

**Town of Jamestown
Technical Standards
Manual**



Adopted May 19, 2009

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100.00 General Standards

100.1 General

All construction and material shall conform to Town of Jamestown standards and specifications. Should any conflicts or discrepancies arise between Town of Jamestown and North Carolina Department of Transportation requirements, the more restrictive standard will apply. Public Services staff must be notified in writing of the conflict or discrepancy prior to any action being taken. The Public Services Director, in consultation with other relevant agencies, may allow modifications to the design criteria.

Modifications to the Design Criteria

- 1) Must be based on sound engineering principles and practices,
- 2) Must not create an unsafe or hazardous situation,
- 3) Must be equivalent to the efficiency, functionality, durability, structural integrity, and long-term maintenance of the minimum standard within this article.

All costs associated with materials, installation and testing shall be the responsibility of the developer/property owner contract.

The Town of Jamestown shall be notified at least 7 days prior to testing. Any testing conducted without town personnel being present shall be re-tested. The design engineer shall be responsible for scheduling and witnessing all tests for required certifications.

All as-built certifications required by any agency, including but not limited to the Public Water Supply branch (water), Division of Water Quality (sewer), Division of Land Quality (erosion control), and the North Carolina Department of Transportation, shall be provided by the Owner's design engineer at no cost to the Town. As-builts shall be provided on a disk to the Town in an AutoCad R14 version as well as a *.tif file. Three paper copies and one mylar shall also be provided.

Any approvals, certifications, required encroachment agreements, or easements from other agencies/property owners shall be obtained prior to commencement of construction. This requirement shall include any necessary 401/404 permits. Should a 401/404 not be required, the owner's representative must notify the Town in writing.

100.2 Bores of Water and Sewer Lines

Sewer lines and water lines shall be bored under existing streets and where deemed necessary by the Public Services Department. Encasement pipe shall be uncoated steel pipe conforming to the Standards of AWWA C200. Minimum diameter and wall thickness shall be as follows:

Encasement Pipe O.D.	Roadway	Railroad
14"	0.216"	0.250"
16"	0.250"	0.281"
20"	0.250"	0.344"
24"	0.250"	0.375"
30"	0.312"	0.469"
36"	0.375"	0.531"
42"	0.438"	0.625"
48"	0.500"	0.688"

All carrier pipes installed with joints inside an encasement pipe must utilize restrained joints. Carrier pipe may be from one of the following manufacturers:

- (1) Griffin Pipe Products
- (2) American Cast Iron Pipe Company
- (3) Mech-Lok
- (4) US Pipe MJ Harness-Lok

100.3 Acceptance of New Streets and Utilities

The design engineer shall provide vertical and horizontal as-built information on water, sewer, and storm drainage improvements. As-built information shall be approved prior to any acceptance of new streets to the Town of Jamestown.

100.4 Repeal of Previous Town of Jamestown Water, Sewer, and Street Standards

The Town of Jamestown Water, Sewer, and Street Standards adopted in July 2004 are hereby repealed.

100.5 Conflict

All other specifications and unapproved detail drawings inconsistent or conflicting with any part of this manual are hereby repealed to the extent of such inconsistency or conflict.

100.6 Amendments

The Town of Jamestown expressly reserves the right to amend, modify, rescind, or supplement this manual.

100.7 Adoption and Effective Date

This manual shall be in full force and effect from and after its passage, approval and publication, as approved by the Town Manager of the Town of Jamestown on May 19, 2009.

200.00 WATER STANDARDS

200.1 General

Minimum water line installation size shall be 2". Six inch water line may be used for short segments as approved by the Public Services Director and where required for hydrant installation. Refer to the Town of Jamestown Standard Details for water line installation.

