



SANITARY SEWER STANDARDS AND PROCEDURES

Design Requirements

REVISION 1 – SEPTEMBER 2019

METROPOLITAN SEWER SUBDISTRICT

120 Augusta Arbor Way • Greenville, SC 29605

Telephone 864.277.4442 • Fax 864.277.4272

www.metroconnects.org

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Revision History

Revision 1 September 30, 2019

1.0 General Requirements

The following requirements establish the standards and procedures that apply to the design, construction, and connection to sanitary sewer collection systems located within the boundaries of the Metropolitan Sewer Subdistrict (Metro) or systems to be incorporated into Metro's collection system.

Additional requirements may be required on a case-by-case basis when special conditions are presented.

1.1 Initial Due Diligence – Preliminary Capacity Availability

Capacity analysis is required each time a new development proposes to connect to a Metro collector system and when the development connects to a collector system owned and operated by another public agency (i.e. city, special purpose district) that utilizes Metro sanitary sewer lines for transportation. A capacity analysis is required for all capacity requests.

The initial capacity analysis for a development is completed at the request of a property owner, realtor, developer, or engineer as a project is being conceived or in the early stages of a project. The person making the request is usually seeking documented assurance that capacity is available prior to proceeding with a project. Upon determination of capacity, Metro will provide approval or denial. If capacity is not available, Metro will discuss the restrictions within the collection system and pipeline upgrades that may be required.

Metro requires the following information for each new development to determine available capacity:

- a) Tax map number(s) identifying the area to be developed
- b) The proposed average daily flow (ADF) as computed using SCDHEC's unit contributory loadings (Appendix A, Standards for Wastewater Facility Construction, R.61-67).
- c) The proposed connection point(s) to Metro's collection system.
- d) Formal submittals shall be submitted on one of the following applicable forms:
 - A. ReWa's "Public Main Extension Preliminary Capacity Request Form", or
 - B. "Service Lateral Connection Capacity Request Form" (or most current).
<https://rewaonline.org/>

Metro's capacity analysis and sign-off is required for project approval by other agencies within Greenville County. ReWa requires a Metro flow approval for all new developments prior to their approval of the project. Greenville County Planning Department requires Metro flow approval for all new subdivisions. Both agencies utilize a similar form to convey this information. Metro capacity approval is good for one year.

1.1.1 Sanitary Sewer System and Basin Planning

Metro analyzes each proposed sanitary sewer system connection for planning of the overall basin. Sewer extensions, easements, and pipe sizing are reviewed to provide future sanitary sewer service to upstream parcels.

1.2 Annexation into Metropolitan's District

Parcels not located within Metro's district, nor within the boundaries of a municipality or special purpose district, desiring to utilize Metro's sanitary sewer system are encouraged to contact Metro for details of the annexation process.

1.3 City Annexation of Property Served by Metro

When the city determines that a property is to be annexed into the city and that property is within Metro's boundaries, the city shall provide Metro with written notice of the property being annexed. Metro will retain the first right of service if the property being annexed is connected to the Metro System. Metro and the city shall make a determination as to which entity shall provide sanitary sewer collection services to the property after annexation based upon the infrastructure in place and a sewer shed approach.

1.3.1 Construction Approval of New Sanitary Sewer Collection Lines and Lateral Lines Following City Annexation

In the event that any annexed property served by Metro desires to construct new collection lines and/or lateral lines, Metro shall provide all permitting review and approval prior to the construction of such lines in accordance with these Sanitary Sewer Standards and Procedures. The city shall refer all persons to Metro for such review and approval. As the owner, Metro shall be solely responsible for the maintenance and operation of the Metro System.

1.3.2 Permit Fees for City Annexed Property

When an annexed property desires to connect to the Metro System, the city shall require the permittee to provide a Metro permit to the city showing that all applicable fees have been paid to Metro prior to issuing a building permit for the project.

2.0 Approval and Acceptance Requirements

To obtain approval for constructing, relocating, or modifying a sanitary sewer main, the applicant must submit a complete submittal package directly to Metro along with the *Plan Submittal Checklist* and the *Project Information Form*, both are located in Appendix C.



The overall permit submittal processes for obtaining approvals required for a SCDHEC Permit to Construct (PTC) and Permit to Operate (PTO) are shown in the flow charts titled *Permit to Construct Submittal Process (PTC)* and *Permit to Operate Submittal Process (PTO)*.

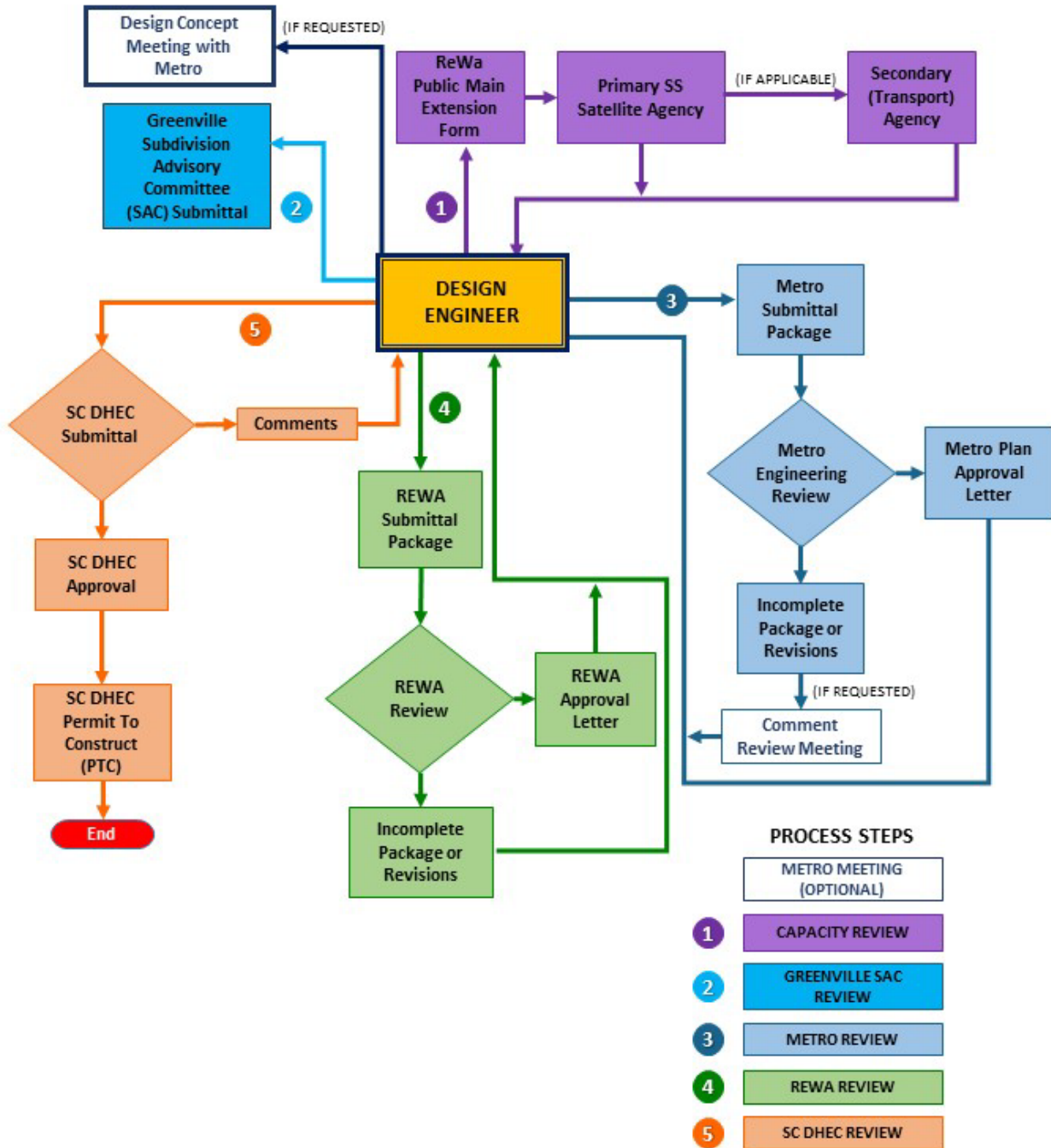
Plan revisions or altered work differing in scope or nature from that authorized under the permit, are subject to Metro's approval. Permittee shall promptly notify Metro of changed or unforeseen conditions, which may occur on site.

After approval, Metro may require an amended design at any time during any portion of the construction. Project transfer of ownership will require notification to Metro before construction continues. A Final Acceptance letter will not be issued until all construction has been approved by Metro.

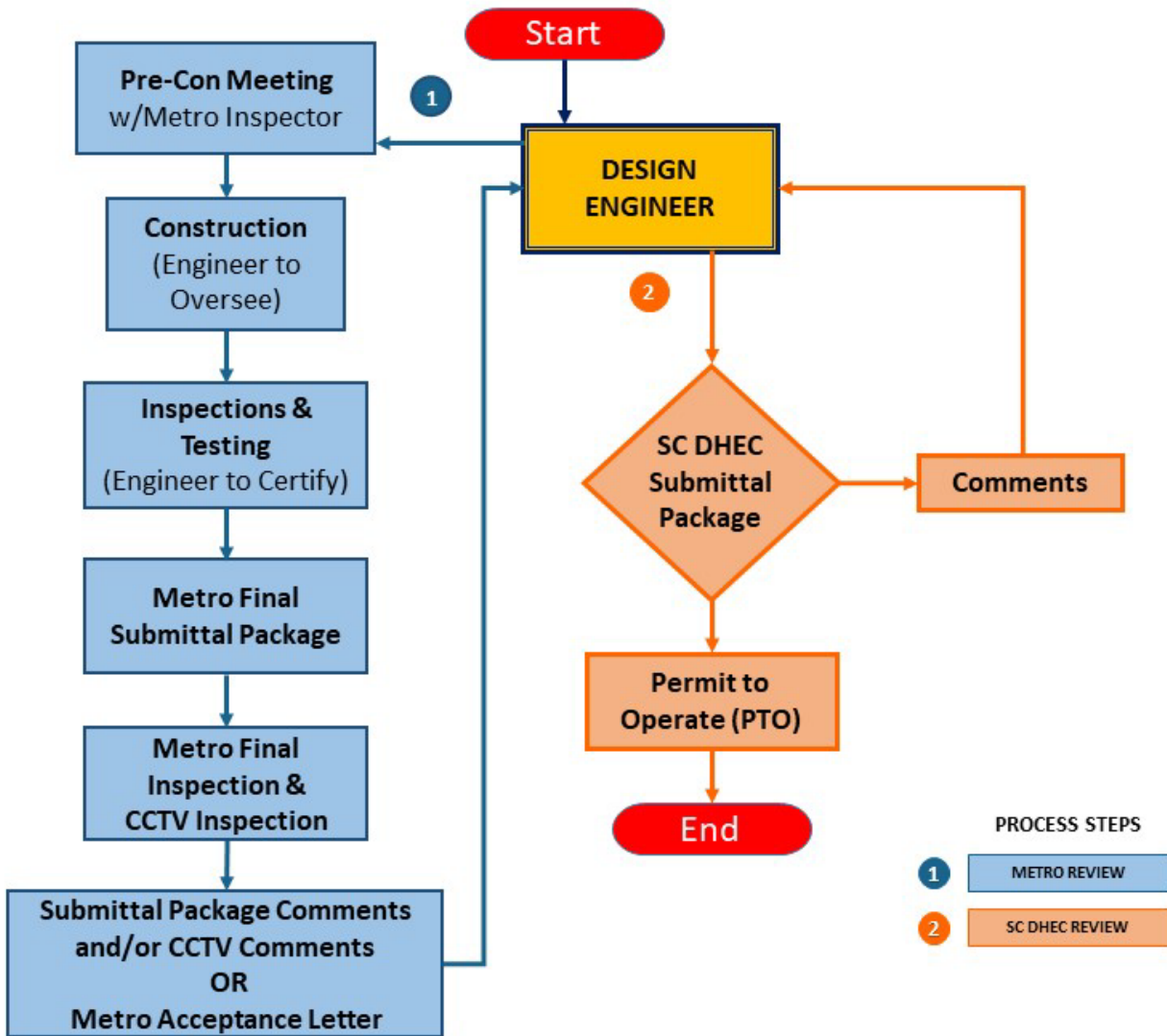
Metro approval and/or acceptance is subject to cancellation due to: 1) noncompliance with permit provisions 2) noncompliance of Metro specifications 3) Inability to access and maintain sewer infrastructure.

Please note that State law and regulations require submission of plans and specifications to obtain a written SCDHEC Permit to Construct (PTC) before a sanitary sewer system may be constructed or modified.

PERMIT TO CONSTRUCT SUBMITTAL PROCESS (PTC) (Appendix C)



PERMIT TO OPERATE SUBMITTAL PROCESS (PTO) (Appendix C)



2.1 Construction Document Requirements

Plans and supporting documents must be prepared, signed, dated, and sealed by a licensed South Carolina Professional Engineer. Construction plans must be in accordance with Metro's standard details and specifications, review may be delayed if the submittal package is incomplete.

Construction drawings must include, the name of the project, a vicinity map, graphic scale bar, north arrow, tax map number, survey datum and control information. Construction drawings shall, at a minimum, include the proposed sanitary sewer main and manhole locations, rim elevations, invert elevations, drop elevations, pipe slope, pipe material, and proposed service connection locations. Plans must contain all pertinent notes and standard details. Metro *Standard Details* and *Standard Technical Specifications* are located in Appendix A and B respectively of this document.

The plans must show the proposed sanitary sewer main with plan and profile views on the same page. Both views must show all existing and proposed utility crossings. Utility crossings in existing easements or rights of way may require written permission from the appropriate utility provider approving the new sanitary sewer crossing as shown on the plans. Utilities running parallel to the mains (water, gas, storm drain) must be shown on both plan and profile views in grey scale and labeled as to type in order to indicate potential conflicts.

