SECTION 7.00
SANITARY SEWER

SUB-INDEX

SECTION 7.00
SANITARY SEWER

7.01 GRAVITY SEWER MAINS

A. General

Gravity sewer extensions shall meet all requirements of these standards. In addition, the *Minimum Design Criteria for the Permitting of Gravity Sewers* and *Alternative Design Criteria for Minimum Separation for Sewer Systems to Wetlands*, prepared by the Division of Water Resources of NC DEQ, and the *North Carolina Administrative Code Title 15A Chapter 02 Subchapter T Waste Not Discharged to Surface Waters* (15A NCAC 02T) are hereby incorporated into the Town's standards for gravity sewer design. This specification section identifies minimum equipment and construction requirements for gravity sewer extensions that are to be owned and operated by the Town of Holly Springs. This section does not address every aspect of gravity sewer extensions; it is the design engineer's (Designer's) responsibility to supplement these requirements as necessary to produce a complete set of plans and specifications.

All utility extension permits must be obtained prior to construction. Refer to the Town Code of Ordinances Section 16 for further requirements.

B. Design

Location

1. All public sanitary sewer mains shall be installed in dedicated street right of way or in dedicated utility easements. Sanitary sewer mains installed in Town of Holly Springs maintained streets shall be located in the center of travel lanes. Mains located within N.C. Department of Transportation right of way shall be placed outside of pavement limits, in accordance with NCDOT standards. See Section 2.10 for landscape plantings within Utility easements.

2. Minimum widths of public sanitary sewer easements shall be:

Pipe Size (inches)	Pipe Depth (feet)	Easement Width (feet)
< 12	< 20	20
< 12	> 20	30
12 - 24	< 20	30
12 - 24	> 20	40

> 24	All depths	Executive Director of Utilities and Infrastructure Services Specified

a) Additional width of easement will be required when easement contains multiple utilities.

b) Additional temporary construction easement may be required for any sewer not constructed at the time the easement is recorded.

c) Sewer mains shall be centered within their easements.

d) All sewer mains that extend as an outfall between residential lots shall have a minimum 30ft easement.

3. Outfalls shall require accessibility with a maximum cross slope of 6:1.

4. Proposed sanitary sewers paralleling a creek shall be designed to a proper depth to allow lateral connections such that all creek crossings will be below stream bed elevation unless otherwise approved by the Executive Director of Utilities and Infrastructure Services. The top of the sewer main shall have a minimum of one foot of cover between steel encasement pipe and the stream bed. In addition, the following is required:

a) Sewer lines crossing stream beds will be required to be installed with restrained joint pipe inside a steel encasement pipe in accordance with the Standard Details section of these standards (Reference TOHS HS607).

b) Sewer lines crossing under storm drainage pipe containing a single pipe greater than 42 inches or multiple pipes greater than 36-inches will be required to be installed with restrained joint pipe inside a steel casing pipe. Installation may be by bore and jack or excavation which will be at the discretion of the Executive Director of Utilities and Infrastructure Services. All encasements to be extended a minimum of 10 feet beyond the stream bank and/or storm drainage pipe.

5. Sanitary sewer mains shall not be installed under any portion of water impoundments unless approved by the Executive Director of Utilities and Infrastructure Services.

6. The following minimum separations must be maintained:

a) Any private or public water supply source, including WS-1 waters or Class I or Class II impounded reservoirs used as a source of drinking water – 100 feet;

b) Any waters classified WS-II, WS-III, B, SA, ORW, HQW or SB (from normal high water [or tide elevation] – 50 feet);

c) Any other stream, lake, or impoundment – 25 feet or as required by State law.

Where the required minimum separations cannot be maintained, ferrous sanitary sewer pipe with joints equivalent to water main standards shall be used. However, in no instance may sanitary sewer lines be installed less than 25 feet from a private well or less than 100 feet from a public water supply source (or as required by State law).

7. Sanitary sewer lines shall be extended to adjacent upstream property lines, in order to serve all upstream properties. These lines shall be sized to serve all upstream tributary areas in accordance with the Master Land Use Plan or approved developments (whichever results in the larger flow).

