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SECTION 1.00
DEFINITIONS AND ABBREVIATIONS

1.01 DEFINITIONS

CONTRACTOR	The successful Bidder to whom a contract has been awarded and who has executed the contract documents.
EASEMENT	A property right to use or control real property of another.
INSPECTOR	The Planning Director/Town Engineer/Public Works Director or other representative duly authorized by the Town to perform inspections.
INVERT	The lowest point in the internal cross section of a pipe or other culvert.
PLANS	The approved plans, profiles, standard details, supplemental plans and working drawings, which show the location dimensions and details of the work to be done.
RIGHT OF WAY	the land area between the back of curb or edge of pavement and the property boundary and including the area containing the street.
STANDARD SPECIFICATIONS	The general term comprising all the directions, provisions, and requirements contained or referred to in this book entitled, "Smithfield Standard Specifications and Details" and in any subsequent revisions or additions to this book.
SUBGRADE	That portion of the roadbed prepared as a foundation for the pavement structure.

1.02 ABBREVIATIONS

ASSHTO	American Association of State highway and Transportation Officials
A.B.S.	Acrylonitrile Butadiene Styrene
A.F.F.	Above Finish Floor
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
°C	Degrees Celsius
cfs	cubic feet per second
CO	Certificate of Occupancy
DIP	Ductile Iron Pipe
DIPRA	Ductile Iron Pipe Research Association
ETJ	Extra Territorial Jurisdiction
°F	Fahrenheit

ft.	foot
gpd	gallons per day
ID	Internal Diameter
lbs.	pounds
MSL	Mean Sea Level
MUTCD	Manual on Uniform Traffic Control Devices
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
N.E.C.	National Electric Code
NFPA	National Fire Protection Association
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
P.C.	Point of Curvature
P.E.	Professional Engineer
P.L.S.	Professional Land Surveyor
PPM	Parts per million
psi	pounds per square inch
P.T.	point of Tangency
PVC	Polyvinyl Chloride
P.V.C	Point of curvature on Vertical Curve
P.V.T.	Point of Tangency on Vertical Curve
Q(max)	maximum discharge
Q(min)	minimum discharge
RH	Relative Humidity
RLA	Registered Landscape Architect
NRCS	Natural Resources Conservation Service
sec.	second
s. f.	square feet
SU	Single Unit Truck (with 20 feet wheelbase and 30 feet overall length)

UDO	Town of Smithfield Unified Development Ordinance
UL	Underwriters' Laboratories, Inc.
V	volts
VAC	Voltage – Alternating Current

END OF SECTION 1.00

SECTION 2.00
GENERAL PROVISIONS

2.01 GENERAL

All construction shall conform to the requirements and dimensions on the construction plans, Town Standard Details, the Town of Smithfield Unified Development Ordinance or as stated in these specifications. The design of streets, water systems, sanitary sewer systems, storm drainage systems, and grading plans shall be signed and sealed by a licensed North Carolina Professional Engineer, Registered Land Surveyor, or Registered Landscape Architect in accordance with N.C. General Statute Chapters 89A, and 89C.

2.02 QUALITY OF MATERIALS

It is the intent of this specification to provide materials of the highest standard known to the trade and to provide materials free from defects in workmanship and product. Equal material not specified may be used provided documentation and samples necessary for the Engineer to determine the acceptability and ISSUE A WRITTEN APPROVAL are provided to him a MINIMUM OF 14 DAYS before being brought onto the construction site. Current specifications and /or the latest revision shall apply in all cases where materials are described by these specifications.

2.03 INSPECTIONS

The Contractor shall provide the necessary manpower and equipment required as part of the inspection process. The presence of the Engineer or Inspector at the work site shall in no way lessen the Contractor’s responsibility for conformity with the plans and specifications. Should the Engineer or Inspector accept material or work that does not conform with plans and specifications, whether from lack of discovery or for any other reason, it shall in no way prevent later rejection or corrections to the unsatisfactory materials or work when discovered. The Contractor shall have no claim for losses suffered due to any necessary removals or repairs resulting from the unsatisfactory work. Any work which has been covered without the Inspector's approval, shall, at the Inspector's request, be uncovered and be made available for inspection at the Contractor's expense. Work performed before or after Town staff's normal work hours or during the weekend or Town Holidays shall comply with the Town Code and shall include only such tasks that do not require observations by an Inspector.

If during the process of routine inspection of a project and related infrastructure being installed under these regulations, it is found that improper or substandard materials or construction methods are being used or if significant deviation from the approved construction plans is detected, the Town reserves the right to assign an inspector to the project. The Inspector shall have authority to act on behalf of the Town in checking all construction for compliance with State and Local standards. The Inspector shall also have the authority to halt any work not meeting Town standards and specifications. All costs associated with the Inspector shall be the responsibility of the Owner and shall be billed accordingly by the Town.

2.04 CLEARING AND GRUBBING

The work of clearing and grubbing shall consist of the cutting, removal, and satisfactory dispose of all vegetation and all surface debris. Clearing end grubbing shall be conducted in a manner to prevent damage to vegetation that is intended to remain growing and to prevent damage to adjacent property.

2.05 EARTHWORK

Earthwork shall be defined as removal of earth or soft rock from its natural location or as the depositing of such material into the proper fill areas as designated on the plans.

Rock excavation shell be defined, in the opinion of the Engineer, as all ledge rock or boulders over 0.5 cubic yard that cannot be excavated without blasting.

A written PERMIT FOR BLASTING must be obtained from the Smithfield Fire Department a MINIMUM of 24 hours before any explosive material or blasting agents are transported into the Corporate Limits of Smithfield.

Fill Material shall be free from construction material, debris, frozen material, organic matter or unstable material.

No fill material shall be used weighing less than 100 pounds per cubic foot. Backfill material shall be free from stones greater than 4 inches.

For all areas under a proposed roadway, the top twelve (12) inches of subbase, and the entire base course shall be compacted to a density of 100 PERCENT maximum Standard Proctor density as determined by AASHTO method T99. For that portion of fill under roadways and extending at a slope of 1 to 1 beyond the back of curb, compact to a density of No LESS THAN 95 PERCENT of the maximum Standard Proctor dry density as determined by AASHTO method T99. Fill material shall be placed in lifts of 8 inches or less of uncompacted soil.

Other fill material shall be compacted to a density of No LESS THAN 90 PERCENT of the maximum Standard Proctor dry density as determined by AASHTO method T99. Backfill material shall be placed in lifts of 12 inches or less of uncompacted soil.

Owner shall provide geotechnical testing/verification of all subgrade evaluations/proof rolls, fill areas and trench backfill. Testing personnel shall be required on site during all subgrade evaluations, proof rolls, fill and backfilling operations. Copies of all test reports shall be provided to the Town prior to acceptance of the public infrastructure.

2.06 MAINTENANCE OF TRAFFIC

A. General

When construction occurs in a traffic zone, traffic control devices must be erected, maintained, relocated, and removed in accordance with the p!ans, specifications, NCDOT Supplement to the MUTCD, or MUTCD. This requirement shall apply for all construction occurring on public streets, including construction or repairs by utility companies. The MUTCD referred to in this provision the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as adopted by the Federal Highway Administration, including all standard documents referred to in Section 1 A-7 of the MUTCD. The current edition shall be the edition current at the time of

construction. Traffic control devices shall include but not be limited to signs, drums, barricades, cones, delineators, flashing arrow panels, temporary guardrail, temporary concrete median barrier, vehicle-mounted temporary impact attenuators, pavement marking, raised reflective pavement markers, flaggers, and pilot vehicles.

B. Materials

Unless otherwise required, materials used in the fabrication and installation of construction traffic control devices shall be in accordance with the applicable provisions of the MUTCD.

All enclosed lens (Engineers Grade) sheeting required for use on traffic control devices shall have an identification mark on the surface. This mark signifies that the sheeting meets the requirements of Federal Specification L-S-300C for Minimum Reflectivity I Sheeting and Tape. The identification mark shall not interfere with the function of the device but shall be visible both day and under illumination at night without the use of special devices.

C. Installation and Maintenance

Existing public streets or highways shall be kept open to traffic at all times by the Contractor unless permission to close the street, or portions thereof, is granted by the Town Engineer. The Town of Smithfield Police Department must be contacted BY THE CONTRACTOR A MINIMUM OF 24 HOURS before any streets ore closed or partially closed.

Work on any project shall not start until all traffic control devices required for the particular work activity ore properly installed.

Traffic control devices shall be property maintained, relocated as necessary, cleaned and operated during the time they are in use. During periods when use of the devices is not warranted, they shall be removed from the work area, covered, or otherwise positioned so that they do not convey their message to the traveling public. The location, legends, sheeting, dimension, number of supports, and horizontal and vertical placement of warning signs, barricades, and other traffic control devices shall be as required by the plans or the MUTCD.

Weeds, brush, trees, construction materials, equipment, etc. shall not be allowed to obscure any traffic control device in use.

Competent and properly trained, attired and equipped floggers, using "stop" and "slow" paddles shall be provided when two-way traffic cannot be maintained.

The Contractor shall assume full responsibility for the continuous and expeditious maintenance or replacement of all construction warning signs, barricades, and other traffic control devices. The Contractor shall continuously review and maintain all traffic control measures to assure that adequate provisions have been mode for the safety of the public and workers. Failure to maintain all traffic control devices in a satisfactory condition shall be cause for suspension of construction operations until proper traffic control is re-established.

2.07 CONCRETE

Concrete shall be only plant-mixed or transit-mixed concrete conforming to ASTM C33 for aggregates and to ASTM C94 for ready-mixed concrete. Any concrete poured that has a slump over 4 inches as

per ASTM C143, or has a batched time of more than 90 minutes, will be considered unacceptable. Concrete shall not be deposited on frozen subgrade. Concrete shall not be poured when the air temperature is falling below 40 degrees Fahrenheit, and the predicted low temperature for the succeeding 24-hour period is less than 32 degrees Fahrenheit.

All concrete when placed in the forms shall have a temperature of between 50 and 90 degrees Fahrenheit and shall be maintained at a temperature of not less than 50 degrees Fahrenheit for at least 72 hours for normal concrete and 24 hours for high early strength concrete, or for as much time as is necessary to secure proper rote of curing and designed compressive strength.

Concrete shall be air entrained with 5-7 % air. Retarders and accelerators shall be used only as directed by the Engineer.

2.08 PERMITS

During the course of design, and prior to any construction, all permits or approvals shall be obtained from the appropriate Town, State or Federal agencies, as applicable. These shall include but shall not be limited to:

1. Site Plan Approval -Town of Smithfield
2. Subdivision Plat Approval -Town of Smithfield
3. Burning Permit -Town of Smithfield Fire Department
4. Sedimentation and Erosion Control - NCDEQ
5. Water System Extension -NCDEQ
6. Sewer System Extension -NCDEQ
7. NCDOT Encroachment/Driveway Permit - NCDOT
8. Wetlands Disturbance 401/404 Permits - US Army Corps of Engineers

2.09 ACCEPTANCE PROCEDURES

All improvements intended for public maintenance are eligible for acceptance by the Town of Smithfield following the procedures outlined below:

After the installation of improvements in accordance with Town Council approved plans and Town Standard Specifications and Details, the Owner /Developer or designee shall contact the Town and schedule a completion (final) inspection.

The Town will accept the improvements or respond with a punch list within 30 days of the request.

The Owner /Developer or designee must complete all items indicated on the punch and any additional items noted, within 60 days or the punch list will be void. The Owner /Developer or designee must then request another completion (final) inspection.

Upon the acceptable completion of all punch list items and payment of any outstanding fees, the Owner /Developer or designee will receive an acceptance letter from the Town of Smithfield. This acceptance begins a warranty for materials and workmanship for not less than one year from the date of acceptance. The warranty will be to the Town from the owner /Developer or designee. The Town will perform routine maintenance during the warranty period.

Upon completion of, or just prior to the end of, the warranty period, the Owner /Developer or designee shall request a final inspection from the Town.

The Town will respond with final acceptance or a punch list on workmanship or materials within 30 days of the request.

The owner /Developer or designee must complete all items indicated on the punch list, and any additional items noted within 60 days, or the punch list will be void. The Owner/Developer or designee must then request another final inspection.

Upon the acceptable completion of all punch list items, the Owner /Developer or designee will receive a letter of acceptance from the Town. The Town will begin total maintenance as of the date of the final acceptance letter. Until a letter of final acceptance has been issued, all materials and workmanship ore the responsibility of the Owner/Developer. Until a letter of final acceptance has been issued, all materials and workmanship are the responsibility of the Owner /Developer.

2.10 PLANTINGS OR STRUCTURES WITHIN TOWN UTILITY EASEMENTS

An "easement" shall mean any area to which the Town has unlimited access for servicing utility lines.

Any plantings or structures installed within an easement may be damaged or destroyed during the course of servicing. The Town is not liable for damage to plantings or structures within an easement. The Town will reseed as necessary any bare or disturbed soil for erosion control purposes.

2.11 LICENSE REQUIREMENTS

All contractors performing any construction activity involving the Town of Smithfield utility system or street system shall be licensed to practice general contracting in the State of North Carolina. The contractor shall be classified in the appropriate area of license for the type construction to be performed and shall not perform construction activity which exceeds the limitations of the designated contractor's license.

2.12 RETAINING WALLS

All retaining walls providing cumulative vertical relief greater than five (5) feet in height within a horizontal separation distance of 50 feet or less must be designed by a professional engineer and shall be signed and sealed. The design shall be submitted to the Town Engineer for approval prior to construction. All necessary permits (e.g., building permit) must be obtained prior to any construction associated with the retaining wall.

2.13 OSHA STANDARDS

All contractors and their employees must comply with all OSHA standards while working on Town projects and while on Town of Smithfield property or rights of way.

2.14 SAFETY AND HEALTH HAZARDS

The operations of any Town contractor shall not expose Town Smithfield employees to any hazardous chemicals or other occupational safety and health hazards. All contractors working on Town projects or on Town of Smithfield property shall inform the project engineer concerning

hazardous chemicals which the contractor might be using and to which Town employees might become exposed by working in that area.

The contractor shaII also advise the Town of the appropriate control measures to be used by the Town employees to prevent exposure and to minimize of exposure.

END OF SECTION 2.00

SECTION 3.00

STREETS

3.01 GENERAL

The latest revision of the "Standard Specifications for Roads and Structures" of the North Carolina Department of Transportation shall apply unless otherwise specified herein.

Whenever the following terms are used in above said specifications the intended meaning of such terms shall be as follows: "State" or "Commission" shall be replaced by "Town of Smithfield".

"Resident Engineer" shall be replaced by the words "Town Engineer", in which context it shall mean the duly authorized Engineer, assistant, or representative acting within the scope of the duties assigned or of the authority given by the Town Manager.

"Sampling and testing by Commission" shall be replaced by the words "sampling and testing by the Town or its authorized testing agent".

"Inspection by Commission" shall be replaced by "Inspection by Town or its duly authorized representative".

3.02 DESIGN

All streets (private and public) shall be designed and constructed to Town of Smithfield Standard Specifications and Details unless NCDOT Standard Specifications are applicable. NCDOT standards shall be used on all existing state roads, extensions of existing state roads, or roads to be maintained by NCDOT.

A. Street Classifications for Street Specifications

Arterial – The arterial system should serve the major centers of activity of an urban area, the highest traffic volume corridors, and the longest trip desires; and should carry a high proportion of the total urban area travel on a minimum of mileage. Arterials consist of Interstates; Other Freeways and Expressways; and Other Principal Arterials. Refer to Arterial Street Details 03.05 and 03.06.

Collector – The collector street system provides land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. Refer to Collector Street Details 03.02 and 03.04.

Local – The local street system consists of all roads not defined as arterials or collectors and primarily provides access to land with little or no through movement. Refer to Local Street Detail 03.01.

B. Horizontal Street Design

All streets shall conform to the Smithfield, "Town Plan", Transportation Plan and UDO when applicable or shall be designed and located in proper relation to existing streets and environment. Collector streets and arterials shall be as directional as possible but consistent with topography and preserving developed properties and community values.

Residential (local and collector) streets shall be designed to discourage high speed traffic and minimize excessive cuts, excessive fills and cut through traffic.

Horizontal Street Design shall be in conformance with the latest NCDOT Standards.

Intersections with a collector street or arterial street shall be at least 1000 feet apart. There shall be a minimum of 200 feet between centerlines of street jogs on collectors and arterial streets. All local streets shall not be offset less than 150 from their centerline.

Superelevation, when applicable, shall conform to NCDOT and AASHTO standards for superelevation design.

Streets with medians shall be designated to allow for proper turning movements for a SU (single unit truck) design vehicle. AASHTO guidelines should be followed for the actual median design and median opening dimension.

C. Vertical Design

Vertical Design shall conform to NCDOT Standards.

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 minimum grade allowed on any street shall be one-half of one percent (1/2%).

The maximum grade allowed when approaching an intersection is five percent (5%) for the last 100 feet of pavement before the intersection.

D. Geometrics

Radii

A minimum radius of 25 feet to the back of curb shall be required where local streets intersect.

A minimum radius of 30 feet measured to the back of curb shall be required where a local street intersects with a collector or arterial street.

It is recommended that the designer consider larger radii or 3-centered compound curves where needed to provide for turning movements of larger vehicles.

A minimum radius of 40 feet will be required where collectors intersect arterial streets.

Cul-de-sacs

Cul-de-sac dimensions shall be as shown in Town of Smithfield Standard Detail 03.07.

A cul-de-sac radius shall be a minimum of 48 feet, measured from curb face to curb face. The standard maximum length for a cul-de sac shall be 750 feet. The length of a cul-de-sac shall be measured from the last point of alternate access within the subdivision. No median shall be allowed in a 48-foot radius cul-de-sac. A median may be permitted where the cul-de-sac radius is increased, and it can be demonstrated that all emergency vehicles can be readily accommodated.

Driveways

Residential Driveway Aprons –A standard concrete driveway apron as shown in Standard Detail 03.10 shall be used for all residential driveways with concrete curb and gutter. Standard driveway aprons as shown in Standard Detail 03.11 shall be used for residential driveways where there is no curb or gutter on the street. Residential drives shall be located a minimum of 10 feet from the point of tangency of curb radii of street intersections. Standard driveway aprons for as shown in Standard Detail 0312 shall be used only when specifically authorized by the Town Council approved subdivision plat.

Commercial Driveway Aprons – A standard concrete driveway apron as shown in Standard Detail 03.13 shall be used for commercial driveways with curb and gutter along the street. A standard concrete driveway apron as shown in Standard Detail 03.14 shall be used for commercial driveways with no curb and gutter along the street.

Street type turnouts shall be used for commercial driveways when the driveway ADT is greater than 500 vehicles or when access by larger trucks must be accommodated. A minimum radius of 25 feet shall be used on all street type turnouts. Larger radii may be permitted depending on the need to provide access for larger trucks. Street type driveways shall have a minimum width travel lane of 24 feet and a maximum width of 36 feet. Any curb and gutter used will be in addition to the 24-foot minimum width.

Commercial driveways without islands shall be a minimum of 24 feet wide for two-way operation. Commercial driveways with islands shall have a 16-foot entrance lane. A 16-foot exit lane shall be required when one exit lane is used, and a 24-foot exit shall be used for 2 exit lanes.

Curb and Gutter

Curb and gutter shall be required on all Town streets.

Streets in the Town's Extra-jurisdictional Territory (ETJ) designed without curb and gutter must meet all of the following requirements:

a. 60-foot right of way;
b. Conform to NCDOT standards;
c. Driveways across swales shall be constructed to provide for the passage of the 10-year storm, and have a minimum 15" culvert pipe;
d. All non-residential driveway pipes shall have flared end sections or headwalls on inlet and outlet ends of the pipe.

All median curb shall be standard 1 '6" mountable curb as shown in Standard Detail 03.08. All other curb and gutter shall be a minimum of 2'-6" curb and gutter shown in Standard Detail 03.08. No valley curb shall be used on public streets unless specifically authorized by the Town Council in association with an approved subdivision.

A minimum five (5) foot section of curb and gutter shall remain when removing curb for the installation of a driveway, street turnout or repair of curb and gutter. When less than five (5) feet of the curb remains, the curb shall be removed to the next joint.

Sidewalks

All sidewalks shall be constructed in accordance with Standard Detail 03.15. The minimum thickness of a sidewalk shall be 4 inches. At locations where a driveway crosses a sidewalk a 6-inch depth is required. Sidewalks shall have a uniform slope toward the roadway of not less than 1 / 4 inch per foot nor greater than 1 /2 inch per foot. The utility strip slope between the sidewalk and the back of curb shall not be less than 1 / 4 inch per foot nor greater than 1 /2 inch per foot toward the roadway.

Where sidewalks intersect any section of curb and gutter, a curb ramp in accordance with Standard Details 03.16A and 03.16B shall be installed.

E. Pavement Design

The minimum pavement design for local and collector streets shall be:

a. 8-inches ABC stone (base course)
b. 1.5-inches S9.5B (initial asphalt)
c. 1.5-inches S9.5B (final course)

The final course shall not be placed until all of the construction traffic is done using the street. Any damaged or bad areas of the road shall be removed and replaced prior to placing the final asphalt course. There shall be no more than 2 years between the initial lift of asphalt and the final course, regardless of the number of developed lots within a project.

The final course shall not be placed until all of the construction traffic is done using the street. Any damaged or bad areas of the road shall be removed and replaced prior to placing the final asphalt course. There shall be no more than 2 years between the initial lift of asphalt and the final course, regardless of the number of developed lots within a project.

F. Pavement Markings

Arterials and collectors shall be marked in accordance with the latest revisions of the MUTCD unless otherwise approved by the Town Engineer. This shall be noted on roadway and subdivision plans as a requirement of the Developer and shall be done prior to issuance of a Certificate of Occupancy for the development or final acceptance of the roadway by the Town of Smithfield. The pavement markings for all collector streets and arterials shall be thermoplastic. These markings are to be applied in accordance with the manufacturer's instructions.

G. Roadway Widening

All roadway widening shall be in conformance with NCDOT Standards and Specifications.

3.03 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.

Nothing shall be erected, placed, planted, or allowed to grow between a height of two and one-half feet and ten feet above the level of the center of the adjacent intersection in a manner which obstructs the view of motorists using any street or approach to any street intersection so as to constitute a traffic hazard or a condition dangerous to the public safety. The foregoing shall not apply to fire hydrants, public utility poles, street markers, governmental signs, and traffic control devices located within such triangular areas or to signalized intersections with stop/ go phases on all approaches.

Intersection sight distance is calculated according to NCDOT Roadway Design Manual and ASSTO Greenbook.

The Town shall insure that sight visibility adjacent to Town maintained streets is maintained. The Town will notify the N.C. Department of Transportation of sight distance obstructions located within the right of way of State maintained roadways. The Town shall notify property owners of sight obstructions which exist on private property. The property owner shall be responsible for the removal of the obstruction on their property and shall be solely liable for any and all consequences resulting from their failure to remove the obstruction.