200.2 Water Mains

- Water line installation for town maintained streets shall be either ductile iron pressure class 350 or PVC C-900 pressure class 150, DR 18. A tracer wire shall be installed during water line installation for PVC only. Fittings for ductile iron or PVC pipe shall be compact fittings pressure class 350. Water line installation within NCDOT maintained roads shall be limited to ductile iron pressure class 350 pipe with compact fittings. The minimum cover for water mains is forty eight inches (48").
- Saddles shall be double strap design, manufactured of bronze, with corporation thread (Required for C-900 and ductile iron pipe 8" or less in diameter). Approved saddles are:
 1. Mueller Brass Service Saddle BR2B Style with AWA/CC
 2. Smith Blair 325 or 313
 3. Ford Brass Service Saddle 202B Series

200.3 Hydrants

Hydrants shall have a compression type main valve, open left, closing with line pressure. Nominal main valve opening shall be a 4 ½ inch, with bronze to bronze seating, and 6-inch mechanical joint elbow. Hydrants shall have one 4 ½ inch steamer nozzle, and two 2 ½ inch hose nozzles all with national standard threads. Other hydrant features shall be a breakable safety stem coupling and breakable safety flange design, dry top design, a weather cap/shield around the operating nut, and a 4 ½ foot bury body. The interior of the hydrant base and all ferrous metals of the lower valve plate assembly shall be coated with a minimum of 8 mils of liquid epoxy. The liquid epoxy shall be AWWA approved for potable water. All other interior and exterior ferrous metal surfaces shall receive one coat of primer paint in accordance with AWWA standards. Hydrants shall be painted to Jamestown colors - safety yellow (Devon Paint #4308-9400) & white (Devon Paint #4308-0100).

Hydrants shall comply with AWWA Standard C-502. Hydrants used may be from one of the following manufacturers:

- (1) Mueller Centurion A-421
- (2) Kennedy K-81D

200.4 Valves

At intersections, valves shall be placed in each pipe leg leaving the intersection. Valves not located in streets shall have a concrete valve collar.

200.4.1 Valves 12-inches and Smaller

Valves 12-inches and smaller shall be resilient wedge gate valves conforming to the applicable requirements of AWWA C509 Standards, with a working pressure of 250 psi, O-ring sealing, 2" square operating nut, open left and mechanical joint ends. Valves manufactured of ductile iron shall meet all applicable requirements of AWWA C515 with a

working pressure of 250 psi. All interior and exterior ferrous metal surfaces shall be coated with a minimum of 8 mils of fusion-bonded coating meeting the requirements of AWWA C550. Approved manufacturers are:

- (1) Mueller Super-Seal Resilient Wedge A 2360 with M.J. Ends
- (2) Kennedy 509

Resilient wedge gate valves shall be warranted to the owner for 10 years from date of purchase against defective material or workmanship.

200.4.2 Tapping Sleeve/Saddle and Valve

Tapping sleeves shall be manufactured of ductile iron, cast iron or stainless steel. Flanged faced and drilled per ANSI B 16.1, with standard tapping flange counterbore per MSS SP-60. Tapping sleeves shall meet minimum working pressure requirements of 200 psi. All tapping sleeves shall include a test plug. Water line taps shall be wet taps only. Examples of compliant tapping sleeves are:

Ford FTSS-SS (stainless steel) Series	Approved in sizes 4" x 4" through 24" x 12"
Mueller H-304 with Ductile Iron or Stainless Steel Flange H-304SS	Approved in sizes 4"x 4" through 24"x 12"

Note: Tapping sleeves and saddles are to be water pressure tested for leaks, through the test plug, for a period of five (5) minutes at 150 psi or as directed by the engineer or town representative. Air testing of the tapping sleeves is not permitted.

Tapping Saddles shall be stainless steel, flanged faced and drilled per ANSI B 16.1 with standard tapping flange counterbore per MSS-SP60. Straps are to be manufactured of alloy steel. Tapping saddles shall meet minimum working pressure requirements of 250 psi for 4" – 12" sizes and 200 psi for 14" – 24".

200.5 Pipe Fittings

Pipe fittings shall be ductile iron designed and manufactured as per ANSI/AWWA C110/A21.10. Fittings shall be designed for an internal pressure of 250 psi Class 350 ductile iron compact fittings may be furnished as an alternate to Class 250 iron fittings. Ductile iron material used for Class 350 iron fittings shall conform to ASTM A536, minimum grade 70-50-05. Thickness of Class 350 iron fittings shall be equal to, or exceed, 350 psi working pressure rated ductile iron pipe thickness. Radii or curvatures shall conform to ANSI A21.10. The Class 350 ductile iron compact fittings shall conform to ANSI/AWWA C153/A21.53 and all applicable provisions of this Article. Lining for all pipe fittings shall be cement mortar with a seal coat of bituminous material, all in accordance with ANSI A21.4. All pipe fittings shall have mechanical joints in accordance with ANSI A21.11.