8. All non-residential swimming pools shall be discharged into the storm sewer system after dechlorination.

Size

1. The minimum size of public gravity sanitary sewer mains shall be 8 inches.

2. Major interceptors shall be sized in accordance with the "Master Wastewater Plan of the Town of Holly Springs." In areas not included in the master plan, new sewer interceptors shall be designed based on the proposed land use (in accordance with the Town's Master Land Use Plan) of the contributory area. The following flow factors shall be used:

Residential, (Single-Family) flow rates:
Use flow factors as required by the North Carolina Department of Environmental Quality- (at the time of this specification revision, these flow rates are contained in 15A NCAC 02T.0114), or use the Town's approved flow reduction of 255 gpd/unit, whichever is less.

Residential (Multi-Family) and Non-Residential flow rates:
Use flow factors as required by the North Carolina Department of Environmental Quality- (at the time of this specification revision, these flow rates are contained in 15A NCAC 02T.0114).

3. For existing sewer systems, an additional allowance shall be made to the above flow factors where the existing flow exceeds these values and immediate remedial measures are not proposed.

4. The ratio of peak to average daily flow shall be 2.5.

5. Sanitary sewers shall be designed to carry the projected peak flow at no more than ½ full. The recommended minimum velocity for sanitary sewer lines is 2 fps. The minimum slope for the uppermost reach of a sanitary sewer line shall be 1.00%.

The minimum grades for public sanitary sewers shall be as follows:

Main Size (inches)	Minimum Slope (feet/100 feet)
8	0.40
12	0.22
16	0.14
18	0.12
21	0.10
24	0.08
30	0.06

6. The maximum grade for sanitary sewers is 10%. The maximum velocity in sanitary sewers is 15 feet per second. These limits may be exceeded with the approval of the Executive Director of Utilities and Infrastructure Services and with the incorporation of the following provisions:

   a) All sewers of greater than 10% slope shall be ductile iron pipe;

   b) High velocity manholes, in accordance with the Standard Details Section of these Standards shall be used on all sewers with a slope greater than 10%;

   c) Concrete anchors shall be installed on all sewers of greater than 10% slope at the following spacings:

      i) Not over 36 feet center to center on grades from 10% to 25%;
      ii) Not over 24 feet center to center on grades from 25% to 40%;
      iii) Not over 16 feet center to center on grades exceeding 40%.

7. Sewer extensions should be designed for projected flows even when the diameter of the receiving sewer is less than the diameter of the proposed extension.

8. Pipe diameter changes shall occur in a manhole with the invert of the larger pipe lowered sufficiently to maintain the same energy gradient. An approximate method of securing these results is to place the 0.8 depth point of both sewers at the same elevation.

9. All residential subdivision lots shall be served by public gravity sanitary sewer unless otherwise approved by the Executive Director of Utilities and Infrastructure Services. If a pump is approved, it shall be privately maintained, must pump into a gravity service connection placed on the lot, and must have a note on the construction plans and recorded plat indicating a private pump may be required to serve the lot with sanitary sewer service. In instances where private pump stations are approved, the gravity service

that received the force main shall be required to extend into private property so that the required private force main vent is located a minimum of 20 feet from public right of way.

10. Downstream receiving sewer infrastructure shall be evaluated to confirm adequate capacity by the design engineer for each project. In addition, a sewer study may be required to accompany plans submitted to the Town for consideration of impacts to downstream sewer infrastructure. Developer shall be required to upgrade insufficient infrastructure.

Installation

1. Sanitary sewer mains shall be deep enough to serve adjoining and upstream properties and allow for sufficient slope in lateral lines. All sanitary sewer mains shall have the following minimum of 4.5 feet of cover and be measured as follows:

   a) 4.5 feet from the top of pipe to finished subgrade when under a roadway;

   b) 4.5 feet from top of pipe to existing edge of pavement elevation when adjacent to a roadway which may be widened in the future;

   c) 4.5 feet from top of pipe to finished grade in all other areas.

   The above requirements may be waived at the direction of the Executive Director of Utilities and Infrastructure Services, in which case ductile iron pipe shall be installed.

2. The construction of all sanitary sewer lines which will be maintained by the Town must be performed by a contractor licensed in North Carolina.

3. Sewer mains from 14 to 20 feet deep shall require special bedding in accordance with the Standard Details Section of these Standards.

4. Sewers over 20 feet deep shall require ductile iron for the entire run between manholes and shall be 401 protectant lined.