In case of any conflict between Town site distance standards and NCDOT site distance standards, NCDOT standards shall apply. Refer to Town of Smithfield Standard Detail 03.17

3.04 MATERIALS

Portland cement concrete for curb and gutter, driveways, and sidewalks shall have a minimum 28-day compressive strength of 3000 psi, a non-vibrated slump between 2.5 and 4 inches, a minimum cement content of 564 pounds per cubic yards, an air entrainment of 5-7 %, and a maximum water-cement ratio of 0.532. Use a mix that contains at least 526 lbs. of cement per cubic yard, a maximum water cement ratio of 0.559, an air content in the range of 4.5% to 5.5%, a maximum slump of 1.5 inches, a minimum flexural strength of 650 psi at 28 days and a minimum compressive strength of 4,500 psi at 28 days. For NCDOT concrete road pavement Section 1000.

Joint filler shall be a non-extruding joint material conforming to ASTM D-1751.

Concrete Curing Agents shall be free from any impurities which may be detrimental to the concrete and meet Section 1026 of NCDOT Standard Specifications for Roads and Structures.

Aggregate for Portland cement concrete shall meet the requirements for fine and course aggregate of Section 1014 of the NC DOT Standard Specifications for Roads and Structures.

Portland Cement and admixtures shall meet the requirements of Section 1000 of the NCDOT Standard Specifications for Roads and Structures.

Water for mixing or curing the concrete shall be free from injurious amounts of oil, salt acid, or other products injurious to the finished product.

Aggregate Base Course shall consist of an approved coarse aggregate produced in accordance with the requirements indicated in Section 1006 and 1010 in the NCDOT Standard Specifications for Roads and Structures.

Bituminous Surface Course, Type S9.5, shall consist of a mixture of coarse and fine aggregates, asphalt cement, and shall meet the requirements in Section 610 of the NCDOT Standard Specifications for Roads and Structures.

Bituminous Concrete Base Course, Type B25, shall conform to the general, material, and construction specifications as specified in Section 610 of NCDOT Standard Specifications for Roads and Structures.

Bituminous Concrete Intermediate Course, Type I19, shall conform to the general, material, and construction specifications as specified in Section 610 of NCDOT Standard Specifications for Roads and Structures.

Tack Coat shall be asphalt or asphalt cement and shall meet the general, material, and construction specifications as specified in Section 605 of NCDOT Standard Specifications for Roads and Structures.

Concrete Pavement shall meet Section 700 of NCDOT Standard Specifications for Roads and Structures.

Geotextile Fabric may be used to stabilize a roadway, subgrades, slopes, and for other uses as necessary. At least one week prior to using this fabric, a sample and its associated engineering data shall be submitted to the Town Engineer for approval. Areas stabilized with fabric shall be indicated on "as-built" drawings with the manufacturer name and type fabric indicated.

3.05 CONSTRUCTION AND INSPECTION

No construction shall be conducted until at a minimum the following applicable items have been obtained: all grading permits, NCDEQ Erosion Control Permits (as applicable), NCDOT Encroachment Agreements, NCDEQ water and sewer permits, performance bonds, wetland impact permits and Town of Smithfield subdivision and/or site plan approval and a zoning permit has been issued.

A. Streets

No base material shall be placed on a roadway until the storm sewer, subgrade, utilities, and all appurtenances have been inspected and conform to the Town of Smithfield Standard Specifications.

The Town's Public Works Director may require field density testing of the subgrade soils from a certified soils laboratory. The soils laboratory shall perform sufficient Proctors to evaluate the compaction characteristics of various soils used in the roadbed. The Inspector may also require field density testing of the ABC used and an asphalt mix formula before either is inspected or approved.

The subgrade shall be compacted as described in Section 2.05 Earthwork. Inspection of the subgrade prior to placement of base course, and inspection of the base course prior to placement of asphalt shall be performed by proof rolling and/or field density testing at the direction of the Public Works Director.

The Public Works Director should be notified at least 48-hours in advance of any proof-roll. Any areas marked by the Town for repair shall be excavated and suitable material shall be placed and compacted within the repair area. Compaction shall meet all ASTM Standards. After repairs are made, the contractor shall notify the Public Works Director at least 48-hours in advance of the follow-up proof-roll.

B. Curb and Gutter, Driveways, and Sidewalks

No concrete shall be placed until the forms and subgrades have been approved by the Public Works Director. The Public Works Director shall be notified at least 48 hours in advance of any proof-roll of the subgrade and proposed installation of curb in gutter.

The surface of sidewalks shall be finished to grade and cross section with a float, troweled smooth and finished with a broom. Subgrade shall be excavated to the required depth and

shaped to the proper cross-section. Where tree roots are encountered, they shall be removed to a depth of 1 foot for the full width of the excavation.

The subgrade shall be stable and thoroughly compacted.

Forms shall be set and maintained true to the required lines, grades, and dimensions. Forms shall be constructed with material of such strength and rigidity to prevent any appreciable deflection between supports. Straight forms shall be within a tolerance of 1/2-inch in 10 feet from a true line horizontally or vertically. Forms shall be thoroughly cleaned of all dirt, mortar, and foreign material before being used. All inside form surfaces shall be thoroughly coated with commercial quality form oil.

Grooved Contraction Joints shall be cut to a depth equal to at least 1/3 of the total slab thickness. The joint shall be no less than 1/8 inch in width and cut at intervals equal to the width of the sidewalk. A 1/2-inch expansion joint filled with joint filler shall be placed between all rigid objects and placed no farther than 50 feet apart for sidewalks and curb and gutter, extending the full depth of the concrete with top of the filler 1 /2 inch below the finished surface.

3.06 FIRE LANES

Fire Lanes shall be installed and inspected in accordance with the 2018 North Carolina State Building Code: Fire Prevention Code, Appendix D or as required by the latest edition. The general requirement designates that any building located more than 150 feet from a public road, or which exceeds 30-feet in height and is set back more than 50-feet from a public road shall have a fire lane.

Fire lanes shall be a minimum width of 26 feet and shall be properly marked and signed to designate the access as a "fire lane" as specified by the Fire Marshal. The surface of the fire lane shall be paved with an all-weather surface capable of carrying a 75,000 lb. fire truck.

All fire lanes shall be marked in accordance with one of the following requirements:

1) Continuously pointed yellow striping along the fire lane with "No Parking Fire Lane" printed with minimum eight (8) inch high letters at forty (40) foot intervals or as directed by the Fire Marshal.

2) Continuously pointed yellow curb with "No Parking -Fire Lane" along the fire lane with "No Parking -Fire Lane" printed with minimum eight (8) inch high letters at forty (40) foot intervals or as directed by the Fire Marshal.

3) The installation of the MUTCD standard sign showing "No Parking Fire Lane" placed at each end of the fire lane and at fifty (50) foot intervals with arrows on the signs or a continuously pointed yellow strip along the designated fire lane.

3.07 TRAFFIC CONTROL AND STREET NAME SIGNS

Traffic Control and Street Name Signs shall be consistent with the MUTCD.

3.08 TRAFFIC CONTROL DEVICES

All traffic control devices (rumble strip, raised pavement markers, speed humps, etc.) must be shown and approved as a part of a site plan prior to installation and must be in conformance with NCDOT standards. 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.

Pedestrian Crossings

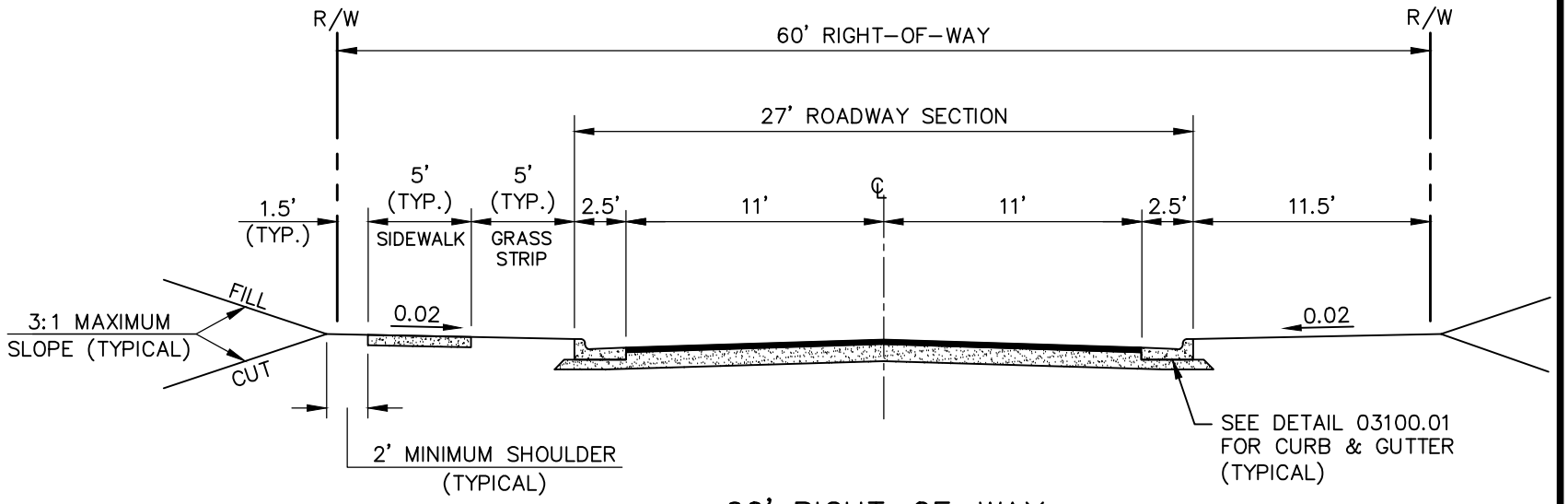
All Pedestrian crosswalks with pavement marking and signage shall be in accordance with MUTCD.

END OF SECTION 3.00

SMITHFIELD
NORTH CAROLINA

STANDARD LOCALSTREET

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



60' RIGHT-OF-WAY
27' ROADWAY
SECTION

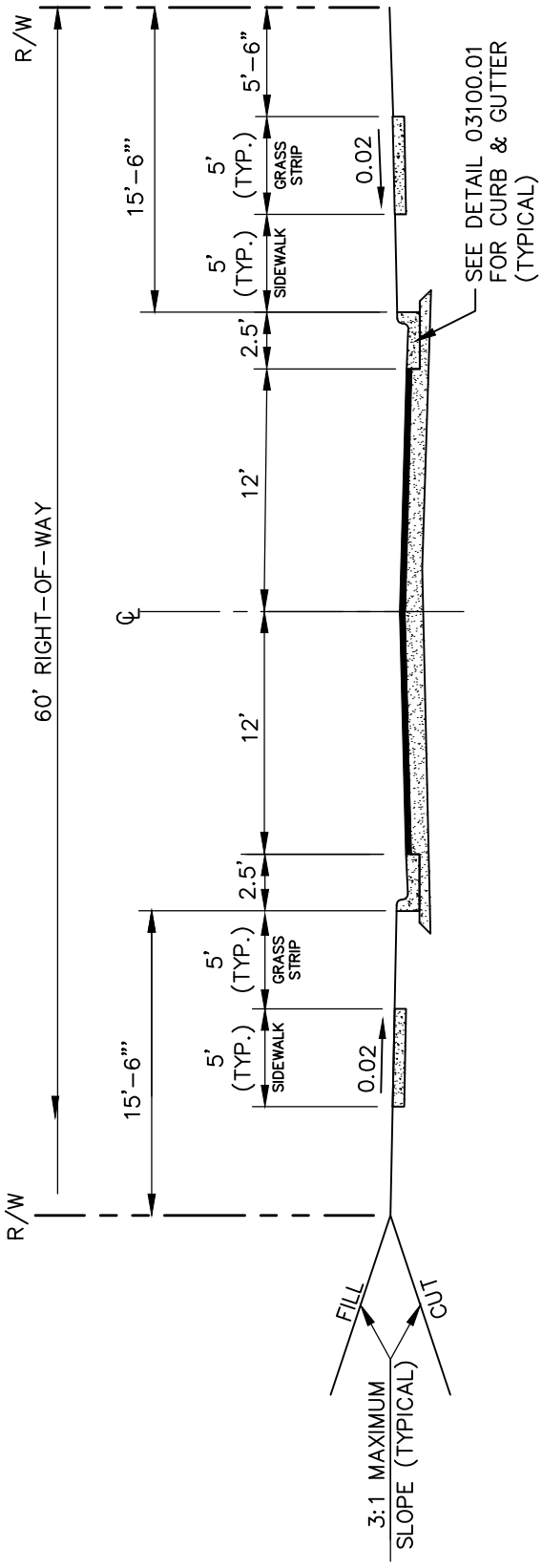
NOTES:

1. PAVEMENT DESIGN SHALL BE IN ACCORDANCE WITH NCDOT STANDARDS OR AS OTHERWISE REQUIRED BY THE TOWN OF SMITHFIELD.

SCALE: NTS

DETAIL NO. 03.01

DATE: 06/16/23



60' RIGHT-OF-WAY
2-LANE COLLECTOR
SECTION

NOTES:

PAVEMENT DESIGN SHALL BE IN ACCORDANCE WITH NCDOT STANDARDS OR AS OTHERWISE REQUIRED BY THE TOWN OF SMITHFIELD.

SMITHFIELD
NORTH CAROLINA

2-LANE COLLECTOR WITH SIDEWALKS

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

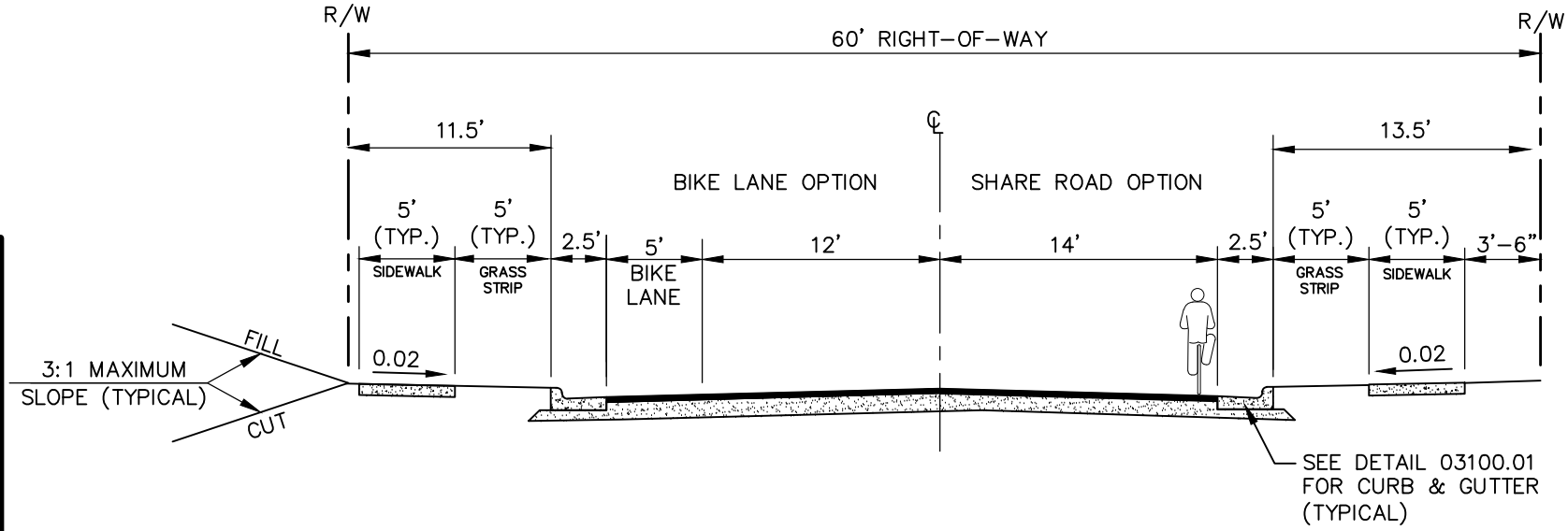
DETAIL NO. 03.02

DATE: 06/16/2023

SMITHFIELD
NORTH CAROLINA

2-LANE COLLECTOR WITH BIKE LANE OPTION

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



60' RIGHT-OF-WAY 2-LANE COLLECTOR WITH BIKE LANE OPTION SECTION

NOTES:

PAVEMENT DESIGN SHALL BE IN ACCORDANCE WITH NCDOT STANDARDS OR AS OTHERWISE REQUIRED BY THE TOWN OF SMITHFIELD.

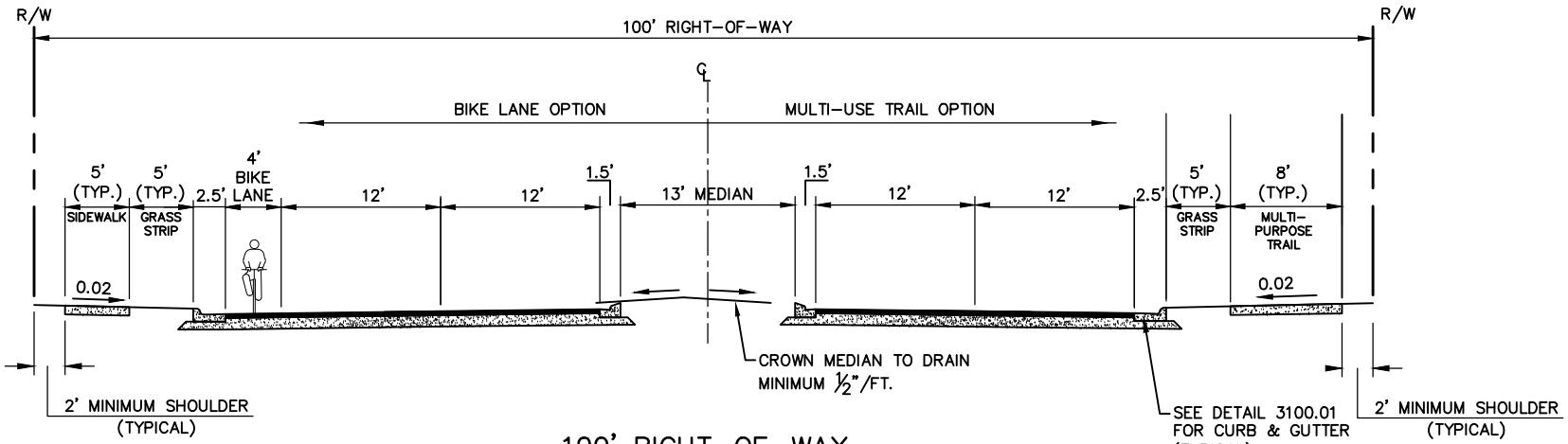
SCALE: NTS

DETAIL NO. 03.04

DATE: 06/16/2023

4-LANE ARTERIAL WITH MEDIAN

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



100' RIGHT-OF-WAY ARTERIAL 4-LANE WITH MEDIAN SECTION

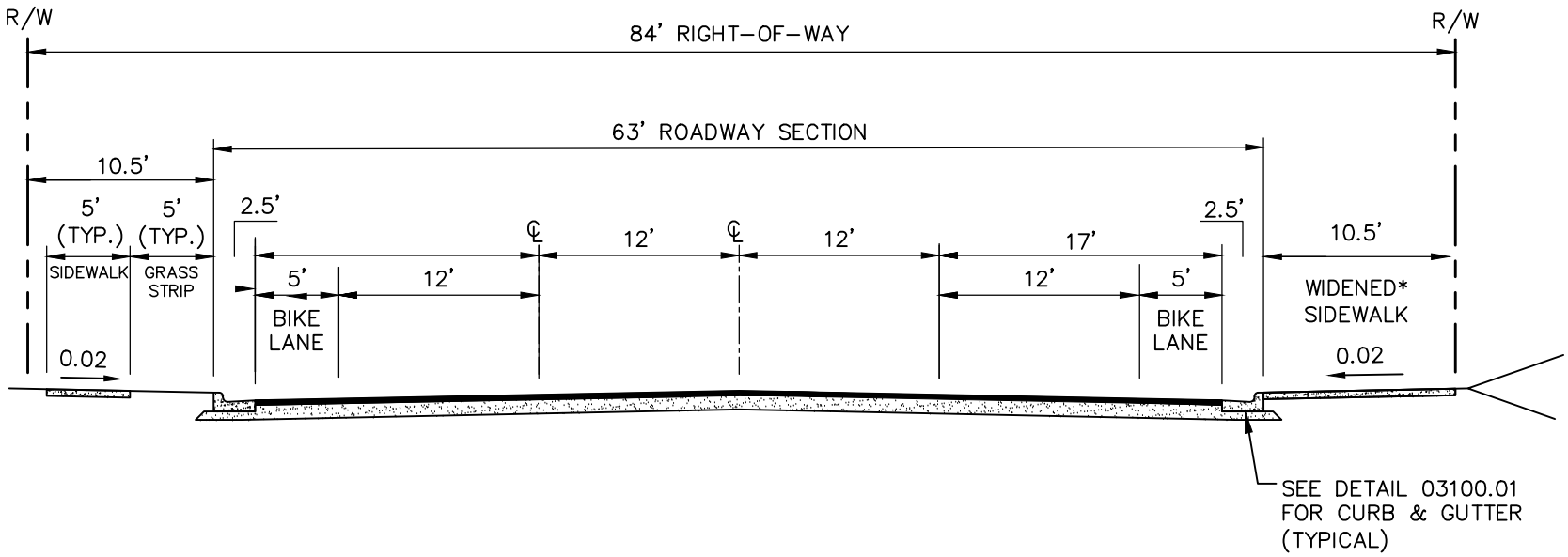
NOTES:

1. PAVEMENT DESIGN SHALL BE IN ACCORDANCE WITH NCDOT STANDARDS OR AS OTHERWISE REQUIRED BY THE TOWN OF SMITHFIELD.

SCALE: NTS

DETAIL NO. 03.05

DATE:06/16/2023



4-LANE ARTERIAL WITH BIKE LANES

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

4-LANE ARTERIAL WITH BIKE LANES
84' RIGHT OF WAY
63' ROADWAY SECTION

NOTES:

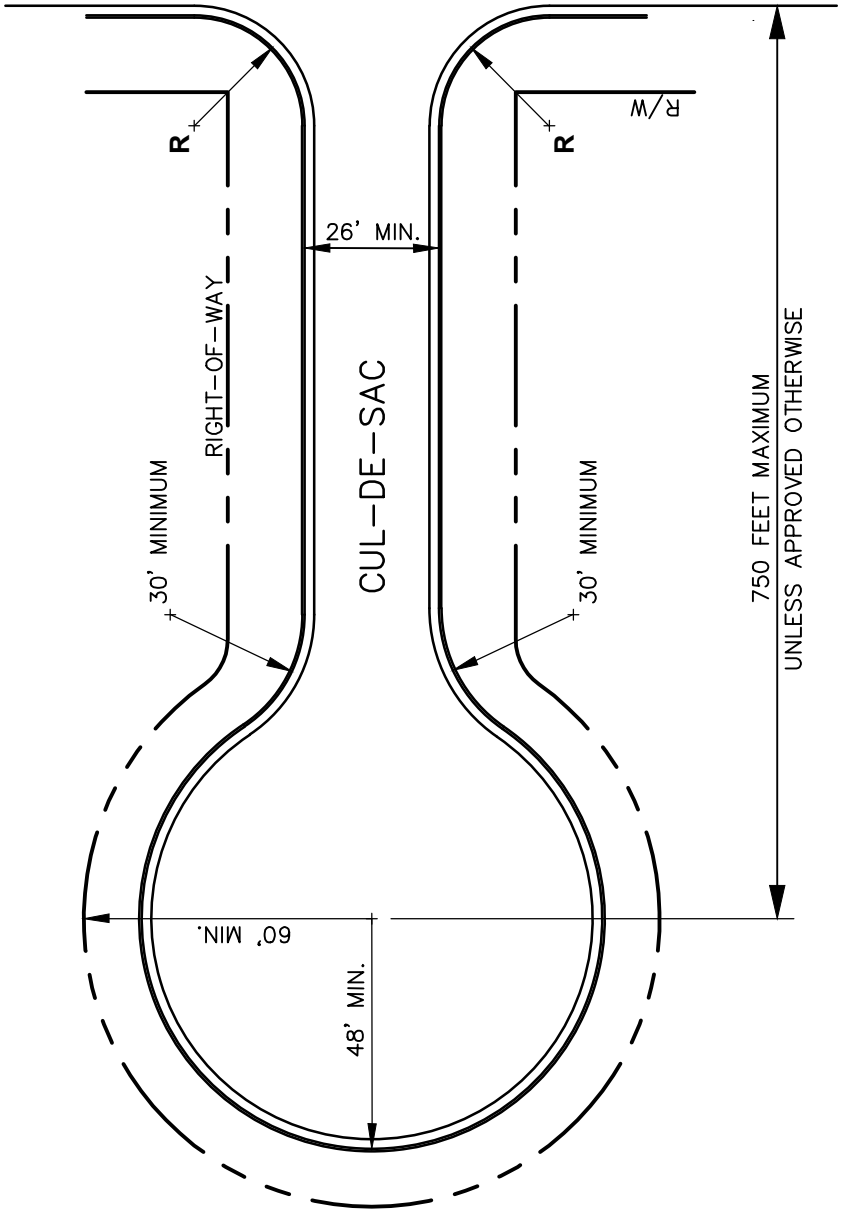
1. PAVEMENT DESIGN SHALL BE IN ACCORDANCE WITH NCDOT STADARDS OR AS OTHERWISE REQUIRED BY THE TOWN OF SMITHFIELD.
   * WIDENED SIDEWALKS MAY BE APPROVED WITH PUD APPROVAL.