200.6 Valve Boxes

Valve boxes may be Cast Iron, slip or screw, 18" - 24", 24" - 36", 36" - 48". Boxes shall be from one of the following manufacturers:

- (1) Charlotte – Model # 562-A
- (2) Tyler – Series 6855, Model # 562-A, 564-A, or 664-A
- (3) EJIW – 8555 Series, Model #562-A, 564-A, or 664-A

200.7 Water Service Lines

200.7.1 Standard Residential Services

Water service lines shall be Type K Copper, ASTM B-88-62. A 1" tap and 1" service line shall be provided to the meter. A 1"x 3/4" compression tee shall be installed before domestic meter yoke. The 3/4" Branch will be for the domestic service & the 1" line (for irrigation) will be capped off with a 1" curb stop, and a 1" brass plug. Compliant curb stops are:

- (1) Mueller B-25172
- (2) Ford B41-444

200.7.2 Other Water Service Line and Sprinkler Line Services

Construction plans detailing water service and irrigation lines to non-residents will not be performed by the Town of Jamestown. Non-residential homeowners must hire a licensed utility contractor to perform water service taps. All water service lines under 4" shall be Type K Copper, ASTM B88. Lines 4" and greater shall be ductile iron. Backflow prevention devices shall be approved by the Public Services Department.

200.8 Corporation Stops

Corporation stops used shall be:

- (1) Mueller B 25008
- (2) Ford FB1000-4

200.9 Meter Yokes

All yokes and meter boxes shall be set in the middle of lots. Any yoke or meter box not set in the middle of the lot must be approved by the Public Services Director. The top of yoke shall be no higher than 12" ± 2" below the final grade.

- (1) Mueller B-2404R2A (5/8" x 3/4" x 7") with (1) H-14227 Mueller Coupling on the town's side of the meter yoke and (1) H-14222 D P coupling on the customer's side of the meter yoke shall be installed.
- (2) Ford VBH70 w/PW (with compression connections for copper tubing)

Note: Yokes must have a padlock on the angle ball valve.

200.10 Meter Boxes

Water meters shall have two cast iron oval meter box with 1 3/4" diameter hole cut in lid for touch read pad.

- (1) Decatur Meter Box MBX-2HP 3/4" & 1"

200.11 Backflow Prevention

Backflow prevention is required depending on the degree of hazard as stipulated in the Town of Jamestown Manual for the Backflow Prevention and Cross Connection Policy.

200.12 Pressure Testing and Chlorination of Water Lines

200.12.1 Flushing of Lines Prior to Testing

Prior to pressure testing and disinfection, the contractor shall flush all water mains with a polyurethane foam pipe pig (minimum 5 pounds per cubic foot density) by Knapp Poly Pig Inc. or approved equal. The pipe pig shall be propelled hydraulically through the mains at a rate sufficient to remove all foreign matter. Valves shall be operated in a manner which will direct the pipe pig toward the end of the main or a selected discharge point. The pig shall be removed through an open end of the main, a fitting, or through a fire hydrant which has the main valve seat ring removed. Flushing shall continue until the engineer or town inspector determines that the mains are free from all foreign matter. The engineer/engineer's representative or town inspector must be present during the entire flushing process. Any work done without supervision will not be accepted.

200.12.2 Pressure Testing

The Contractor shall furnish all labor and equipment necessary to perform the pressure tests. The pressure test shall be performed by the Contractor and observed by the town's representative and engineer or engineer's representative.

Unless modified in the project special provisions, the test pressure shall be 150 psi as measured at the lowest elevation of the line. The duration of the test shall be two hours. The 150 psi test pressure shall be maintained during the two hours by use of a by-pass pumping system. Allowable leakage per 1,000 linear feet of pipe per two hours shall be as follows:

Pipe Size (inches)	Allowable Leakage (Gallons)
4	0.73
6	1.11
8	1.47
10	1.84
12	2.21
14	2.57
16	2.94

Note: If pressure testing of the water line fails due to one or more leaking joints, those joints shall be cut out or removed from the pipe installation and closure shall be made with suitable lengths of ductile iron pipe and mechanical joint solid sleeves. Bell joint repair clamps are not permitted.