2.2 Review Process

The applicant must submit all items on the *Plan Submittal Checklist* directly to Metro. After a submittal is reviewed, comments will be available for pickup at Metro's office. The engineer must submit revisions directly to Metro. The revision box on the plans must be noted, signed and dated after each modification. Once Metro approves the submittal package, the engineer must include Metro's approval letter to ReWa as part of the permitting process. The engineer should then refer to ReWa and SCDHEC for further information to complete and obtain a permit to construct (PTC) from SCDHEC.

2.3 Construction Requirements

The Engineer shall be responsible for managing the construction of the sanitary sewer system and shall be the point of contact for Metro. The Engineer of Record is responsible for the oversight and documentation of construction inspections, all testing and final inspections to ensure all installation of the sanitary sewer system is in accordance with the approved plans and specifications.

2.3.1 Pre-Construction Conference

Construction is prohibited until the PTC is issued by SCDHEC and a mandatory pre-construction meeting has been held with Metro's inspector. The engineer must schedule Metro's inspector at least 48 hours (two working days, not to include weekends or holidays) prior to the proposed mandatory pre-construction meeting. Attendees shall include the contractor and any related sub-contractors, owner/developer, and engineer. The pre-construction meeting **must** occur prior to beginning installation. All applicable permits, shop drawings and recorded off site rights of ways shall be presented to Metro's Inspector at the time of the pre-construction meeting, if they have not been provided prior. See Appendix D for the *Pre-Construction Meeting Checklist*.

Following the preconstruction meeting, the owner/developer agrees to the admission of properly authorized person's at all reasonable hours for inspection. A copy of the SCDHEC PTC and one set of approved stamped construction drawings must be kept on site during construction and through final testing.

An additional pre-construction meeting will be required in the event that construction ceases for more than 6 months or a new contractor becomes involved. Failure to comply may result in Metro's non-acceptance of the sanitary sewer system. All construction shall be in accordance with the construction drawings and specifications approved by Metro. The SCDHEC PTC does not constitute approval, temporary or otherwise, to place the system into operation.

The Contractor(s) shall be licensed in the State of South Carolina and have a WL (water and sewer contractor classification) and legally qualified under the provisions of the South Carolina's Licensing Law (South Carolina Code of Laws Title 40) Chapter 11).

2.3.2 Changes During Construction

The engineer shall be responsible for design changes that would cause any variance in construction from the design shown on the permitted "Issued for Construction" drawings. Any variances to the approved stamped construction drawings must be submitted by the permitting engineer for review and approval by Metro and SCDHEC, prior to construction of the modification. All revision dates shall be shown on the drawings. Once revised drawings have been approved, the engineer shall reissue revised drawings to the Contractor.

2.3.3 Testing

The engineer, or an employee under his direct supervision, shall witness and certify all testing for gravity systems, pump stations and force mains in accordance with the specifications and SCDHEC requirements.

2.4 Metro Acceptance Requirements

*** Please note this section (2.4 through 2.4.8) has changed to more accurately reflect the workflow***

The *Final Project Submittal Checklist* (Appendix H) should be referred to for acceptance requirements. Upon Metro's review and approval of the record drawings, the engineer will schedule a final inspection. After the final inspection is complete a punch list will be developed. The items of this punch list must be resolved before the CCTV (closed circuit television) inspection will be scheduled.

Upon Metro's receipt of all *Final Project Submittal Checklist* items and after all fees are paid, Metro shall issue a letter agreeing to accept the sewer system for ownership, operation, and maintenance.

A Metro acceptance letter is required as part of SCDHEC final package when requesting a *Permit to Operate* (PTO). Upon approval, SCDHEC will issue the Permit to Operate. No flow may be discharged into a newly constructed sanitary sewer main until a Permit to Operate has been officially issued by SCDHEC and a copy has been received by Metro.

2.4.1 Record Drawings

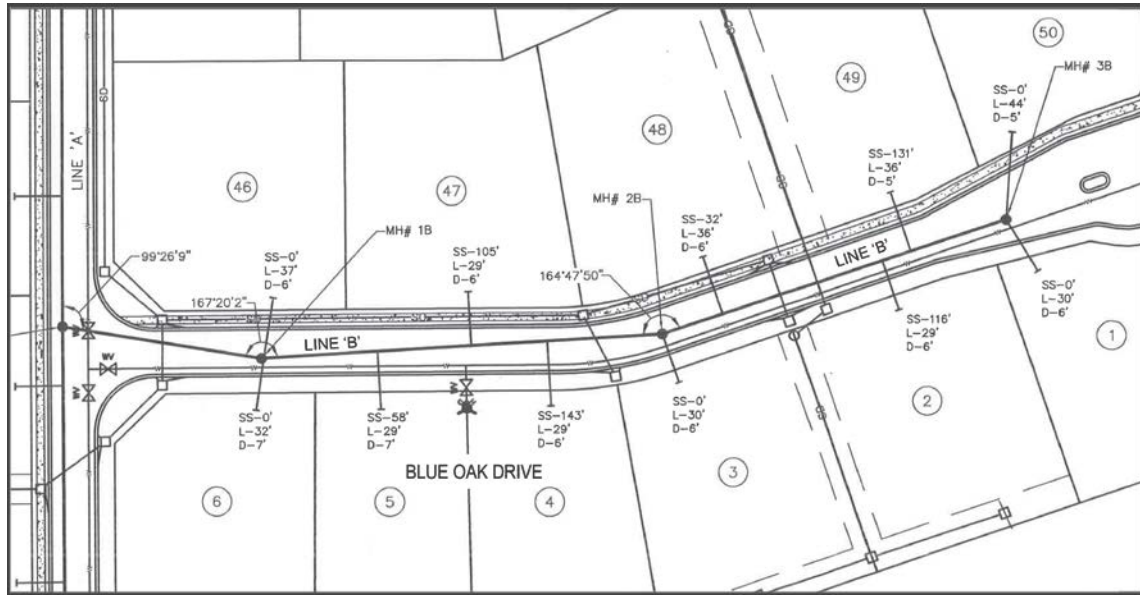
Upon completion of construction, record drawings shall be prepared by the engineer including the plan and profile. Plan and profile drawings shall show surveyed rim elevations, pipe invert elevations, line segment footage and slope, and shall accurately represent the as constructed sanitary sewer system. Service lateral locations shall be shown on the sanitary sewer drawing and shall include, lot numbers, road/street names, the distance from the downstream manhole to the service lateral, the length of the service lateral, and the depth of the service lateral at the connection point (see Figure 1). Any services which are DIP shall also be labeled as such. All record drawings shall be 24" x 36" in size and shall be noted and dated in the revision block.

Record drawings must be signed and sealed by the Engineer of record.

(See note and detail on the next page)

After record drawings are reviewed, comments will be returned to the engineer if necessary for correction.

FIGURE 1 – Plan View Record Drawing Example



1. "SS" indicates the distance of the service lateral location from the downstream manhole.
2. "L" is the length of the service lateral from the main to the connection point.
3. "D" is the depth of the service lateral at the connection point.
4. Ductile iron pipe (DIP) services shall be noted on drawings.

2.4.2 Final Dedication

The engineer shall provide to Metro the completed *Final Project Submittal Checklist* and *Certification Letter Requirements*, instructions, flow charts and legal documents are located in **Appendix H**. All items on the *Final Project Submittal Checklist* must be complete, all associated fees paid, and the sanitary sewer system dedicated to Metro, prior to the final acceptance letter being issued. Metro's acceptance letter is a requirement by SCDHEC for the engineer to obtain the PTO.

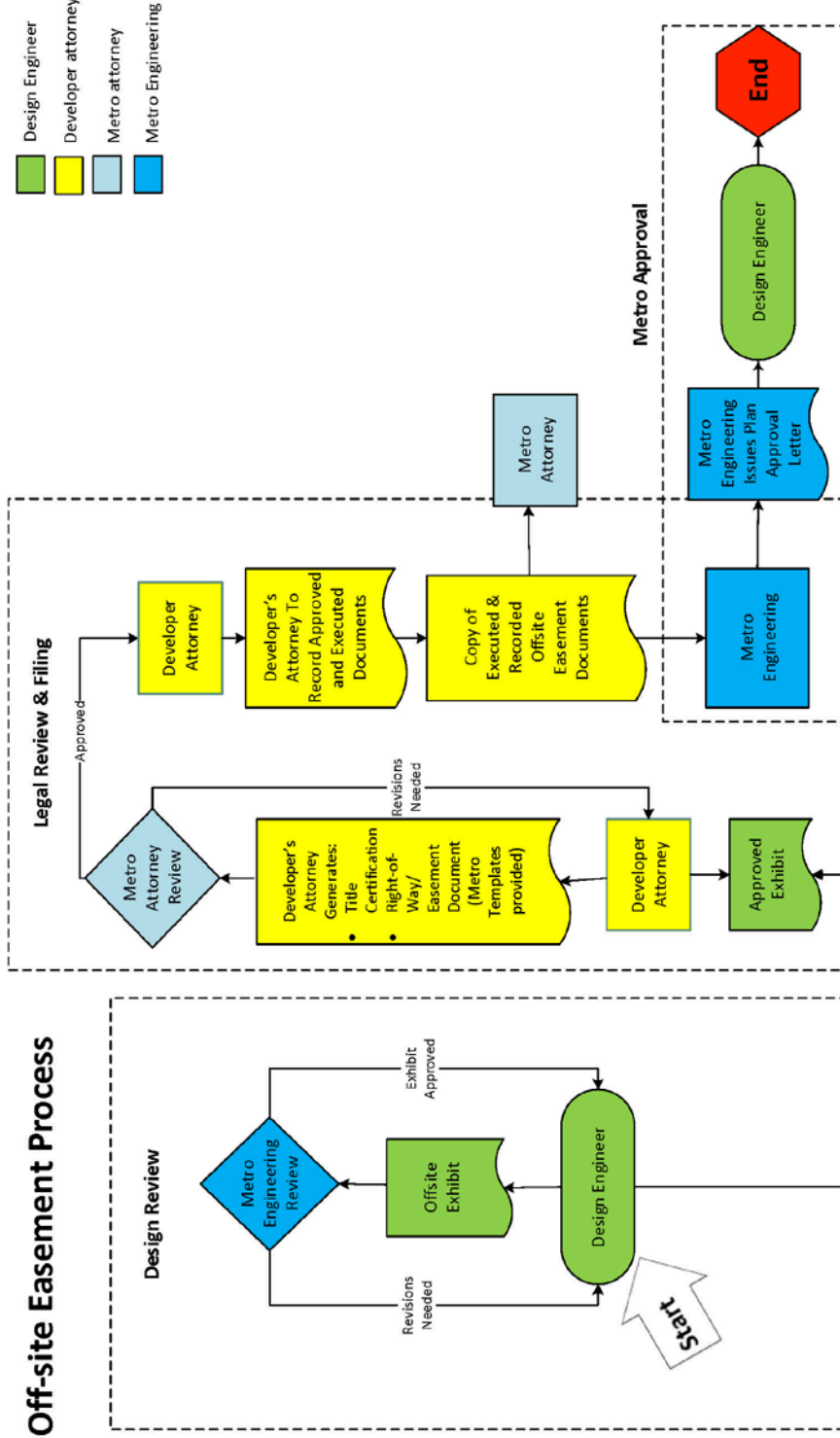
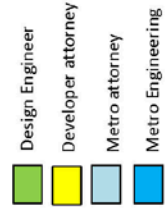
2.4.3 Off-site Easements

If a proposed sanitary sewer system requires access onto an off-site parcel; the developer will be responsible to obtain any and all off-site sanitary sewer easements. **Metro strongly recommends that the developer acquires all off-site sanitary sewer easements before any sanitary construction begins.** Should the developer construct the on-site sanitary sewer system before obtaining the off-site easement, Metro is in no way liable for any reimbursements to the developer, to acquire the off-site easement, or to condemn any off-site property.



The off-site sanitary sewer exhibit shall meet the minimum standards for a Class A survey in the State of South Carolina and must be signed and sealed by a licensed South Carolina Professional Land Surveyor (see Off-site exhibit Checklist).

The “Right of Way” document is located in **Appendix H**. The [“Right of Way” template \(word format\)](#) is located at <http://www.metroconnects.org/developer-offsite-r-w/>.