SCALE: NTS

DETAIL NO. 03.06

DATE: 06/16/2023

R = 25' MIN. WHEN INTERSECTING WITH A LOCAL STREET. 30' MIN. ON ALL OTHER INTERSECTIONS.



SMITHFIELD
NORTH CAROLINA

STANDARD CUL-DE-SAC DIMENSIONS

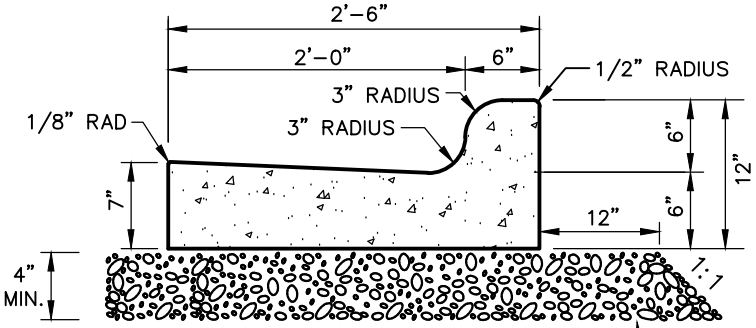
SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

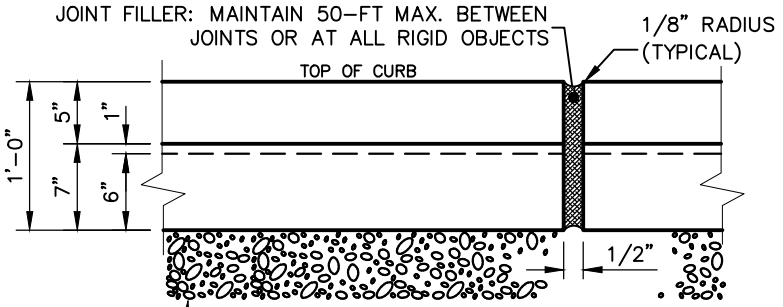
DETAIL NO. 03.07

DATE: 06/16/2023

STANDARD CURB TYPE



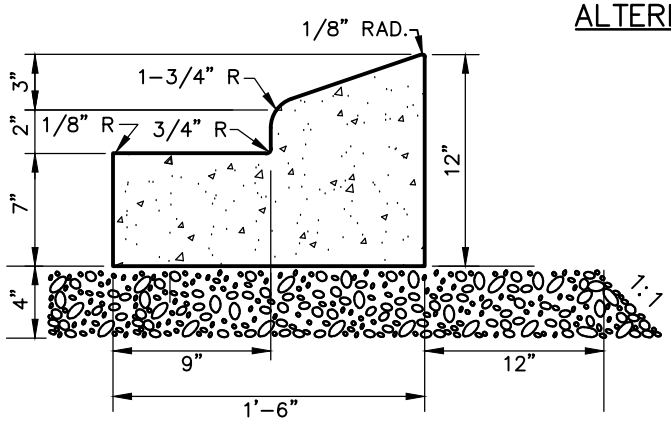
STANDARD 30" CURB & GUTTER
SIDE VIEW



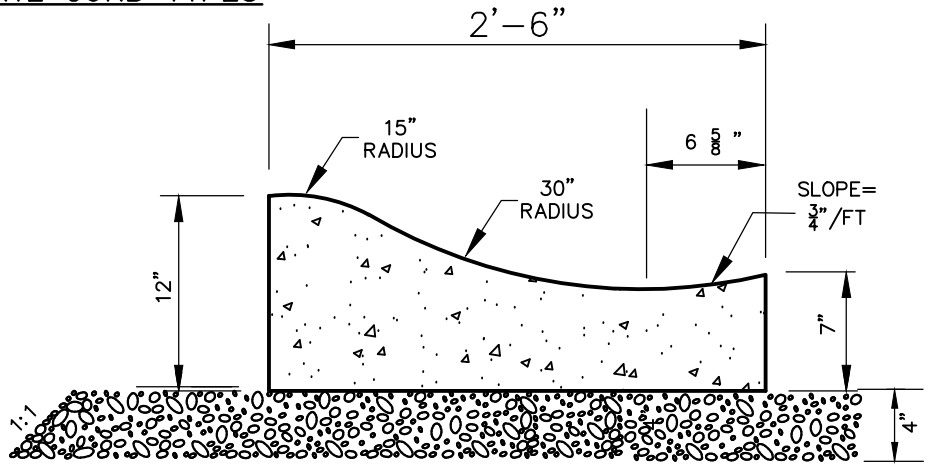
AGGREGATE BASE COURSE (A.B.C.) UNDER THE CURB & GUTTER

FRONT VIEW
TRANSVERSE EXPANSION JOINT

ALTERNATE CURB TYPES



MEDIAN CURB & GUTTER
SIDE VIEW



ROLLED CURB
SIDE VIEW

NOTES:

1. CONCRETE SHALL BE 3,000 P.S.I.
2. CONTRACTION JOINTS SHALL BE SPACED AT 10 FOOT INTERVALS. (A 15 FOOT SPACING WILL BE ALLOWED WHEN A MACHINE IS USED)
3. FINISH ALL CONCRETE WITH CURING COMPOUND.
5. MEDIANS AND ROLL CURBS SHALL ALSO REQUIRE 4-INCHES OF ABC STONE AS BASE.
6. ROLL CURBS ARE ONLY ALLOWED WHEN SPECIFICALLY APPROVED BY THE TOWN COUNCIL WITH THE APPROVAL OF THE SUBDIVISION.

SMITHFIELD NORTH CAROLINA

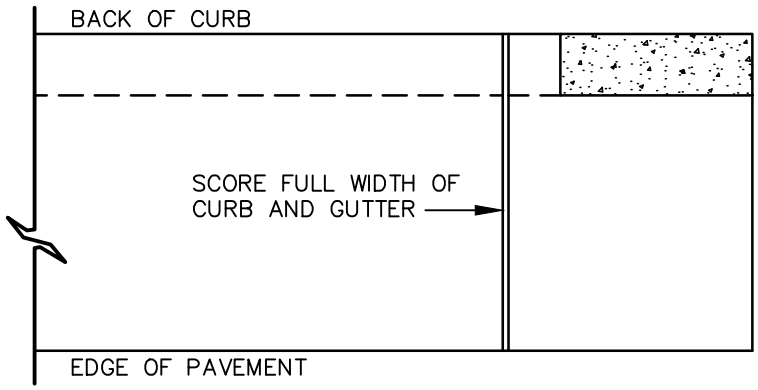
STANDARD CONCRETE CURB & GUTTER

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

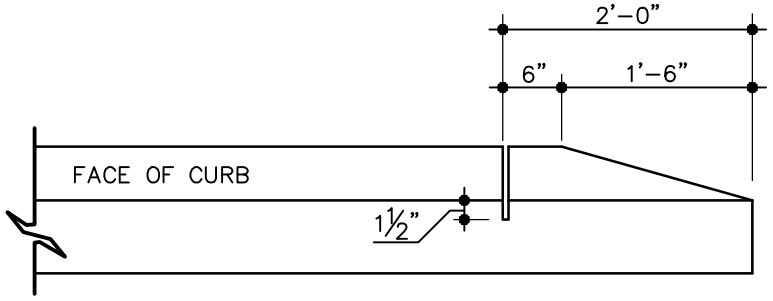
SCALE: NTS

DETAIL NO. 03.08

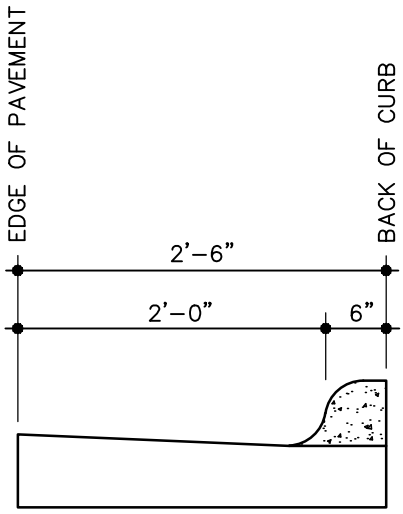
DATE: 06/16/2023



PLAN



FRONT



END

SMITHFIELD
NORTH CAROLINA

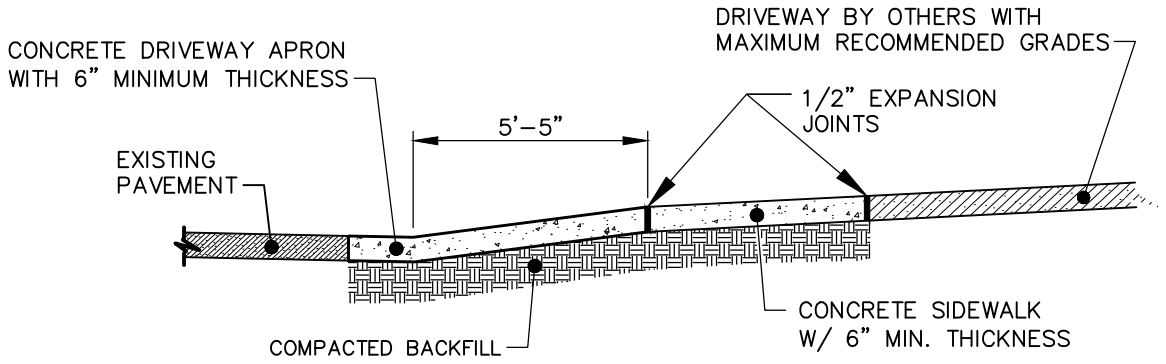
STANDARD METHOD OF ENDING CURB & GUTTER

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

DETAIL NO. 03.09

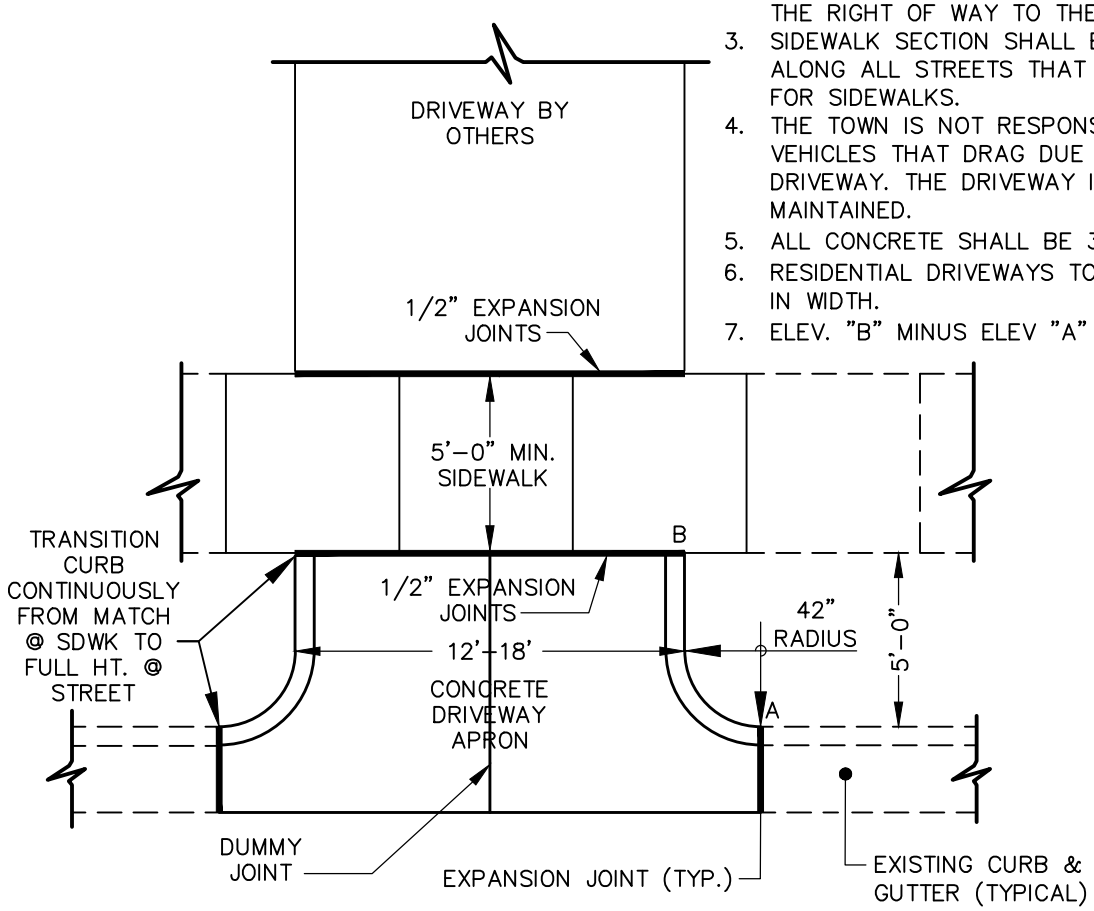
DATE: 06/16/2023



TYPICAL SECTION

NOTES:

1. CURB SHALL BE TAPERED TO FINISH FLUSH WITH SIDEWALK.
2. BEGINNING RADIUS SHALL NOT ENCROACH ON ADJACENT PROPERTIES BASED ON A PROJECTION OF THE PROPERTY LINE FROM THE RIGHT OF WAY TO THE CURB LINE.
3. SIDEWALK SECTION SHALL BE REQUIRED ALONG ALL STREETS THAT ARE PLANNED FOR SIDEWALKS.
4. THE TOWN IS NOT RESPONSIBLE FOR VEHICLES THAT DRAG DUE TO GRADE OF DRIVEWAY. THE DRIVEWAY IS PRIVATELY MAINTAINED.
5. ALL CONCRETE SHALL BE 3,000 PSI (MIN).
6. RESIDENTIAL DRIVEWAYS TO BE 12' TO 18' IN WIDTH.
7. ELEV. "B" MINUS ELEV "A" EQUALS 1 INCH



PLAN VIEW

SMITHFIELD
NORTH CAROLINA

STANDARD RESIDENTIAL DRIVEWAY APRON DETAIL

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

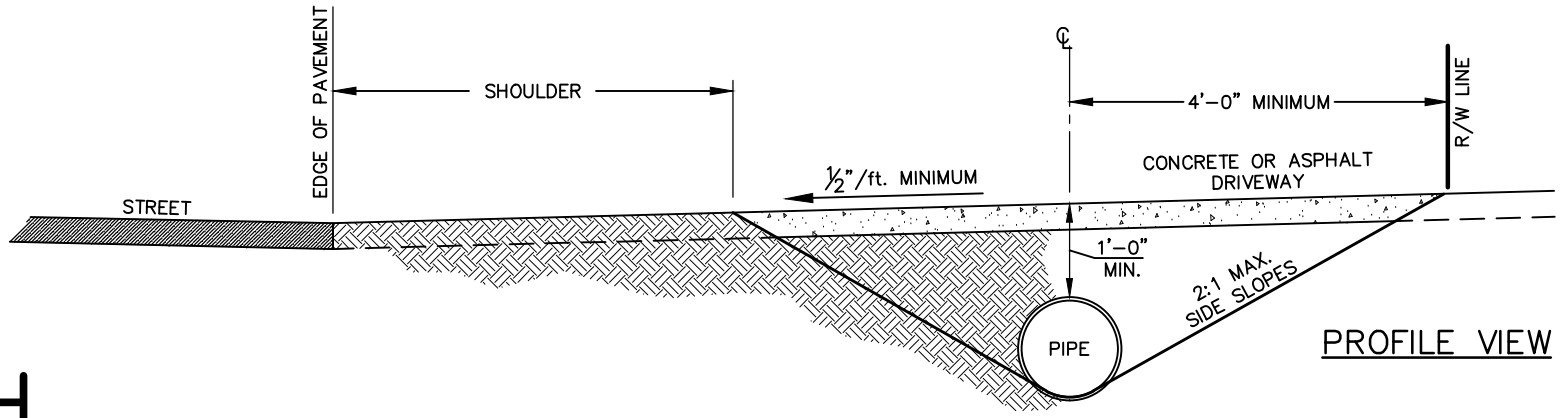
DETAIL NO. 03.10

DATE:06/16/2023

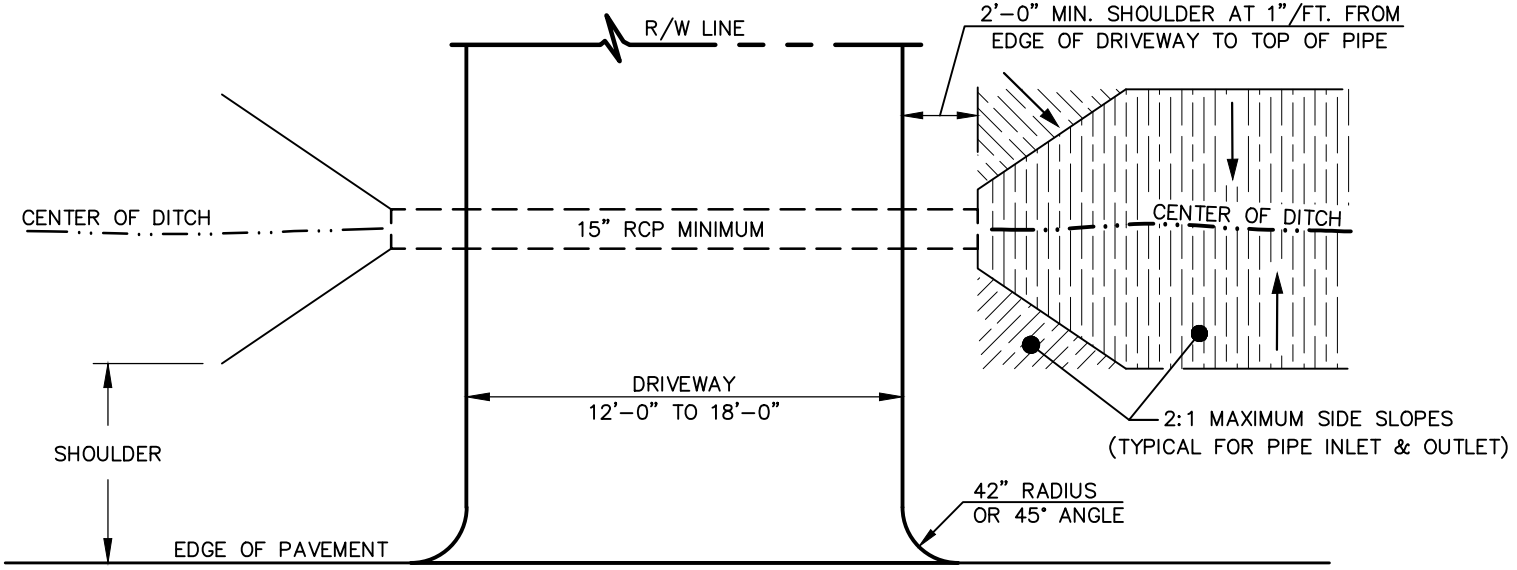
SMITHFIELD
NORTH CAROLINA

STANDARD RESIDENTIAL DRIVEWAY APRON WITHOUT CURB & GUTTER

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



PROFILE VIEW

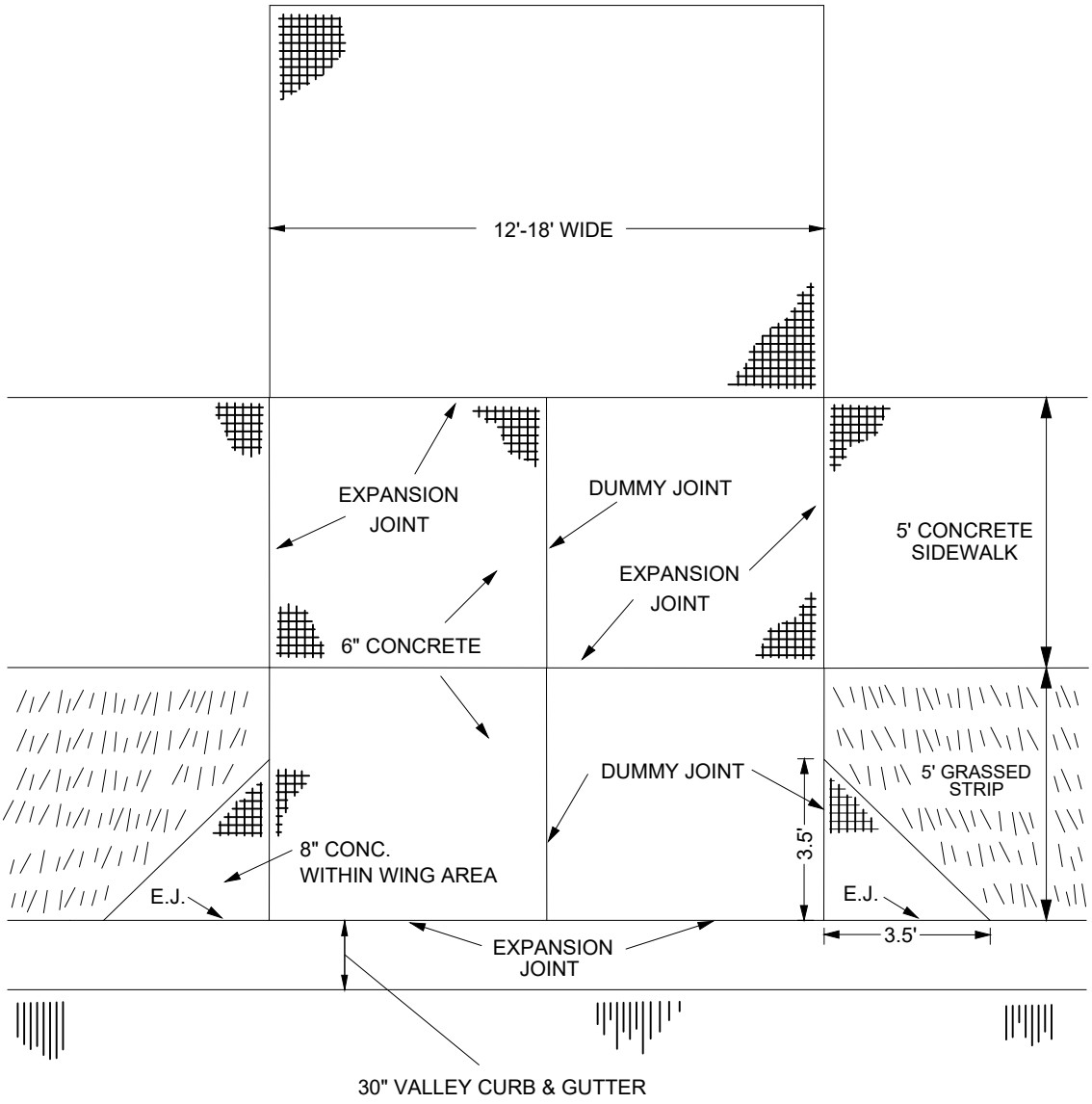


NOTES:
1. PIPE SHALL BE SIZED BY ENGINEER.
2. DRIVEWAY TO BE 12 TO 18 FEET IN WIDTH.
3. BACKFILL PIPE TRENCH TO 95% COMPACTION PER **AASHTO** METHOD T99 AND **TOC** STANDARD 5020.
4. THE TOWN IS NOT RESPONSIBLE FOR VEHICLES THAT DRAG DUE TO GRADE OF DRIVEWAY. THE DRIVEWAY AND STORM DRAIN PIPE ARE PRIVATELY MAINTAINED.