200.12.3 Chlorination

All water lines or appurtenances added to or replaced in the Town of Jamestown water system shall be properly chlorinated before being placed in service. An independent testing firm under the supervision of the engineer or engineer's representative and town's representative shall perform the testing. Any pipe subjected to contaminating materials shall be treated as directed by the engineer/engineer's representative. Should such treatment fail to cleanse the pipe, the contractor shall replace the pipe at no cost to the town. The contractor shall perform the chlorination of a completed line in the following manner:

(1) Taps will be made at the control valve located in the upstream end of the line and at all extremities of the line. These taps shall be located in such a manner as to allow high-test hypochlorite (HTH) solution to be introduced into all parts of the line.

(2) A water solution containing HTH (65%) available chlorine shall be introduced into the line by regulated pumping at the control-valve tap. The solution shall contain a concentration of HTH that will produce a uniform concentration of 100 ppm total chlorine immediately after the introduction of the solution into the line has been completed.

The following quantities of 65% HTH compound per 1000 feet of line is required to produce a solution concentration of 100 ppm total chlorine as stated above:

Pipe Size (inches)	65% HTH (Pounds per 1,000 feet of line)
4	0.84
6	1.88
8	3.35
10	5.70
12	7.53
14	10.26
16	13.43

The HTH solution shall be circulated in the line by opening the control valve and systematically manipulating hydrants and taps at the line extremities. The HTH solution must be pumped into the line at a constant rate for each discharge rate in order that a uniform concentration will be maintained in the line. Water laterals shall be sterilized by the contractor using methods acceptable to the engineer. The contractor shall bear the same responsibility for water laterals as he bears for water mains and appurtenances, including any costs for corrective measures needed to comply with the bacteriological requirements. The HTH solution shall remain in the lines for a minimum of 24 hours. If directed by the engineer/engineer's representative, the HTH solution shall remain in the lines longer than 24 hours. At the end of this period, the free residual chlorine shall be a minimum of 10 ppm or the lines shall be re-chlorinated.

The Contractor shall exercise extreme caution at all times in order to prevent the HTH solution from entering the Town of Jamestown water system.

200.12.4 De-chlorination

The contractor is to de-chlorinate the water by use of apparatus that injects or mixes EPA approved chemicals with the water to neutralize the chlorine before it is released to the ground. Residual chlorine levels shall be reduced and maintained to a maximum of 2.0 parts per million (2.0mg/l). The contractor shall test the discharge at 15 minute intervals to insure that acceptable levels of neutralization are maintained. Discharge shall be stopped if chlorine levels exceed 2.0 parts per million. All procedures shall be in accordance with manufacturers' recommendations.

Only in cases where this method is not practical for unique reasons would the town consider allowing the water to be released into a sanitary sewer. In those cases, the inspector will need to make a request at least 48 hours in advance in order for the town to determine the acceptability of the facility.

200.12.5 Flushing and Bacteriological Sampling

The contractor may proceed with flushing of the lines after the 24-hour or longer period outlined above, provided the free residual chlorine analysis is satisfactory. The flushing shall continue until a check shows that the lines contain only the normal chlorine residual.

A certified laboratory shall collect and analyze water samples for bacteriological analysis 24 hours after flushing of the lines is completed. The tests results are to be provided to the Town of Jamestown and the development engineer. The contractor shall furnish any reasonable amount of assistance that may be required by the laboratory to secure these samples. If test results are unsatisfactory, the contractor shall immediately re-chlorinate the lines and proceed with such measures as are necessary to secure sterile lines. All laterals shall be re-chlorinated during this process. At the satisfactory completion of the bacteriological requirements, the lines shall be placed into service under the supervision of the engineer. All valves shall be fully opened, and the engineer shall report each valve placed into service to the Public Services Department.

300.00 SEWER STANDARDS

300.1 General

A minimum of 8" diameter gravity sewer lines shall be used.