5. Pipe trench excavation and backfilling shall be performed in accordance with Section 5.00 of these Standards.

6. Transitions of pipe material shall occur only at manholes.

7. Sewer mains shall be laid at least 10 feet laterally measured edge to edge from existing or proposed water mains unless it is determined that local conditions or barriers prevent a 10-foot lateral separation in which case:

a) The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer;

b) The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

8. Where sanitary sewers cross NCDOT roadways or major Town roads, as determined by the engineer, pipe encasement shall be required.

9. Where sanitary sewers cross beneath water mains with a vertical separation of 18 inches or less or where water mains cross under sewer mains, the entire leg of sewer line shall be ductile iron pipe. The water line pipe shall be centered at the point of crossing and shall cross sanitary sewer lines at an approximate 90º angle.

10. Where sanitary and storm sewers cross with a vertical separation of less than 24 inches the entire leg of sanitary sewer shall be of ductile iron pipe. There shall be a minimum 5-foot horizontal separation between sanitary sewer and storm sewer.

11. For sanitary sewer and reclaimed separation, see Section 11.01.

12. There shall be a minimum 5-foot horizontal separation between parallel gravity and/or force mains.

13. Sewer line easements shall be completely cleared of all vegetation, graded smooth with minimum cross slope of 6:1, free from rocks, boulders, roots, stumps, and other debris, free from ponded water, and seeded and mulched upon the completion of construction.

14. The first new downstream manhole(s) of any sanitary sewer line extension under construction shall be plugged on the outlet side with a masonry wall or a wing nut plug (to be determined and inspected by the Development Inspector); secured with a stainless steel cable with identification plate of contractor's name; and secured with stainless steel cable to prevent the passage of groundwater, runoff and sediment into the existing sanitary sewer system. All water upstream of the plug shall be pumped out of the sanitary sewer line and all sediment and solids shall be removed and properly disposed of by the Contractor prior to removal. The plug shall not be removed until the line has been inspected by the Development Inspector to ensure that all possible points of inflow or infiltration have been secured. Failure to meet this requirement will result in a $1,000 per day fine. If the plug blows out and causes equipment or material damage or spills downstream, the Contractor shall be responsible for resulting fines and costs

of repairs. Authorization to remove the plug shall be required by Development Inspector. If the Contractor fails to obtain necessary approvals and removes the plug before the system is activated, the Contractor shall be responsible for resulting State and Town fines and damages resulting.

Manholes

1. All manhole cone sections shall be the eccentric type.

2. Manholes shall be spaced at a maximum distance of 425 feet apart regardless of size unless documentation is provided showing capability to perform routine maintenance on sewer at distances greater than 425' apart.

3. Manholes for sewers under 21 inches in diameter shall be a minimum of 4 feet in diameter. Manholes for sewers 21 inches in diameter or greater shall be 5 feet in diameter. Manholes requiring inside drops shall be a minimum of 5 feet in diameter. When 2 or more inside drops occur at one manhole, a minimum 6-foot diameter manhole shall be used.

4. All manholes that are over 20 feet deep shall be 5 feet in diameter.

5. Manholes shall be installed at each deflection of line and/or grade. The flow channel through manholes should be smooth and shall conform to the shape of the entering/exiting sewer line. A standard 0.20-foot drop shall be provided at each manhole. Inverts "in" and "out" shall be as designated on the approved plans. Sewers shall be designed to minimize free drops in manholes.

   Either precast or brick and mortar inverts may be used conforming to these Standards. The invert shall be smooth and uniform in shape along the entire length.

6. Inside drops shall be used when free drops exceed 12 inches. For inside drop manholes, the entire upstream leg of sewer must be ductile iron. For inside drop manholes, see the Standard Details Section of these Standards. Outside drops shall not be permitted except when necessary to connect to existing manholes.

7. Manholes not located in roadways shall have a top elevation a minimum of 12 inches above finished grade. Manholes located along outfalls shall have a top elevation a minimum of 24 inches above finished grade or 100 year flood plain, or 12 inches above 500 year flood plain, whichever is higher.

8. Watertight manhole rings and covers shall only be allowed upon approval by the Executive Director of Utilities and Infrastructure Services. Manholes

with watertight tops shall be vented in accordance with the Standard Details Section of these Standards.

