INTRODUCTION

Purpose of These Guidelines and Specifications:

The purpose of these planning guidelines and specifications is to provide general design, planning and construction guidance to developers, their representative engineers and contractors when designing and constructing new water and sewer facilities. Additionally, these documents shall serve to streamline and standardize the materials utilized in the City of Brentwood's water and sewer systems and the procedures to be followed when installing, inspecting and testing those materials. This is intended to be a "living document," with frequent updates that will be available on-line. These standards are intended to apply, where applicable, to facilities installed in conjunction with private developments as well as the City's capital improvement projects.

The intention is to maintain a current set of specifications and details on the City's Website. ***It is the responsibility of the Developer / Contractor / Supplier to ensure their version of these standards is current.***

Developers and Contractors shall also familiarize themselves with the requirements of other applicable City of Brentwood departments, codes and ordinances and to coordinate with the Standard Subdivision Regulations.

BRENTWOOD WATER SERVICES
NEW DEVELOPMENT GUIDELINES & PROCEDURES

The City of Brentwood's Water Services Department or WSD, in an effort to streamline and formalize its procedures for development, is providing this general guideline for the approval process. Potential Developers are encouraged to thoroughly review the following information prior to beginning a project:

- The current water and sewer service provider's coverage map for the City of Brentwood;
- The Department's current Standard Specifications and Detail Drawings for Water and Sewer Construction;
- The pertinent sections of the City Code;
- The State-imposed sewer moratorium area, if applicable.

The above information may be found at the WSD webpage.

The general steps for water and sewer service approval are as follows:

STEP	DESCRIPTION	
1	Request for Water / Sewer Availability	☑
2	Preliminary Planning Commission Review	☑
3	Planning Commission Review	☑
4	Construction Plans Review	☑
5	Shop Drawing Review	☑
6	Preconstruction Conference	☑
7	Construction	☑
8	Testing and Acceptance	☑
9	Warranty Inspections / Bonding	☑

1. Request for Water / Sewer Availability

1.1 Prior to submitting any plan proposing to connect to, or expand an existing usage of the public water or sewer system, a Developer or his representative must apply for Availability. A request form is available in Appendix 1 of this document and at the WSD webpage. Each request for Availability must be completed in its entirety, signed by the Developer or their representative and include a detailed projected sewer demand and projected domestic water, fire protection and irrigation demand. Upon receipt of the request, the City will review and respond accordingly. Availability must be approved prior to the planning commission review.

2. City Planning Commission Review

2.1 It is encouraged that, at the conceptual stage of the design, a meeting be held with the WSD staff to provide an overview of the project. The initial step for new development in the City of Brentwood is to obtain Planning Commission approval for the project. The Water Services Department takes part in the review process as new developments or re-developments are considered. At a minimum, the following information should be included at the Planning Commission review stage:

A. General layout of all proposed water and sewer facilities, with appurtenances;

B. Projected demand generated by the Development (including proposed service connections for water and sewer);

C. Identification of size and point(s) of connection to the existing water and sewer system;

D. Any FOG or pretreatment related items should be discussed at this point with WSD staff;

E. Determination of Availability.

3. Design Guidelines

3.1 Water Facilities

A. The State of Tennessee, “Community Public Water Systems Design Criteria” latest revision, shall be followed when designing public water systems within the City of Brentwood, unless otherwise stated.

B. Water distribution lines should be designed and sized for an instantaneous peak (IP) demand of 2 gpm per connection for water lines serving up to

100 residential connections. Peak design demands can be reduced to 1.75 gpm per connection for 101 – 149 residential connections, 1.5 gpm per connection for 150 - 299 residential connections, 1.0 gpm per connection for 300 - 499 residential connections, 0.75 gpm per connection for 500 - 999 residential connections and 0.5 gpm per connection for 1000 or more residential connections.

C. Extensions to the public water system shall be sufficiently designed to generally provide 40 psi residual pressure during peak demand at all service connections (at the meter); residual pressure shall never be less than 20 psi at each service connection during peak flows.

D. Prior to granting approval of availability. all projects which, in the opinion of the WSD, may have a significant impact on the water system shall require a hydraulic analysis be performed by the WSD at the cost of the Developer. Cost of analysis will be determined by the WSD on a case-by-case basis dependent on the magnitude of the analysis and in accordance with the WSD fee schedule. The analysis shall include anticipated average and peak flows associated with a typical unit and project as a whole, including domestic, irrigation and fire protection, residual pressures of system under average and peak conditions. The analysis shall include recommended meter and service line size information for each structure/use within the development. Meter and service line determinations shall adhere to AWWA Manual 22, latest edition, and manufacturer's specifications.