SCALE: NTS

DETAIL NO. 03.11

DATE: 06/16/2023



NOTES:

1. EXPANSION MATERIAL SHALL EXTEND THE FULL DEPTH OF THE CONCRETE.
2. ALL CONCRETE SHALL BE 3000 PSI (MIN.).
3. DRIVEWAY APRON SHALL HAVE A MINIMUM 2% SLOPE TOWARD THE STREET.

SMITHFIELD NORTH CAROLINA

STANDARD DRIVEWAY APRON FOR VALLEY CURBS

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

DETAIL NO. 03.12

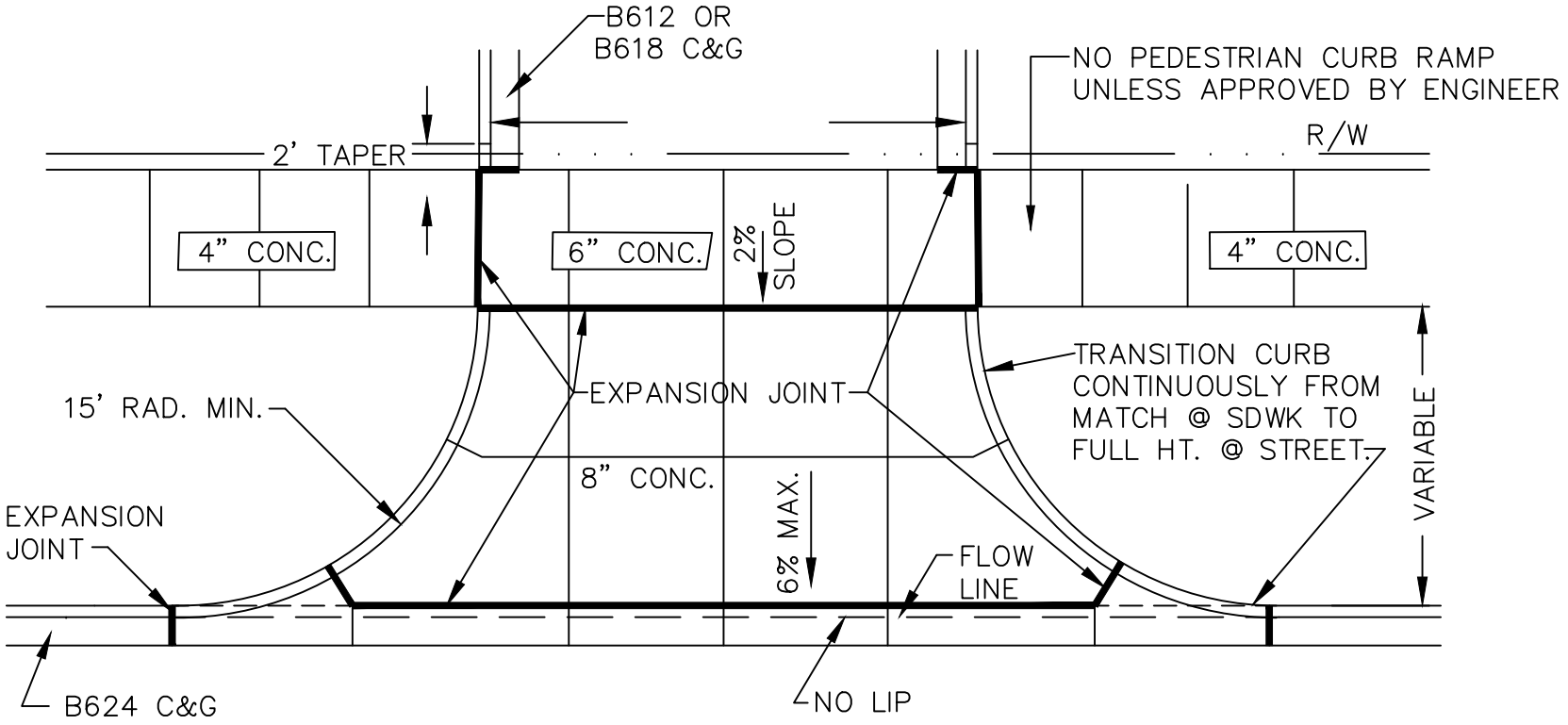
DATE: 06/16/2023

SMITHFIELD
NORTH CAROLINA

STANDARD NON-RESIDENTIAL CONCRETE DRIVEWAY APRON

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

NOTE:
- EACH DRIVEWAY PANEL NOT TO EXCEED 100 SF.
- REINFORCEMENT BARS OR WELDED WIRE FABRIC (STEEL MESH) ARE NOT ALLOWED IN THE RIGHT-OF-WAY
- CLASS 5 AGGREGATE BASE REQUIRED UNDER CURB AND GUTTER.
- IF PRESENT, STREET LIGHT, SIGNAL AND INTERCONNECT CONDUIT OR DIRECT BURIED STREET LIGHT WIRING MUST BE EXPOSED FOR INSPECTION PRIOR TO POUR
- DRIVEWAY SHALL HAVE A MINIMUM WIDTH OF 24 FT. AND A MAXIMUM WIDTH OF 36 FT.



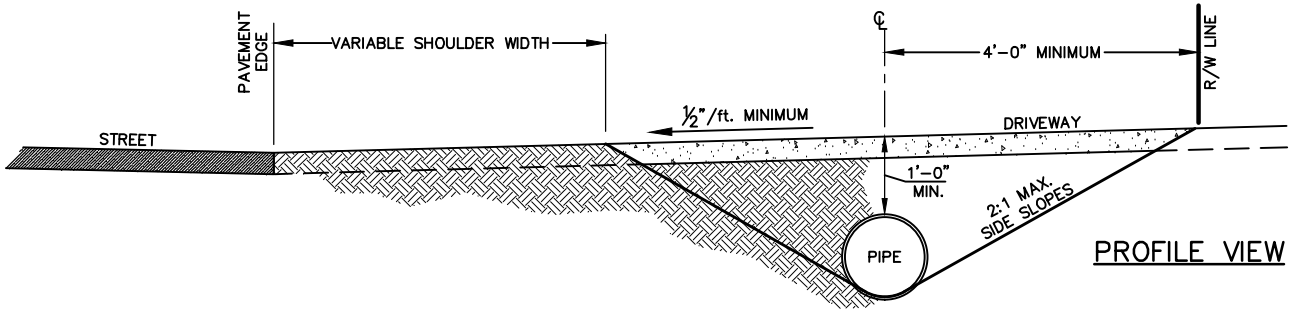
NON-RESIDENTIAL CONCRETE DRIVEWAY APRON

DATE: 06/16/2023
DETAIL NO. 03.13
SCALE: NTS

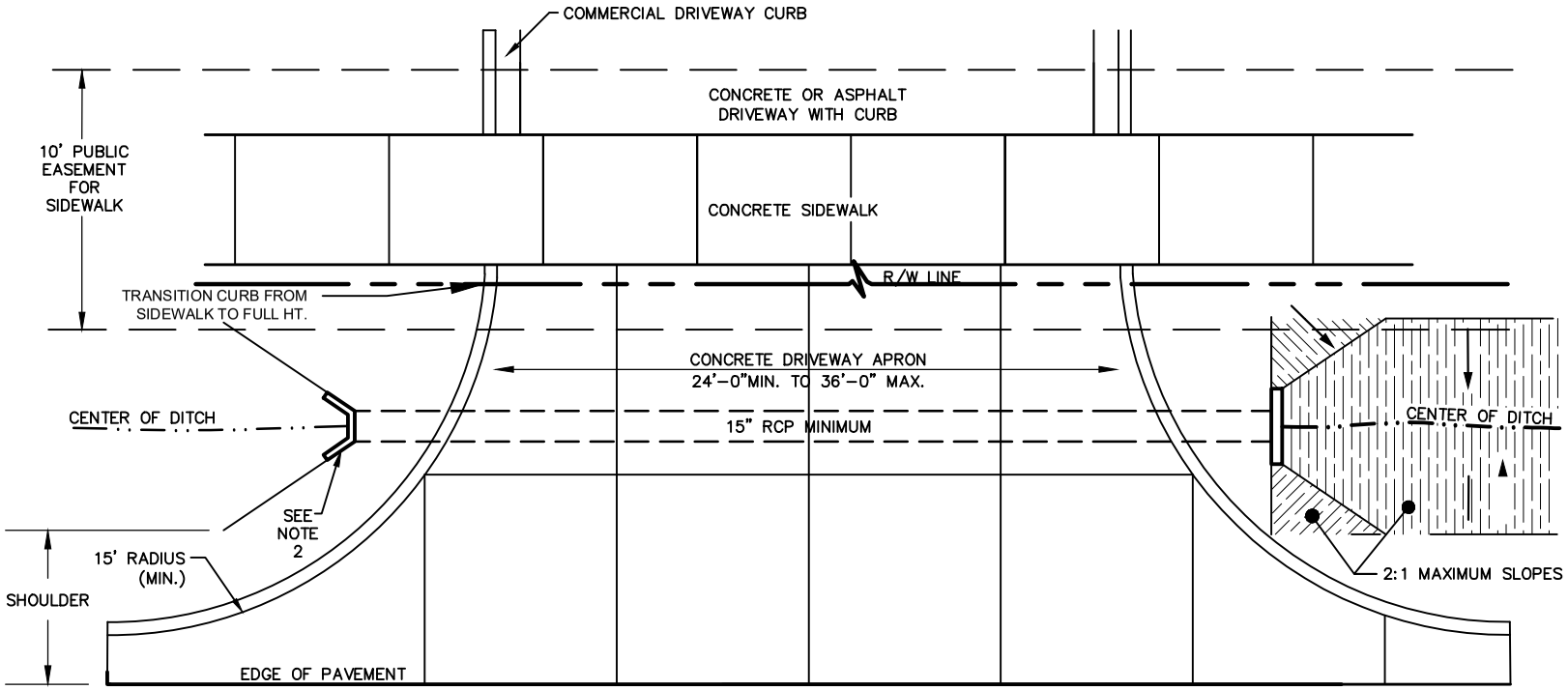
SMITHFIELD
NORTH CAROLINA

STANDARD NON-RESIDENTIAL DRIVEWAY APRON WITHOUT CURB & GUTTER

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



PROFILE VIEW



PLAN VIEW

NOTES:

1. PIPE SHALL BE SIZED BY ENGINEER. PIPE CLASS AND COVER TO BE DETERMINED BY LOAD.
2. HEADWALLS, ENDWALLS, OR FLARED END SECTIONS SHALL BE INSTALLED AT ENDS OF PIPE CULVERTS THAT ARE GREATER THAN 60" IN DIAMETER, OR ON MULTIPLE PIPE CULVERTS GRATER THAN 36" IN DIAMETER.
3. DRIVEWAY TO BE 24 FEET (MIN.) TO 36 FEET (MAX.) IN WIDTH.
4. BACKFILL PIPE TRENCH TO 95% COMPACTION PER **AASHTO** METHOD T99 AND **TOC** STANDARD 5020.
5. THE DRIVEWAY AND STORM DRAIN PIPE ARE PRIVATELY MAINTAINED.
6. ALL CONCRETE SHOULD BE 6" THICK.
7. WHERE CURB ENDS AT STREET, TRANSITION STORM FLOW FROM GUTTER SECTION TO DITCH SECTION

SCALE: NTS

DETAIL NO. 03.14

DATE:06/16/2023

SECTION 4.00
SOIL EROSION AND SEDIMENTATION CONTROL

4.01 SCHEDULING

Temporary and permanent erosion control measures shall be provided for all land disturbing work in accordance with an erosion control plan approved by the NCDEQ for sites where over an acre of land is disturbed.

The Town reserves the right to require that soil erosion and sedimentation control measures be established for sites where disturbed areas will be less than one acre.

All permanent erosion control measures shall be incorporated into the work at the earliest practical time. All temporary measures shall be maintained until the permanent measures have taken effect. Temporary and permanent measures shall be coordinated to provide effective and continuous erosion control throughout the construction and post-construction period to-minimize siltation of streams, lakes, reservoirs, and other impoundments, ground surfaces, and other property.

4.02 TEMPORARY MEASURES

Silt Fence shall be installed at the toe of all fill slopes and any other necessary locations as required. Silt fence shall be erected in accordance with Standard Detail 04.01.

Diversion Ditches shall be installed at the top of cut and fill slopes and any other necessary locations as required. Diversion ditches shall be installed in accordance with Standard Detail 4.08.

Construction Entrances shall be installed at all points of access to construction sites. Any access point which does not have a construction entrance shall be barricaded to prevent its use. Construction entrances shall be installed in accordance with Standard Detail 04.02 NCDEQ Standards.

Sediment Basins or Filter Basins shall be installed at all points where accumulated runoff is released to natural drainage channels as required. Sediment basins and filter basins shall be sized to hold 1800 cubic feet of sediment for every acre of denuded area tributary to the structure. Sediment basins shall be installed in accordance with Standard Detail 04.02. Filter basins shall be installed in accordance with Standard Details 04.03-04.05.

Temporary Seed is the use of rapid growing annual grasses, small grains or legumes to provide initial, temporary cover for erosion control on disturbed areas for less than twelve (12) months. Seed bed preparations and soil amendments shall be in accordance with the method described under "Seeding and Mulching".

Seeding and Mulching shall be done immediately behind construction. All disturbed areas shall be dressed to a depth of 8 inches. The top 3 inches shall be pulverized to provide a uniform seedbed. Agricultural lime shall be applied at the rate of 95 lbs./1000 sq. ft. immediately before plowing. Grass seed shall be applied at the rates outlined in Tables 4.1 and 4.2.

10-10-10 fertilizer in Fall, or 5-10-10 fertilizer in Spring shall be applied to all disturbed areas at a rate of 2 tons/acre and mulching shall consist of small grain straw applied at a rate of 1-2 tons/acre. Mulched areas shall be tacked with asphalt or other approved method sufficient to hold the straw in place, 435 gallons per acre.

If active construction ceases in any area for more than 15 days all disturbed areas must be seeded, mulched, and tacked unless written approval is granted by the Town.

4.03 PERMANENT MEASURES

Ground Cover

After construction is complete, all disturbed areas shall receive a permanent ground cover in accordance with the seeding and mulching schedule in Section 4.02 "Seeding and Mulching". Permanent seeding and temporary seeding differ only in the type of seed to be used annual versus perennial.

Permanent Ground Cover is the establishment of perennial vegetation cover for periods longer than twelve (12) months. Seed bed preparations and soil amendments shall be in accordance with Section 4.02 "Seeding and Mulching". As a part of permanent seeding, maintenance may be required to maintain vegetative growth for twelve (12) months. This maintenance shall be considered a part of establishing permanent ground cover.

Riprap Dissipation Pads and Riprap Protection

After construction is complete, all points of stormwater release shall be protected by riprap dissipation pads designed to reduce discharge velocities to nonerosive levels.

The dissipation pads shall be designed and constructed with an engineering fabric between the dissipation pad and the natural ground. Calculations shall be furnished to indicate the sufficiency of the dissipation pads specified. Riprap pad design shall be in accordance with NCDOT or NCDEQ methods. Filter fabric shall be used on all sediment basins, riprap dissipators, or channel designs.

4.04 COMPUTATIONS

Erosion and sedimentation control measures, structures, and devices shall be planned, designed, and constructed to control the calculated peak runoff from a 10-year frequency storm. Runoff rates shall be calculated using the NCRS TR-55 Method, the Rational Method, or other acceptable

calculation procedures. Runoff computations shall be based on rainfall data published by the National Weather service for this area.

4.05 CONSTRUCTION SEQUENCE

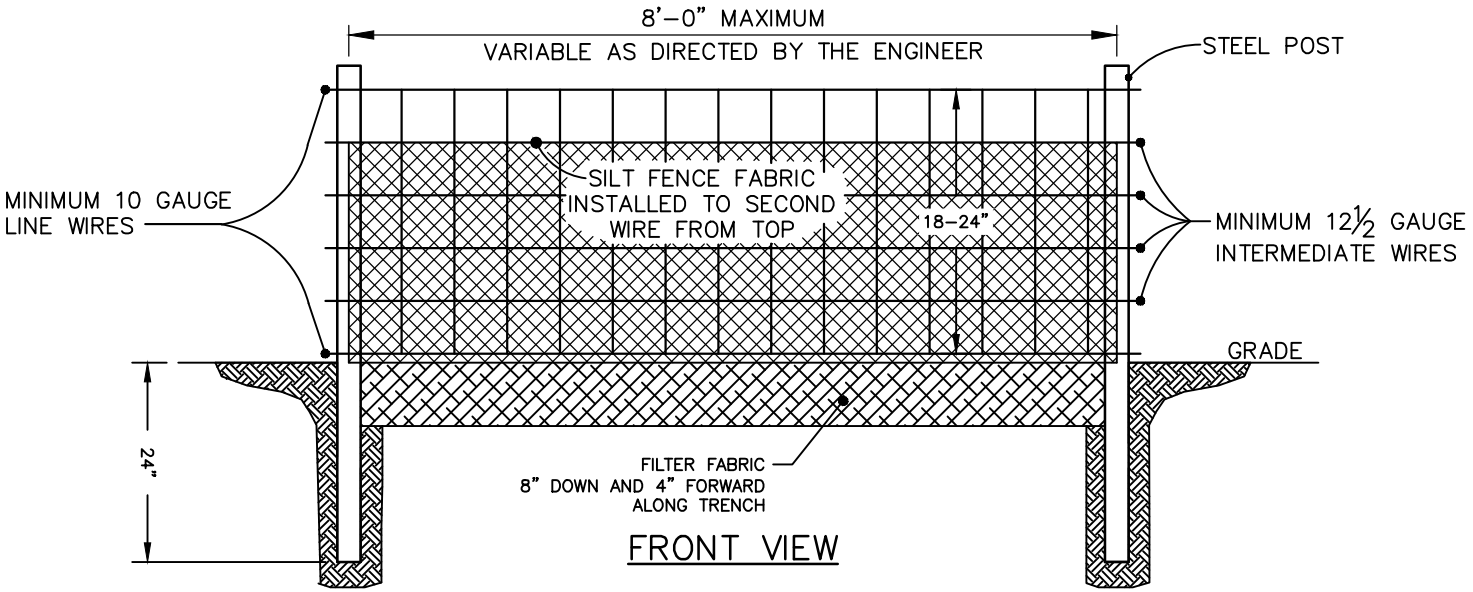
The construction sequence on projects shall be as follows:

1) Preconstruction meeting recommended with the Town.
2) Obtain Site Plan/Zoning Approval in accordance with the Town of Smithfield Unified Development Ordinance
3) Sedimentation and Erosion Control Plan Approval NCDEQ/Town;
4) Install all erosion control measures as required;
5) Proceed with grading;
6) Clean sediment basins when one-half full;
7) Seed and mulch denuded area within fifteen (15) days after finished grades are established;
8) Inspect erosion control measures within 24-hours after any 10-year storm event for washouts. Repair or replace devices as necessary.
9) Maintain soil erosion control measures until permanent ground cover is established;
10) Remove soil erosion control measures and stabilize these areas.

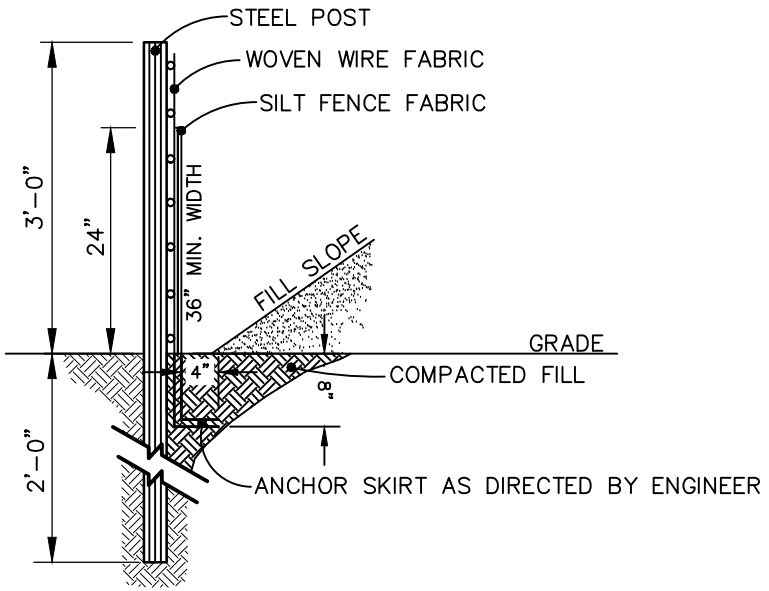
END OF SECTION 4.00

STANDARD SILT FENCE

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



FRONT VIEW



SIDE VIEW

NOTES:

1) USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE PER 100 ft. OF FENCE AND NEVER IN AREAS OF CONCENTRATED FLOW.
2) OVERLAP 12 INCHES WHEN SPLICING FABRIC.
3) FOR REPAIR OF SILT FENCE FAILURES USE DETAIL 4000.23.