Revised 8/7/19

The checklist below serves as a guide for completing this process:

Off-site Exhibit Checklist

- 8 1/2" X 11" Off-Site Exhibit
- Tax map numbers
- Site address
- Lot numbers
- North arrow
- Graphical scale bar
- Existing sanitary lines and manholes
- Existing sanitary sewer easements (label owner: Metro, Rewa...)
- Proposed lines and manholes
- Hatch and label proposed easement
- Road right of ways with road names
- Associated water bodies
- Existing property lines
- No metes and bounds associated with the sanitary sewer lines, easements, or manholes (including ties to property corners)
- 25' sanitary sewer easement detail and note **(Figure 3 in Appendix H)**
- No vertical data (rim or invert elevations)
- Signed and stamped by a licensed South Carolina Professional Land Surveyor
- Off-site exhibit title "Off-site sanitary sewer exhibit for: (developer or development) **Not Metro Sewer**

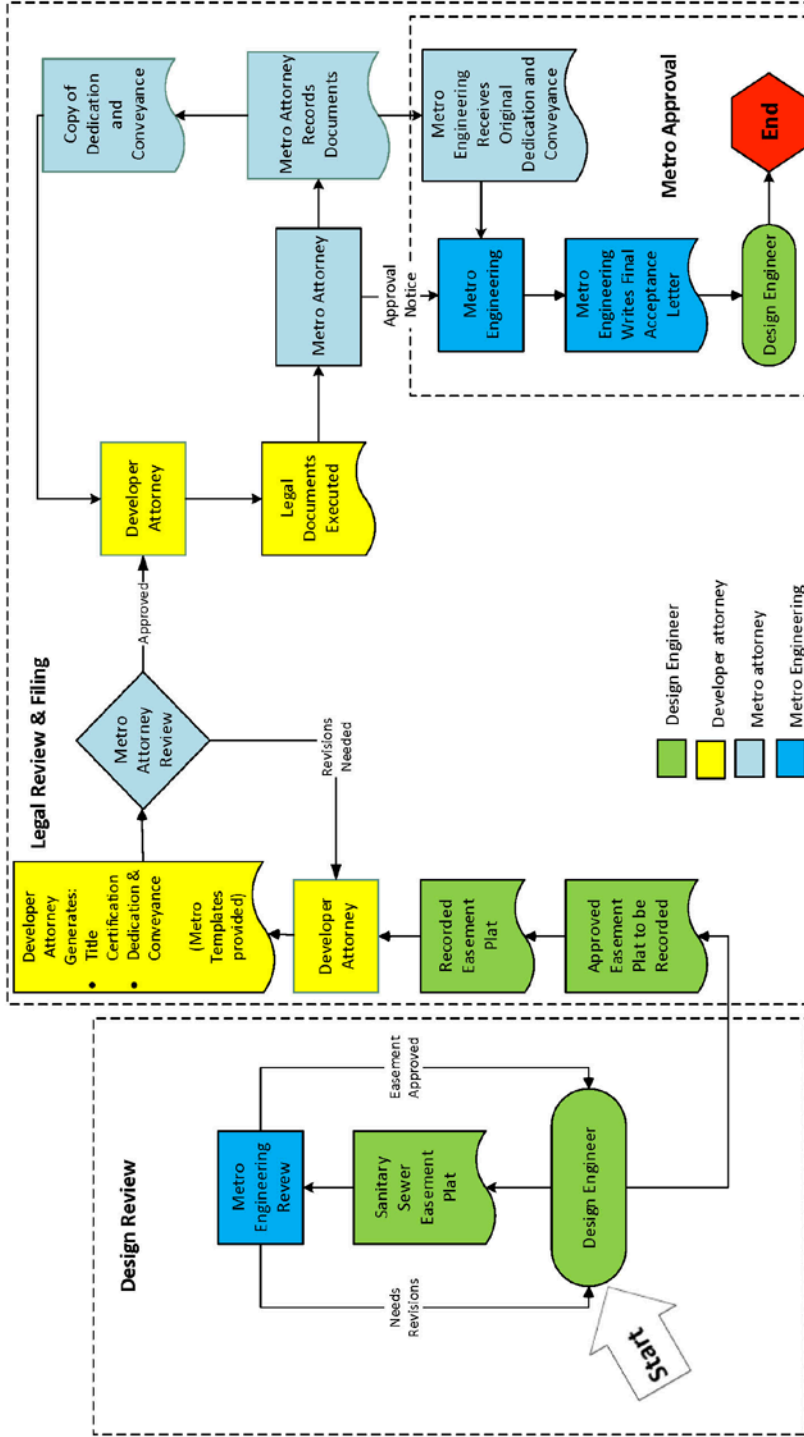
2.4.4 On-site Easement Plats

The sanitary sewer easement plat is required as part of the final dedication of the sewer system to Metro. **The easement plat should be produced and submitted to Metro for review as soon as the sewer manholes and lines have been installed.** Once the sanitary sewer easement plat has been approved by Metro Engineering the legal dedication process may begin (see flow chart on next page). **NOTE: Failure to submit the sanitary sewer easement plat before project completion will result in closeout delays (see On-site Exhibit Checklist).**

*The “Dedication and Conveyance” document is located in **Appendix H** the [“Dedication and Conveyance” template \(word format\)](http://www.metroconnects.org/developer-dedication-6-2019-c1/) is located at <http://www.metroconnects.org/developer-dedication-6-2019-c1/>.

Revised 8/2/19

On-site Dedication and Conveyance Process



On-site Easement Plat checklist

- 24" X 36" On-Site Easement Plat
- Tax map numbers
- Site address
- Lot numbers
- North arrow
- Graphical scale bar
- Existing sanitary lines and manholes
- Existing sanitary sewer easements (label owner Metro, Rewa...)
- Proposed lines and manholes
- Hatch and label proposed easement
- Road right of ways with road names
- Associated water bodies
- No metes and bounds associated with the sanitary sewer lines, easements, or manholes (including ties to property corners)
- 25' sanitary sewer easement detail and note (Figure 3 in Appendix H)
- No vertical data (rim or invert elevations)
- Signed and stamped by a licensed South Carolina Professional Land Surveyor
- On-site easement plat title (Sanitary sewer easement plat for: (subdivision name with section and/or phase) **Not Metro Sewer**)

2.4.5 Final Plats

The following items will be required on the final development plat for recording:

- 1) Sewer line and manholes shown
- 2) Sewer Easement note and detail (Exhibit 3 in Appendix H)
- 3) Register of Deeds recording information for the Sanitary Sewer Easement Plat to be referenced.

2.4.6 Development Covenants

Covenants for the development shall contain the following statement:

“The Sanitary Sewer Rights of Ways for the development are defined in the Dedication and Conveyance of the Sanitary Sewer Line and Right of Way (easement) recorded in Deed Book ____, Page____ in the Office of the Register of Deeds for Greenville County and are shown on the recorded plat(s) referenced therein.”

2.4.7 Final Inspection

The construction of the sanitary sewer system shall be complete prior to scheduling a final inspection. The engineer must schedule Metro’s inspector at least 48 hours (two working days, not to include weekends or holidays) prior to the proposed final inspection. All prior punch list items shall be completed. The pipelines and manholes shall be completely clean and free of gravel, dirt, and construction debris. All inverts shall be smooth with a uniform grade through the manhole and shall not hold water. All rights of way shall be cleared to a minimum width of 25 feet and shall be fine graded and grassed to allow vehicle access.

Following the final inspection, the **engineer** shall prepare the Final Inspection Punch List to provide to Metro’s inspector and the contractor. The engineer will notify Metro’s inspector when all punch list items are completed and schedule a follow up inspection. Upon satisfactory completion of the noted deficiencies, Metro will perform a CCTV inspection.

2.4.8 CCTV Inspection

After the final inspection is complete and all deficiencies are corrected, Metro will perform a CCTV (closed circuit television) inspection of the sanitary sewer system and provide the *CCTV Inspection Report* (Appendix H) to the engineer. The **engineer** will be responsible for managing any required repairs, following the process specified in the report. Upon completion of deficiency corrections, the engineer shall return the executed *CCTV Inspection Report* to Metro for subsequent CCTV inspections. Upon acceptance of the inspection, Metro will forward a final

invoice to the engineer (see *Fee Schedule* – Appendix I). The CCTV inspections shall be performed by Metro in the order in which they are received.

2.5 Warranty

The **CONTRACTOR** warrants to Metro that all materials and equipment furnished for the construction of the sanitary sewer system will be new unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the approved plans, details, and standard specifications.

A warranty period of a minimum of one-year is required for all new sanitary sewer systems and will begin once Metro issues a final acceptance letter. A longer warranty period may be required under special circumstances as determined by Metro. The contractor shall, promptly and without charge to Metro, repair, replace, or otherwise remedy such defects that may be discovered or develop at any time within the warranty period to the full and complete satisfaction of Metro. The warranty shall be extended automatically to cover all repaired and replacement materials and labor provided or performed under the warranty for a period of one year from the date of such repair or replacement.

3.0 Gravity Sewer Design

Design of all sanitary sewer systems that are to be dedicated to Metro shall be performed by a Professional Engineer registered in the State of South Carolina. All designs shall be in accordance with the Design and Specifications Manual, South Carolina Department of Health and Environmental Control (SCDHEC) Regulation 61-67, and the Ten State Recommended Standards for Wastewater Facilities (latest edition). Where information presented herein conflicts or overlaps with a governing regulation, deed, or plat restriction, the more stringent restriction shall prevail.

Horizontal survey datum control shall be based upon, and referenced to, South Carolina State Plane, NAD83 HARN, International Feet coordinates. Vertical survey datum control shall be based upon, and referenced to, the North American Vertical Datum of 1988 (NAVD 88). Electronic drawings submitted to Metro shall be in the correct projection, coordinate system, datum, and units.

Sanitary sewers are designed for the collection and transmission of wastewater. Downspouts, foundation drains, yard drains, area drains, basement drains, hazardous waste materials, and sump discharges for other than sanitary waste shall not be connected to the facilities of Metro.

The safety and protection of public and private water supplies is vital. There shall be no connection between any public or private potable water supply system and any sanitary sewer or appurtenance thereto which would permit the passage of any sewage or polluted water into the potable water supply.

3.1 System Sizing

New sanitary sewer mains shall be a minimum of eight inches in diameter. Average daily flows shall be calculated using SCDHEC’s Unit Contributory Loadings. Peak flows shall be calculated by multiplying the average daily flow by a peaking factor based on the following formula. In no case shall the peaking factor be less than 2.5.

$$\text{Peak Factor} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}, \text{ where } P = \text{population in thousands}$$

Refer to “Recommended Standards for Wastewater Facilities,” latest edition

Pipes shall not exceed the following maximum allowable flow depths:

TABLE 1

Sewer Diameter (inches)	Maximum Percent Full at Peak Flow
8	50
10	50
12	60
14	65
15	70
16	70

3.2 Sanitary Sewer Upsizing and Extension

Sanitary sewer mains shall be designed to serve the entire drainage basin. If there is the potential for service to be extended beyond the proposed development, Metro will prepare flow calculations for the basin. Flow calculations shall include projections of future flows for upstream areas that drain into the site based on zoning and current development trends. Upsizing of the proposed sanitary sewer system may be required by Metro. Upon request, Metro may reimburse the material cost difference of the upgrade subject to Commission approval.

Similarly, provisions shall be made for future extensions at proposed locations as determined by Metro. In the case where no upstream extensions are reasonable or likely, sanitary sewer systems may be terminated at a point acceptable to Metro.

3.3 Minimum Slope and Velocity

Gravity sewers shall be designed with uniform slope between manholes. Calculations for velocity will be based on Manning's formula using an "n" value of 0.013. In cul-de-sacs or other low flow situations, the slope from the starter manhole shall be a minimum of 1 foot per 100 feet on an 8" system.

A minimum velocity of 2.0 feet per second is required. In no case shall the slope of a pipe fall below the minimum values listed in Table 2 below. Pipe sizes shall not be increased arbitrarily to take advantage of a flatter grade.

TABLE 2

Sewer Diameter (inches)	Minimum Slope (feet per 100 feet)
8	0.50
10	0.32
12	0.25
14	0.20
15	0.18
16	0.17

3.4 Maximum Velocity

Average flow velocities greater than fifteen feet per second will not be permitted without special exception. Drop manholes may be used when required to reduce steep slopes and high velocities. Where permitted velocities are anticipated to exceed fifteen feet per second, restrained joint pipe and fittings may be required and the pipe material, inverts and/or special linings shall provide protection against internal erosion in conformance with ASTM and/or American Water Works Association (AWWA) specifications.

Sanitary sewer lines on twenty percent slopes (20 feet per 100 feet) shall be anchored securely with concrete anchors or approved equal. Anchors shall be spaced at a maximum of 36', center to center.

3.5 Alignment

Sanitary sewers shall be designed with straight alignment between manholes. Where applicable, lines shall be designed beneath the travel way with the manholes centered within a lane. Installations under curb lines shall be minimized. Sanitary sewer lines shall be designed such that the internal angle of deflection is not less than ninety (90) degrees.

3.6 Depth

For most common applications, the minimum bury depth from the top of the pipe to the finished grade shall be 4.0 feet and the maximum bury depth shall be 18.0 feet. The presence of rock or unsuitable soil conditions is not justification for reduced cover. Reduced cover and installations deeper than 18 feet may be approved on a case-by-case basis by Metro.

3.7 Pipe Materials

Refer to the attached *Standard Technical Specifications* (Appendix B) for all pipe material requirements.

Ductile iron pipe (DIP) shall be used when the depth of cover is less than 4.0 feet or greater than 18 feet, when located within 18 inches of the storm drain, or where point superimposed loading may occur due to other utilities or structures. Lined DIP pipe is required in areas where corrosive conditions may occur.

ANSI/AWWA C900 may also be used in depths equal to or exceeding 18 feet. In approved cases, PVC pipe meeting the requirements of AWWA C900 may be used in place of Ductile Iron Pipe.

3.8 Horizontal and Vertical Separation

All separation requirements are measured from the nearest outside edge of the sewer pipe to the nearest outside edge of that which is being avoided. A minimum of 18 inches clearance, both horizontally and vertically, shall be maintained between sanitary sewer systems and all other underground systems. No utility shall be within 3 feet of a sanitary sewer manhole.

Additionally, sewer lines shall be at least ten feet horizontally from potable water mains, unless otherwise permitted by Metro. Should local conditions prevent a horizontal separation of ten feet, the sewer main must be in a separate trench where the elevation of the top of the sewer is at least 18 inches below the bottom of the water main.

Prior approval from Metro must be obtained before a sanitary sewer main is permitted to cross a water main. When local conditions necessitate that a sewer main and potable water main cross, all reasonable effort must be made for the sewer line to cross under the water main. New sanitary sewer crossing water mains shall be designed to provide a minimum vertical separation

of 18 inches. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

When unique and exceptional conditions exist such that a minimum 18-inch vertical clearance cannot be maintained between a sanitary sewer main and any other underground utility crossing, the following conditions must be addressed on the plans:

1. The crossing shall have adequate structural support to prevent damage to the main.
2. The sewer main shall be a slip type or mechanical joint pipe complying with ANSI/AWWA C900 or ANSI/AWWA C600 (D.I.P), public water supply standards. This section of the sewer line shall be pressure tested in accordance with Metro specifications.