E. Each deeded parcel shall have a single service line and meter for domestic water service and a backflow prevention device for irrigation service (when installed). Backflow prevention devices shall be located immediately after the meter. No connection is allowed between meter and backflow prevention device. Service lines shall generally be located at the center of a lot. All residential meters shall be located at the customer's property line, or edge of easement.

F. All domestic and irrigation service connections in newly developed single lot residential areas will be minimum of 1-inch. Any and all service lines providing fire protection, residential or commercial, shall be designed by a Tennessee licensed engineer or licensed fire/sprinkler contractor. In no instance shall a residential fire sprinkler service connections be less than 1-inch. In newly developed single-lot residential areas where all three services (fire sprinkler, domestic and irrigation) are to be required at time of development, then the service connection shall be no less than 2-inch and subsequently divided into three smaller separate lines. When fire sprinkler services for single family residential lots are added on existing lots already containing domestic water service, then the new residential fire sprinkler service shall be a minimum of 1-inch. Fire, domestic and

irrigation service connections for commercial, retail, apartments, multi-family and other developments shall each be sized for their specific water demands or as required by the WSD.

G. Fire protection service for nonresidential service shall include an appropriately sized meter and backflow prevention device installed at the customer's property line, or edge of easement. Meter and backflow devices for residential fire lines shall be designed by the Developer's Engineer on a case by case basis. Commercial connections and meters shall be installed in a location acceptable to the WSD. At no time shall commercial meters be located in a paved area.

H. Generally, all water lines shall be ductile iron pipe class 52 as specified in Section 02660; water lines shall be located outside the roadway, adjacent and parallel to public right-of-ways, generally behind the curb or at the top of bank where open ditches exist. Water lines may be installed under sidewalk if approved by the WSD. Water lines should be located on opposite sides of the road from electric and gas lines, or maintain five (5) feet horizontal separation when installed in the same general location. Water lines must maintain ten (10) feet horizontal separation or two (2) feet vertical separation from sanitary sewer lines. Five (5) feet horizontal or 18-inch vertical separation must be maintained from all other utilities. A minimum 10 ft. open space and 20 ft. public utility and drainage easement (PUDE) shall be provided for water lines 12 inches in diameter and smaller, where water facilities are located outside public right-of-ways. For water lines greater than 12 inches in diameter, the width of the open space and PUDE will be established by the WSD on a case by case basis. Water lines shall be installed in steel casing pipe when located under headwalls, storm structures 24 inches or greater in diameter or other above ground features that, in the opinion of the WSD, create an unnecessary burden to maintain or repair.

I. Water distribution lines shall be a minimum 6 inches in diameter unless otherwise approved by the WSD. All dead end lines shall have a fire hydrant assembly installed at end of line.

J. Valves shall be generally placed at no more than 500 foot intervals when fire protection is not required and on each branch of all water line intersections (i.e. a tee intersection requires a 3-way valve assembly, a cross intersection requires a 4-way valve assembly) and on each side of significant crossings such as railroad, interstates, gas transmission lines. The WSD reserves the right to reconfigure proposed valve alignment when multiple water line intersections are in close proximity to each other,

K. When fire protection is to be provided, system design should consider the recommendations of the Insurance Services Organization and

recommendations of the City of Brentwood, Fire Department. Fire hydrant locations shall be approved by the Brentwood Fire Department and WSD. However, in no case shall fire hydrants be located in excess of 500 feet from the furthest point of any structure. All fire hydrants shall include an isolation valve and shall be connected to a minimum 6-inch line.