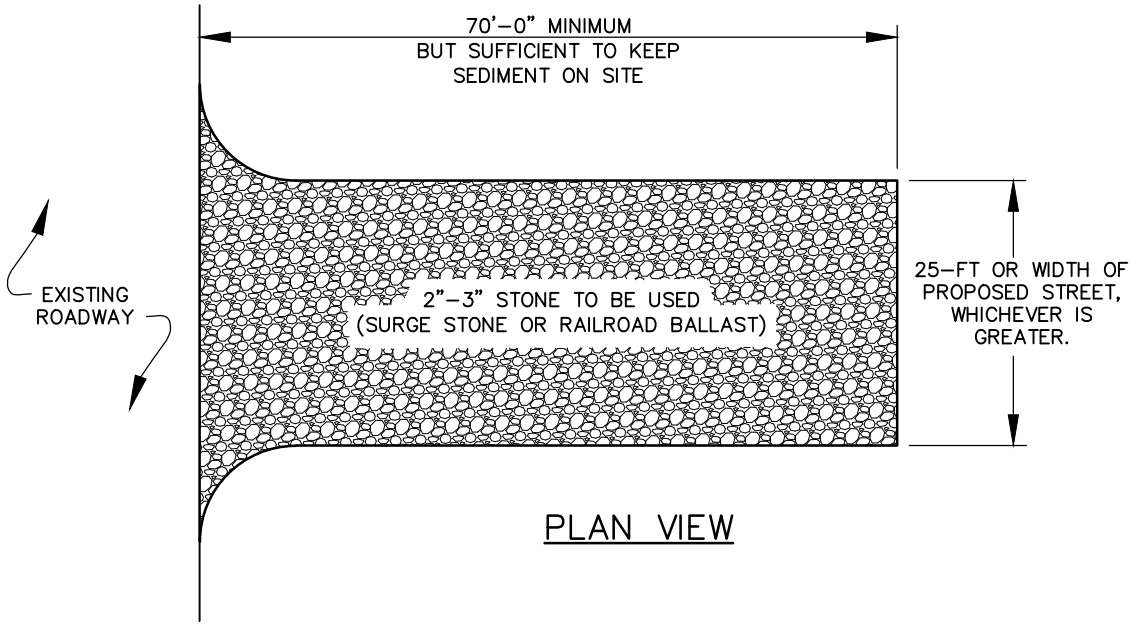
SCALE: NTS

DETAIL NO. 0401

DATE: 07/08/2021

STANDARD SILT FENCE

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



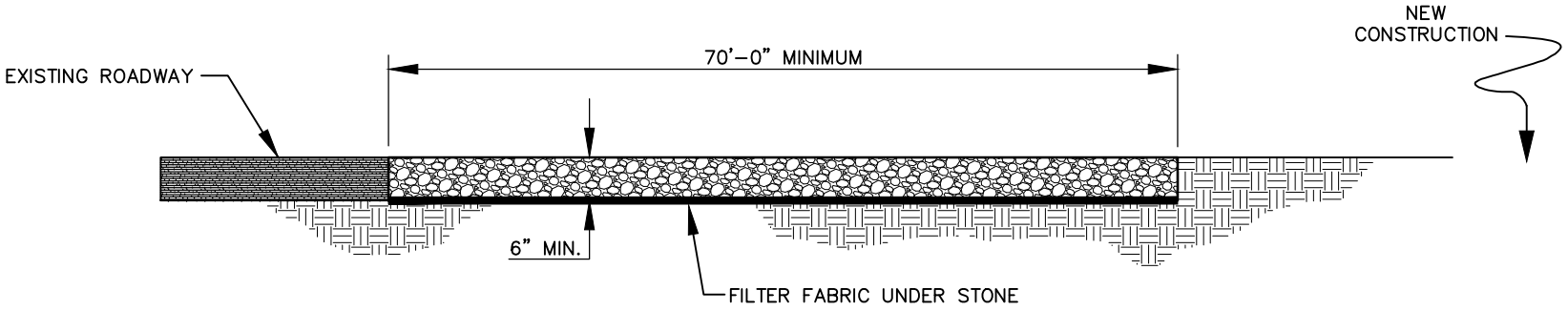
PLAN VIEW

NOTES:

1) PUT SILT FENCE OR TREE PROTECTION FENCE UP TO ENSURE CONSTRUCTION ENTRANCE IS USED.

2) IF CONSTRUCTION ON THE SITES ARE SUCH THAT THE MUD IS NOT REMOVED BY THE VEHICLE TRAVELING OVER THE STONE, THEN THE TIRES OF THE VEHICLES MUST BE WASHED BEFORE ENTERING THE PUBLIC ROAD.

3) WHEN CONSTRUCTION ENTRANCE CROSSES A SIDEWALK, ADA REQUIREMENTS REMAIN INTACT.



CROSS SECTION

SCALE: NTS

DETAIL NO. 0401

DATE: 07/08/2021

SECTION 5.00
PIPE TRENCHES

5.01 EXCAVATION AND PREPARATION OF PIPE TRENCHES

Trenches for water distribution lines, sanitary sewer lines, force mains, and storm sewer lines shall be excavated to the required depth to permit installation of the pipe along the lines and grades shown on the construction drawings. The minimum trench width at the top of the pipe shall be at least 18 inches greater than the outside diameter of the pipe. Where excavation is in rock, the rock shall be removed to a depth of at least 6 inches below grade and shall be backfilled with materials in accordance with these specifications. Wet trenches shall be stabi1ized with #78 M stone or with a base layer of #57 stone.

5.02 PIPE LAYING AND BACKFILLING

All pipe shall be laid in accordance with the manufacturer's recommendations. The subgrade at the bottom of the trench shall be shaped to secure uniform support throughout the length of the pipe. A space shall be excavated under the bed of each pipe to provide space to relieve bearing pressure on the bell and to provide room to adequately make the joint. Open ends of pipe shall be plugged with a standard plug or cap at all times when pipe laying is not in progress. Trench water shall not enter the Backfill material shall be free from construction material, debris, frozen material, organic material, or unstable material. The top 2 feet of backfill material shall be free from stones greater than 4 inches in diameter.

Under roadways and extending at a slope of 1 to 1 beyond the back of curb, measured perpendicular from centerline, backfill shall be compacted to a density of no less than 95% standard Proctor maximum dry density as measured by AASHTO method T99. Backfill shall be placed in lifts of 8 inches or less of the uncompacted soil. Other fill material shall be compacted to a density of no less than 90% of the maximum dry density as measured by AASHTO method T99. Backfill material shall be placed in lifts of 12 inches or less of the uncompacted soil. Suitable backfill material shall be utilized and compacted in accordance with Town compaction requirements and the pavement repair shall be in accordance with Standard Detail 05.01.

All trenches shall be properly backfilled at the end of each working day. All pavement cuts shall be repaired within a maximum of three (3) days from the date the cut is made. If conditions do not permit a permanent repair within the given time limit, permission to make a temporary repair must be obtained from the Town Engineer.

In locations where backfill material is temporarily stockpiled on the roadway surface, a layer of 1-1/2 inches of screenings shall be used between the pavement surface and the backfill material.

5.03 BORING AND JACKING

All crossings of Town streets shall be by bore and jock method in order to minimize pavement cuts and maintenance problems. The Town shall recommend that all crossings of State maintained streets within the Town corporate limits be by the bore and jack method. In cases where circumstances such as utility conflicts will not allow crossing by bore and jock method, the Town may consider approving other methods of crossing with additional requirements to minimize pavement failure and maintenance problems.

In locations where open pipe trenches ore not allowed, dry bore and jock operations may be allowed. Smooth wall or spiral welded steel pipe may be jacked through dry bores slightly larger than the pipe bored progressively ahead of the leading edge of the advancing pipe. The spoil material shall be mucked by the auger bock through the pipe during the boring operation. As dry boring new section of the encasement pipe shall be butt-welded to the section progresses, each previously jacked into place.

The steel pipe shall be manufactured of grade 'B' steel with a minimum yield strength of 35,000 psi in accordance with ASTM A 139 and A283. When used along or under a roadway maintained by NCDOT, the encasement pipe shall be coated to meet NCDOT requirements.

If voids ore encountered while installing encasement pipe thirty (30) inches and larger, grout holes shall be installed at ten (10) foot centers and filled with 1:3 Portland cement grout at sufficient pressure to prevent settlement of the roadway, unless NCDOT approval stipulates otherwise. Other grout mixtures may be submitted for approval.

In the event that an obstruction is encountered during the boring and jacking operation, the auger is to be withdrawn and the excess pipe is to be cut off, copped, and filled with 1 :3 Portland cement grout at a sufficient pressure to fill all voids before moving to another boring site. Size and wall thickness of smooth wall or spiral welded encasement pipe shall be as follows:

Pipe Size (O.D.)	**Wall Thickness (in.)**
12-3/4”	0.188
16”	0.250
18”	0.250
20”	0.250
24”	0.250
30”	0.312
36”	0.375

Casing pipe shall be installed with a minimum cover of 3 feet under pavement.

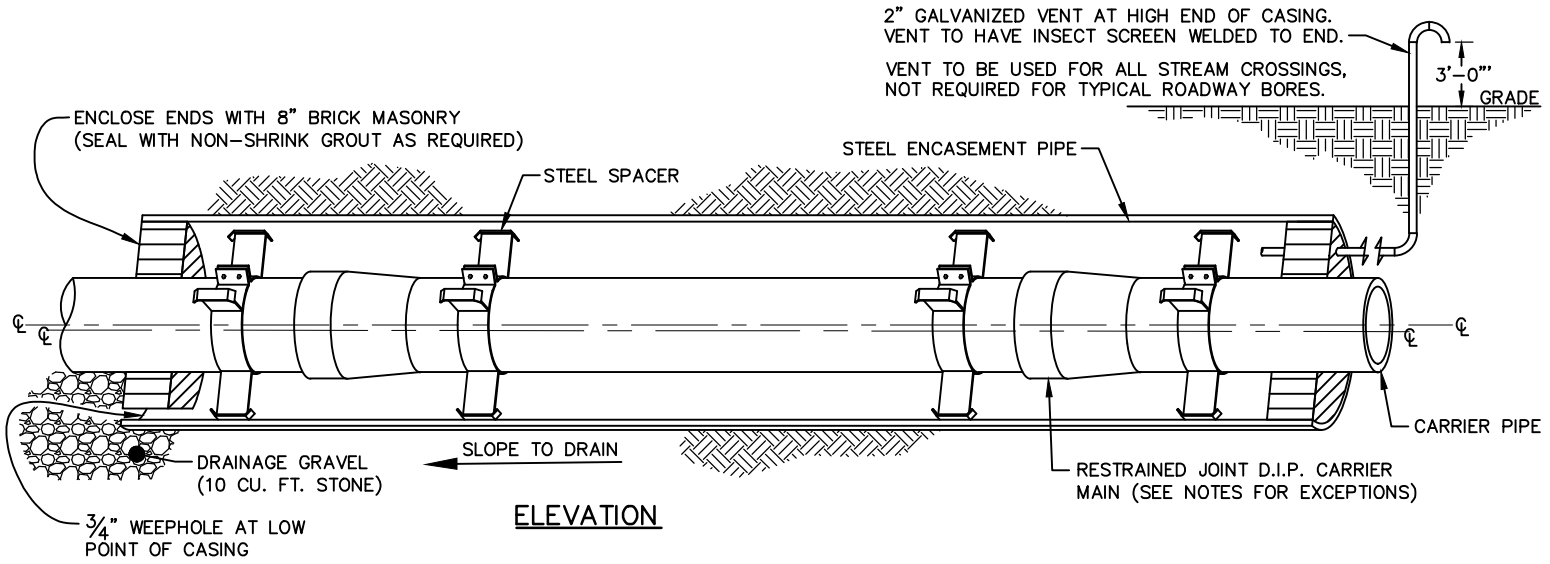
All carrier pipe shall be slip joint ductile iron pipe resting on treated timber skids as shown on Standard Detail 05.02 so as to prevent damage to the pipe bell. Pipe bells shall not contact the interior of the casing pipe. No blocks or spacers shall be wedged between the pipe and the top of the casing. Casing pipe shall have the following minimum sizes:

Carrier Pipe Size (in)	Casing Pipe Size (in.)
4	12-3/4
6	12-3/4
8	18
10	20
12	24
14	26
16	28

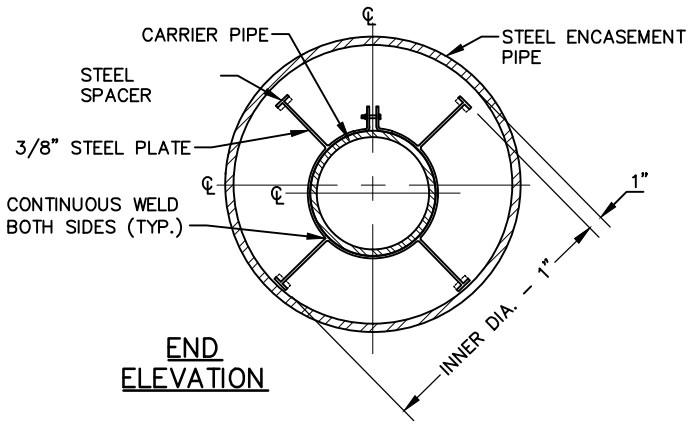
END OF SECTION 5.00

CARRIER PIPE

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



ELEVATION



END ELEVATION

NOTES:
1. STEEL SPACERS SHALL BE USED FOR SUPPORT OF THE CARRIER PIPE WITHIN THE CASING PIPE.
2. A MINIMUM SPACING OF 2 SPACERS PER JOINT OF CARRIER PIPE SHALL BE REQUIRED. 3 SPACERS ARE REQUIRED FOR CARRIER PIPE ≥ 36 INCHES.
3. THE SPACERS SHALL BE LOCATED EVENLY ALONG THE CARRIER PIPE SUCH THAT EACH SPACER SUPPORTS THE SAME UNIT WEIGHT OF THE CARRIER MAIN.
4. FOR CASING SIZE SEE STANDARD SPECIFICATION SECTION 5000.
5. RECLAIMED WATER LINE SHALL BE PVC WITH RESTRAINED JOINTS.
6. VENT OPENING SHALL BE INSTALLED 12" ABOVE 100-YEAR FLOOD ELEVATION OR 36" ABOVE EXISTING GRADE, WHICHEVER IS HIGHER.

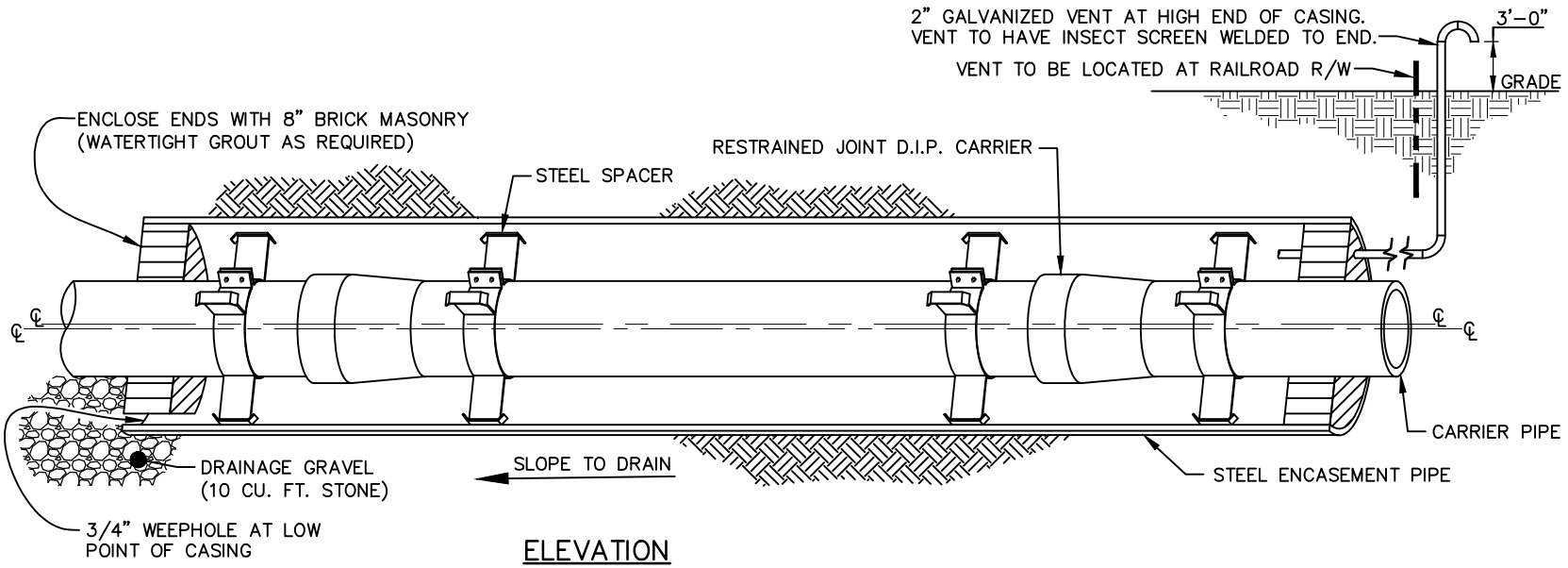
SCALE: NTS

DETAIL NO. 05.02

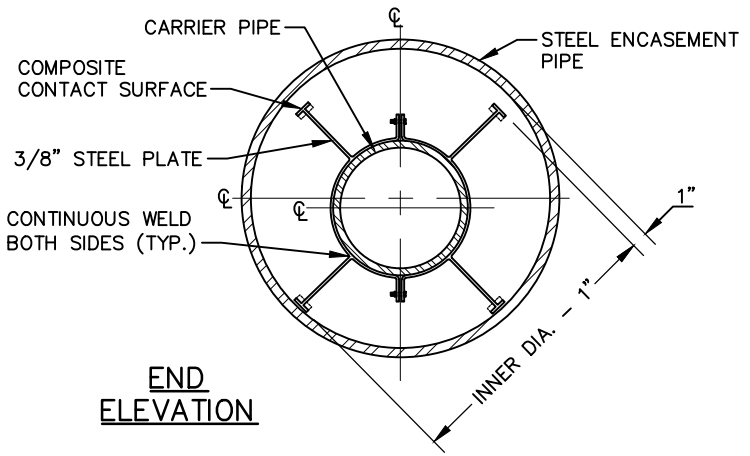
DATE:06/16/2023

CARRIER PIPE - UNDER RAILROAD

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



ELEVATION



END
ELEVATION

NOTES:

1. STEEL SPACERS SHALL BE USED FOR SUPPORT OF THE CARRIER PIPE WITHIN THE CASING PIPE. FOR RAILROAD CROSSINGS WITH IMPRESSED CURRENT OR WITH ENCASEMENT PIPES REQUIRING CATHODIC PROTECTION, STEEL SPACERS WITH **EPDM** OR COMPOSITE CONTACT SURFACES SHALL BE USED.
2. A MINIMUM SPACING OF 2 SPACERS PER JOINT OF CARRIER PIPE SHALL BE REQUIRED. 3 SPACERS ARE REQUIRED FOR CARRIER PIPE ≥ 36 INCHES.
3. THE SPACERS SHALL BE LOCATED EVENLY ALONG THE CARRIER PIPE SUCH THAT EACH SPACER SUPPORTS THE SAME UNIT WEIGHT OF THE CARRIER MAIN.
4. THE PROPOSED ENCASEMENT PIPE & CARRIER PIPE SHALL COMPLY WITH ALL APPLICABLE CARY & OTHER JURISDICTIONAL REQUIREMENTS, WHICHEVER IS MORE STRINGENT.
5. NO BLASTING ALLOWED IN RAILROAD RIGHT-OF-WAY.

SCALE: NTS

DETAIL NO. 05.03

DATE:06/16/2023

SECTION 8.00
STORM DRAINAGE

8.01 STORM DRAINAGE MATERIALS

A. Pipe Materials

1) Reinforced Concrete Pipe shall be as per ASTM C76, Table Ill or Table IV with a minimum 12 inch inside diameter. Joints shall be sealed with a plastic cement putty meeting Federal Specification SS-S-00210, such as a butyl rubber sealant.

2) Corrugated Steel Pipe or Pipe-Arch shall have a minimum 12-inch nominal diameter and conform to AASHTO M36 with pipe ends having no less than 2 round corrugations on each end. Bands for connecting pipes shall be corrugated with a minimum of 2 corrugations for each pipe. Pipe shall be fully bituminous coated with an asphalt paved invert in accordance with the requirements of AASHTO M 190 for Type C pipe.

3) ADS N-12 High Density Polyethylene Corrugated Storm Sewer Pipe shall have a minimum 12-inch nominal diameter and shall be used only in areas outside of public right of way. ADS pipe shall not be installed under any pavement or curb and gutter and shall be installed with Class I or Class II bedding to the spring line of the pipe. Pipe material shall meet the product specifications of ASTM F667 and shall have a smooth interior.

B. Structure Materials

All storm drainage structures such as manholes, inlets, junction boxes and catch basins shall be constructed of either solid block, or precast concrete.

1) Concrete Block shall be solid and conform to ASTM C139 as to design and manufacture. The block shall be embedded in a mortar bed to form a ½ inch mortar joint.

2) Precast Concrete Manholes shall meet ASTM C478 as to design and manufacture. All manhole cones shall be the eccentric type. Manhole joints shall be sealed with o plastic cement putty meeting Federal Specification SS-S-00210, such as Ram-Nek or a butyl rubber sealant.

3) Manhole Frames and Covers shall be cast iron or ductile iron with "Storm Sewer" stamped on the cover and two 1-inch holes. Costings shall be machined to give even and continuous bearing on the full length of the frame. Castings shall be free of porosity and blow holes, and shall receive one coat of Koppers Super Service Bitumostic black paint. Paint shall be kept off of bolt threads, and surfaces shall be thoroughly wire brushed before painting. All manhole rings in roadways shall be installed in accordance with Standard Detail 07.03.

4) Manhole Steps shall be of polypropylene material reinforced with a 1/2-inch diameter reinforcing rod. They shall be designed for a vertical load of 400 pounds and a horizontal pullout load of 1000 pounds, and shall be set 16" on center. Holes for the installation of manhole steps shall not project through the manhole wall, but shall stop a minimum of one inch from the outside wall. Steps shall be at least 10 inches clear width and shall project at least 4 inches from the wall into which they are embedded. Steps in precast concrete structures shall be installed by the manufacturer.

5) Catch Basins (curb inlets) for street drainage shall be in accordance with Standard detail 8.03 or 8.04. Precast concrete boxes are allowed, but precast manholes are not acceptable for use as catch basins.

6) Headwalls and endwalls may be cast in place per NCDOT Standard Details 838.01 through 838.75, or precast with wing walls and apron by an approved manufacturer. Installation of precast headwalls and endwalls shall be in accordance with the manufacturer's recommended installation procedures and specifications.

7) Frame, Grate and Hood shall be cast iron and meet AST requirements set forth I the latest edition of the NCDOT "Standard Specifications for Roads and Structures" and the dimensional requirements set for the latest edition of the NCDOT "Roadway Standard Drawings #840.03". Grate shall be stamped with the NCDOT Specification number as evidence of satisfying the above requirements. Hoods and Drop Inlets grates shall be stamped with "Drains to River" Lettering ¾" height and shall be clean crisp and free of defects.

8.02 STORM SEWERS

A. Location

1) All public storm sewers shall be installed in dedicated street right of way or dedicated easements. Minimum widths of storm sewer easements shall be 20 feet for pipes up to and including 48 inches in diameter and 30 feet for pipes greater than 48 inches in diameter. The Town may revise the minimum easement width for storm drainage pipe based on depth.