When a new utility installation crosses an existing sewer line not meeting the minimum clearances specified above, a section of the existing sewer line must be replaced with pipe meeting conditions 1 and 2 above for a distance of at least 18 feet centered under the crossing utility, or as directed by Metro. In addition to the requirements specified above, a water main shall not be allowed to pass through or come into contact with a sewer manhole.

3.9 Steel Pipe Casing

When dry boring and jacking is required for the construction of sanitary sewer lines; or when a steel casing and carrier pipe system is used for longer aerial spans, installation shall be in conformance with the latest Metro *Standard Details* and *Standard Technical Specifications*.

Steel casing pipe shall be laid to the appropriate line and grade, as designed and permitted, working in the upstream direction. At least one end of the encasement shall be a minimum of 25' from the closest manhole.

When the casing pipe is installed without the benefit of protective coating or said casing is not cathodically protected, the wall thickness shall be increased to the next higher standard thickness as approved by Metro.

3.10 Relationship to Water Bodies

Sanitary sewer lines shall not be located in or under ponds, pond embankments, lakes, storm water detention ponds, or within dams or any other structures that hold water on a permanent or temporary basis. Sewers crossings must meet all associated state and federal permitting requirements. Prior to issuance of Metro's approval letter, the engineer shall deliver all required permits and a sealed letter that all required permits have been obtained, or are not required, from all relevant permitting agencies including Local Floodplain Development, US Army Corps Wetlands, State 401 Water Quality, etc.

Aerial and underground stream crossings will be approved by Metro on a case-by-case basis. Sewer systems shall be designed to minimize the number of stream crossings. Sewers crossing streams must be designed to have a minimum impact on the stream cross section and ecosystem and must cross the stream as nearly perpendicular to the stream flow as possible. Metro will not allow inverted siphons.

If an aerial crossing is necessary, support shall be provided for all non-mechanical pipe joints. The supports shall be designed to prevent frost heave, overturning, and settlement. In FEMA-regulated floodplains, the bottom of the pipe shall be placed no lower than the elevation of the 50-year flood; on a case by case basis the 100-year flood elevation may be required. As a general guideline, the manhole rim elevation shall not be greater than six (6) feet above the finished grade elevation. The impact of floodwaters and debris shall be considered. Piers and all appurtenances thereto require structural analysis of horizontal and vertical stability by a South Carolina Professional Engineer. Soil boring information is required at proposed pier locations. All reasonable effort shall be made to minimize the number of piers located within the floodway. All ditch, creek, stream, and river crossings shall be ductile iron pipe (DIP) from manhole to manhole and the associated channel banks shall be stabilized. Alternate pipe materials and stream bank stabilization may be reviewed on a case by case basis.

When proposed aerials are to cross areas of floodplain, it is recommended to present a preliminary plan to the County floodplain administration before submitting to Metro.

If an underground crossing is necessary across a US Army Corps regulated stream, it shall be installed either by open cut or by jack and bore method. An encasement and carrier pipe may be required by Metro. The encasement pipe shall extend a minimum of 20 feet on both sides of the stream channel measured from the top of bank, or as directed by Metro. The top of all encasement pipes shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line crossing. In general, the following cover requirements must be met; 1) One foot of cover where the sewer is in rock, and 2) four feet of cover in other material. In some cases, more than four feet of cover may be required.

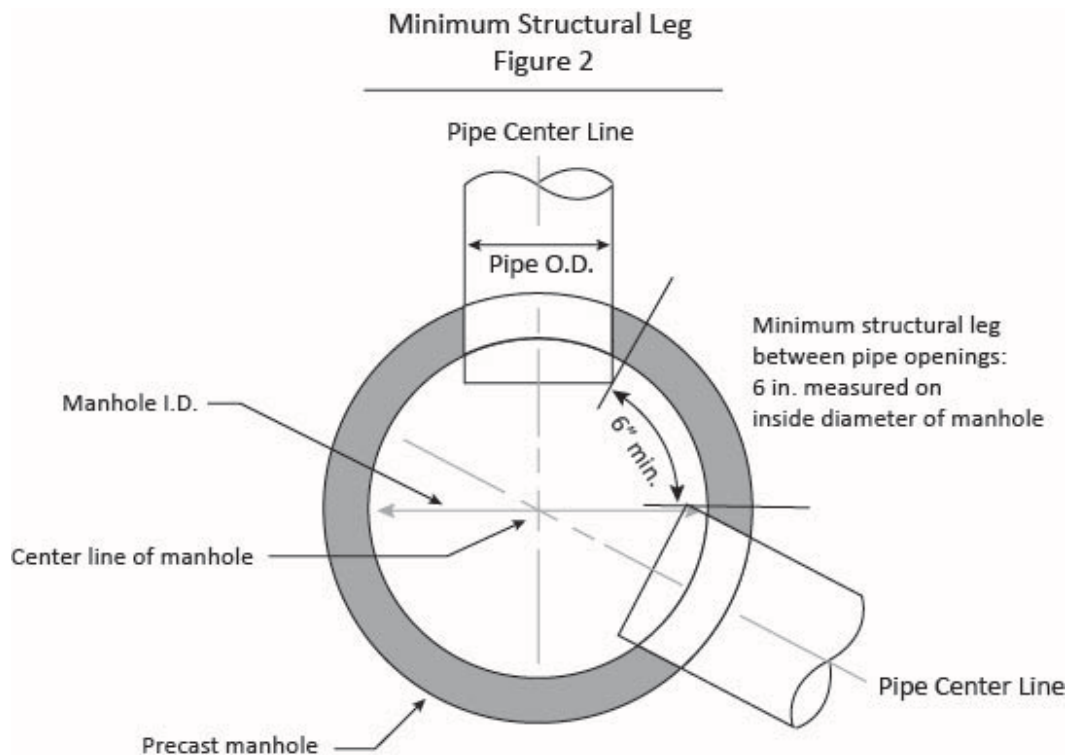
When working in wet areas, care shall be taken to ensure water tightness of structures per ASTM C443. The engineer should refer to specification section 02240 for dewatering requirements.

3.11 Manholes

Manholes must be installed at the end of each gravity sewer main line; at all changes in line size, slope, or alignment; and at all intersections. Additionally, manholes must be installed at intervals

not greater than 350 feet for all sewers 18 inches and smaller. Where applicable, manholes shall be placed within the center of the travel lane.

For most common applications, the minimum interior diameter of gravity sewer manholes shall be 48 inches for manholes that are less than 16.0 feet deep and 60 inches for manholes 16.0 feet deep and greater, measured from the lowest invert of the manhole to the top of the cover. In no case shall manhole depths be less than 5 feet deep. Any manholes placed in fill areas must utilize an extended base section (see detail Appendix A). Additional compaction testing may be required for manholes placed in fill areas. No more than four (4) connections (including laterals and mains) are permitted to any one manhole without prior approval of Metro. There shall be a minimum of 6-inches of structure leg between pipe connections (see Figure 2). Minimum horizontal angle between all incoming (invert in) and outgoing (invert out) pipes shall be 90 degrees. Where a new sewer line ties to an existing brick manhole, the manhole must be completely replaced with a precast reinforced concrete manhole meeting Metro specification.



3.11.1 Manhole Flow Channel

The flow channel straight through a manhole shall conform as closely as possible in shape to that of the connecting sewers and be a smooth connection between the inlet and the outlet pipe. Pipes shall not protrude into the manhole greater than 2-inches. Flow channels between an inlet pipe and the outlet pipe may be field constructed or precast. The invert of the pipe shall be equal to the invert of the flow channel at the connection. The channel walls shall be formed or shaped to 0.8 times the height of the crown of the outlet sewer in such a manner that does not obstruct maintenance, inspection or flow and to prevent solids deposition. When curved flow channels are specified in manholes, increased channel slope may be necessary to maintain acceptable velocities.

Manhole channels shall conform to the Manhole Standard Detail.

A bench shall be provided on each side of the flow channel. The bench shall be sloped no less than 1-inch per foot. No lateral, service connection, or drop manhole pipe shall discharge onto the surface of the bench.

Through design and installation, careful consideration must be taken to compensate for the head losses occurring through the flow channel between all manhole inlets and outlets. Manholes shall have a minimum 0.2 foot drop in elevation from the lowest inlet invert to the invert of the outlet. A 0.1-foot drop may be considered under special circumstances at the discretion of Metro. Where a new sewer connects to an existing main and a new manhole is required, there shall be a minimum 0.3 foot drop in elevation from the invert of the new inlet to the outlet pipe invert. All manholes shall have a maximum 0.3 foot drop in elevation through the manholes. All changes of direction, size or shape of sewers shall be made by smooth transitions in the flow channel to minimize head loss in manholes. Where a smaller sewer transitions to a larger one through a manhole, the crown elevation of the two pipes must match.

3.11.2 Drop Manholes

The use of drop manholes shall be minimized. Metro shall approve the use of drop manholes only when it cannot be avoided. The minimum drop, measured from the invert of the incoming pipe to the manhole invert, shall be no less than 5 feet. Drops of less than 5 feet may be allowed on a case by case basis with approval from Metro. No connection to the manhole shall be made between 12 inches and 5 feet above the manhole invert without prior approval from Metro.

Outside drop manholes must be constructed in conformance with the latest Metro *Standard Details* and *Standard Technical Specifications*.

3.11.3 Doghouse Manholes

Doghouse manholes are mandatory in lieu of cut-in manholes on existing sewer mains when the following conditions are encountered:

1. For manholes with 0.1' drop between inverts, doghouse manholes will be required on existing mains with slopes less than 2.0%.
2. For manholes with 0.2' drop between inverts, doghouse manholes will be required on existing mains with slopes less than 4.0%.
3. Refer to detail in Appendix A.

3.11.4 Manhole Water-tightness

Infiltration to and exfiltration from the sanitary sewer system must be minimized to the greatest extent possible. Watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water. All manholes and other above ground access points located less than one foot above the Base Flood Elevation (BFE) shall be watertight.

Flat top slabs shall be required when the rim elevations of the manholes are greater than 3 feet above finished grade.

Within the floodplain, in areas with a high-water table, or in other areas as directed by Metro, manhole joints shall be sealed externally in accordance with the *Standard Technical Specifications*.

3.11.5 Corrosion Protection for Manholes

Where corrosive conditions due to septicity or other causes are anticipated, such as at a force main discharge, corrosion protection on the interior of the manholes shall be provided in accordance with the *Standard Technical Specifications*. In such case, contact Metro for specifications. The interior of manholes for a distance not less than 1,000 linear feet downstream of the corrosive source must also be coated with the acid resistant material.

3.12 Service Laterals

Service lateral design shall include coordination with other utilities, proposed structure finished floor elevations (basement), lot grades, etc. Design shall be in conformance with the standard sewer service lateral detail(s) and shall maintain true line and grade - 1% minimum. (see details in Appendix A). Additional laterals will not be allowed to be installed on new systems which have already been installed without permit approval from Metro.

Ductile iron pipe (DIP) shall be used for service laterals when the depth of cover is less than 4 feet, when located within 18 inches of storm drain structures, or where point superimposed

loading may occur due to other utilities or structures. All DIP laterals to be installed shall be shown on construction plans.

Service laterals are encouraged to be tied into manholes. Service lines connected to the gravity main must be a minimum of 90 degrees in relation to the downstream section of the main. The invert of the lateral shall be called out on the plans and shall be constructed per the *Standard Details* (see Appendix A).

In subdivisions, the service lateral shall be installed a minimum of 5 feet upstream of the lowest property corner fronting the proposed sewer and stub outs shall be in unpaved areas and marked.

4.0 Pump Stations and Force Mains

The owner/developer and engineer must coordinate a pre-design conference for all projects requesting the use of pump stations and force mains.

Metro has determined that, in appropriate circumstances, it may own and operate sanitary sewer pump stations, which constitute a part of its sewer collector system to carry out its functions and serve constituents within its boundaries. Metro may accept sanitary sewer pump stations, on a case-by-case basis, subject to the provisions of the **Pump Station Policy** (Appendix E).

Pump stations should typically be regional in nature. Pump stations and force mains shall be designed and installed in accordance with sound engineering practice and must adhere to South Carolina Department of Health and Environmental Control Regulation 61-67, Ten State Recommended Standards for Wastewater Facilities (latest edition), and Renewable Water Resources (ReWa) regulations. Third party peer review and inspection may be required. Force mains shall be tested to satisfy a leakage test in accordance with AWWA Standard C600. See Appendix F for the *Pump Station Design Review Checklist*.

4.1 Tracer Wire

Tracer wire must be installed on all force mains. Refer to the attached *Standard Technical Specifications* (Appendix B) for all pipe material requirements.

5.0 Installation

5.1 Sewer Mains

Sewer mains shall be laid with a straight alignment and uniform slope between manholes. Sewer mains shall be installed at a depth to provide gravity sewer service from any property/structure within the service area.

All compacted fill for roadways, etc. shall be in place prior to the installation of all sewer lines unless otherwise approved in writing by Metro. Compaction (standard proctor density) should be a minimum of 95% under roadways and 90% in all other areas. Compaction reports within roadways shall be submitted to Metro prior to acceptance of the sewer system. See section 8.4 Compaction Testing. Additional compaction testing may be required at the discretion of Metro.

5.2 Service Laterals

Service laterals shall be installed at right angles to the gravity main. Minimum spacing between service lateral connections to a given gravity main shall be 5 feet. Exceptions will be reviewed on a case by case basis. All service lateral tees shall be installed 45-degrees from the cross section horizontal centerline (10 and 2 o'clock position). No horizontal (9 and 3 o'clock) or vertical

(12 o'clock) services will be allowed. Service laterals shall be extended to the road or Metro right of way line and then plugged.

5.3 Manholes

Manholes shall be constructed to rim elevations shown on the drawings. Chimneys shall be a maximum of 10-inches from the top of the cone to the bottom of the frame and cover. A maximum of 32 inches is allowed from the top of the manhole to the first step. If an existing manhole requires an adjustment and is unable to meet these requirements, the manhole shall be adjusted below the cone section. The use of four inch frames and covers to keep manholes in compliance are not allowed.