9. Manholes located within flood plain areas, on outfalls, and within any areas of high groundwater shall be waterproofed by wrapping all joints with a minimum 8-inch width band of butyl joint wrap. Waterproofing shall be installed by mopping asphalt over the joint area, then wrapping butyl joint wrap around the joints, and finally mopping the wrap with another coat of asphalt. The total asphalt coat thickness shall be a minimum of 20 mils.

10. Manholes for sewers 12 inches and above shall be coated with an epoxy coating system such as Cor-Cote SC as manufactured by Sherwin-Williams, Raven 405 as manufactured by Raven Lining Systems, Sewer Kote Duramer 1030 or an approved equivalent.

11. Manholes with an exterior height of four feet or greater from finished grade shall have exterior steps.

12. Manholes on outfalls shall have frames and rotating covers as detailed in HS722 with vent holes.

13. All sanitary sewer manholes in areas of special concern shall be required to be vacuum tested in accordance with ASTMC-1244.

14. Where manholes are located in streets inside the Triassic Basin (HS356) it will be required to have suitable off-site structural material or stone to backfill around excavation of manholes up to subgrade. Also see Section 3.02J of these standards.

C. Materials

The Executive Director of Utilities and Infrastructure Services will maintain a list of approved manufacturers for all sanitary sewer collection system products. New manufacturers must submit requests for approval to the Executive Director of Utilities and Infrastructure Services. Additional information such as catalogs, lists of installations in the area or material samples may be required. A written response will be mailed to the applicant accepting or rejecting the product within 90 days of the receipt of all necessary information.

Each length of sanitary sewer pipe installed shall have plainly and permanently marked thereon the following information:

1. Pipe class or strength designation;

2. Manufacturer’s name or trademark;

3. Nominal pipe size.

A.B.S. Composite (Truss) Pipe

A.B.S. composite pipe shall meet the requirements of ASTM D 2680. Pipe joints shall be chemically welded or gasket joints in accordance with ASTM D 3212. See Section 7.01-C for additional installation requirements. See the Standard Drawing Details Section of these Standards for bedding requirements.

Ductile Iron Pipe

Ductile iron pipe for gravity sewer use shall be designed and manufactured in accordance with AWWA C150 and C151 for a laying condition Type 2 and a working pressure as follows:

3 – 12 inches	350 psi
14 – 20 inches	250 psi
24 inches	200 psi
30 – 54 inches	150 psi

Pipe joints shall be of the push-on type as per AWWA C1211. Pipe lining shall be cement lined. All ductile sewer lines 12" and above shall be 401 protectant lined

Polyvinyl Chloride (PVC) Pipe

PVC pipe shall be made of PVC plastic having a cell classification of 12454-B, 12454-C or 13364-B (with minimum tensile modulus of 500,000 psi) as defined in Specification D1784. PVC pipe shall have integral wall bell and spigot joints for the conveyance of domestic sewage. Fittings shall be made of PVC plastic having a cell classification of 12454-B, 12454-C or 13343-C as defined in Specification D1784. Fittings must be manufactured by pipe supplier or approved equal, and have bell and/or spigot configurations compatible with that of the pipe. Compounds with superior properties are also acceptable.

All pipe less than 18 inches in diameter shall have a maximum Standard Dimension Ratio (SDR) of 35. Where laying conditions so warrant, and in accordance with manufacturer's recommendations, lower SDR values (stronger pipe) may be required.

PVC pipe 18 inches in diameter and larger must be SDR-35 as defined in ASTM 679. Pipe strength shall be equal to or exceed that required for pipe less than 18" in size. Pipe shall have special bedding as per Detail HS 703.

Installation shall consist of Class I bedding material (as defined in Section 7.01 C) placed 4 inches below the pipe barrel and continuing to 4 inches above the pipe barrel, as per ASTM D2321. In addition, the installation of PVC pipe shall satisfy

the requirements of Section 7.01-C below. See the Standard Details Section of these Standards for bidding requirements.

PVC Composite (Truss) Pipe

PVC thermoplastic material shall be a rigid PVC plastic conforming to ASTM D-1784 for a minimum cell class of 12454-B. The Portland Cement Perlite concrete or other inert filler material shall be as described in Section 6.3 of ASTM D-2680.

Joints shall be chemical welded or gasketed in accordance with ASTM D3212. Solvent cement for joining PVC to PVC shall comply with ASTM D-2564. Pipe test specimens shall meet all the manufacturing requirements established in ASTM D-2680.