L. Water booster stations shall meet the requirements of the TDEC Design Criteria for Surface Water Facilities and Booster Pumps. Stations shall generally be below grade, top entrance, pumping stations designed for unattended operation and include SCADA for remote pump operations, telemetry for monitoring station operating conditions and pressure gauges. Underground water booster stations shall be manufactured by Engineered Fluid, Inc. of Centralia, Illinois. Above ground stations if permitted, shall be designed on a case-by-case basis. Provisions shall be included for a permanent, onsite generator and auto transfer switch. Station configuration shall include a minimum 30 feet by 30 feet deeded site, site preparation that includes a 12 feet wide asphalt driveway, site landscaping and 6 feet high security fence with City signage. Developers are responsible for all fees associated with providing electrical service to the water booster station. The following requirements shall also apply to water booster stations:

1. Stations shall include a minimum of two (2) pumps;
2. Pumps shall be capable of maintaining all domestic, irrigation and fire demand conditions;
3. Pumps shall not produce negative pressure anywhere in the distribution system;
4. The pressure in the suction line shall be maintained at or above 20 psi by the use of a pressure sustaining valve or low pressure cutoff device;
5. Shall include a flow meter device on the common discharge of the pump station. WSD reserves the right to determine the type of flow metering device to be utilized.
6. Automatic or remote control devices shall have a range between the start and cutoff pressure which will prevent excessive cycling;
7. Stations shall not serve more than 50 service connections unless gravity storage is provided or service pressure can be maintained above 20 psi without the pumps running;

M. All public water facilities shall be installed by a contractor licensed in the State of Tennessee with either an MU-A, MU-B or BC-B license classification as required for the type of project.

3.2 Sanitary Sewer Facilities

A. The State of Tennessee, "Design Criteria for Sewage Works" latest revision, shall be followed when designing public sanitary sewer systems within the City of Brentwood, unless otherwise stated. When determining projected flows, the Design Basis for Sewer System table included at the end of Appendix 1 of this document shall govern. The State of Tennessee, "Design Criteria for Sewage Works" shall be followed in the absence of relevant flow data contained within Appendix 1."

B. Generally, sewer service shall be provided by gravity means except as determined otherwise by the WSD. Extensions to the public sewer system shall be approved only if sufficient capacity exists in the downstream facilities to adequately convey the additional loading, where improvements are a part of an approved plan (developer improvements), or where downstream improvements to provide adequate conveyance are anticipated to be constructed by the City.

C. Prior to granting approval of availability, all projects which, in the opinion of the WSD, may have a significant impact on the sewer system shall require a hydraulic analysis be performed by the WSD at the cost of the Developer. Cost of analysis will be determined by the WSD on a case-by-case basis dependent on the magnitude of the analysis and in accordance with the WSD fee schedule.

D. Gravity Sewer Pipe
   1. Generally, gravity sewer pipe shall be SDR 26 PVC as specified in Section 02730.Gravity sewer lines shall be located inside the roadway where possible, centered in a travel lane. Only when necessary and when approved by the WSD shall gravity sewer lines be located at the rear of properties, between structures or outside public right-of-ways.
   2. Gravity sewer location shall meet all TDEC or local requirements, including required stream buffer separation.
   3. Where sewer facilities must be located outside public right-of-ways, a minimum 10 ft. open space and 20 ft. wide public utility and drainage easement (PUDE) shall be provided for sewer lines 12 inches in diameter and smaller and installed with less than 12 feet of cover. For sewer lines greater than 12 inches in diameter and/or installed with 12 feet of cover or greater, the width of the open sapce and PUDE will be established by the WSD on a case by case basis.
   4. Gravity sewer lines shall generally not be installed with less than 4 feet of cover, or with cover greater than 12 feet without prior approval of the WSD; including added fill over existing gravity

sewer lines. Gravity pipe at depths greater than 12 feet of cover or greater based on average depth of any section between manholes shall be ductile iron pipe or C900 as specified in Section 02730; including added fill over existing gravity sewer lines.

5. Gravity sewer service lines shall generally be located 10 feet from the water service line (when centered on lot) and on the sewer's downstream side of the water meter, out of the way of driveways, landscaping, headwalls, etc. Sewer lines shall be installed in steel casing pipe when located under headwalls, storm structures 24 inches or greater in diameter or other above ground features that, in the opinion of the WSD, create an unnecessary burden to maintain or repair.
6. Minimum gravity sewer service connection size shall be 6-inch diameter. Service tee material shall be of the same type as the sewer main. A 6-inch cleanout assembly shall be installed at the property line or edge of easement as shown on the standard drawings.
7. A sand/grit separators shall be provided for all commercial pool backwash systems prior to those flows entering the sanitary sewer system.