2) See Sections 6.00 and 7.00 for horizontal and vertical separation requirements between storm drainage pipe, water lines, and sanitary sewer lines.

3) The Town of Smithfield shall maintain only the storm sewer systems within Town maintained rights of way, Town dedicated storm drainage easements, and on Town owned property. Storm drainage systems located on private property shall be maintained by the property owner(s).

4) Unless prevented by topographic constraints, storm sewer shall not discharge into front yards of lots but shall extend to within 20 feet of the rear property line in lots up to 1/2 acre in size and shall extend a minimum of 150 feet from right of way in lots larger than ½ acre.

B. Sizing and Design

1) Storm sewer systems shall be designed on the basis of the 2-year storm for inlet spacing following NCDOT guidelines for allowable gutter spread, the 10-year storm for street drainage pipe sizing, the 25-year storm for cross-street drainage, and the 100-year storm for flood plain areas. Pipes shall be designed to flow 7/8 full.

2) Runoff rates shall be calculated by the Rational Method, NRCS Method, or other acceptable procedure. Runoff computations shall be based on rainfall data published by the National Weather Service for this area.

3) The Rational Method is recommended to calculate runoff for drainage areas up to 100 acres in size. For drainage areas greater than 100 acres, the NRCS-Method or other recognized method is recommended.

4) Time of concentration (tc) shall be appropriate for the drainage area in question using Kirpich Equation (Bureau of Reclamation, 1974, p.71).

5) Storm duration shall equal the time of concentration (tc).

6) Storm sewer pipe shall be sized in accordance with the Manning Equation.

7) Storm sewers shall be designed to provide a velocity of at least 2 feet per second at design flow.

8) The minimum pipe diameter shall be 12 inches where the inlet is grated and 15 inches where the inlet is not grated.

C. Installation

1) All storm sewers shall be installed to provide a true line and grade between structures.

2) Structures shall be installed at each deflection of line and/or grade.

3) The maximum length between access points shall be 400 feet for all pipe sizes.

4) No inaccessible storm drainage structures shall be allowed.

5) Pipe may enter through the corner of all structure material types except precast concrete "waffle" boxes.

6) A reinforced concrete slob designed by on engineer may be used at oversized structures to adjust an inlet to standard dimensions. Slabs shall be designed to meet H-20 loading.

~~7)~~ The minimum cover for storm sewer pipe shall be 2 feet to finished subgrade under roads and 1 foot to finished grade under nonloadbearing areas. Trench excavation and backfilling shall be in accordance with Section 5.00. ~~of these specifications unless more stringent installation requirements are listed with specific material type and certified by an engineer.~~

8) Pipe shall not project into a drainage structure but shall be finished flush with the inside of the structure. Voids shall be filled with non-shrink grouting. The exterior annulus between the box and the pipe shall be filled with non-shrink grout and wrapped with an approved joint seal material.

9) Catch basins between 5 and 20 feet in depth shall have minimum interior dimensions of 4 feet by 4 feet, and those over 20 feet in depth shall have minimum interior dimensions of 5 feet by 5 feet.

10) Each drainage structure shall have a shaped invert constructed from concrete, and a bench with a maximum 5:1 slope. The bench shall begin at o height of one-half the pipe diameter for 12-to-24-inch pipe, one-third the pipe diameter for 30-to-48-inch pipe, and one-fourth the diameter for pipe greater than 48 inches in diameter.

11) Precast concrete structures may be installed only to depths certified as acceptable by the manufacturer.

D. Pipe Inlets and Outlets

1) Headwalls, endwalls or flared end sections shall be installed at all inlets and discharge points.

2) Flared end sections shall be installed on single pipe culverts up to and including 60 inches in diameter, and on multiple pipe culverts up to and including 36 inches in diameter.

3) Headwalls and endwalls shall be installed on single pipe culverts greater than 60 inches in diameter, and on multiple pipe culverts greater than 36 inches in diameter.

4) Precast headwalls shall only be installed at single pipe culverts.

5) Energy dissipators shall be installed at all discharge points and shall be properly sized to ensure that stormwater is re eased at a nonerosive velocity.

6) A fabric or washed stone barrier shall be installed between the dissipation pad and the natural ground.

7) The stormwater design shall include scour protection for the drainage way.

8) Storm drainage channels and ditches shall be designed to carry the design flow at nonerosive velocities. Calculations indicating design velocities shall be provided along with typical channel cross-sections. The maximum allowable design velocity in grass channels is 4 feet per second.

9) The Town may require additional information on the impact of stormwater discharge on adjacent properties.

E. Street Drainage

1) Stormwater shall not be allowed to flow across streets at intersections. Drainage structures shall be provided to intercept flow prior to the radius of intersections, or the street design shall provide for a continuous grade around the radius to channel flow down the intersecting street.

2) No stormwater inlets shall be placed within travel areas of a roadway, driveway or parking lot.

3) Curb inlets shall be designed to intercept stormwater before the gutter spread exceeds ½ of a lane width for the 2-year storm. In areas of heavy pedestrian traffic, the maximum allowable spread may be decreased by the Town Engineer.

8.03 STORMWATER IMPOUNDMENTS

Stormwater Impoundments, where required, shall meet the following criteria:

Retention (wet) facilities shall be utilized where the upstream drainage area is ten (10) acres or greater unless otherwise approved by the Town.

Detention (dry) facilities may be utilized where the upstream drainage area is less than ten (10) acres.

Retention (wet) facilities shall be designed in accordance with the most current NC DEQ Standards.

The following general guidelines should be followed when designing both retention and detention facilities:

1) Side slopes shall be no steeper than 3: 1 and no flatter than 10: 1.

2) Both barrel and riser shall be concrete, and the riser shall be located in or near the embankment.

3) The riser inlet shall be covered with a trash rack to prevent clogging.

4) The principal spillway shall be designed for 10-year post-development storm; the emergency spillway shall be designed for the 100-year storm.

5) The minimum length to width ratio shall be 2: 1; The maximum length to width ratio shall be 5:1 unless otherwise approved by this Town.

6) A maintenance access to and around the perimeter of the facility shall be provided via a minimum fifteen (15) foot wide travel area adequate to withstand heavy equipment. The access road shall not cross the emergency spillway and shall have a maximum slope of 5:1.

7) On-site disposal areas capable of receiving sediment from at least two (2) clean-out cycles should be reserved in adjacent open space, if available.

8) All inflow points and outlet channels shall be protected by appropriately designed velocity dissipators.

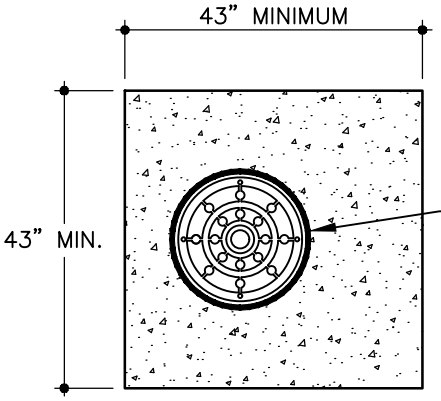
9) Embankments shall allow for a minimum one (1) foot freeboard.

10) Anti-seep collars shall be installed around the barrel and a core trench shall be installed under the embankment to key it to the substrate.

11) Such facilities may be used as erosion control devices during construction; however, conversion to the SCM must occur prior to approval of a final plat for a phase that drains to the structure, or a bond provided for the conversion cost. If the development proposes to direct multiple phases to an SCM and delay conversion, approval by the Town Engineer is required. Without such approval, subsequent phases will not be allowed to proceed with construction.

12) The Town shall receive, for all stormwater impoundments, design calculations including, but not limited to, hydrographs, routing and outlet sizing, and a maintenance plan and schedule for sediment removal and disposal.

END OF SECTION 8.00



CONCRETE SLAB

NOTES:

1. EITHER SOLID BLOCK, OR PRECAST CONCRETE MAY BE USED.
2. TOP AND BOTTOM STEPS REQUIRED.
3. USE MINIMUM 3,000 P.S.I. CONCRETE MIX FOR SLABS.
4. INSIDE DIMENSION FOR 24 INCH PIPE AND GREATER USE PIPE DIAMETER PLUS 12 INCHES.
5. WHERE DEPTH EXCEEDS 3 FEET, MANHOLE RING AND COVER TO BE LOCATED OVER STEPS.

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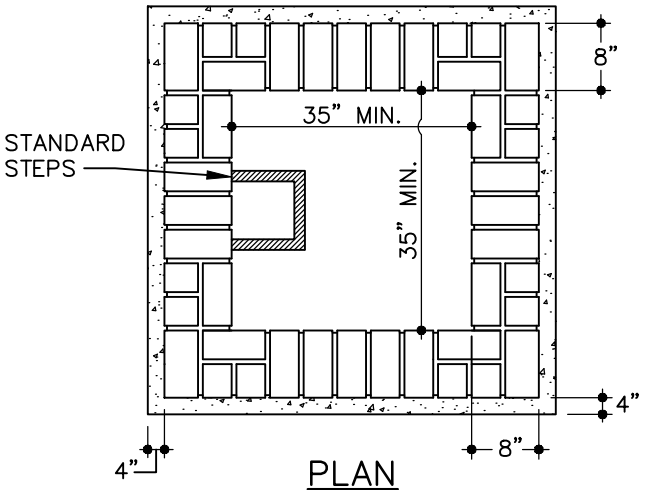
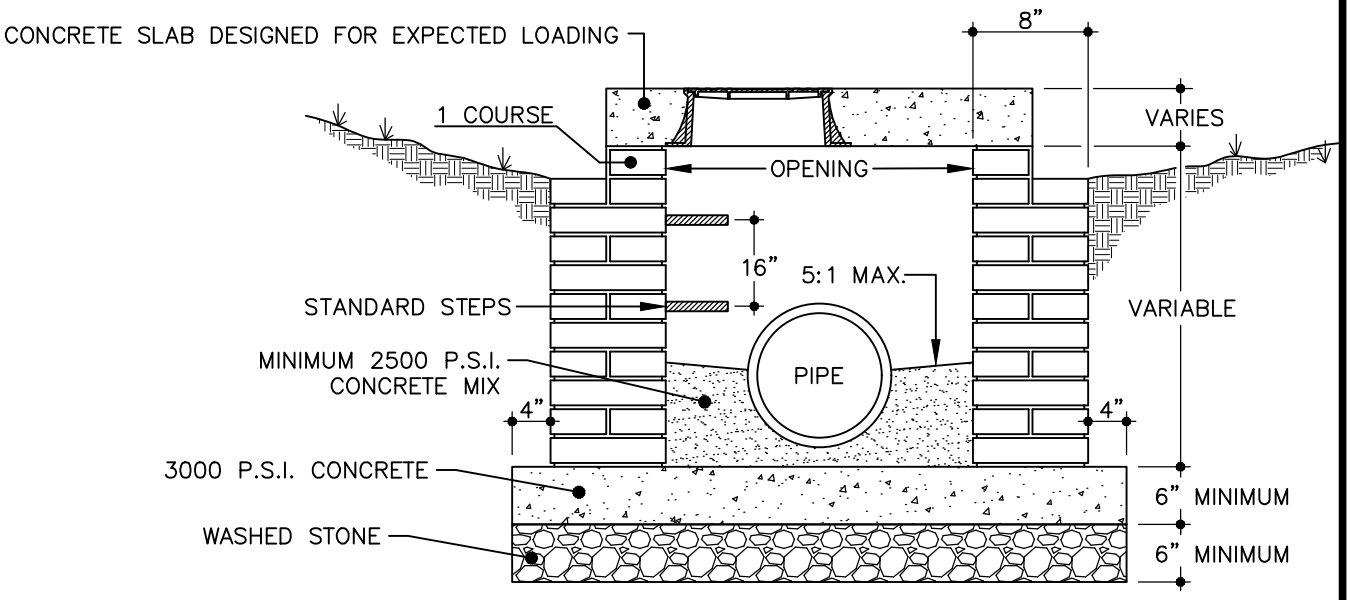


PLAN



SECTION

SMITHFIELD NORTH CAROLINA

STANDARD YARD INLET WITH CONCRETE SLAB

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

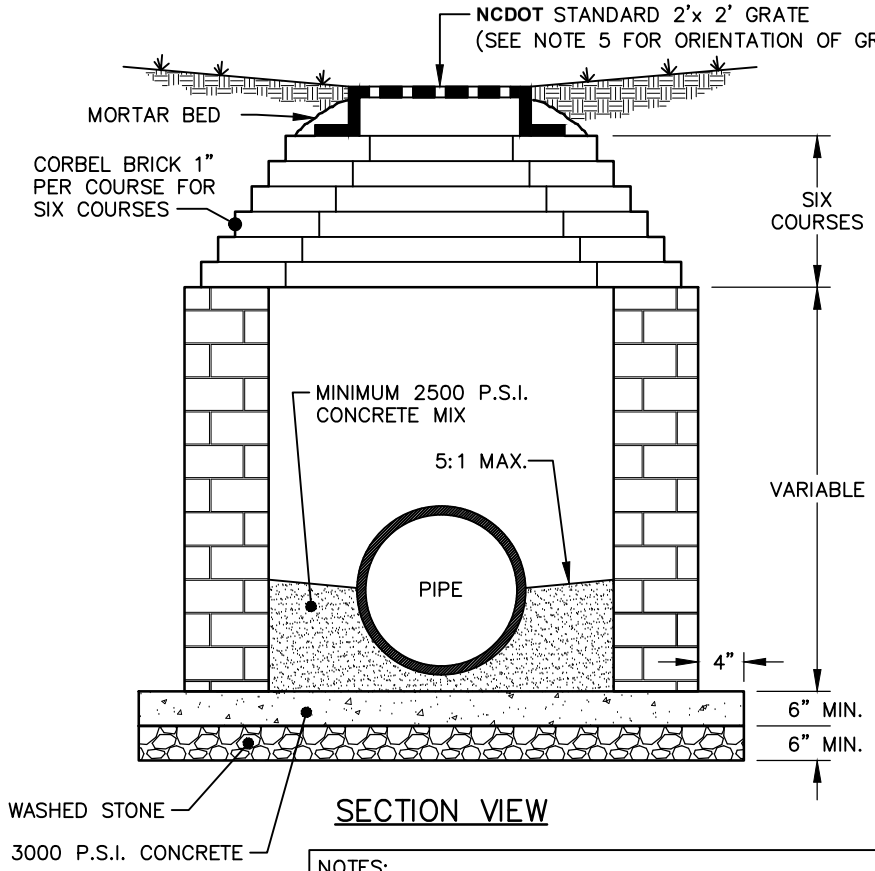
SCALE: NTS

DETAIL NO. 8.01

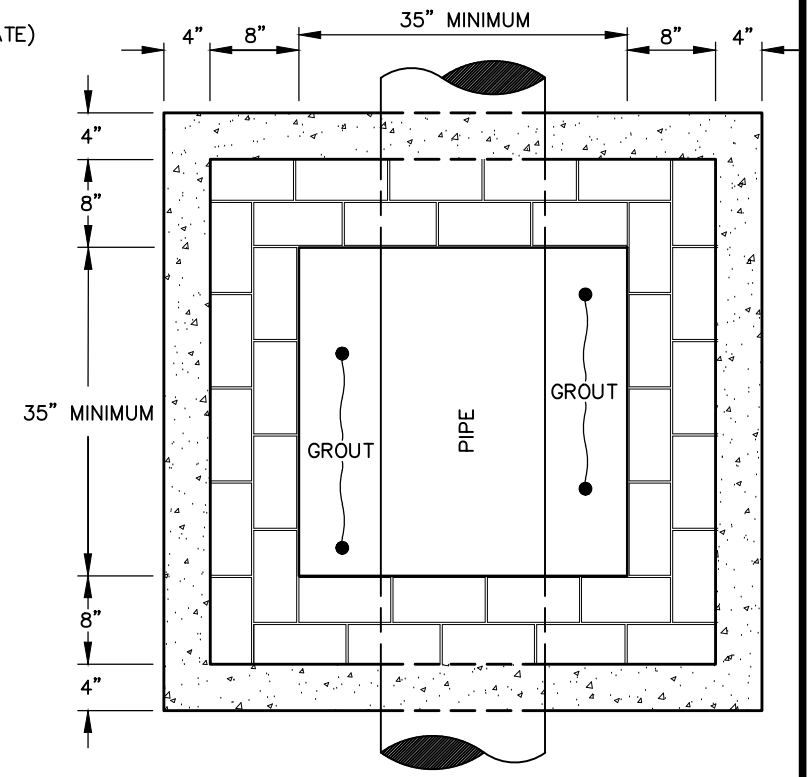
DATE: 6/15/23

STANDARD YARD INLET WITH GRATE & FRAME

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



SECTION VIEW



PLAN VIEW

NOTES:
1. EITHER SOLID BLOCK, OR PRECAST CONCRETE MAY BE USED.
2. FOR 24 INCH RCP AND LARGER USE PIPE DIAMETER PLUS 12 INCHES FOR MINIMUM INSIDE DIMENSION.
3. GRATED INLETS SHALL NOT BE USED WITHIN TRAVEL AREAS.
4. TOP AND BOTTOM STEPS REQUIRED.
5. WHERE STEPS ARE REQUIRED, USE OF PRECAST CONCRETE SLAB SHALL BE USED AS TOP AND GRATE POSITIONED OVER STEPS.
6. YARD INLETS DEEPER THAN 10 FEET SHALL REQUIRE DOUBLE WALLS.

SCALE: NTS

DETAIL NO. 8.01B

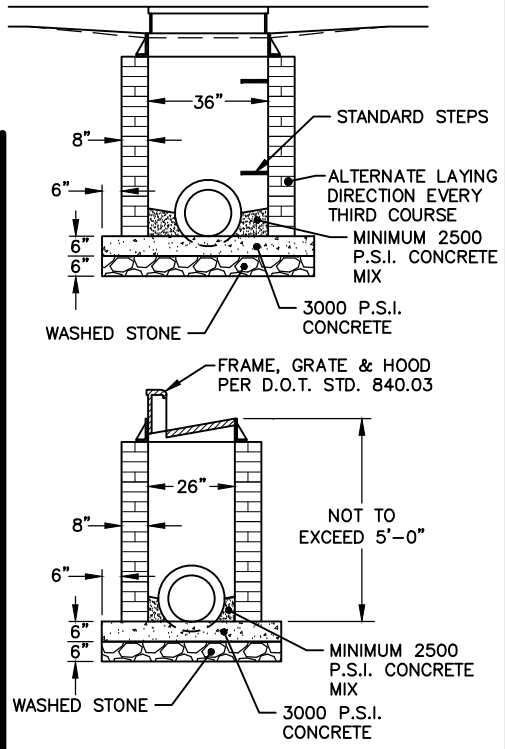
DATE: 6/15/23

SMITHFIELD
NORTH CAROLINA

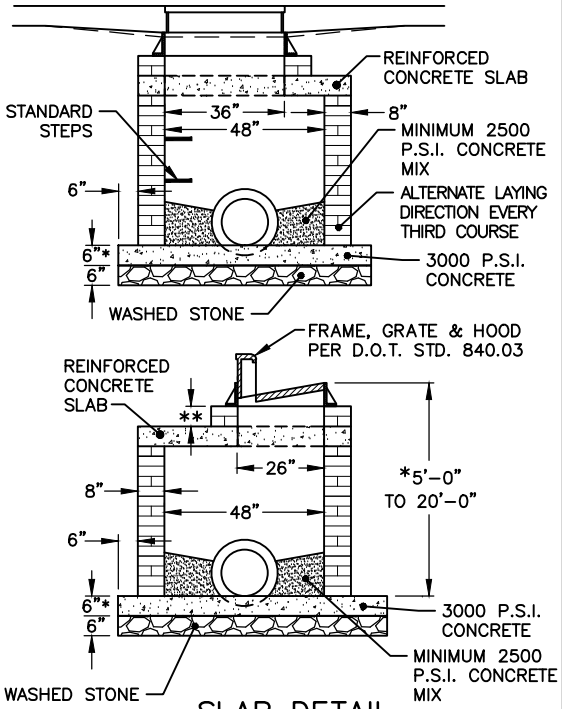
STANDARD CONCRETE BLOCK CATCH BASIN

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

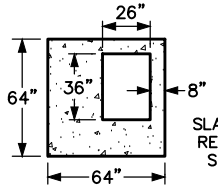
SHALLOW TYPE
(5 FEET OR LESS IN DEPTH)



INTERMEDIATE TYPE (4'X4')
(5 FEET TO 20 FEET IN DEPTH)

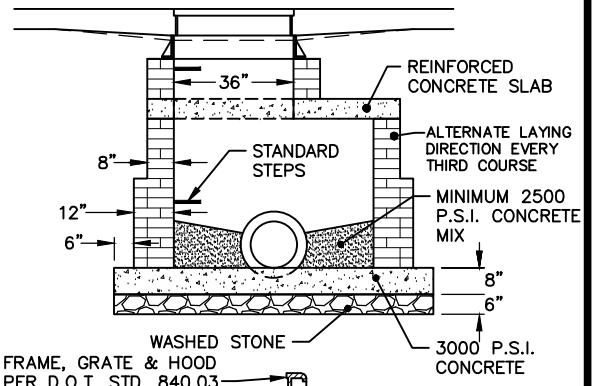


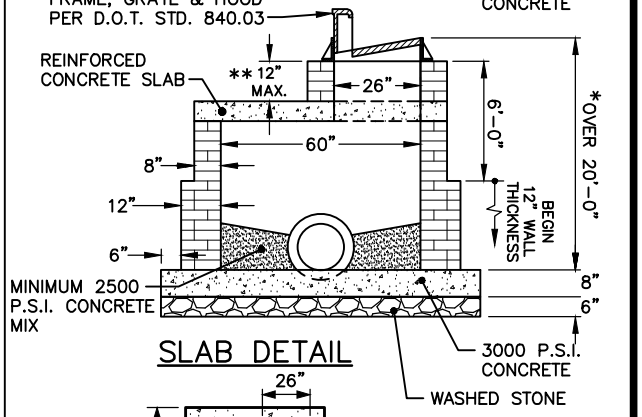
SLAB DETAIL



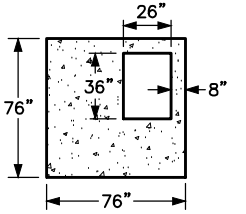
SLAB THICKNESS AND REINFORCEMENT FOR SOIL AND TRAFFIC LOADING BY AN ENGINEER

DEEP TYPE (5'X5')
(OVER 20 FEET IN DEPTH)





SLAB DETAIL



SLAB THICKNESS AND REINFORCEMENT FOR SOIL AND TRAFFIC LOADING BY AN ENGINEER

NOTE: TOP AND BOTTOM STEPS REQUIRED.

* OVER 8' IN DEPTH, 12" WALL THICKNESS TO 6' FROM TOP OF WALL, AND 8" BOTTOM SLAB SHALL BE USED.