All recommendations of the manufacturer shall be followed in shipping, handling, laying, joining and backfilling of the pipe, and the pipe shall be installed in full and complete compliance with Recommended Practice D2321. In addition, the installation of PVC composite pipe shall satisfy the requirements of Section 7.01-C below. See the Standard Details Section of these Standards for bedding requirements.

Steel Encasement for water/sewer pipes are required for the following Street Classifications to avoid traffic disruption in the future:

- Controlled Access Highway

For carrier pipes that employ cathodic protection anticorrosion systems, the carrier and casing pipes shall be effectively insulated from one another. Carrier and casing shall be cathodically protected as a unit.
See Section 5.03 Boring and Jacking for more casing pipe size requirements.

D. Additional Requirements for Flexible and Semi-Rigid Sanitary Sewer Pipe

Installation of flexible and semi-rigid sanitary sewer pipe shall satisfy the requirements of the manufacturer and/or the following, whichever is more stringent:

1. Installation shall follow the recommendations of ASTM D-2321 "Underground Installation of Flexible Thermoplastic Sewer Pipe." For flexible and semi-rigid pipes, bedding and embedment material shall be Class I. In any area where the pipe will be installed below existing or future ground water levels or where the trench could be subject to inundation, additional Class I material shall be used for bedding. Refer to the Standard Details Section of these Standards for embedment requirements.

2. The manufacturer's specifications or otherwise approved method shall be used in determining the stiffness class of the pipe to be installed so as to attain the required deflection control. The class of the pipe must be approved by the Executive Director of Utilities and Infrastructure Services prior to installation.

3. The maximum allowable deflection after installation shall be less than 5% for flexible pipe and 3% for semi-rigid pipe. The mandrel (go/no-go) deflection test must be performed on each line prior to acceptance, and no less than 30 days after installation. The Contractor shall supply the mandrel used for this performance test. The mandrel device shall be cylindrical in shape having 9 possible contact points with the pipe. The mandrel's length and diameter (ID of proving ring) shall equal the dimensions in the following table, and shall be subject to the Construction Inspector's approval. A mandrel test on truss pipe shall only be required if the Construction Inspector finds a problem during the visual inspection.

For polyethylene pipe, the following shall apply:

Nominal Diameter (inches)	Mandrel Length (inches)	Mandrel Diameter (inches)
18	12 (minimum)	16.53
21	″	19.30
24	″	22.08
27	″	24.84
30	″	27.62
33	″	30.38
36	″	33.15
42	″	38.68
48	″	44.21
54	″	49.74
60	″	55.27

For other flexible pipes the following shall apply:

Nominal Diameter (inches)	Mandrel Length (inches)	Mandrel Diameter (inches)
6	6	5.65
8	8	7.40
10	10	9.31
12	10	11.22
15	12	14.09

For semi-rigid (truss) pipes the following shall apply:

Nominal Diameter (inches)	Mandrel Length (inches)	Mandrel Diameter (inches)
8	8	7.52
10	10	9.46
12	10	11.40
15	12	14.31

4. For PVC and Polyethylene pipe, the pipe shall be produced with bell and spigot end construction. Joining will be accomplished by rubber gasket in accordance with manufacturer's recommendation, unless otherwise directed or approved by the Executive Director of Utilities and Infrastructure Services. Flexible watertight elastomeric seals in accordance with ASTM D3212-81, may also be used. Each pipe length shall be clearly marked with information including pipe size, profile number, and class number.

5. Minimum trench width shall be one pipe diameter plus 9 inches on each side of the pipe.

6. Special Bedding (6-inch minimum) and embedment materials shall be per ASTM D2321. Embedment materials shall be installed from trench wall to trench wall and from 6" below the invert to a minimum of 6 inches above the crown of the pipe, for all pipe 14-20 feet deep.

7. The bedding and embedment material shall be compacted to a minimum of 90% Standard Proctor density for Class I materials.

8. If hydraulic jack shoring is utilized for trench walls where shoring is used, it shall be kept to the area just above the top of the pipe. This will ensure the embedment materials and pipe will not be disturbed when removal is made.

9. Bedding and embedment material classifications shall be defined as follows:

   Class I - Angular, (¼ to 1½ inch) graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, crushed gravel, and crushed shells.