E. Manholes

1. Manholes shall be 48-inch diameter, minimum, for depths up to 12 feet. For manholes greater than 12 feet and up to 18 feet in depth, diameter shall be 60-inch, minimum. For manholes greater than 18 feet in depth, utilize 72-inch base section (minimum 6 feet high) with transition section to 48 inch diameter risers and cone.
2. Manholes shall generally be located in the public right-of-way, in the middle of a travel lane when possible. Space manholes, generally, at not more than 400 feet, center to center.
3. Place manholes at breaks in grade or alignment and at intersections of lines. Use care when locating manholes, particularly in residential neighborhoods; to ensure manholes are not located in the center of lots, inside future or existing fence enclosures, designated landscape areas, etc.
4. For manholes less than 6'-0" in depth, use shallow manholes as shown on Standard Drawings.
5. Manholes located along streams or within a flood plain or floodway shall have watertight covers in accordance with Standard Drawings.
6. In accordance with Standard Drawings, place manhole vents at every third manhole when three or more watertight covers are used on consecutive manholes. Place vents, when possible, at fence lines or less conspicuous locations but not in violation of State or design rules. Place tops of manhole vents above known flood

elevation. If flood elevation is not known, use calculated 50-year flood elevation.

7. Where a sewage force main enters a manhole, the cover and frame on the two (2) downstream manholes (new or existing), including the one containing the force main connection, shall be a Composite Manhole Frame and Cover with minimum 26" clear opening and ¼" turn paddle locks or approved equivalent. Existing manholes shall be coated with (Level Yellow) cementitious coating followed by spray applied epoxy resin (Level Blue). New manholes receiving flow from a force main shall be coated with spray applied epoxy resin (Level Blue). All manhole coatings shall be in accordance with Section 02765.

F. Pressure Pipe (Force Main)

1. Force main pipe less than 4-inch diameter, typically associated with the WSD's grinder sewer system, shall be ANSI/ASTM D2241, Poly Vinyl Chloride (PVC) material; SDR 21.
2. Force main pipe from 4-inch up to 12-inch diameter shall be DR 25, C900 PVC, green in color. Force main pipe greater than 12-inch diameter shall be as directed by the WSD.
3. Force mains shall be sized to provide a minimum velocity of 3.0 feet/second (fps) with normal operation between 3 and 5 fps. Velocity shall not exceed 5.0 fps.
4. Air release valve assemblies shall be placed at each high point along the force main profile.
5. An isolation plug valve shall be placed at 2000-foot intervals on force mains exceeding 2000 linear feet.

G. Individual Pressure (Grinder) Systems

1. A pressure sewer system may be approved for providing service in residential developments when, in the opinion of the WSD, gravity sewer service is not practical.
2. Individual pressure system pumping units (grinder units) shall be located next to the residence, in an easily accessible location, five (5') foot clear of driveways, landscaping features, headwalls, etc. Sepratation shall not exceed 25' between the control panel and pump/wet well. The control panel must be visable from the pump/wet well. Service line valves installed on sewer pressure systems shall be located inside a valve box at customer's property line, or edge of easement. A clean out shall be installed on the customer's gravity sewer lateral, between the structure (home or business) and the pumping unit's tank; adjacent to the pumping unit's tank.

H. Submersible Lift Stations

1. Sewer lift stations shall generally include submersible pumps installed below grade in a precast concrete wet well configuration with check valves located in a separate and adjacent precast concrete vault with emergency "quick" connect capability. Station shall include flow meter, plug valves for isolation, SCADA system for remote pump operations and telemetry for monitoring station operations. Station configuration shall include a minimum 50 feet by 50 feet deeded site, site preparation that includes a 12 feet wide asphalt driveway, site landscaping and 6 feet high security fence. Site shall be provided with a 1-inch water service and frost-proof hydrant to allow for washdown. Provisions shall be included for a permanent, onsite generator and auto transfer switch. Corrosion control and odor control shall be required at each site.
2. The following requirements shall apply to the precast wetwell;
   (a) Wetwell sizing shall be based on minimum of 4 pump starts per hour (6 feet minimum diameter);
   (b) No wet well shall be less than six (6) feet in diameter.
   (c) The wet well capacity shall be measured from the low pump cutoff level to the bottom of the lowest inlet pipe.
   (d) All wet well penetrations shall be mechanically sealed with resilient pipe connectors to eliminate inflow and infiltration.
   (e) Inlet design must be positioned to minimize flow turbulence which accelerates release of trapped gases in the flow stream.
   (f) Wet well bottoms shall be designed with a minimum of a 4-inch, 45^{o} fillet at wall joints to prevent solids accumulation.
   (g) All fabricated joints on precast concrete shall be sealed with a butyl mastic sealant.
   (h) Access steps for wet wells will not be allowed.
   (i) Access hatch shall be lockable, double-leaf, aluminum diamond pattern able to support a minimum live load of 150 psf. The entire hatch and all hardware components shall be highly corrosion resistant. The size of the access hatch will be reviewed on a case by case basis by the WSD. Hatch shall be manufactured by BILCO Company.
   (j) Concrete wet well shall conform to the requirements of AASHTO M-199 SR and ASTM C478 and include Xypex admixture.
   (k) Wetwell shall be lined with epoxy lining system (Level Blue).
   (l) The tops of all precast structures and the bottom of all station electrical components shall be elevated and protected up to a minimum of 2 feet above the 100 year floodplain.