** MAY BE USED TO ADJUST FRAME, GRATE & HOOD TO SURFACE ELEVATION A MAXIMUM OF 12 INCHES.

SCALE: NTS

DETAIL NO. 8.02

DATE: 6/15/23

STANDARD PRECAST CONCRETE CATCH BASIN

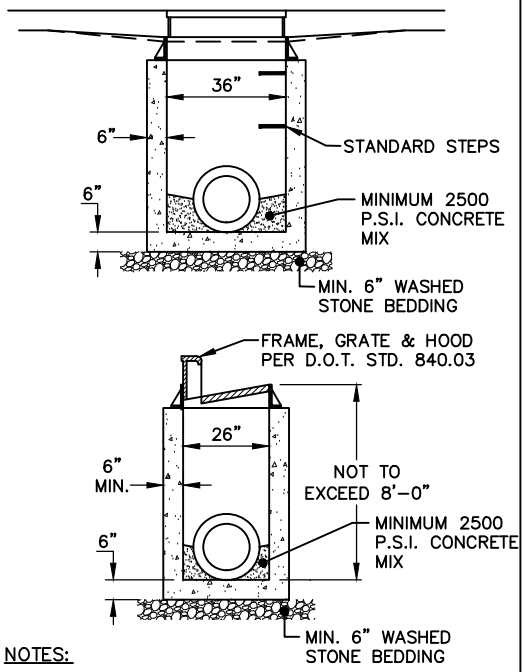
SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

SCALE: NTS

DETAIL NO. 8.02B

DATE:6/15/23

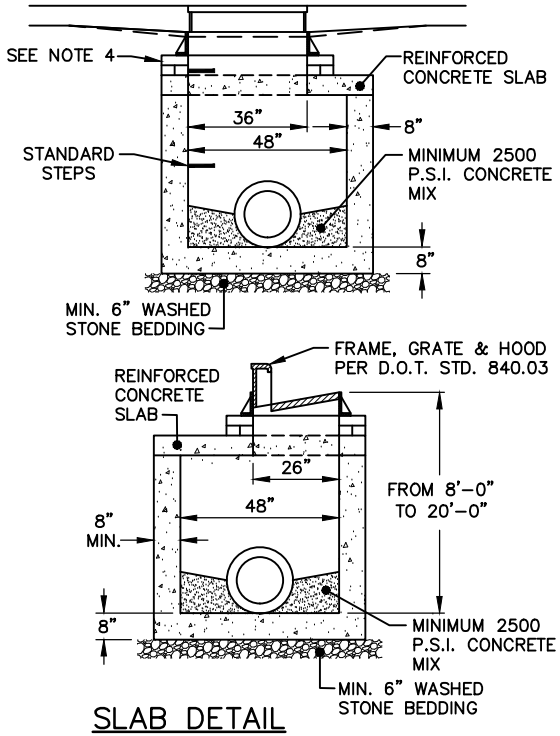
SHALLOW TYPE
(8 FEET OR LESS IN DEPTH)



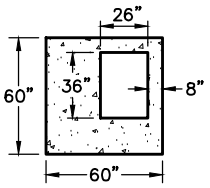
NOTES:

1. CONCRETE SHALL BE 4,000 P.S.I. MINIMUM FOR ALL PRECAST CONCRETE CATCH BASINS.
2. PRECAST CONCRETE STRUCTURES MAY ONLY BE INSTALLED TO DEPTHS CERTIFIED AS ACCEPTABLE BY THE MANUFACTURER.
3. "WAFFLE" BOXES ARE ACCEPTABLE FOR SHALLOW TYPE CATCH BASINS.
4. TOP AND BOTTOM STEPS REQUIRED.
5. BRICK MAY BE USED TO ADJUST FRAME, GRATE & HOOD TO SURFACE ELEVATION A MAXIMUM OF 12 INCHES.

INTERMEDIATE TYPE (4'X4')
(8 FEET TO 20 FEET IN DEPTH)

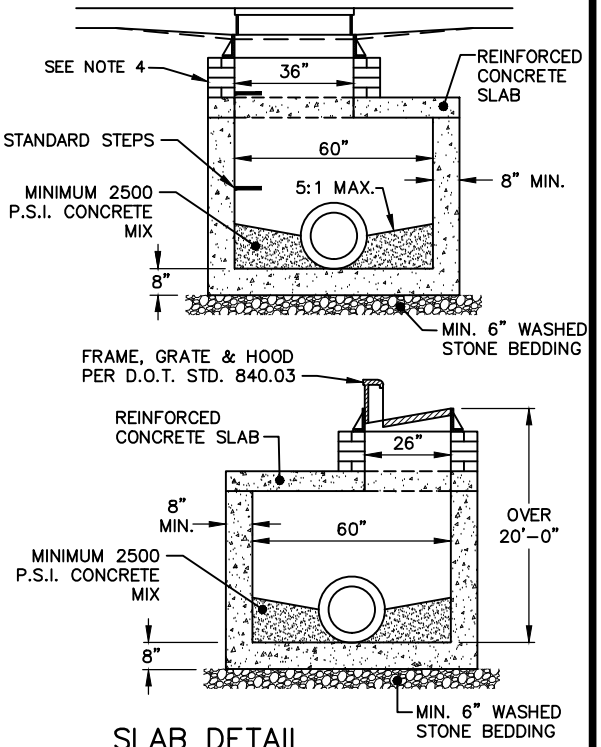


SLAB DETAIL

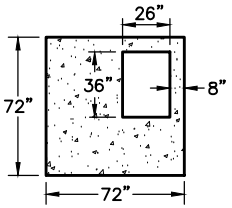


SLAB THICKNESS AND REINFORCEMENT FOR SOIL AND TRAFFIC LOADING BY AN ENGINEER

DEEP TYPE (5'X5')
(OVER 20 FEET IN DEPTH)



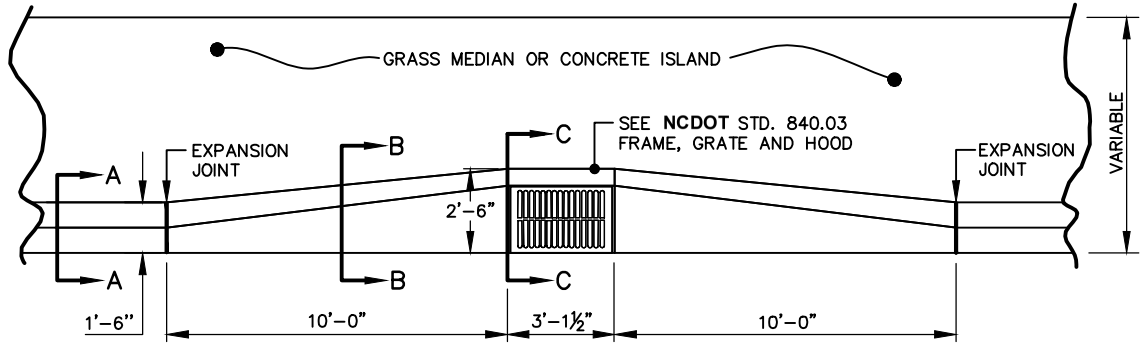
SLAB DETAIL



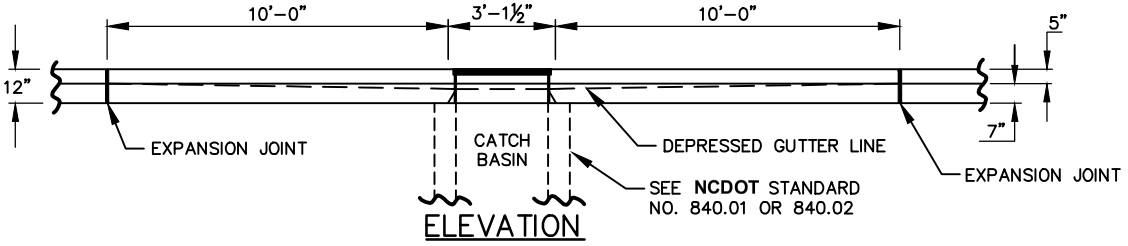
SLAB THICKNESS AND REINFORCEMENT FOR SOIL AND TRAFFIC LOADING BY AN ENGINEER

STANDARD MEDIAN CURB FOR CATCH BASIN

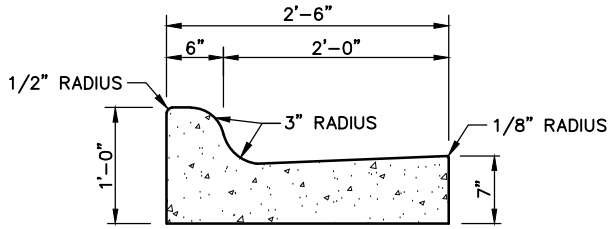
SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



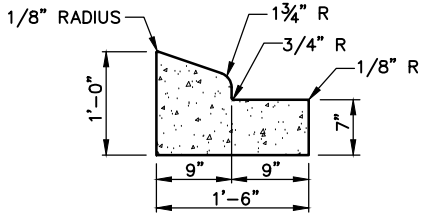
PLAN VIEW



ELEVATION



SECTION "C–C"



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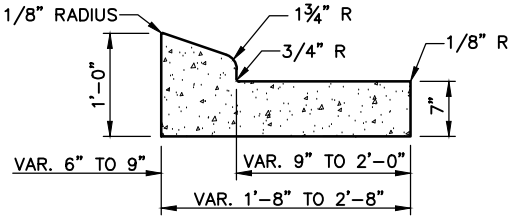

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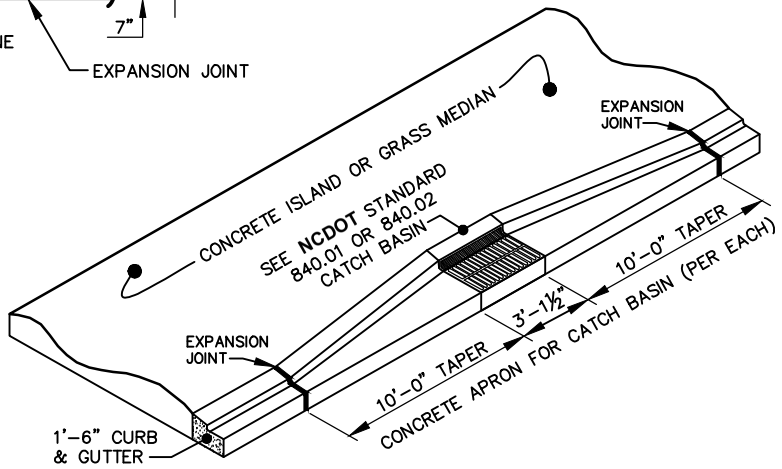
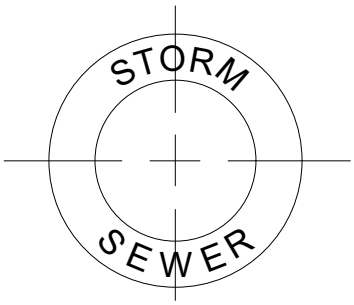


SCALE: NTS

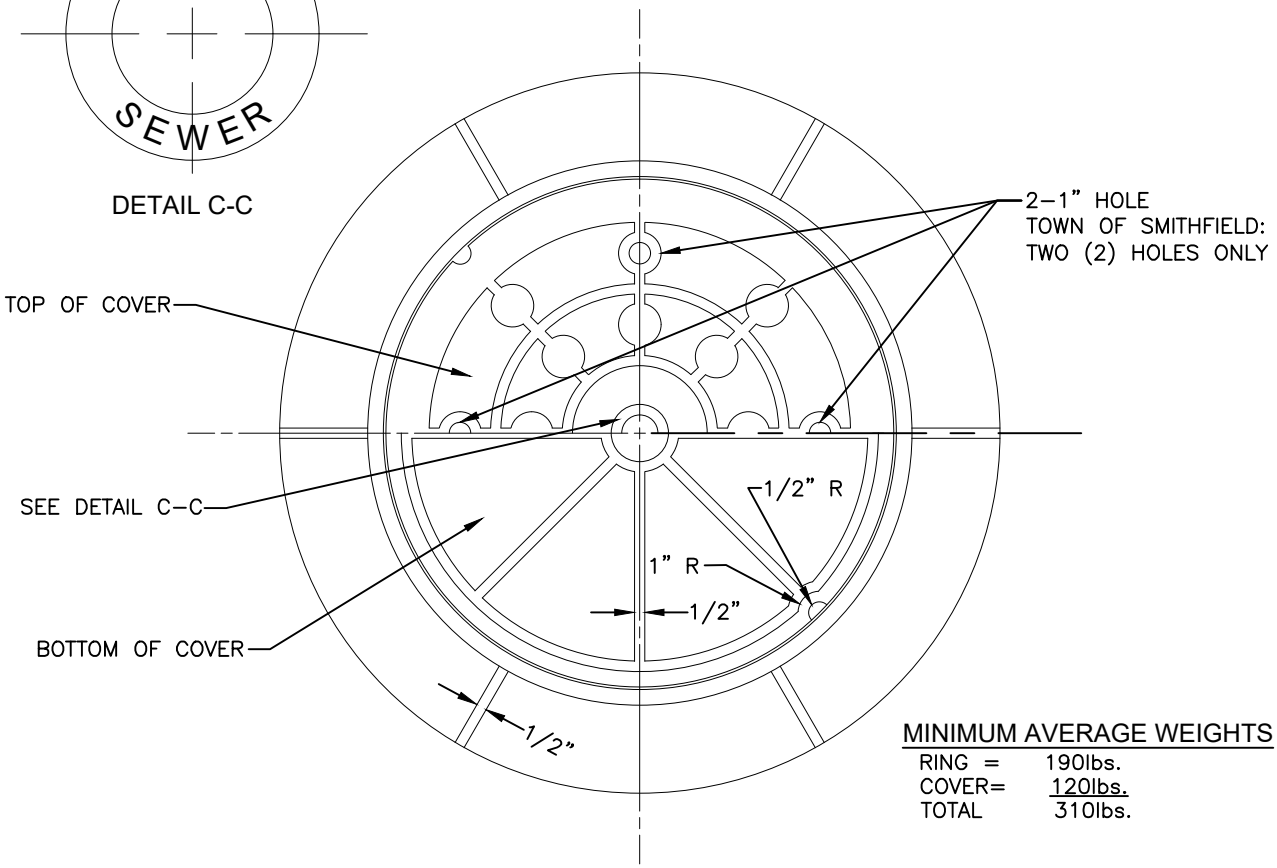
DETAIL NO. 8.03

DATE: 6/15/23



DETAIL C-C

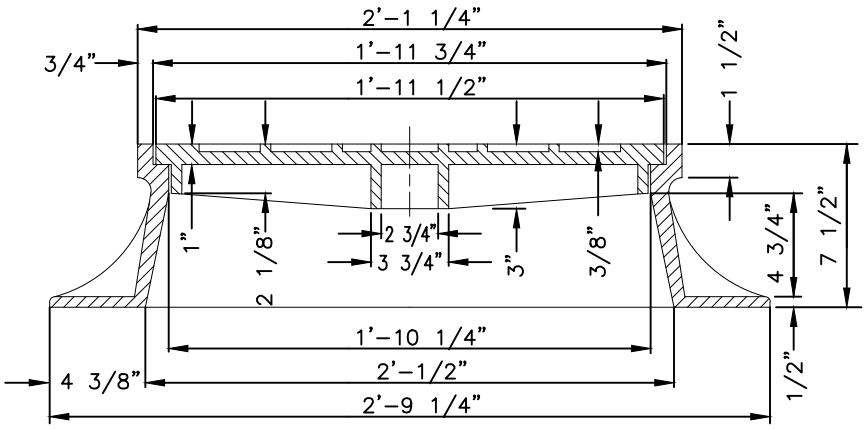
SOLID COVER MAY BE REQUIRED
DEPENDING ON FIELD CONDITIONS



PLAN

MINIMUM AVERAGE WEIGHTS

RING =	190lbs.
COVER=	120lbs.
TOTAL	310lbs.



SECTION

PROVIDE MANHOLE INSERTS MANUFACTURED FROM HIGH DENSITY POLYETHYLENE, MEETING THE REQUIREMENTS OF ASTM D–1248, CLASS A, CATEGORY 5, TYPE III. INSERTS SHALL BE EQUIPPED WITH 1 GAS RELIEF VALVE, 1 VACUUM RELIEF VALVE, A CROSS–LINKED POLYETHYLENE GASKET AND ONE HEAVY WEIGHT POLYPROPYLENE LIFTING STRAP.

SMITHFIELD
NORTH CAROLINA

STANDARD MANHOLE RING & COVER

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE: NTS

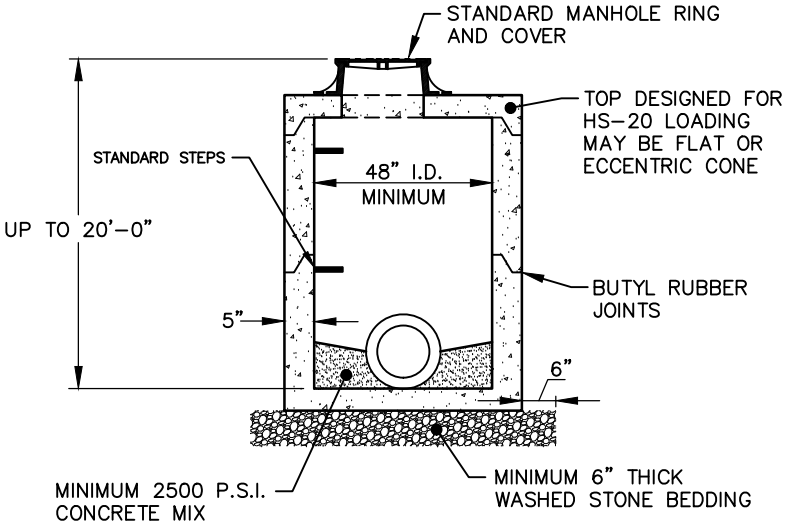
DETAIL NO. 08.04

DATE: 06/15/2023

STANDARD PRECAST CONCRETE MANHOLE JUNCTION BOX

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

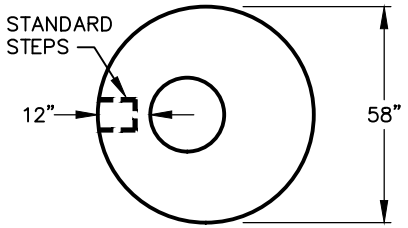
STANDARD TYPE
(UP TO 20 FEET IN DEPTH)



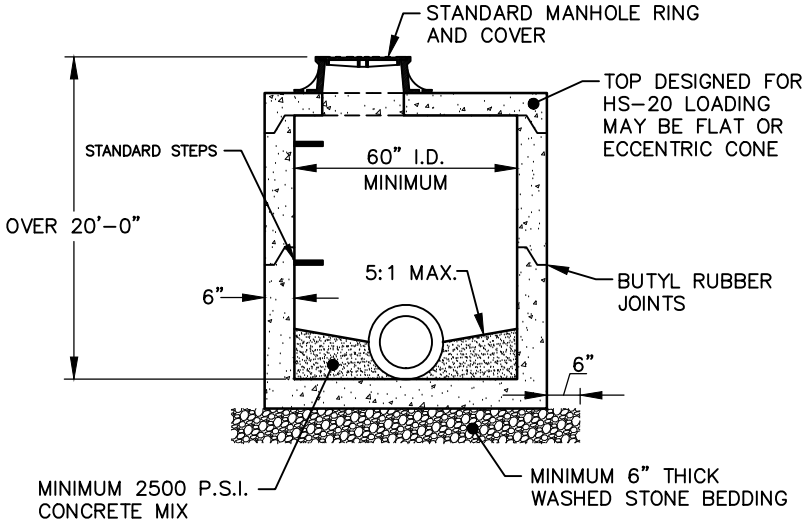
NOTE:

TOP AND BOTTOM STEPS REQUIRED.

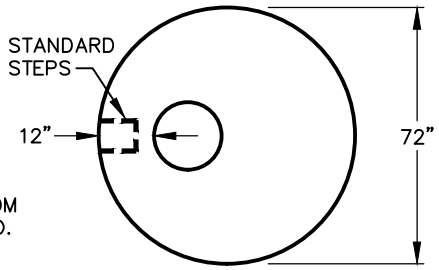
FLAT TOP DETAIL



DEEP TYPE
(OVER 20 FEET IN DEPTH)



FLAT TOP DETAIL



NOTE:

TOP AND BOTTOM STEPS REQUIRED.