   Class II - Coarse sands and gravels with maximum particle size of 1½ inch, including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

   Class III - Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil types GM, GC, SM, and SC are included in this class.

   Class IV - Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class. These materials are not recommended for embedment.

7.02 MOVED to NEW Section 13

7.03 MANHOLES

A. Materials

Manholes shall be precast concrete. No hoop steel base or riser sections are allowed. All manholes shall have eccentric cone sections.

Precast concrete manholes shall meet ASTM C478 as to design and manufacturer. The standard joint shall be sealed with a plastic cement putty meeting Federal Specification SS-S-00210, such as Ram-Nek or a butyl rubber sealant. All lift holes must be plugged with non-shrinking grout after installation. For precast concrete manholes, see the Standard Details Section of these Standards.

Manhole frames and covers (including rotating covers) shall be cast in ductile iron, conforming to ASTM A-48 Class 30, with "Sanitary Sewer" stamped on the cover and two 1-inch perforated holes in roadways and four 1-inch perforated holes in outfalls unless covers required to be watertight. Castings shall be machined to give even and continuous bearing on the full length of the frame. Castings shall be Grey Iron ASTM 48, CL 35B made in the U.S.A. Manhole frames shall be bolted to the manhole as per the Standard Details Section of these Standards. All manhole rings in roadways shall be encased in a concrete collar, 18 inches by 12 inches, of 3,000 psi concrete beneath the asphalt, with the cover flush with the top of pavement and rated for an AASHTO loading Class HS-20, as shown in the Standard Details Section of these Standards.

Watertight manhole frames and covers shall have neoprene gasket, machine bearing surfaces. Bolts shall be standard hexagonal-head, countersunk such that when fully tightened bolt head is flush with the top of the cover. Castings shall be Gray Iron ASTM 48, CL 35B, made in the U.S.A., free of porosity and blow holes. Watertight manhole frames and covers shall only be permitted in lieu of elevating the manhole tops above the 100 and/or 500-year flood plain with specific approval by the Executive Director of Utilities and Infrastructure Services. Watertight manholes shall require venting per the Standard Details section of these standards.

Manhole steps shall be furnished with the precast sections. Steps shall be of polypropylene material reinforced with a half-inch diameter grade 60 reinforcing steel rod. Manhole steps shall be designed for a vertical load of 400 pounds and a horizontal pull out load of 1,000 pounds. Steps shall be set 16" on center. Holes for the installation of manhole steps shall not project through the manhole wall. There shall be a minimum of 1-inch wall thickness from the deepest penetration of the step installation hole and the outside wall. Steps shall be at least 10" clear width

and shall project at least 4" from the wall into which it is embedded. Steps shall not be located over the influent or effluent pipes and shall be installed along a vertical manhole wall from the shelf to the top of cone.

All manholes shall have 6-inch, 3,000 psi concrete bottoms resting on a minimum of 6 inches of #57 stone. Sewer mains shall enter and exit radially through the manhole. Inverts shall be constructed with a width and height equal to half that of the effluent pipe and shall be so brushed and troweled that a minimum energy loss occurs in the manhole.

At each inlet and outlet of line 8 inches or greater, wastewater lines are to be connected to the manholes by means of compression connectors (flexible sleeves) cast into the manhole section. Flexible connectors are to be manufactured of high-quality rubber or synthetic rubber and all strap clamps or draw bolts are to be manufactured from stainless steel.

7.04 SERVICE CONNECTIONS

A. Materials

Cast iron soil pipe shall be service weight hub and spigot meeting Federal Specifications WW-401. The joints shall be rubber type elastomeric as per ASTM C425.

PVC pipe shall be schedule 40 or greater supplied in 18 foot lengths. The pipe may be joined by elastomeric gaskets.

Ductile iron pipe shall be used for sanitary sewer services with less than 3 feet of cover or in excess of 20 feet of cover.

Services for new lines shall use in-line wyes of like material unless otherwise approved by the Executive Director of Utilities and Infrastructure Services.

Service saddles for existing PVC or ABS lines shall be of the same material as the main, solvent welded and fastened with double stainless steel bands as shown on the Standard Details Section of these Standards.