(m) For all wet wells, base slabs shall be designed to provide support and restraint against floatation. Calculations shall be submitted to the WSD for review.
(n) Coated steel, pre-fabricated below ground wet wells and pumping stations will not be permitted.
(o) Wet wells shall meet the requirements of Section 02731.

I. All public water facilities shall be installed by a contractor licensed in the State of Tennessee with either an MU-A, MU-B or BC-B license classification as required for the type of project.

4. Construction Plan Review

4.1 Plan Submittal

A. Once the project has moved beyond the Planning Commission stage, utility and grading construction plans shall be submitted. Although utilities are reviewed and approved by the WSD and grading plans are reviewed and approved by the Engineering Department, concurrent reviews can generally be performed by both departments. For the WSD, at a minimum, preparation and submittal of construction plans is described below.

B. Water Plans: Submit two (2) sets of completed construction plans plus one (1) set in pdf format, stamped by a Professional Engineer licensed by the State of Tennessee. Plans / submittal shall include:
1. utility plans drawn at either a 1"=50' scale , with design performed using the Tennessee State Plane Coordinate System;
2. a north arrow on each plan sheet;
3. all topographical features such as driveways, streets, rights-of-way, property lines and all drainage features;
4. all Property lines including subdivision block and lot numbers and right-of-way;
5. locations of existing and proposed easements;
6. indications of any modifications or revisions from previous drawings;
7. statement that all work shall conform to the City of Brentwood WSD Water and Sewer Planning Guidelines and Standard Specifications, latest edition;
8. specifications for any items not in the City's Standard Specifications;
9. detailed plans and engineering report for any special construction, such as water booster stations, creek crossings, etc.;
10. a cover sheet that includes a project location map, project identification, Owner contact information, appropriate approval

signatories (Brentwood Water Services Department and State of Tennessee);

11. layout of all existing and proposed non-City owned utilities (i.e. gas, electric, communication, etc.);
12. location, size, and material of all existing and proposed water mains in the subdivision, (or outside the subdivision if off-site connections are required), with locations of connections to other mains, service connections, valves, fire hydrants, blow-offs and all other appurtenance indicated;
13. if overall project consists of multiple phases, include an overall plan with each phase submittal.
14. profiles of all water lines 12 inch and greater drawn at 1"=50' horizontal and 1"=5' vertical scales.

C. Sanitary Sewer Plans: Submit two (2) sets of completed construction plans plus one (1) set in pdf format, stamped by a Professional Engineer licensed by the State of Tennessee. Plans / submittal shall include:

1. utility plans drawn at either a 1"=50' scale, with design performed using the Tennessee State Plane Coordinate System;
2. plans shall include a north arrow on each plan sheet;
3. all topographical features such as driveways, streets, rights-of-way, property lines and all drainage features;
4. all Property lines including subdivision block and lot numbers and right-of-way;
5. locations of existing and proposed easements;
6. indications of any modifications or revisions from previous drawings.
7. statement that all work shall conform to the City of Brentwood WSD Water and Sewer Planning Guidelines and Standard Specifications, latest edition;
8. specifications for any items not in the City's Standard Specifications;
9. detailed plans and engineering report for any special construction, such as, sewer lift stations, creek crossings, etc.;
10. a cover sheet that includes a project location map, project identification, Owner contact information, appropriate approval signatories (Brentwood Water Services Department and State of Tennessee);
11. layout of all existing and proposed non-City owned utilities (i.e. gas, electric, communication, etc.);
12. location, size, and material of all existing and proposed sanitary sewer mains in the subdivision, (or outside the subdivision if off-site connections are required), with locations of connections to other manholes, lateral connections, valves, and all other appurtenance indicated;
13. direction of flow in each sewer line;

14. deflection angles of manholes;
15. profile of proposed sewer system, drawn at 1"=50' horizontal and 1"=5' vertical scales, with grades (%) indicated and invert elevations shown at every manhole. (Calculations are to be done from center of manhole to center of manhole.). Profiles shall include location of each storm drain and/or storm drain structure.