300.2 Sewer Mains

Ductile iron sewer lines being used shall be coated with cement mortar with a seal coat of bituminous material. Other approved sewer line materials are PVC – SDR-26, and vitrified clay class 200 by permission by permission of Public Services Director. Protecto 401 coating is required where hydrogen sulfide (H₂S) gases are known to exist or be created. Vitrified clay pipe shall be extra strength, designed and manufactured in accordance with ASTM C700. Pipe joints shall meet the requirements of ASTM C425. PVC sewer pipe shall meet the requirements of ASTM D3034, Type PSM. Tracer wire shall be installed on PVC sewer mains not extending from manhole to manhole. Pipe joints shall be elastomeric gasket, push-on type, in accordance with ASTM D3212. Polyvinyl compounds shall comply with a minimum cell classification of 12454B as defined in ASTM Specification D1784.

Unless otherwise approved by the, grades for the 8" sewer mains shall be no less than 0.60% and no greater than 20%. Designs shall follow the guidelines established by the State of North Carolina – Gravity Sewer Minimum Design Criteria.

300.3 Service Lines

Service lines within the town's public right-of-ways shall be either cast iron soil pipe or SCH 40 PVC. The long sweep must be made of cast iron pipe. Within NCDOT public right-of-ways, cast iron soil pipe services shall be used. Wyes shall be installed during new line installation. Saddle services may be used for tie-ins to existing sewer mains and outfalls.

300.4 Clean Out Stacks

Clean outs, including long sweep & stack, shall be constructed of extra heavy cast iron soil pipe with IBCO, countersunk brass plug. No sewer stacks to be left in driveway or areas surrounded with concrete.

300.5 Manholes

Precast reinforced concrete manhole 4' in diameter and conforming to ASTM C-478 and AASHTO M 199 standards. Manhole section joints shall be sealed prior to acceptance. Joint sealing material between manhole sections shall be rubber gasketed joints or butyl rubber. Rubber gasketed joints shall conform to ASTM C443 "Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets". Butyl rubber sealants shall conform to Federal Specifications SS-S-210A, AASHTO M-198, Type B-Butyl Rubber with a maximum of 1% volatile matter and suitable for application at temperatures between 10° and 100° F. If butyl rubber joints are used, the surface of the joint receiving the butyl rubber shall be coated with an adhesive coating wrap to assure that a seal is established between the rubber and the concrete. The adhesive wrap can be *Black Massey* manufactured by Old Castle Concrete, *Riserwrap* manufactured by Pipeline Seal and Insulator, Inc. or equal as approved by the Public Services Director.

Outfall manholes shall be flat-top type manholes conforming to Town of Jamestown Standard Details. Manhole top shall extend approximately 2' (min.) to 3' (max. with

approval) above the surrounding ground elevation. For outfalls installed within the 100-year flood plain, manholes shall be water tight with every third manhole vented above the 100-year flood elevation. Cone top manholes will be used in areas of manicured lawns, and the top elevations will be established flush with surrounding ground elevations.

300.6 Rings and Covers

Acceptable ring and covers for outfall use (see detail 308):

- (1) US Foundry 669 KL (non-vented) Model Number 8020600
- (2) East Jordan Iron Works, Model V 1484-3

Acceptable ring and covers for non-outfall use (see detail 307):

- (1) US Foundry 669 KL ring and “Jamestown” cover 8015781 (Sanitary Sewer), 8015715 (Water) and 8015297 (Storm Water). Two one inch (1”) may be required as determined by Town Staff. Vent holes must be requested when ordering covers.

Height adjustment is limited to two (2) concrete rings (see detail 302.0).