Service saddles for existing cast iron soil pipe services may be "ROMAC C" sewer saddles consisting of a virgin SBR gasket compounded for sewer service, a ductile iron saddle casting, a 304 stainless steel adjustable strap for fastening the gasket and the saddle casting to the sewer main and a 304 stainless steel adjustable circle clamp for securing the service line into the SBR gasket.

B. Installation

Individually owned structures shall require individual sewer taps to public sewer. All service connections to existing or new sanitary sewer mains shall be made by a licensed Contractor in the State of North Carolina, and in accordance with these Standards.

Service taps into mains shall be made on the top quarter of the main with the wye angled with the direction of flow in the main. All services installed on new lines shall be inline wyes unless otherwise approved by the Executive Director of Utilities and Infrastructure Services.

All service lines shall require Class I bedding from 6 inches below service line to 6 inches above the service line. All service lines shall have a minimum of 8 inches separation from other utilities. Service lines greater than 20 feet or less than 3 feet in depth must be ductile iron.

Service connections to the main lines shall be perpendicular to the main line to the edge of the right of way or easement line. Services shall have a minimum slope of 1.0 feet per 100 feet. Cleanouts shall be required on all sewer services at a maximum spacing of 75 feet on 4-inch services and 100 feet on 6-inch services. A cleanout shall be placed on all service lines at the right of way line or at the edge of the easement. All cleanouts shall extend a minimum of 6 inches above finished grade or meet the optional installation requirements in accordance with the Standard Details Section of these Standards. Sewer cleanouts located in paved areas must have traffic load bearing mini-manhole.

All 6-inch service lines shall tie directly into a manhole.

All service lines which are connected into manholes shall be installed less than 2½ feet above the invert or shall be installed with a standard drop as shown on the Standard Details Section of these Standards. Service lines shall not be installed through manhole cone sections or manhole joints. The use of service saddles will only be permitted for connection to existing sewer lines.

Service connections made using a “ROMAC C” sewer saddle shall be made only when the service line is cast iron soil pipe and only when the sewer main is 8, 10, or 12-inch diameter concrete, ductile iron, or PVC sewer pipe. This service connection shall not be used when the sewer main material is truss sewer pipe.

The opening in the sewer main for the “ROMAC C” sewer saddle shall be cut with a hydraulically driven or a pneumatically driven circular tapping saw of the same nominal diameter as the sewer service line.

C. **Grease Interceptor**

All grease traps/interceptors shall be designed according to minimum standards of the North Carolina Plumbing Code and any requests of the Town. The Town prohibits joint use of a tap or interceptor between establishments. All cooking establishments shall have grease interceptors installed and maintained at the User's expense. Non-cooking establishments or other commercial, institutional and/or industrial establishments may also be required to install a grease-handling device(s) when deemed necessary by the Town.

The discharge from the following fixtures shall be connected to the grease interceptor: all sinks, dishwashers, floor drains in food preparation and storage areas, and any other fixtures through which grease may be discharged. See Detail HS725.

7.05 TESTING AND INSPECTION

All materials used must be inspected by the Construction Inspector before they shall be allowed to be installed. Materials rejected by the Construction Inspector shall be immediately removed from the job site.

The Contractor shall furnish all materials, labor, and equipment, and shall pay for the water used to perform all testing and inspection to the satisfaction of the Construction Inspector. The Contractor shall obtain a meter from the Town of Holly Springs for use.

Sanitary sewer lines shall be free and clean from obstructions and shall be visually inspected from every manhole to ensure all lines exhibit a fully circular pattern. Lines which do not exhibit a true line and grade or have structural defects shall be corrected. Sanitary sewer service connections shall be visually inspected prior to backfilling.

Prior to the placement of any roadway structure, the Contractor shall clean and CCTV all newly installed sewer mains. A 3rd Party CCTV contractor shall televise the sewer main and all lateral connections installed from the upstream to the downstream manhole with no reverse setups or cutaways. This shall be done at the Developers expense. The contractor shall clean the sewer mains ahead of the video inspection with a high velocity water jet. The video inspection shall take place within two hours of the cleaning operation as witnessed by a Town of Holly Springs Development Inspector. All construction debris shall be collected in the down stream manhole and shall not be released into the sewer system. No other work shall be performed on the sewer lines after cleaning and prior to the video inspection. The contractor may not perform CCTV inspections on any utilities that they have installed. The contractor shall provide a DVD or Flash Drive, submitted to the inspector for review.