D. Developer shall also submit copies of approvals from all applicable agencies (plans will not be approved for construction until other jurisdictions provide their approval), including:
   1. Tennessee Department of Environment and Conservation – Aquatic Resource Alteration Permit
   2. Tennessee Department of Transportation Utility Permit
   3. US Army Corps of Engineers
   4. Railroads
   5. TVA
   6. Columbia Gulf Gas
   7. Other Utilities as Required

4.3 Plan Approval

A. Plans are considered to be acceptable for construction by the WSD once all comments are addressed and all plan sets are signed by the WSD. Once approval is received, Developer shall submit six (6) sets each of water and sewer plans to be stamped by the WSD as approved. Plans are then ready to be submitted to and approved by the State of Tennessee. Developer shall be responsible for paying all agency review and permit fees. ***One (1) set each of approved water and sewer plans, signed by both the WSD and the State, shall be kept at the jobsite at all times.***

B. After WSD plan approval, the WSD will prepare a cost estimate of the water and sewer improvements, including quantities and unit costs (to be used in calculating bond or letter of credit amounts for this project);

C. Upon approval by TDEC of water and/or sanitary sewerage improvements, the WSD shall be provided with two (2) sets of TDEC approved drawings bearing original TDEC stamps. Copies of TDEC approved drawings will not be accepted.

5. Preconstruction Requirements

5.1 Submittals and Scheduling

A. Prior to scheduling a preconstruction conference, Developer shall submit for review the following items:

1. Four (4) complete sets of material submittals, or one (1) complete electronic PDF set;*
2. If applicable, Performance Bond or letter of credit security as set forth in the City of Brentwood Subdivision Regulations and applicable City Code.
3. Documentation that any required offsite public utility easements have been obtained and recorded;
4. Proof of State contracting license(s) for the utility contractor(s) proposing to perform the work;
5. Documentation that TDEC has received a construction start notification;

Upon each review, WSD will return three (3) sets of submittals to the Developer with comments and approval status based on their review. If electronic submittals are provided, WSD will return submittals and comments in the same format.

B. Once all submittals (and any resubmittals) listed above are approved by the WSD, the Developer can order materials and schedule a Preconstruction Conference. Developer shall notify the WSD once all materials are delivered to the site so that the WSD can confirm that materials received are in compliance with the WSD Specifications and approved material submittals for the project.

C. The Preconstruction Conference cannot occur until all materials are received and approved by the WSD.

5.2 Preconstruction Conference

A. A preconstruction conference will be held for all projects involving the installation of public utilities. The Developer shall schedule this meeting, at least 5 business days in advance of construction and after all preconstruction submittal requirements have been met.

B. To this conference, the Developer will need to bring:

1. Approved plans;
2. Copies of all permit approvals;
3. Contact listing for Developer, Engineer, and Contractor key personnel;

4. An executed agreement with the City for any cost participation (if applicable) by the City, in accordance with City Code;

6. Construction Requirements

6.1 Workmanship

A. All water and sewer construction work shall be in accordance with the latest specifications of the WSD.

B. The Developer shall ensure the project contractor provides properly licensed, competent, qualified personnel to survey, layout and construct the work. Contractor shall maintain an orderly and safe site at all times.

C. All utility staking and layouts shall be performed by a Professional Land Surveyor licensed in the State of Tennessee.

D. Except when otherwise authorized, water and sewer facilities work at the site or adjacent thereto shall be completed during working hours of 7 a.m. to dark, Monday through Friday. No work on water and sewer facilities, that require an inspection, shall be completed on Weekends or Holidays without permission of the WSD.

E. All grading work shall be completed all roads constructed to subgrade and lot corners shall be marked prior to the installation of water and sewer lines.

F. Backfill for water and sewer lines within roadways shall conform to the requirements of the agency having jurisdiction (i.e. TDOT, City, County).