300.7 Testing

300.7.1 Manhole Testing

Manholes shall be vacuum tested at 10” of Mercury. The time for vacuum drop to 9” Hg shall not exceed:

Manhole Depth	Vacuum Test Time
Less than or equal to 10 feet	60 seconds
Between 10 and 15 feet	75 seconds
Between 15 and 25 feet	90 seconds

300.7.2 Sewer Mains and Service Lines

After the pipeline is completely backfilled and before being placed into service, a low-pressure air test with an approved pressure gauge will be conducted by the contractor in accordance with ASTM C-828. Each section of pipeline (including connections) between manholes will be tested by plugging the upstream manhole, the downstream manhole, and cleanouts installed on the segment of line being tested. By using mirrors, lights, etc., the contractor must show the engineer or town representative that the 2 plugs are at the proper location and that the line is clear between the plugs. Air is added to the line until the pressure is between 3.0 psi and 4.0 psi. If the pressure drops more than 1.0 psi during the time shown on the chart below, the line is presumed to have failed the test. If the top of the pipe to be tested is below the ground water table, an infiltration test will be required. Infiltration shall not exceed 100 gallons per inch diameter per mile of pipe per 24 hours. An obvious leak in any section will be corrected even if the section passes testing. The engineer or engineer’s representative along with the town’s representative must be present during the entire testing process. Any testing done without supervision will not be accepted. Air testing will be required for pipelines 42” and smaller. Air test time shall be as follows:

MINIMUM AIR TEST TIME

Main Size	Time (minutes per 100 feet of pipe)
8"	1.5
10"	1.8
12"	2.1
15"	2.4
18"	2.7
21"	3.3
24"	3.9

300.7.3 Infiltration

All sewer mains shall be subject to a maximum infiltration rate of 100 gallons per day per inch mile of pipe, on a segment to segment basis, regardless of air testing results. The Public Services Director can initiate this requirement if any water is visible within the sewer main.

300.7.4 Television of Lines

The contractor will be responsible to perform a video inspection of the sewer line once it is completed and cleaned. Television inspection information will be provided to the Town of Jamestown Public Services Department for all public mains and connecting services, up to the cleanout. The Public Services Department will review the approved recorded information and contact the appropriate parties to confirm the results. The inspector will be provided a report with each section identified and linked to either a VHS tape or DVD disc with all inspection footage included for each section. Quality of video inspection will be to industry acceptable standards clearly showing any potential defects. Cost of televising lines shall be incorporated into contractor's unit price of construction. The sub-contractor televising the sewer lines shall demonstrate competence of video inspection on sewer lines prior to being approved for televising lines.

- (1) Sewer under pavement is not considered complete until any required pavement binder is in place and manhole rims are adjusted to grade with the sewer line cleaned out.
- (2) All tapes shall be recorded on "VHS" format at "SP" speed or on DVD.
- (3) Every foot of pipe shall be recorded with zero beginning at first manhole and ending with next manhole.
- (4) Laterals shall be filmed from base of cleanout to the main.
- (5) The camera should have pan and tilt capabilities to viewing the pipe at 360 degrees with on-screen print out of data.
- (6) A report form for every segment of line shall be submitted, this should include the firm submitting the report, date, project, upstream and downstream invert elevations, manhole depths, length between manholes, pipe diameter and material type.
- (7) Any video inspection report that doesn't clearly show the lines, connecting service laterals, and are not meeting the above requirements, will be rejected.
- (8) In the event that repairs are required, affected segment or segments of line will need to be inspected by means of the video inspection process for final approval.

300.8 Dog House Manholes

When it is necessary to tie into an existing sewer main at a point other than an existing manhole, the connection shall be made using a dog house manhole installed over the existing sewer main. See the Detail Standards for manhole installation.

300.9 Pipe Connection to Manholes

Rubber "Boot" Type connectors shall be fastened to pipe with 2 stainless steel band type clamps. When connecting to existing manholes, the manhole must be cored with an internal expansion ring provided for fastening the boot to the manhole. The inside and outside of the core must be grouted with non-shrink grout.

400.00 STREET STANDARDS

400.1 General

Street width shall be designed as 26', 32', or 40' face of curb to face of curb. Maximum allowable street lengths from an intersection will be 1600'. Cul-de-sacs will have a radius of 40' to the face of curb. Dimensions and pavement specifications shall comply with Town of Jamestown Detail 504.00. Street cul-de-sacs shall conform to Standard Detail 505.00.

400.2 Compaction and Proof Roll Tests

These are to be done by a qualified Geo-Technical Engineer. Compaction tests shall be performed upon the removal of topsoil, during the addition of fill dirt and during all utility trench work.