See Section 7.01 C for additional testing requirements for flexible and semi-rigid pipe.

Low-pressure air testing shall be performed after all laterals or stubs are installed on the line and after the main has been backfilled to finished grade. Plugs shall be installed at each manhole to seal off the section of line to be tested. The line will be pressurized with a single hose and monitored by a separate hose connection from the plug. Air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig. The air pressure shall then be allowed to stabilize for a minimum of 2 minutes to no less than 3.5 psig (plus groundwater pressure, if any). When the pressure reaches 3.5 psig, the time required for the pressure to drop 1.0 psi shall be observed and recorded. The line shall be termed "acceptable" if the pressure does not drop more than 1.0 psi in the time prescribed for the test in the following table:

STANDARD AIR TEST TABLE

Specification time (min:sec) required for pressure drop from 3½ to 2½ psig when testing one pipe diameter only

Length of Pipe (feet)	Pipe Diameter (inches)								
	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	0:31	1:09	2:03	3:13	4:37	7:05			
200	0:35	1:19	2:21	3:40	5:17				12:06
225	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	0:53	1:59	3:31				10:12	13:53	18:09
350	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	1:10	2:38			6:03	9:27	13:36	18:31	24:12
450	1:19	2:50			6:48	10:38	15:19	20:50	27:13
500	1:28			5:14	7:34	11:49	17:01	23:09	30:14

If the section of line tested fails to meet these requirements, the source of leakage shall be determined and repaired. The section of line shall then be retested.

The Construction Inspector may require that an infiltration test be performed. Infiltration shall not exceed 100 GPD per inch per mile.

At the discretion of the Executive Director of Utilities and Infrastructure Services, sanitary sewer manholes in areas of special concern may be required to be vacuum tested in accordance with ASTMC-1244 as shown.

C 1244 – 05a [e1]																		
Table 1 Minimum Test Times for Various Manhole Diameters (30-120 in.) in Seconds										Table 1 Minimum Test Times for Various Manhole Diameters (30-120 in.) in Seconds (continued)								
Diameter, in.										Diameter, in.								
Depth (ft)										Depth (ft)								
	30	33	36	42	48	54	60	66	72		78	84	90	96	102	108	114	120
Time, in seconds										Time, in seconds								
<4	6	33	7	9	10	12	13	15	16	<4	18	19	21	23	24	25	27	29
6	9	10	11	13	15	18	20	22	25	6	26	29	31	34	36	38	41	43
8	11	12	14	17	20	23	26	29	33	8	35	38	41	45	48	51	54	57
10	14	15	18	21	25	29	33	36	41	10	44	48	52	56	60	63	67	71
12	17	18	21	25	30	35	39	43	49	12	53	57	62	67	71	76	81	85
14	20	21	25	30	35	41	46	51	57	14	62	67	72	78	83	89	94	100
16	22	24	29	34	40	46	52	58	67	16	70	76	83	89	95	101	108	114
18	25	27	32	38	45	52	59	65	73	18	79	86	93	100	107	114	121	128
20	28	30	35	42	50	53	65	72	81	20	88	95	103	111	119	126	135	142
22	31	33	39	46	55	64	72	79	89	22	97	105	114	122	131	139	148	156
24	33	36	42	51	59	64	78	87	97	24	106	114	124	133	143	152	161	170
26	36	39	46	55	64	75	85	94	105	26	114	124	134	144	155	164	175	185
28	39	42	49	59	69	81	91	101	113	28	123	133	145	155	167	177	188	199
30	42	45	53	63	74	87	98	108	121	30	132	143	155	166	178	189	202	213

7.06 REPAIR OF SANITARY SEWER LINES

The repair of damaged sanitary sewer lines shall be as follows:

1. PVC Pipe - Replace damaged section with PVC pipe. Install PVC couplings or ductile sleeves and mechanical bolt at each end (encased in concrete).

2. ABS/PVC Truss Pipe - Replace damaged section with D.I.P. Install PVC couplings or ductile sleeves and mechanical bolt at each end (encased in concrete).

All repairs to damaged sanitary sewer lines shall be backfilled with ABC stone (crusher run) to a density of 95% Standard Proctor.

7.07 MOVED to NEW Section 13

END OF SECTION 7.00