G. A WSD inspector shall be present for all testing and startup related to water and sanitary sewer work. Tests for acceptance and startup not witnessed by the WSD will result in non-acceptance.

6.2 Inspection

A. Throughout construction, the WSD will be performing on-site inspections of the progress of construction. If *any* deviations from previously-approved plans are necessary, the Developer shall immediately notify the WSD in writing of the issue and the proposed resolution. WSD personnel will perform inspections in a frequency as deemed necessary by the WSD and will bill the Developer for actual costs of those services, including, at a minimum, labor, equipment, materials and laboratory fee costs per City code.

6.3 Service Lines to be Abandoned

A. Any water or sewer services that are to be abandoned must be abandoned in accordance with Section 02660 - Water Distribution System and Section 02730 - Sanitary Sewer System accordingly.

6.4 Testing

A. Once the construction is complete, the Developer shall notify the WSD in writing that the facilities are ready for testing. The testing of the facilities shall be in conformance with the procedures outlined in the WSD's Standard Specifications.

B. At that time the WSD will perform a punch list inspection of the facilities and provide the Developer with a listing of items that need to be addressed prior to the WSD accepting the improvements.

C. NO CONNECTIONS TO EXISTING WATER AND SEWER FACILITIES SHALL BE MADE UNTIL SATISFACTORY TEST RESULTS HAVE BEEN RECEIVED AND APPROVAL IS GRANTED BY THE WSD.

7. Acceptance

7.1 Record Drawings

A. As part of the acceptance of the public facilities and prior to Plat approval, the Developer shall provide the WSD with record information noting any changes or deviations from the approved construction drawings. Prior to final submittal, WSD shall be provided with a hard copy set and an electronic set in pdf format for review and comment. After final review and approval by WSD, a digital file shall be submitted containing GPS information of all installed infrastructure in accordance with the following:

1. Water System – GPS data shall include horizontal and vertical location, material identification, size and installation date of all water features including pipe segments, fittings, valves, hydrants, meters and other installed system components. Booster stations shall include lot corners and all station component features.
2. Sewer System – GPS data shall include horizontal location, material identification, size and installation date of all pipe segments, fittings, valves, manholes, grinder pumps and other installed system components. Manhole information shall include top-of-casting and invert elevations. Sewer lift stations shall include lot corners and all station component features.

B. All GPS data shall be survey-grade based on the State of Tennessee State Plane Coordinate System.

C. GPS information shall conform to the City of Brentwood's GIS system information. For more information, contact the City's GIS office.

7.2 Final Acceptance

A. The Water Services Department will not sign off on a plat until this punch list has been addressed, record drawings have been submitted and approved, and all fees (i.e. tap fees, inspection services) have been paid in full.

B. Contractor shall submit with record drawings a line item cost for all water and sewer materials installed.

C. Additionally, Operation and Maintenance (O&M) documents related to any mechanical features, particularly station equipment, and line valves, etc., shall be provided in electronic (PDF) format.

D. **NO CONNECTIONS TO EXISTING WATER AND SEWER FACILITIES SHALL BE MADE UNTIL SATISFACTORY TEST RESULTS HAVE BEEN RECEIVED AND APPROVAL IS GRANTED BY THE WSD**.

E. Upon completion of all punch list items to the satisfaction of the WSD, approval of Record Drawings, and confirmation of fee payment, the project (or section thereof) shall be considered "Accepted" and ready for service. At this point, Maintenance Bond or Letter of Credit security will be required as set forth in the City of Brentwood Subdivision Regulations and applicable City Code.

F. Provide WSD with a final completed construction cost for all water and sanitary sewerage facilities and appurtenances.

8. Warranty

8.1 Warranty

A. In accordance with the Municipal Code, the Maintenance Bond or Letter of Credit shall secure the WSD against defects or damage to the improvements arising out of defective or inferior materials or defective or negligent workmanship arising, occurring, or becoming apparent within one (1) year from the date of acceptance of the improvements. Inspection or acceptance of the water and sewer improvements by the WSD shall in no way affect the developer's obligation under the bond.

B. During the time that the project is bonded, the Developer is responsible for addressing and correcting warranty items regarding the public water and sewer facilities. Prior to release of the bond or Letter of Credit, the WSD will perform a final warranty inspection of the improvements.

END OF SECTION – DEVELOPMENT GUIDELINES AND PROCEDURES