5.3.1 Boot Connections

Flexible sleeves meeting shall conform to the *Standard Details* and *Standard Technical Specifications*. The installed pipe shall have a smooth, formed invert; boring or chipping of the existing table to the flow channel is required. Pipes shall not protrude into the manhole greater than 2-inches. Corings for boot connectors shall not be made within six inches of a manhole barrel section joint. Re-coring or over coring an existing connection will only be allowed by prior

approval of Metro. Brick or block manholes shall not be cored and must be replaced prior to a new connection.

5.3.2 Manhole Frames and Covers

Frames and covers conforming to the latest version of the published Metro *Standard Details* shall be used on all Metro owned sanitary sewer mains. Covers shall be cast with Metro's logo as shown on the detail. Within the roadway, manhole frames and covers shall be set at grade to match the final paved surface. No more than 2-inches of the manhole ring and cover shall be exposed in paved areas after pavement is installed and prior to the installation of the final surface course.

6.0 Easements/Right of Way Requirements

Metro must maintain accessibility to the sanitary sewer infrastructure for inspection, maintenance and repair. Accessibility is achieved through the establishment of restricted utility easements above and around Metro's sanitary sewer infrastructure. The information below presents the intent of the policy relative to sanitary sewer infrastructure installations.

A permanent dedicated easement centered over the installed underground system, shall be conveyed to Metro. Additionally, Metro may require an access easement.

The easement width must be 25-feet for sewer mains 24" in diameter and smaller. At the discretion of Metro larger easements may be required. Justification for a larger easement includes, but is not limited to, remote locations, adverse slopes, and/or poor site conditions.

The entire width of the easement shall remain clear and fully accessible, and access to manholes shall be preserved at all times. Maximum grade of access easements shall be 1:10 (both horizontally and vertically). No obstacles that inhibit Metro's ability to access and maintain its infrastructure shall be placed within an easement including, but not limited to, temporary or permanent structures, permanent signage, lighting, underground electrical wiring, walls, fences, trees, ponds, lakes, storm water detention ponds, dams, or any other structures that hold water on a permanent or temporary basis.

Fences are not permitted in the sanitary sewer easement parallel to the sewer line. Consent from Metro is required in instances where the fence is placed perpendicular to the sewer line. If permitted, (2) two – (6') six-foot wide gates are required where the fence crosses the sewer

easement. The use of the sanitary sewer easement by the private property owner shall not injure, endanger or render the sewer line or its appurtenances inaccessible in any way.

Metro will not bear the responsibility for property loss or damage for unpermitted items placed within the easement. Metro has the right to cause any obstruction to be removed without notice to the property owner and all related costs shall be the property owner's responsibility.

Asphalt paths, concrete sidewalks, roads, parking lots, grass, shrubs and other planting whose natural height does not exceed three feet are permitted in the easement. Maintenance for these items is the responsibility of the property owner or homeowner's association; however, like all other items not defined for use in the easement, they are at risk to damage and subject to removal at any time.

If trees are planted within close proximity to the sewer easement Metro will require root barrier protection. Barrier protection shall be located at the drip line (i.e., outermost circumference of the tree canopy) of the mature tree. The engineer shall submit a shop drawing detailing the proposed root barrier protection system proposed for approval prior to construction.

In order to meet the easement requirements, the following hierarchy is established:

- e) Sanitary sewer installations shall be located within public rights of way or within dedicated permanent easements adjacent to public rights of way. Where sanitary sewer infrastructure is placed within an existing public easement or right of way, but there is less than half of the full width of the required easement or right of way on each side of the sewer line, additional right of way will be required by Metro to provide the full easement width. New sanitary sewer systems will not be allowed parallel to and within the SCDOT roadway right-of-way.
- f) Sanitary sewer installations shall be located within a permanent easement through areas with unrestricted access.
- g) When unique and exceptional conditions exist that prohibit installation in conformance with the above requirements, Metro may permit the installation of wastewater infrastructure within a permanent easement through private property that meets the established easement requirements to the greatest extent possible. These easements must be clearly marked and identifiable and generally run along common property lines.
- h) Easement and Final Plats, record drawings and as-builts must show the new sewer easement located 12.5 feet from each side of the sanitary sewer line as constructed. This includes easements that extends outside of a road right of way.

7.0 Service Connections to Existing Sewer (Taps)

Service connections (service laterals) are defined as the portion of the sanitary sewer system that extends from the main line or manhole to edge of easement or road right-of-way. Service laterals shall be a minimum 6-inch diameter and installed at a minimum 1% grade.

The connection assemblies of the laterals to the main sewer line shall be installed in conformance with the latest Metro *Standard Details* and *Standard Technical Specifications*. Metro will require service connections be inspected and/or tested to ensure positive connectivity to the main sewer line prior to placing the service lateral into operation.

If the service connection does not comply with Metro standards, a Metro inspector will coordinate with the local Building Code Division to place a hold on the Certificate of Occupancy (CO) until the connection is accepted.

7.1 Connection to Existing Main Sewer Line or Manhole

Metro will allow a new connection to the sewer main or manhole only when a service lateral for a parcel does not exist. New service lateral installations shall connect into a new or existing manhole unless circumstances prevent the connection. Saddle taps conforming to the Standard Detail will only be approved if a manhole connection is not feasible. A site meeting with the contractor and Metro Inspector will be required prior to finalizing the location of the proposed service lateral. All new service lateral connections must be made by a water and sewer contractor who possesses a SC State LLR “WL” license and will be paid for by the customer. On all taps a plumber may make the connection provided the “GC” assumes the responsibility of the plumber’s work. Metro shall inspect all service lateral installations at the connection and piping to the edge of the sewer easement or road right-of-way, whichever is greater. No part of the installation in the sewer easement shall be backfilled or covered prior to a Metro inspection and the work is found to be satisfactory. The connection and service lateral shall be constructed in accordance with Metro’s Sanitary Sewer Service Lateral Detail (see Appendix A)

For all work within the County road rights of way, an approved and signed Greenville County road encroachment permit will be required prior to issuance of the Metro sewer permit. For commercial and industrial taps, flow calculations (based on SCDHEC contributory loading chart) should be submitted to Metro by the engineer. A ReWa “New Service Lateral Connection Form” will be required for Metro review and approval (see ReWa website for an electronic copy). This form pertains to service laterals only.

For Commercial or Industrial lateral taps and installations, plans will be required and should be submitted a minimum of 1 week prior to picking up the permit. The plan should include the following information:

1. A 24" x 36" plan shall be drawn to an acceptable scale (e.g., 1" = 10', 20', 30', 40', 50', 60', or 100');
2. Tax Map ID (Block Book # or PIN);
3. Location map, property lines and road rights of way;
4. Footprint of the proposed building with finish floor elevation, driveways and parking lots;
5. Existing sewer right of ways with mains and manholes included;
6. Location and routing of the proposed connection to Metro's existing main;
7. Utilities and storm drainage within roadway or Metro's existing easement;
8. Note on plan "Contact Metropolitan Sewer Inspector 864-277-4442 minimum of 48-hours prior to making new lateral connection"; and
9. Note on plan "Contractor shall possess a SC LLR issued WL (water/sewer) license. Contractor to call Metro 864-277-4442 for license verification prior to beginning work".

Residential, commercial and industrial permits will be issued at Metropolitan's office located at 120 Augusta Arbor Way, Greenville SC 29605. Once a permit application has been submitted and received through Metro's website (<http://metroconnects.org/permit-application/>), the permit may be picked up after a minimum of 24-hours (not including weekends and holidays). If a project requires a County roadway encroachment permit, a copy of the approved encroachment permit shall be presented. Commercial and industrial permits will not be issued prior to plan approval. Permits must be paid for with cash or check when picked up.

Service lateral connections to manholes shall be air tested in the presence of the Metro inspector or engineer.

After the final inspection is complete and any deficiencies are corrected, Metro will CCTV the service lateral connection(s) and approve or deny the service lateral connection. If necessary, the contractor will document that all repairs have been made prior to subsequent CCTV inspections.

7.2 Connection to Existing Service Lateral

For new development, Metro utilizes information provided on the record drawing for the location of the service lateral connection and therefore does not guarantee its accuracy.

The customer shall call Metro prior to any work related to Metro's pipelines, manholes or rights-of-way. The customer shall provide Metro personnel with the location of the proposed connection (address or tax map ID number) so that Metro personnel can determine if a sewer service lateral is available.

In some cases, the location of the plugged end of the service lateral may vary from the information provided on the record drawings. Problems encountered due to inaccurate information for Developer Constructed Facilities shall be resolved by contacting Metro. Metro will assist in providing additional information in order to locate the service lateral.

If Metro determines that an existing sewer service lateral can be utilized, then the customer may obtain a **Permit to Connect** as outlined in the following section of this guide.

Connections to existing service laterals shall be made using a watertight fitting appropriate to the existing sewer service lateral material (in accordance with the *Standard Details and Technical Specifications*).

7.3 Condominium, Apartment, Mixed-Use Development

A vertically arranged condominium/apartment type structure which is located on one parcel (one tax map ID) under one roof may convey wastewater from all units through one private service lateral (gang-service) to the public sanitary sewer main.

A proposed mixed-use development with a separate tax map number (individual parcels) must have separate service lateral connections for each privately-owned unit within the structure.

7.4 Service Lateral Connection Exclusions

Service lateral connections are limited to the same exclusions as defined by SCDHEC Regulation 61-67.

7.4.1 Illegal Taps

Any tap or connection made to Metro sewer lines or manholes without a permit is an illegal tap. Upon discovery of an illegal tap, Metro will contact the property owner and allow them 14 calendar days to obtain the appropriate permits and pay the required fees. In addition to a \$500 fine, the property owner will be required to reimburse Metro for all costs associated with repairs (plus a 15% administration fee) to correct any deficiencies caused by the illegal connection. Line cleaning and CCTV inspection costs will also be charged to the property owner.

Metro shall not maintain service laterals that are not installed per Metro requirements. Failure to comply with Metro requirements may result in the termination of the sewer service. Any

licensed contractor or plumber who installs an illegal tap shall be reported to the SC LLR and fined \$500 by Metro.

7.4.2 Dumpster Tie-in

Refer to ReWa standards.

7.4.3 Grease Traps

Grease traps are regulated by ReWa.

8.0 Inspection and Testing Requirements

Metro's Inspector shall inspect all new construction and modifications to sanitary sewer mains. Service lateral connections must meet the permitting and inspection requirements described in this manual. Construction must be in accordance with the approved plans, *Standard Details* and *Standard Technical Specifications*. A copy of the permit to construct (PTC) and one set of approved stamped construction drawings must be kept on site during construction and accessible to the Inspector. Any modifications to the approved stamped construction drawings must be submitted to Metro by the permitting engineer for review and approval prior to installation of the modification as well as any other affected portion of the approved system.

The permitting engineer, or his designee, must be present for all final performance tests and daily inspections. **The engineer must schedule all required inspections at least 48 hours in advance with Metro.**

8.1 Pipe Inspection

The engineer, or his designee, will observe the installation techniques to determine if they are appropriate for the soil conditions and the type of pipe. The engineer or his designee will verify that all materials used comply with Metro's standards and shall notify Metro's Inspector when materials are delivered on-site. Metro's inspector may require a field review prior to installation. The contractor may be required to produce supporting documentation that Metro's standards are being met. Work stoppages may result if the inspector cannot satisfactorily verify that the work is in compliance with the established standards.

After the lines are laid and the service connections are installed, the lines shall be air pressure tested in accordance with Metro's *Standard Technical Specifications*. If any section of pipe fails, the design engineer shall recommend an appropriate repair that must be approved by Metro. No flexible couplings will be allowed.

Main lines constructed of PVC material will be subject to the deflection mandrel test in accordance with the *Standard Technical Specifications*. This test may be performed no earlier than 30 days after installation is complete. Ductile pipe does not require a mandrel test and should be noted on the testing form.

Metro's inspector will perform a visual inspection of all lines, regardless of pipe material. If there is any settlement or slope loss of the sewer main as it enters and or leaves a manhole, the line shall be uncovered and raised to proper alignment. If the Inspector finds excessive misalignment of the piping between manholes, the entire line shall be removed and re-laid.

8.2 Manhole Inspection

The engineer, or his designee, will observe and verify the installation techniques to determine if they are appropriate for the site conditions. The engineer will verify that all materials used comply with Metro's standards. The engineer may be required to produce supporting documentation that Metro standards are being met. Work stoppages may result if the inspector cannot satisfactorily verify that the work is in compliance with the established standards. The Inspector will check all the flow channels between inverts and all benches for proper construction. The Inspector shall inspect all manholes to ensure that lift holes, steps, joints and rings are mortared smooth in accordance with *Standard Details* and *Standard Technical Specifications*. In order to be accepted, there shall be no signs of infiltration into the manhole. The Inspector will verify proper alignment of the ring and cover and all sections of the manhole. The Inspector will also verify that the ring and cover are at appropriate grade.

8.3 Performance Tests

The Contractor will furnish all facilities and personnel for conducting the tests in accordance with the Standard Technical Specifications. The required tests shall be performed in the presence of the engineer after the sanitary sewer has been backfilled and compacted. All tests must have a signature confirmation by the engineer or his designee. Metro testing forms and times can be found in Appendix G. The contractor is encouraged to perform a pretest of the system.

8.3.1 Vacuum Testing

Vacuum testing will be required for all manholes in accordance with Metro specifications. All connections, benches, and flow channels shall be installed prior to testing. Manholes located within the roadway must have the binder course of asphalt placed before testing. If a coating or lining is to be applied to the interior of the manhole, special conditions may be required by Metro based on type of material specified.

8.3.2 Air Testing

Sanitary sewer lines (including service laterals) will be required to pass a low-pressure air test in accordance with the *Standard Technical Specifications*.