SCALE: NTS

DETAIL NO. 8.05

DATE:6/15/23

SMITHFIELD
NORTH CAROLINA

STANDARD DRAIN CONNECTION TO STORM DRAIN BOX

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

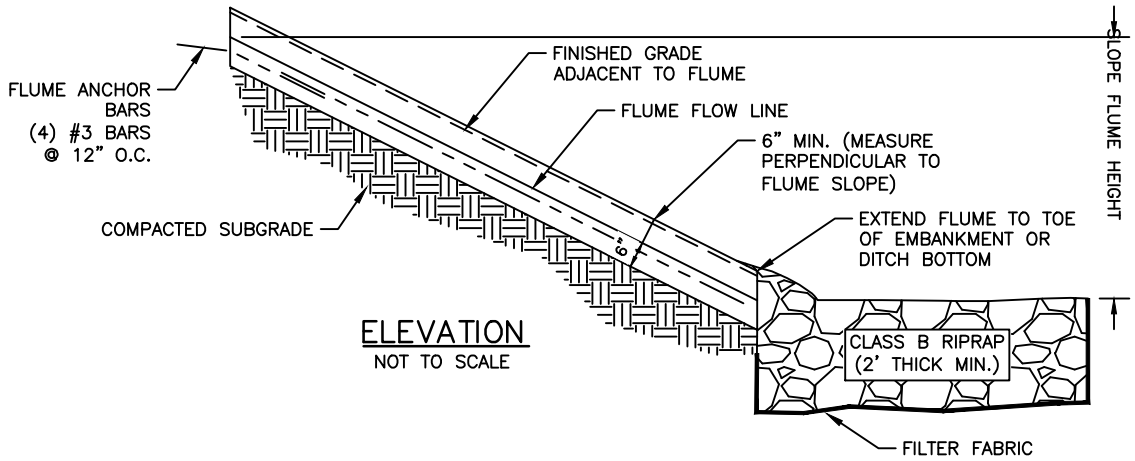
SCALE: NTS

DETAIL NO. 8.06

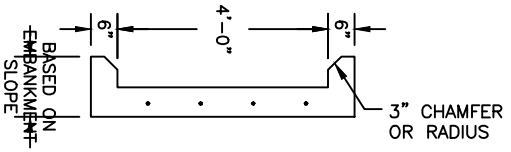
DATE: 6/15/23

STANDARD CONCRETE DRAINAGE FLUME

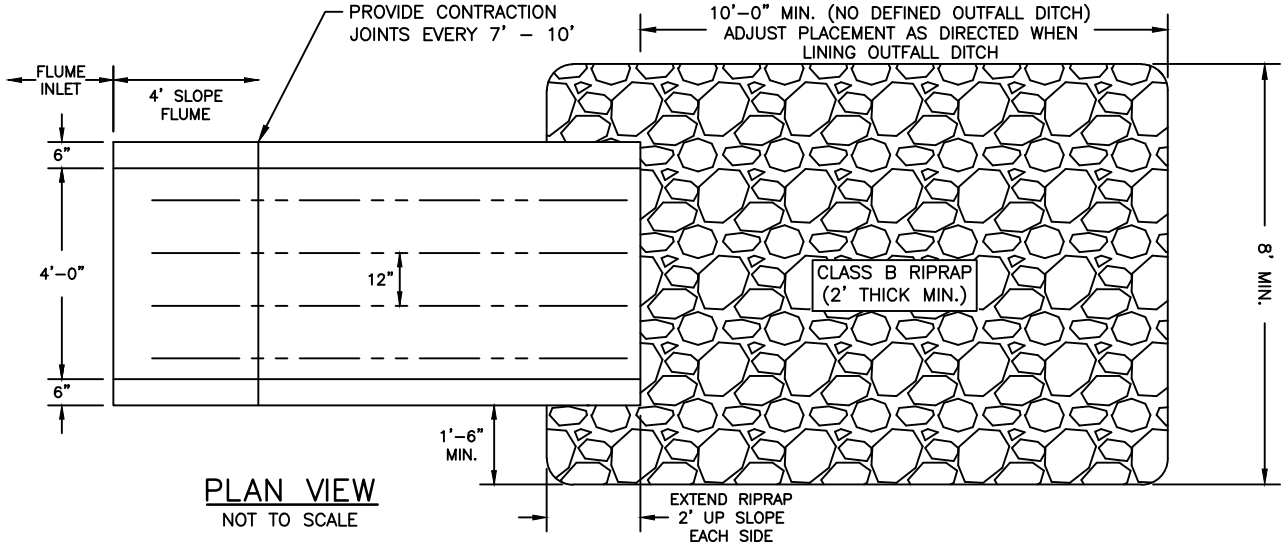
SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT



ELEVATION
NOT TO SCALE



SECTION
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

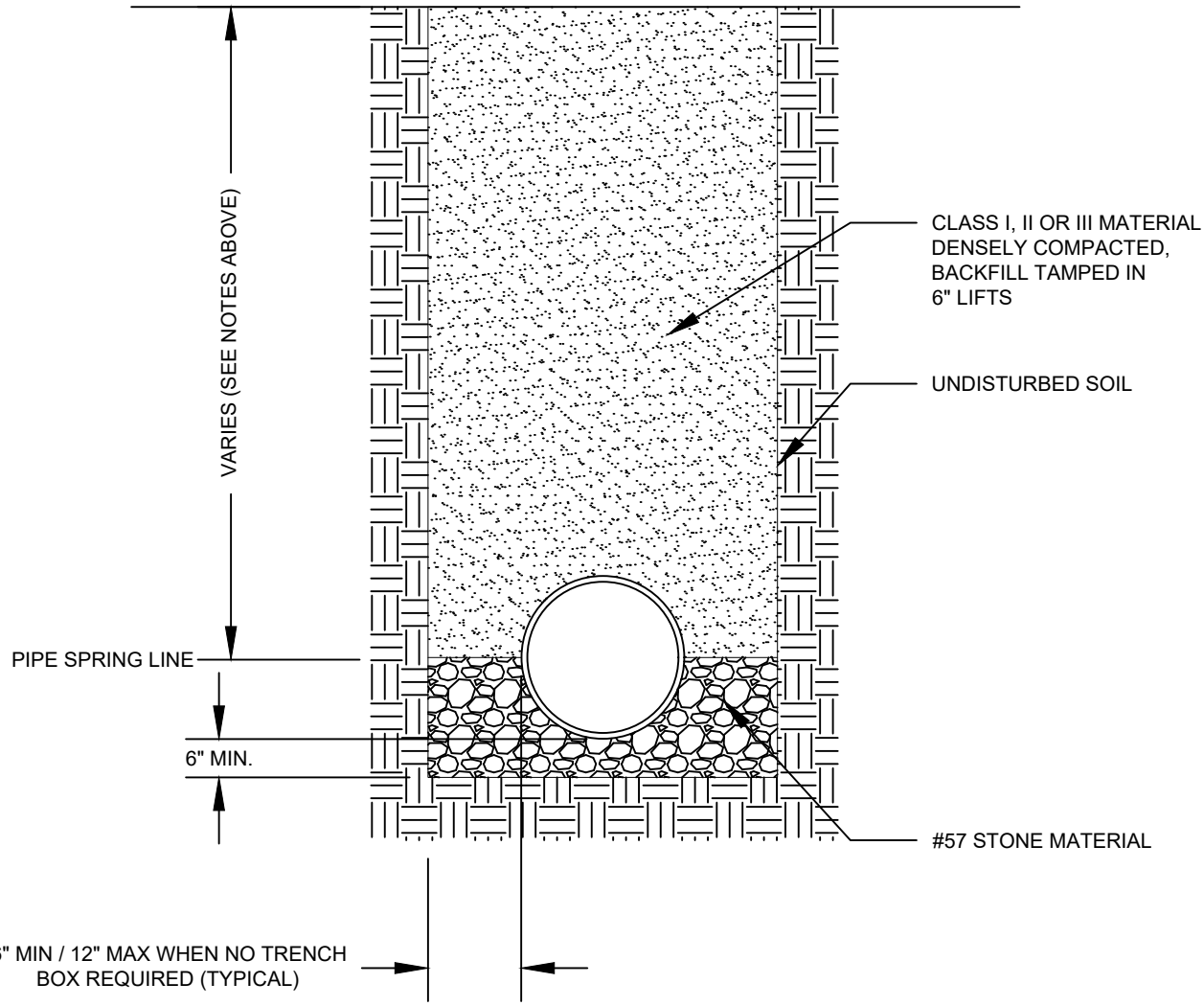
SCALE: NTS

DETAIL NO. 8.07

DATE: 6/15/23

NOTES:

1. MIN 2 FOOT COVER IN RESIDENTIAL DRIVEWAYS.
2. IN STREET SECTIONS, COVER SHALL ADHERE TO MANUFACTURER RECOMMENDATIONS FOR APPROPRIATE DEPTH AND PIPE CLASS



BEDDING FOR STORMWATER RCP PIPES

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE: NTS

DETAIL NO. 08.08

DATE: 06/15/2023

SECTION 10
TREE PLANTING AND PROTECTION

X.01 TREE PLANING

All Trees to be planted shall conform to the American Standards for Nursery Stock, published by the American Association of Nurserymen, latest edition.

Trees shall be well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

Native trees species are preferred, and exotic invasive species shall be prohibited. It is recommended that trees be selected from the Town's Recommended Plant List found in the Unified Development Ordinance, Article 10, Section 10.18.

A. Balled and Burlap (B&B), Container and Bare Root Plant Materials

1. Trees designated B&B shall be properly dug with firm, natural balls of soil with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree, retaining as many fibrous roots as possible. Balls shall be firmly wrapped with biodegradable burlap and secured with nails as recommended by ANSI Z60.1. Balled and Burlap Trees shall be planted as shown on the Standard Tree Planting Detail 0x.x1.

2. The root flare shall be apparent at the surface of the root ball, or the contractor will be responsible for removing excess soil from the top of the root ball in order to establish the correct grade. Trees shall be rejected if the root flare has been buried long enough for the stem to sprout adventitious roots. Trees with loose, broken, processed, or manufactured root balls will not be accepted.

3. Container-Grown Stock shall be healthy, vigorous, wellrooted exterior plants grown in a container with wellestablished root system reaching sides of container and maintaining a firm ball when removed from container. The root flare shall be apparent at surface of ball, or the contractor will be responsible for removing excess soil from the top of the root ball in order to establish the correct grade. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.

4. Bare root material shall be grown in the ground in the nursery without artificial root restriction devices, such as containers or fabric bags, under favorable growing conditions and which have received the proper cultural treatment to develop a well-branched root system. After harvest, the soil is removed from the roots.

B. Delivery, Storage and Handling

1. trees shall not be pruned before delivery. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.

2. Handle planting stock by root ball. Heavier material shall be handled with straps on the root ball and appropriate equipment such as a small skid steer loader.

3. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

4. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

    i. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
    ii. Do not remove container-grown stock from containers before time of planting.
    iii. Water root systems of trees stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.
    iv. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out trees.

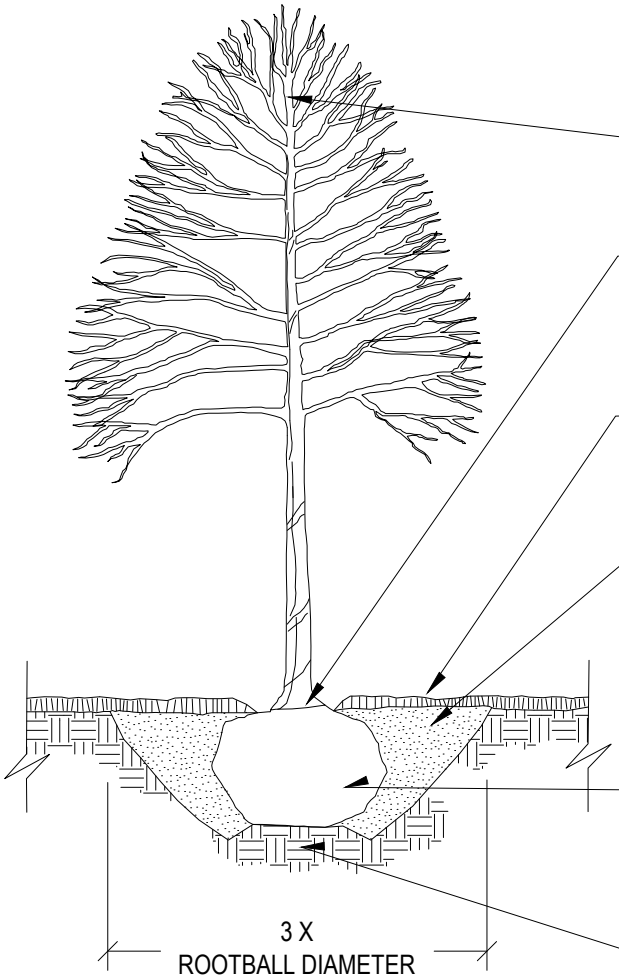
C. Tree Planting Standards.

1. Trees to be installed under overhead utility lines shall have a mature height of no greater than 30ft.
2. Trees will be planted in accordance with the Unified Development Ordinance, Article 10, Part II.
3. Trees should have the following recommended minimum distance from walks, curbs and utilities:

Recommended Minimum Distance from Walks, Curbs and Utilities	
Sidewalks	2’
Back of curb	2’
Driveways	10’
Structures	10’
Manholes and catch basins	10’
Fire hydrants	10’
Water meters and other utility boxes	5’
Traffic signs	10’
Stop signs	30’

Light poles	10’
Water and sewer lines that cross planting strip	10’
Sewer easements	prohibited

Tree Protection



DO NOT PRUNE LEADER. PRUNE OR CUT ONLY DEAD OR DAMAGED BRANCHES TO AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) A300 STANDARDS

REMOVE EXCESS SOIL TO EXPOSE THE ROOT FLARE. THE ROOT FLARE SHALL BE PLANTED AT GRADE, NO HIGHER THAN 2" ABOVE GRADE, AND NEVER BELOW GRADE. TREE SHALL BE SET PLUMB

APPLY 3" AVERAGE THICKNESS OF ORGANIC MULCH EXTENDING 12" BEYOND THE PLANTING PIT OR TRENCH. KEEP MULCH 3" FROM ROOT FLARE AND DO NOT CONTACT STEM.

PLANTING SOIL MIX AROUND ROOT BALL. 600 CU FT OF NATIVE SOIL (IF SUITABLE FOR VIGOROUS AND HEALTHY GROWTH) OR UNSUITABLE SOIL SHALL BE AMENDED WITH 2-PARTS TOPSOIL AND 1-PART COMPOST REQUIRED PER TREE. STRUCTURAL SOIL SHALL BE USED WHEN TREES TO BE SURROUNDED BY CONCRETE WALKS, LANDSCAPE ISLANDS OR ROADS.

COMPLETELY REMOVE TOP HALF OF BURLAP, LACING STRAPS, NAILS AND WIRE BASKET AND DISCARD FROM HOLE. ALL SYNTHETIC BURLAP MUST BE REMOVED FROM SIDES OF ROOT BALL.

ROOT BALL SHALL BE PLACED DIRECTLY ON COMPACTED SUBGRADE. HANDLE TREE BY THE ROOT BALL ONLY.

NOTES:

1. TREES MUST CONFORM TO AMERICAN STANDARDS FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMAN (A.A.N) AND UNIFIED DEVELOPMENT . ORDINANCE SECTION 10.18 - RECOMMENDED PLANT-LIST.
2. CONTRACTOR IS RESPONSIBLE FOR ADEQUATE DRAINAGE OF ALL PLANTING PITS (POSITIVE DRAINAGE AWAY FROM PIT).
3. TREES SHALL BE PLANTED BETWEEN OCTOBER 1ST AND APRIL 30TH.
4. ELECTRICAL OUTLETS AND OTHER UTILITIES ARE PROHIBITED IN THE PLANTING AREA IMMEDIATELY SURROUNDING THE TREE.
5. ALL TREE STAKING MUST BE REMOVE WITHIN ONE YEAR.
6. TREES WILL HAVE A MINIMUM 1 YEAR WARRANTY AFTER INITIAL PLANTING IS APPROVED BY THE TOWN.

SMITHFIELD NORTH CAROLINA

STANDARD TREE PLANTING DETAIL

SMITHFIELD, NORTH CAROLINA
PLANNING DEPARTMENT

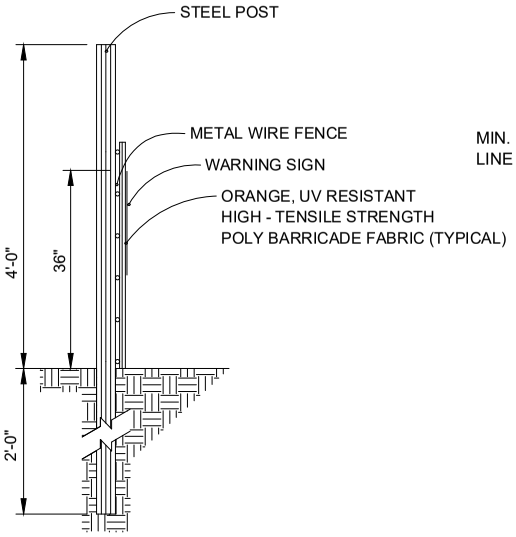
SCALE: NTS

DETAIL NO. ___

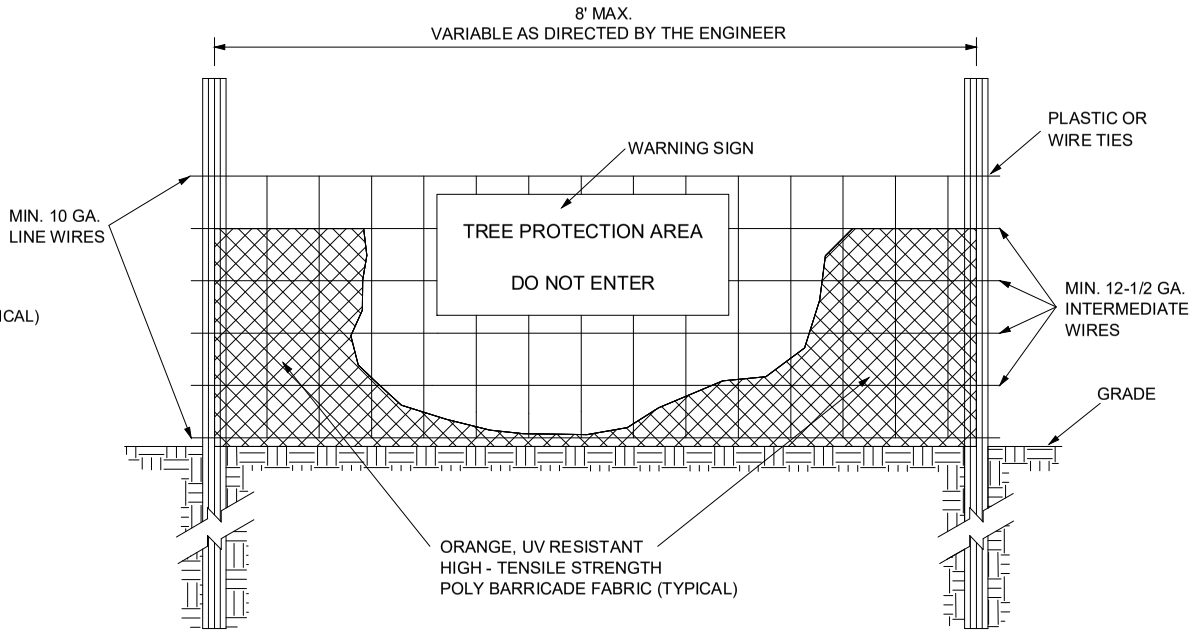
DATE:12/12/2022

STANDARD TREE PROTECTION DETAIL

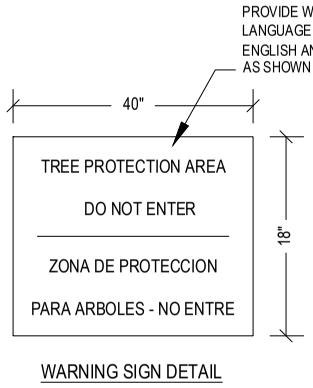
SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES



SIDE VIEW



FRONT VIEW



WARNING SIGN DETAIL

NOTE: FOR TREE PROTECTION ONLY

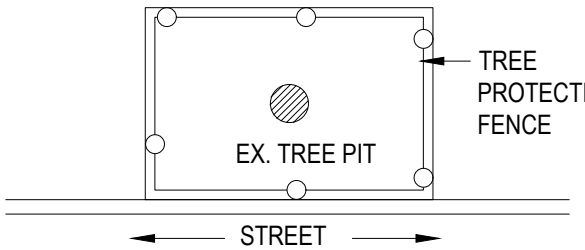
NOTES:

1. TREE PROTECTION FENCING MUST BE INSTALLED AT A MINIMUM RADIUS OF THE CRITICAL ROOT ZONE (SEE DETAIL TPP-02 FOR EXAMPLES)
2. THE TREE PROTECTION FENCING MUST REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE APPROVED BY THE PLANNING DEPARTMENT.
3. APPROVED IMPACT PROTECTION DEVICES MUST BE REMOVED AFTER CONSTRUCTION WHEN APPLICABLE.
4. SIGNS SHALL BE PLACED AT 50' MAXIMUM INTERVALS. PLACE A SIGN AT EACH END OF LINEAR TREE PROTECTION AND 50' ON CENTER FOR THE REMAINDER
5. FOR TREE PROTECTION AREAS LESS THAN 200' IN PERIMETER, PROVIDE NO LESS THAN ONE SIGN PER PROTECTED AREA.
6. ATTACH SIGNS SECURELY TO FENCE POSTS AND FABRIC.
7. ADDITIONAL SIGNS MAY BE REQUIRED BY TOWN OF SMITHFIELD BASED ON ACTUAL FIELD CONDITIONS.
8. SIGNS ARE TO BE MADE OF DURABLE, WEATHERPROOF MATERIAL WITH LETTERS A MINIMUM OF 2 1/2" HIGH, CLEARLY LEGIBLE AND SPACED AS SHOWN.
9. TREE PROTECTION MAY REQIRE ADJUSTMENTS AS DEFINED IN THE MOST RECENT VERSION OF THE AMERICAN STANDARD OF NURSERY STOCK MANUAL, . PUBLISHED BY THE AMERICAN HORTICULTURAL INDUSTRY ASSOCIATION.

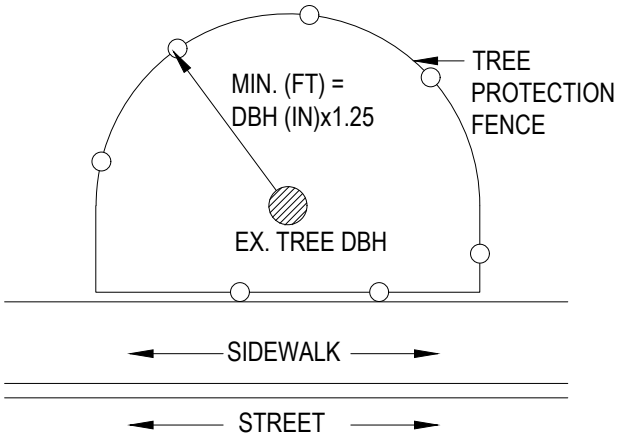
SCALE: NTS

DETAIL NO. 07.05

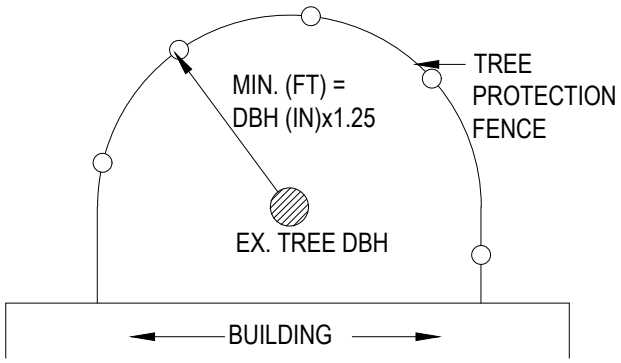
DATE: 04/03/2018



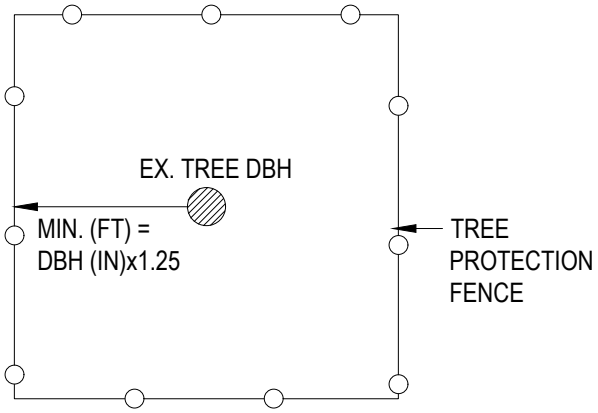
A. IN TREE PIT



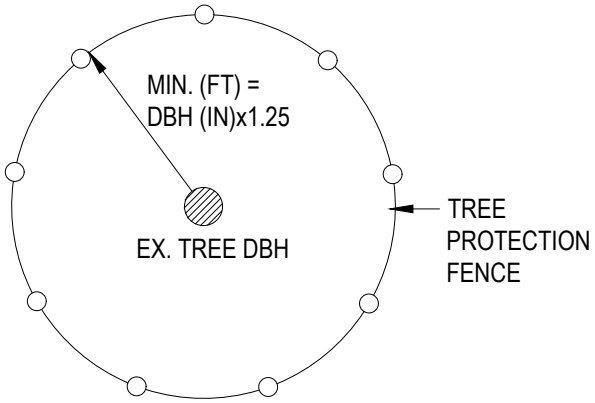
B. BY SIDEWALK



C. BY BUILDING



D. SQUARE LAYOUT



E. CIRCULAR LAYOUT

NOTES:

1. CONTRACTOR MUST PROVIDE AND INSTALL TREE PROTECTION SIGNAGE.
2. A ZONING PERMIT IS REQUIRED PRIOR TO INITIATION OF CONSTRUCTION IF ANY TREES ON TOWN PROPERTY ARE TO BE IMPACTED BY PRUNING, TRENCHING, BORING, REMOVAL, PAVING, PLANTINGS, ETC.

SMITHFIELD
NORTH CAROLINA

STANDARD TREE PROTECTION FENCE LAYOUT DETAIL

SMITHFIELD, NORTH CAROLINA

SCALE: NTS

DETAIL NO. ——

DATE: 12/12/2022