Proof rolls shall be performed prior to placement of stone base. Compaction tests shall be performed on stone in place to verify depth and required compaction (100% standard proctor). The Geo-Technical Engineer shall provide certifications on the results of the compaction and proof roll test to the Town of Jamestown.

NOTE: Town of Jamestown inspectors shall be notified and be present at proof roll and stone compaction tests.

400.3 Street Signs

Street sign post placement plans must be approved by the Public Services Director prior to installation activity. All costs associated with the installation of the sign posts will be paid by the subdivision developer or property owner(s). Street sign posts must be installed prior to approval of final plat and/or placement of water meter(s). (See Sign Post Specifications)

400.4 Street Naming Suffixes

The Town of Jamestown and Guilford County shall be responsible for street address number assignments.

- **Street** – This suffix shall be used for roadways running generally in a north-south direction.
- **Avenue** – This suffix shall be used for roadways running generally in an east-west direction.
- **Drive, Trail, Trace** – These suffixes shall be used for roadways which follow a wandering alignment in different directions.
- **Road** – This suffix shall be used for roadways running generally in a diagonal direction or connecting urban areas.
- **Boulevard or Parkway** – These suffixes shall be used for divided roadways on which the travel ways are mostly separated by a park or open median strip.
- **Court, Point or Cove** – These suffixes shall be used for cul-de-sacs having circular turnarounds.
- **Way or Dale** – These suffixes shall be used for short roadways with an exit from one end only (dead end) with no potential for extension.
- **Circle** – This suffix shall be used for short roadways that are circular or semi-circular in form and intersect the roadways from which they emanate at two different places.
- **Place, Lane, or Terrace** – These suffixes shall be used for short roadways generally not over a block in length (exit from both ends) with no regard to predominant direction.

400.5 Street Lights

In subdivisions, the developer shall purchase street lighting and underground service. Street lighting plans shall be approved by the Public Services Director prior to installation activity. All costs associated with the installation of the lamp posts will be paid by the subdivision developer or property owner(s). Once the lamp posts have been satisfactory installed and approved by Public Services Director, the Town may opt on a case by case basis to accept and pay the lease on lamp posts along publicly maintained roadways.

400.6 Curb and Gutter

The standard 2'-6" concrete curb and gutter is the preferred type to be used. Refer to Town of Jamestown Standard Detail 503.00 for dimensions on standard and spill curb and gutter. Curb inlet spacing and storm system design shall be consistent with criteria found in *NCDOT - Guidelines for Drainage Studies and Hydraulic Design*. Roll type curb and gutter may be used upon approval from the Public Services Director. Transition from curb and gutter to ribbon pavement may be used upon approval from the Public Services Director and approval of construction plans providing all design information and calculations for street cross section.

400.7 Curb Inlets

Curb inlets shall be either precast (preferred) or masonry. During installation of a behind the curb type box (non grate inlet), 18" entry ring and cover shall be included in the precast top. NCDOT hood and grate inlets may be used as approved by the Town of Jamestown and shall follow NCDOT Standard Details. Curb inlets installed within NCDOT Public Rights-of-Way shall be installed in accordance with NCDOT standards.

400.8 Storm Drain Pipe

Within Public Rights-of-Way, storm drainage material shall consist of reinforced concrete pipe Class III, Wall B, ASTM C-76 or Corrugated Aluminized Steel Pipe (CASP). Pipe grades steeper than 15% shall have concrete collars, and pipe shall not be installed steeper 25% grade.

400.9 Sidewalks

Sidewalks must have a minimum five (5) foot width and meet all current Americans with Disabilities Act (ADA) standards. NCDOT will allow sidewalks by encroachment and will not accept responsibility for maintenance.

400.9.1 Brick Sidewalks

Bricks shall be 2 ¼" X 4" X 8" solid brick paver and conform to ASTM C902, class SX. New brick shall closely match existing sidewalk along Main Street at the Jamestown Public Library. Approved brick is provided by Pine Hall Brick Company, style 'Old Town' paver. The brick shall be installed in a running bond with a header course along each edge.

The brick surface walkway shall be supported by geotextile fabric, 5" of compacted aggregate base course, and ¾" ± quarry rock dust. After installation, ⅛" ± quarry rock dust shall be spread on the brick surface and worked into the joints by means of a flat plate mechanical vibrator. Brick along the edges shall be retained in place by means of an anchored PVC angle strip or approved equal.