Force mains will be required to pass a leakage test in accordance with American Water Works Association (AWWA) Standard C600 (D.I.P.)

8.3.3 Mandrel Test

The mandrel test must be performed only after the sanitary sewer line(s) have been installed for a minimum of 30 days and all adjacent storm drainage with associated manholes have been installed and backfilled to final subgrade. Mandrel testing must be performed in accordance with the *Standard Technical Specifications*.

8.4 Compaction Testing

Compaction testing of all trench and fill areas shall be conducted by a third-party testing firm in accordance with the *Standard Technical Specifications* (Appendix B). Metro reserves the right to request evidence of compaction tests at any time during or after construction.

Per Greenville County Land Development Regulations, section 6.5.2.B. Compaction Testing:

The grading contractor and/or utility installation contractor shall be responsible for providing compaction testing and reporting as described below.

Location and Frequency of Tests. Compaction tests shall be taken at random locations and at random depths at each location to provide a range of sampling depths. The required frequency of testing shall be as follows:

Sanitary Sewer Test along the line at 300' intervals, and randomly at service connections at a rate of 1 test per 8 services and at manholes at a rate of 1 test for every 3 manholes. Tests shall be required for all repair work requiring cutting of the asphalt binder course.

Compaction requirements are provided in the *Standard Technical Specifications* (Appendix B) and as discussed in Section 5.1.

9.0 Definitions

Unless the context specifically indicates otherwise, the meaning of terms used herein shall be as follows:

Appurtenance – Any accessory or other item associated with a sanitary sewer system.

As-Built Drawing – As-built drawings are prepared by the contractor. They show on-site changes to the original construction documents.

Base Flood Elevation (BFE) – According to FEMA (www.fema.gov), BFE is the computed elevation to which flood waters are anticipated to rise during the base (1-percent-annual-chance) flood event. The 1-percent-annual-chance is also referred to as the "100-year flood". The BFE is the regulatory requirement for the elevation or flood proofing of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium.

Chimney – The cylindrical variable height portion of the manhole structure used to support and adjust the finished grade of the manhole frame. The chimney extends from the top of the cone to the base of the manhole frame.

Easement/Right-of-Way – A permanent non-possessory interest to use real property for the purpose to construct, operate, maintain, reconstruct, or remove a public utility and appurtenances along, under, and across said easement.

Force Main – A sewer line that carries wastewater under positive pressure.

Gravity sewer – A sanitary sewer pipe and manhole system that utilizes gravity to transport wastewater.

Infiltration – Groundwater that enters the sewer system via such means as pipe cracks, joints, connections, or defects in manhole structures.

Inflow – Surface water which enters the sanitary sewer system via an illegal drain connection (foundation drain, roof drain, yard drain, inlet structure, storm sewer cross connection, or sump pump) or from sources such as leaks around manhole covers.

Lateral – See service connection.

Metro Inspector or Inspector – Designee of Metro for the purposes of observation, inspection and testing of public improvements.

Peak Daily Flow – The maximum flow rate determined by use of the appropriate peaking factor multiplied by the average daily flow.

Pump Station – Any arrangement of pumps, piping, valves, and controls which convey wastewater to a receiving sanitary sewer.

Record Drawings – A record drawing is the final compiled drawing prepared by the engineer of record. These drawings must be prepared, signed and sealed by a Professional Engineer licensed in the State of South Carolina. These drawings mark the notes of the on-site changes that the contractor makes in the as-built drawings. The record drawing is surveyed, drawn and compiled as an “engineer approved” set of on-site changes to the original plans.

Service Area – A geographical area served by a public utility or wastewater collection system.

Service Connection – An individual sewer line serving only one (1) building or one (1) residential lot with domestic or industrial wastewater connecting to a gravity sewer system. A service connection does not include the following:

- A gravity sewer line or pump station and force main serving more than one (1) building or more than one (1) residential lot.
- Sewer lines that have the reasonable ability to serve any additional projects and/or buildings in the future.

Structure – Anything constructed or erected that requires permanent location on the surface of the land. The term "structure" does not include features such as walkways, driveways, recreational courts, flagpoles, light standards, or mailboxes.

Stub – Short length of sewer segment tapped into existing system allowing for future connection.

Tap – Any new service lateral connection to an existing main or manhole.

Ten State Standards – “Recommended Standards for Wastewater Facilities of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.” Latest Edition.

Wastewater – A water supply that has been fouled by a variety of uses. From the standpoint of sources of generation, wastewater may be defined as a combination of the liquid- or water-carried wastes removed from residences, institutions, and commercial and industrial establishments.

10.0 Abbreviations

DIP – Ductile Iron Pipe

Metro – Metropolitan Sewer Subdistrict (dba MetroConnects)

PTC – Permit to Construct

PTO – Permit to Operate

PVC – Polyvinyl Chloride Pipe

ReWa – Renewable Water Resources

SCDHEC — South Carolina Department of Health and Environmental Control

Appendix A – Standard Details

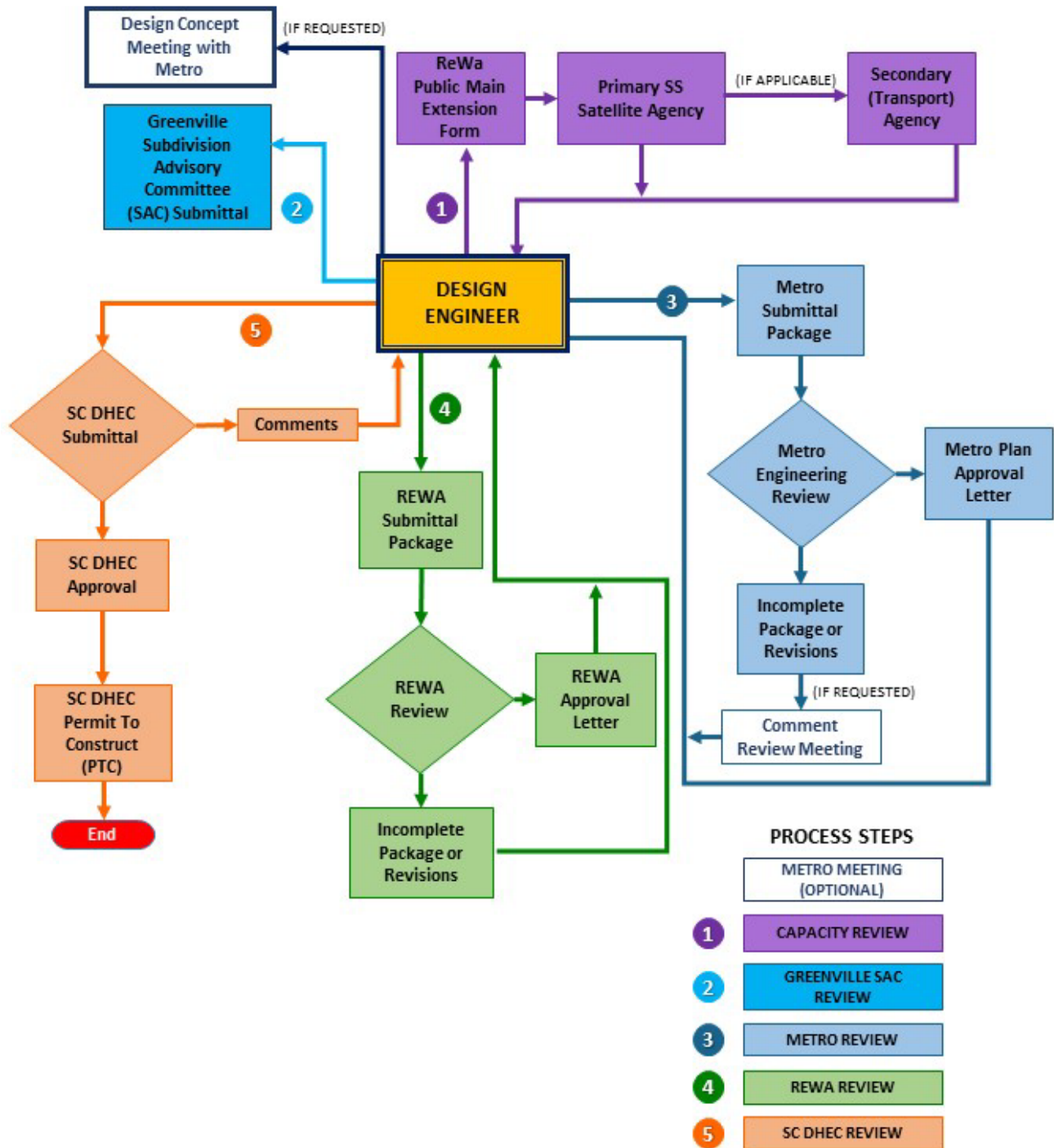
Appendix B – Standard Technical Specifications

Appendix C – Plan Submittal Process

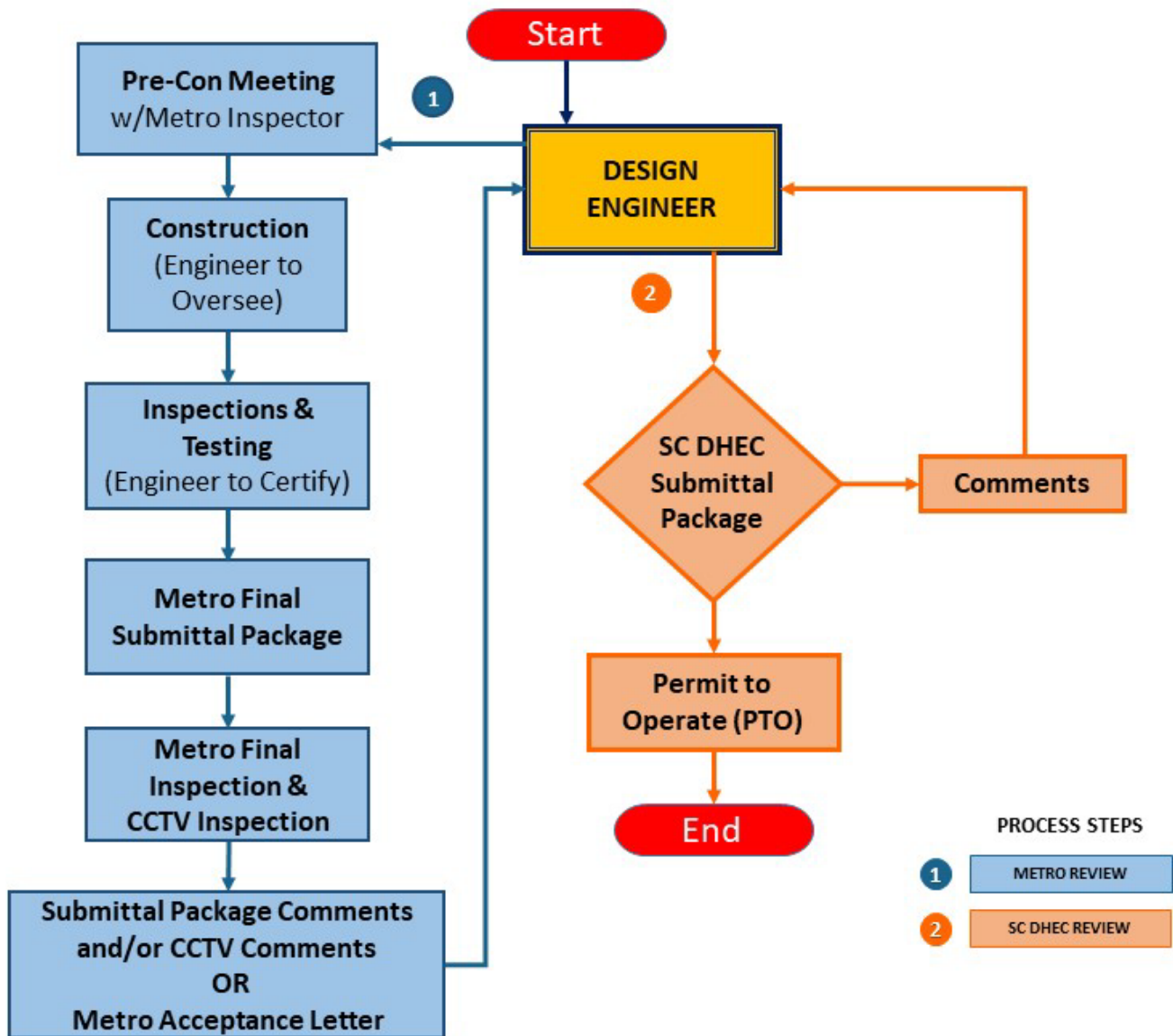
- General Flow Chart: Permit to Construct
- General Flow Chart: Permit to Operate
- Plan Submittal Checklist
- Project Information Form
- Metro Plan Approval Letter



PERMIT TO CONSTRUCT SUBMITTAL PROCESS (Appendix C)



PERMIT TO OPERATE SUBMITTAL PROCESS (Appendix C)



PLAN SUBMITTAL CHECKLIST

The engineer shall complete this checklist and include it in initial plan submittal to Metro. All documents shall be delivered in one submittal. If any items are incomplete or unclear, it will be noted on the bottom portion of this form and the form shall be returned to the engineer. Failure to provide a complete submittal package will increase the review and approval time.

Check boxes or write "N/A" if not applicable.

- One complete set of signed and sealed construction plans. Drawing to include an overall plan view with the following: lot lines, lot numbers, manholes, line segments, lateral locations, and road names.
- One copy of the sewer design calculations.
- A completed (Metro) Project Information Form
- A copy of the completed and signed SCDHEC Construction Permit Application.
- A copy of the ReWa *Public Main Extension* form approved by all sanitary sewer providers receiving flow from the proposed development.
- Copies of other permits required for sanitary sewer construction (wetlands, flood plains, encroachments, etc.). If the above mentioned affects the construction or operation of the proposed sewer system and no permit is required, a letter stating such must be signed, sealed, and submitted by the Engineer.
- Letters from existing utilities (Duke Energy, Greenville Water System, ReWa, etc.) approving the proposed sanitary sewer crossing.
- Payment of Metro's plan review fees.

PROJECT INFORMATION FORM

PROJECT NAME: _____

DEVELOPER: _____

SITE LOCATION: _____

DEVELOPMENT TMS# _____

TMS# _____

TMS# _____

TMS# _____

ENGINEERING FIRM: _____

ENGINEER: _____

ADDRESS: _____

TELEPHONE: _____

EMAIL: _____

List all property owners with appropriate tax map numbers for **off-site** right-of-ways necessary to connect this project to an existing sanitary sewer system. Attach additional information as needed. Indicate "N/A" if not applicable.

OWNER(S): _____ TMS#: _____

OWNER(S): _____ TMS#: _____

OWNER(S): _____ TMS#: _____

April 10, 2018

Mr. / Ms. Engineer
ABC Engineering & Associates, Inc.
100 Main Street, Suite 100
Greenville, SC 29601

Subject: Subdivision - Gravity Sanitary Sewer

Mr. / Ms. Engineer,

The sanitary sewer plan for the above referenced project has been reviewed and approved according to Metropolitan's (Metro) current standards. This approval is **only** for the plan that is on file at Metro's office. Plan revisions or altered work differing in scope or nature from that authorized under this permit, are subject to Metro's approval. Permittee shall promptly notify Metro of changes or unforeseen conditions, which may occur on site. Metro may require an amended design at any time.

Metro will own, operate and maintain the system once the project has met the following requirements and the project has received final approval from Metro.

- A. The South Carolina Department of Health and Environmental Control (SCDHEC) must issue a "Permit to Construct" prior to beginning sanitary sewer construction for this project.
- B. Metro's inspector must be contacted by the design engineer at least 48 hours (two working days, not to include weekends or holidays) to schedule a mandatory pre-construction meeting; to be held before sanitary sewer construction can begin.
- C. Sewer lines not in roadways shall be located in the center of a completely cleared, grubbed, graded and stabilized 25' permanent right of way.
- D. A letter of acceptance for ownership, operation and maintenance **will not** be issued until the engineer or a representative of the firm has conducted construction observations, witnessed and approved all required tests and inspections and submitted a complete final acceptance package to Metro. See *Metropolitan Sanitary Sewer Standards and Procedures - Appendix H for Final Project Submittal Checklist*.
- E. Prior to acceptance, the system shall be conveyed with the appropriate rights of way to Metro for public use.

This approval is subject to cancellation due to: 1) Noncompliance with permit provisions 2) Noncompliance of Metro specifications 3) Inability to access and maintain sanitary sewer infrastructure.

Regards,
Metropolitan Sewer Subdistrict

Engineering Representative

Engineering Department
CC: SCDHEC

Rev: 9/30/2019

Appendix D – Pre-Construction Meeting Checklist

- Review “Issued for Construction” drawings with engineer to make sure no revisions have been made (2 sets) since plan approval. If revisions have been made, but have not yet been reviewed by Metro, approval must be obtained prior to construction of the revised portion.
- Provide a copy of all SCDOT and County encroachment permits required for the sanitary sewer installation. In addition, provide a copy of all required U.S. Army Corps of Engineers, County Floodplain, and SCDHEC environmental permits to include the “Wastewater Construction Permit”. The engineer shall verify that all permits have been obtained.
- The engineer shall record contact information for all present at the meeting, take notes during the meeting, and prepare minutes for distribution to all parties. The engineer shall obtain a copy of the Contractor’s License to submit to Metro.
- Check shop drawings and materials on-site for compliance with specifications. (1 set)

Pipe (PVC, and DIP)	Encasement pipe (if bore)
Manholes	Spiders (if bore)
Frames & covers	Couplings for PVC to DIP transitions
Tees	Piers (if applicable)

- The engineer shall resolve all design issues and shall resubmit any changes to Metro the construction drawings for approval prior to re-issuing to the contractor for construction.
- The Contractor shall be held responsible for release of wastewater when working on or near existing sewer lines. Should a wastewater spill occur the Contractor shall be identified on the SCDHEC Sanitary Sewer Overflow Report and shall be responsible for all clean-up and applicable fines.
- Plugs shall be installed in all tie-in manholes. The Contractor will be held responsible for any flow, sediment or debris entering the existing systems. Unless prior approval has been given by Metro the Contractor shall not remove plugs installed in tie-in manholes until the “Permit to Operate” has been issued by SCDHEC.
- Creek crossings shall require the placement of appropriate stabilization. See Metro details.
- Couplings for like materials – (cut joints) will only be allowed when absolutely necessary.

- If the project includes a bore, the engineer shall verify location and grade of the encasement pipe and schedule a visual inspection by Metro. Both ends of the encasement pipe shall be accessible during the inspection and the carrier pipe shall not be installed.
- Manholes shall be constructed to rim elevations shown on the drawings. Chimneys shall be a maximum of 10-inches from the cone to the bottom of the frame. If final manhole adjustments result in exceeding the 10-inch maximum allowance, the manhole shall be adjusted below the cone section to bring it into compliance. The use of four inch frames and covers are not allowed.
- Doghouse manholes are mandatory in lieu of cut-in manholes on existing sewer mains in accordance with the following:
 - For manholes with 0.1' drop between inverts, doghouse manholes will be required on existing mains with slopes less than 2.0%.
 - For manholes with 0.2' drop between inverts, doghouse manholes will be required on existing mains with slopes less than 4.0%.

All manholes, including doghouse manholes, must pass a vacuum test.

- Short radius 90-degree manhole inverts will not be approved by Metro. The invert shall have a smooth curve with the maximum radius the manhole diameter will allow.
- All service lateral tees shall be installed 45-degrees from the cross section horizontal centerline (10 and 2 o'clock position). No horizontal (9 and 3 o'clock) or vertical (12 o'clock) services will be allowed. There shall be a minimum of 5' separation between service tees.
- Any laterals installed under storm drainage with less than 18" separation shall be constructed of Class 50 D.I.P. A minimum 18' single section of D.I.P. shall be centered under the storm drain piping. Special consideration may be made to allow C900. This will be considered on a case by case basis and must be approved by Metro.
- The Contractor shall address all grade and drainage issues within the 25' right-of-way. The right-of-way shall be graded to provide access to all manholes by Metro personnel and maintenance equipment. Right-of-way access shall be verified by the engineer and approved by Metro prior to sewer acceptance.

- Testing – Engineer is required to witness all testing (deflection, air, and vacuum). Metro forms must be used to record all test results. The pipe deflection test shall be performed a minimum of 30 days after installation.
 - The vacuum test and final inspection shall be done after the binder has been placed on the road and prior to final CCTV Inspection.
 - All service laterals, including laterals connecting to manholes, shall require low-pressure testing.
 - Low-pressure testing of sewer pipe shall be performed in accordance with ASTM F1417 (Table 1, 1.0 psig pressure drop). Adjust the test pressure by adding 0.43 psig per foot of groundwater head (do not exceed 9.0 psig). Refer to Section 8 of Uni-Bell's Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe, UNI-B-6-98 for guidance on determining groundwater elevations.
 - Where tubes are installed in manholes to determine groundwater elevations, the manhole must be repaired once low-pressure testing is completed. Manholes must be vacuum tested after the manhole is repaired.
 - Engineer shall be prepared to provide calculations of test times and groundwater adjustments to Metro's inspector prior to testing operations. Calculations shall be submitted to Metro along with the test forms in the final submittal package.

- After cleaning the lines, the contractor shall call the engineer to schedule a final inspection with Metro's inspector. The engineer shall prepare a punch list during the final inspection and a copy of all final punch list items to Metro's inspector. Upon satisfactory completion of all punch list items and approval of the engineer's final project package, Metro shall schedule the final CCTV inspection.
 - Metro will forward repair information, if required, or Metro's letter of acceptance to the engineer. All Metro CCTV inspections and invoices will be addressed and sent to the engineer.

- The contractor shall warrant the work for one year from the date of the Metro's Acceptance Letter. Metro shall inspect the line prior to the year anniversary and if required shall forward a punch list of deficiencies to the engineer. The engineer shall manage the rework and notify Metro upon completion to schedule the final re-inspection.

- As part of the final submittal package, submit a copy of the contractor's final invoice for the sanitary sewer system installation. Metro will use this to determine the value of the new sewer system assets.

Appendix E

Sanitary Sewer Pump Station Policy

Metropolitan Sewer Sub District Pump Station Policy

In an effort to adapt to the increased challenges of providing sanitary sewer service, the Commissioners of Metropolitan Sewer Subdistrict, (“Metropolitan”) have determined that it is necessary and desirable to formally adopt the following policy regarding the ownership and operation of Pump Stations within the Metropolitan service area (the “Pump Station Policy”).

2) Definitions

- a) Pump Station – a sewage collection lift system approved by Metropolitan commonly comprised of wet well structures, dry pit structures, generators, electrical control panels, valve vault structures, force main and all structures and appurtenances required for the proper operation and maintenance of the pump station system. A Pump Station shall also include all sanitary sewer collection components located within a fenced area and the access drive to the Pump Station site.
- b) Regional Pump Station – A Pump Station that serves a significant service area. Typically, the influent gravity line size is equal to or greater than 18”. Regional Pump Stations are typically owned and operated by Renewable Water Resources (“ReWa”).
- c) Metropolitan Pump Station – A Metropolitan Pump Station that serves a moderate developable service area. Typically, the influent gravity line size ranges from 10” to 16” and will serve a range from approximately 600 single-family homes (180,000 gallons per average day) to 2,500 single-family homes (750,000 gallons per average day).
- d) Temporary Pump Station – A Metropolitan Pump Station that serves a limited developable area or considered a short-term solution for the current master planning documents. Typically, these pump stations have an 8” influent gravity line size.

3) Planning

- a) All proposed Pump Stations shall be reviewed by Metropolitan with respect to determining the location, size, ownership, and justification. Factors that will be considered in the reviews are:
 - i) How the Pump Station fits into ReWa & Metropolitan’s current Masterplan, the 2018 Upstate Roundtable Plan, Greenville County planning and municipal planning.

- ii) Gravity sewer options that have been evaluated and reviewed by Metropolitan and ReWa.
 - iii) Impact to Metropolitan's facilities with respect to capacity and operations.
 - iv) Rate of return on investment for Pump Station projects that include Metropolitan funding.
 - v) Limiting the use of Temporary Pump Stations for long term (greater than 10 years) service solutions.
- b) Ultimately, gravity sanitary sewer systems are the preferred method of providing service due to the efficiency, low risk/consequence and life cycle.

4) Metropolitan Ownership of Pump Stations

- a) Metropolitan may seek additional funding from the developer to support the operation and maintenance of a Pump Station, fund a portion of an upgrade necessary to serve the proposed service area, or to fund a portion of a future project that would allow for the abandonment or removal of the Pump Station. A summary of these options are as follows:
- i) A lump sum payment for the first ten years of projected operation and maintenance costs determined at the time of Metropolitan's approval of the project. Payment of these costs would be required prior to issuing the Flow Acceptance Letter for the project.
 - b) Metropolitan's decision to take ownership of a Pump Station will be based on consideration of the above factors and options, including customer costs and fees. Metropolitan reserves the right to determine what is in the best interest of its operations and facilities, and its customers.
 - c) Each Pump Station must meet all Metropolitan standards at the time of acceptance.
 - d) Fee simple title (or exclusive use easements) and access to all property comprising a Pump Station must be conveyed to Metropolitan free and clear of any encumbrances or liens. In addition, all necessary force main right of ways shall be conveyed to Metropolitan.

- e) All costs incurred for design, construction, inspection, testing, title examination, and other costs related to the installation of a Pump Station shall be borne by the developer/grantor thereof. The initial operating costs (prior to Metropolitan accepting ownership) relating to a Pump Station will be the developer's responsibility.
- f) The construction of any new Pump Station to be conveyed to Metropolitan must commence within one (1) year of Metropolitan's approval of the Pump Station and all construction must be completed within two (2) years of the Metropolitan approval. If these conditions are not met, then either an extension must be filed or the approval becomes void and a new submittal must be made.
- g) Other factors as Metropolitan may deem necessary or appropriate for determining the feasibility of owning, operating and maintaining the Pump Station.
- h) The General Manager/or their designee is authorized to determine if Metropolitan will take ownership of a Pump Station based upon the parameters set forth in this policy.