The aggregate base course stone shall conform to NCDOT requirements for aggregate base course.

The fabric shall be specifically manufactured as a subgrade reinforcement geotextile, made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM 4759 and referenced standard test method.

- (1) Grab tensile strength: 140 lbf (490 N); ASTM 4632
- (2) Tear strength: 50 lbf (178 N); ASTM D 4533
- (3) Puncture resistance: 70 lbf (222 N); ASTM D 4833

Refer to Town of Jamestown Standard Detail 511.00 for additional installation details and dimensions.

400.9.2 Concrete Sidewalks

- (1) Must be constructed of Portland Cement Concrete (Section 1000), Class B, not less than three thousand (3,000) pound-per-square-foot concrete.
- (2) Be a minimum of four (4) inches thick when adjacent to standard 30" curb and gutter, the sidewalk must be six (6) inches thick when adjacent to valley curb and gutter.
- (3) Be constructed on an adequately compacted and properly graded base.
- (4) Have a lateral slope of between one-quarter (1/4) inch per foot (min.) to one-half (1/2) inch per foot (max.) toward the street.
- (5) Be steel-trowelled, light broom-finished and properly cured by means of a curing compound (Section 1026).
- (6) Have tooled joints at intervals of not more than five (5) feet and expansion joints at intervals of not more than forty (40) feet.

Refer to Town of Jamestown Standard Detail 510.00 for additional installation details and dimensions.

400.10 Wheel Chair Ramps

In accordance with General Statute 136-44.14, all street curbs in North Carolina being constructed or reconstructed for maintenance procedures, traffic operations, repairs, correction of utilities or altered for any reason after September 1, 1973, shall provide wheel chair ramps for the physically handicapped at all intersections where curb and gutter is provided and at other major points of pedestrian flow. Wheel chair ramps and depressed curbs shall be constructed in accordance with details contained in the Department of Transportation, Division of Highways' publication entitled, *Guidelines, Curb Cuts and Ramps for Handicapped Persons*.

400.10.1 Ramp Detectable Warnings

Detectable warnings shall be provided as raised truncated domes. The domes may be stamped concrete or a stone and resin composite tile. This tile has the added benefit of being applied to the surface of the ramp after the concrete has cured and can be cut to fit. The tiles typically are dimensioned one (1) foot by two (2) feet and must be applied using a two-part polyurethane adhesive (summer and winter adhesives available).

Black tiles or dye must be utilized on red brick wheel chair ramps. Red tiles or dye must be utilized on gray concrete wheel chair ramps. The colors must be approved by the Town prior to use.

All products must conform to ADA specification and requirements.

400.11 Parking Lots

Parking lots shall be designed to meet current ADA requirements for the physically handicapped. Signage shall be installed at designated handicapped spots and shall conform to current ADA standards.

400.12 Bicycle Racks

The Town of Jamestown has approved the installation of bike racks from the following manufacturer:

- (1) DuMor – Style 125

400.13 Bus Stops

A public bus stop shelter shall be designed by a structural engineer and architect. Design shall be reviewed and approved by the town. Benches at the site shall be from the following manufacturer:

- (1) DuMor Bench style 58: 6' Bench – 58-60
8' Bench – 58-80

400.14 Driveway Design for Town Maintained Roads (not applicable to NCDOT maintained roads)

The width, in feet, of a driveway approach and curb return flare or radius shall be within the minimum and maximum limits as specified below:

Residential:	Driveway Width, ft. <u>Minimum/Maximum</u>	Flare/Radius, ft. <u>Minimum/Maximum</u>
	12/26	1/3
Non-residential:	25/35	5/10*
	15/35	5/10**

*Two-Way

**One-Way

Special exceptions may be reviewed by the Technical Review Committee on a case-by-case basis. TRC shall consider any exceptions using an “Equal or Better Performance” review standard.

Driveway spacing and number of driveway approaches shall be spaced as outlined below:

1 permitted driveway:	N/A
2 permitted driveways:	30 feet spacing, inside edge to inside edge.
3 + permitted driveways:	100 feet spacing, inside edge to inside edge.

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