Appendix F – Pump Station Design Review Checklist

Design Calculations (signed and sealed by Professional Engineer)

a) Design Flow & Operating Point

- Design flow, gpd = average daily flow (based on SC DHEC contributory loadings, projected development of undeveloped acreage, & existing developed areas) X 2.5 peak factor
 - Initial design flows calculated
 - Future conditions calculated
- System Head Curve (check various points along force main route if necessary), calculate for pipe friction coefficients C=100, 120, & 150
 - Static head calculation (high pt. of force main – pump off elev.)
 - Friction Head (pipe losses)
 - Minor Head Losses, fittings (either by equiv. length or energy loss calculation)
 - TDH, ft. vs. flow rate
- Operating Point – plot TDH vs. flow onto pump curve & identify impeller size and operating point at C=120 (gpm @ TDH, ft.). Also, plot curves for C=100 & C=150. Also, plot operating point for both pumps running (C=120).

b) Wet Well Design

- Cycle Time
 - Volume = (pump on – pump off) X cross sectional area of wet well
 - Fill time = Vol./ Q_{in} , where Q_{in} = average daily flow
 - Run time = Vol./($Q_{pump} - Q_{in}$)
 - Cycle time = fill time + run time (2 ≤ cycle time ≤ 8)
- Uplift Check (Buoyancy), Factor of Safety ≥ 2.0
 - FS = (wet well weight + soil overburden + soil resistance)/uplift force

c) Surge Relief Check

- Condition – both pumps running.
- Calculate wave velocity
- Calculate water hammer pressure
- Total pressure = water hammer pressure plus static head (as calculated from high point). Check total pressure vs. valves & piping (verify class & thickness required)

d) Supporting Documentation

- Basin map with service area delineated
- Cut sheets from wet well manufacturer (dimensions and weights)
- 100 year flood (FEMA) map or high ground water elevation (SCS)
- Cut sheets from valve manufacturers (with max. operating pressure info.)
- Pump curve
- Fittings losses (equiv. length charts, etc.)
- Motor data; electrical data; pump, pump base, and duplex arrangement dimensions
- Power source (utility provider)

Specifications (signed & sealed by Professional Engineer)

- General
 - O & M Manuals required by Metro (4 copies)
 - Manufacturers rep. at pump start up
 - Shop drawing review and approval required by Metro on P.S. & F.M.
- Pumps – ABS standard. 1750 rpm max., 60 Hz, 230/460 volt, 3 phase design. BHP ≤ motor rated horsepower throughout entire operating range of pump. A 3rd pump supplied to Metro.
- Schedule 40 stainless steel guide rails
- Stainless steel lifting chain for each pump, sufficient to extend 6' outside top of wet well
- Discharge piping – Pipe shall be Class 53 DIP in compliance with AWWA C150, and AWWA C151. Pipe shall be furnished with push-on, mechanical or flanged joints. Flanged joints ANSI B16.1 125 pound flanges. The flanges shall be suitable for working pressures of 150 psi. Fittings shall be manufactured of ductile iron pipe and rated as a minimum to equal the pressure rating of the pipeline. Fittings shall be furnished with mechanical, or flanged joints. The interior of all pipe and fittings shall be lined with Metro approved hydrogen sulfide protective lining. Exterior of all pipe fittings and specials shall be coated with either a coal tar or asphaltic base bituminous pipe coating in accordance with ANSI-A 21.8. FM shall be thoroughly flushed prior to testing (minimum 2.5 fps flushing velocity). FM shall be pressure and leakage tested in accordance with AWWA C600.
- Floats
 - 15-pound weight.
 - Mercury tilt type switch which operates on less than 1" level change.
 - Molded polyethylene body & internal redundant polyurethane foam flotation.
 - Stainless steel suspension chain & fasteners.
 - Cable shall be AWG #18 with heavy-duty rubber jacket, and shall run un-spliced to control box.
- Valves
 - Plug valves – Non-lubricated eccentric type. Flanged ANSI 125. Cast iron body w/ nickel seats. Pressure rating of 175 psi up to 12", 150 psi 14" & greater. Resilient faced with neoprene

- gaskets suitable for sewage. Lever actuated up to 8". Hand wheel actuated for 10" & above. All exposed nuts, bolts & washers shall be stainless steel. Dezurik Series 100.
- Check Valves – Air-cushioned swing check w/ ANSI 125 flanges. Cast iron body & cover. Stainless steel seat. GA Industries.
 - Air Release – A.R.I. Model D-020 or D-025. Supplied with inlet & blow-off valves, quick disconnect couplings and min. 5' hose for flushing. Specify inlet size.
 - Flap valve – Iron body bronze mounted with bronze hinge pins, flap ring and seat ring. M&H style 47-02.
 - Controls
 - Hand/On/Off Switches
 - 6-digit elapsed time meters
 - Motor starters
 - Disconnect switches
 - Pump alternator
 - Automatic level controls for duplex operation (lead pump start, lag pump start, pump stop, high level alarm).
 - Enclosure – NEMA 3R
 - Electrical
 - Square D manual transfer switch with service ground kit in NEMA 4X enclosure
 - Generator connection – Appleton Electric Co. Model ADR 1044, 100 amp, Powertite with spring door, weatherproof, grounding style 1 on side of control panel.
 - Pump Station Monitoring System – High Tide monitoring system – contact Pete Duty and Associates. Surge protection.
 - Wet Well, Valve Vault, and Air Valve structures
 - ASTM C-478 or ASTM C913
 - Access door – Halliday or equal. 300 psf loading.
 - Interior bituminous coating

Drawings (signed & sealed by Professional Engineer)

1) Site Plan

- Property, property lines and pins
- Maximum scale 1" = 20'
- Show & dimension the following
 - Pump station easement/right-of-way
 - Chain link fence & 12' double swing gate
 - ¾" water service, yard hydrant & back flow preventer (meter box)
 - Wet well
 - Valve vault
 - Force main & gravity sewer within fence
 - Electrical rack/control panel

- Control panel shelter
- Power pole
- Limits of finished (gravel, asphalt) surface
- Turn around outside fence
- Area lighting
- Min. 12' access drive (asphalt)
- Ability to drive around outside of fencing – allow 20 ft. area.
- Existing & proposed contours (grading plan)
- Site drainage, access drive culverts, swales – drainage calculations
- Permanent erosion control measures
- Note sign location on gate
- Concrete pad for odor control system with conduit/line from pad to wet well for chemical feed

2) Pump Station Plan - show & dimension the following:

- Wet well (WW) and valve vault (VV) size (min. 6' dia. WW required)
- Spacing between WW and VV
- Access covers (size and type)
- 3" Vent pipe location
- Pumps and FM piping
- Influent line
- VV drain line
- Surge relief line
- Pump around set-up
- Horizontal pipe supports
- Grout fillet
- Bypass connection
- Asphalt entire area inside of fence (asphalt to extend 6" minimum beyond edge of fence)
- Pipe in valve box to be painted with Protective H2S Coating (Tnemec or Sherwin Williams)
- Wetwell, receiving manhole and the discharge piping shall receive hydrogen sulfide protective coating:
 - 1) Raven 405
 - 2) Sherwin Williams Duraplate 6100

3) Pump station Section

- 3" Vent pipe w/ insect screen (required) set insect screen 9" above top of WW
- Steps or ladder in VV (material)
- Minimum 12" foundation material VV & WW (Class 1B, ASTM D2321)
- Vertical pipe supports
- VV drain line with flap valve
- Grout fillet (2:1 required) in WW

- Grout in VV to provide positive drainage to drain line
- Pressure gauge. Pressure gauge range set to 2 x normal pressure.
- By-pass connector and plug valves and appropriate sized quick connection, easily accessible
- Opening direction of access covers
- Floats (provide enough separation from pumps)
- Cable holder (material type)
- Type of wall penetration (wall pipe, boot, etc.)
- Plug valves (between check valve and FM)
- Check valves (between plug valves and pumps)
- Surge valve – set on turned up tee in FM, relief line drains into WW or MH
- Minimize number of joints in precast structures (2 max. for VV)
- Elevations required for:
 - WW & VV Top (set 9" above finished grade)
 - WW & VV Inverts
 - Influent line
 - VV drain line (at VV & WW)
 - FM invert
 - Floats (alarm, lag on, lead on, off)

4) Electrical Details

- Power and telephone plan
 - Underground/overhead lines
 - Grounding for chain link fencing
- Power pole (area light, meter, grounding, conduit)
- Electrical Rack
 - Base (Concrete)
 - Elevation view (show elapsed time meters, HOA switches, reset buttons, indicator lights, alarm test switch, pump mode switch, alarm horn, alarm light, generator receptacle)
- Single line diagram

5.) Force Main Plan & Profile

- Pipe size & type
- Maintain 3.5' min. cover
- Bore & jack locations
- Easement required (15' access desired)
- Separation from other utilities
- Creek crossings (restrained joint DIP)
- MH tie-in (elev. & flow direction, capacity of downstream line)
- Air Valves

- Appropriate locations
- FM at appropriate depth approaching valve (increasing depth)
- Rim elev. (relative to existing grade)

6.) Miscellaneous Details

- Permanent erosion control details (rip rap stream crossing, lined swales, rip rap aprons)
- FM tie-in
- Pipe encasement detail (bedding)
- Post Hydrant (2'x2'x6" conc. Pad required)
- Chain link fencing
- Boring details (bulkhead, encasement)
- Air valve assembly
- Pressure gauge installation
- Thrust restraint
- Double check valve assembly
- Sign detail
- Valve box installation (2'x2'x6" conc. Pad required)
- Access drive detail (Heavy duty asphalt)
- Pump station finished surface detail (extend beyond chain link fence)
- Covered shelter for electrical rack.
- Dedication of property and pump station

Appendix G – Construction Testing Forms

- Low-Pressure Air and Manhole Vacuum Testing Times
- Manhole Vacuum Test Form
- Low Pressure Air Test Form
- Mandrel Test Form

Low-Pressure Air and Manhole Vacuum Testing Times

Manhole Vacuum Testing Time

Manhole Diameter (Inches)	Test Time (seconds)
48	60
60	75
72	90
84	105
96	120
120	150

Low Pressure Air Testing Times

**MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015**

Pipe Diameter (in.)	Specification Time for Length of Pipe Shown (min:sec)					
	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft
6	5:40	5:40	5:40	5:40	5:40	5:40
8	7:34	7:34	7:34	7:34	7:36	8:52
10	9:26	9:26	9:26	9:53	11:52	13:51
12	11:20	11:20	11:24	14:15	17:05	19:56
15	14:10	14:10	17:48	22:15	26:42	31:09
18	17:00	19:13	25:38	32:03	38:27	44:52

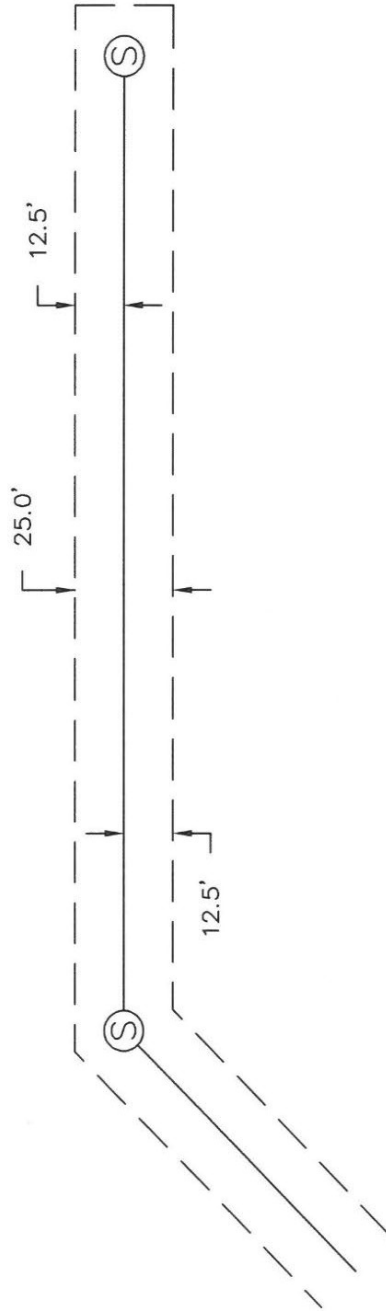
*Source: Unibell PVC Pipe Association – Table UNI-B-6-98

Appendix H – Final Project Submittal

- Typical 25' Sanitary Sewer Right-Of-Way and Easement (Figure 3)

Typical 25' Sanitary Sewer Right-Of-Way (Figure 3)

THE SANITARY SEWER RIGHT OF WAY AND EASEMENT CONVEYED HEREON TO METROPOLITAN SEWER SUBDISTRICT (METRO) SHALL EXTEND TWELVE AND ONE-HALF FEET (12.5') ON EACH SIDE OF THE CENTERLINE OF THE SANITARY SEWER LINE AS CONSTRUCTED AND SHALL HAVE A TOTAL RIGHT OF WAY AND EASEMENT WIDTH OF TWENTY-FIVE FEET (25'), (HEREINAFTER CALLED THE "PERMANENT RIGHT OF WAY"). FOR REFERENCE AND RESTRICTIONS, SEE THE RECORDED DEDICATION AND CONVEYANCE OF SANITARY SEWER LINE AND RIGHT OF WAY CONTAINING THE REFERENCE TO THIS RECORDED PLAT."



TYPICAL 25' SANITARY SEWER RIGHT-OF-WAY

Final Project Submittal Checklist

The engineer shall complete this checklist and include it in the final project submittal to MetroConnects. All documents shall be delivered in **one** submittal. If any items are incomplete or unclear, it will be noted on the bottom portion of this form and the form shall be returned to the engineer. MetroConnects shall not proceed with the CCTV inspection until all items have been satisfactorily received.

Check boxes or write "N/A" if not applicable.

- Two sets of Record Drawings signed and sealed by the Engineer of record. Drawings shall include plan view and line profiles and clearly identify manholes and line segments to be permitted including service lateral locations, service lengths and depths at end of service.
- One copy of engineer's certified low-pressure air, mandrel, and manhole vacuum tests. If ground water is encountered: include low-pressure air test calculations, water table elevations, and steps implemented to alleviate the ground water. (See Metro Forms, Appendix G.)
- One copy of engineer's certified pump station and force main test results, if applicable.
- Engineer's certification letter for sanitary sewer system. (See Certification Letter requirements - next page).
- Sanitary sewer trench backfill compaction tests (within roadways and fill areas).
- Verification and submittal of actual cost for sewer installation (total cost of labor & materials).
- Copy of Renewable Water Resources' approval letter.

By: _____

Date: _____

CERTIFICATION LETTER REQUIREMENTS

Acceptance letters will not be issued without the following information.

- A: Subdivision Name
- B: Number of lots and lot numbers requesting approval in this section or phase (state if the Permit to Operate is a **partial** permit of the overall Permit to Construct).
- C: Number of manholes, manhole numbers and manhole station numbers. (Manholes must match numbering on record drawing)
- D: Make statement: “To the best of my knowledge, information, and belief, I certify that construction is complete and in accordance with the approved plans and specifications.”
- E: Total linear footage of pipe installed: [pipe type, size and footage of each]
- F: Line segments to be approved
- G: The DHEC construction permit number. State any modifications to the original permit to construct and an explanation of modifications, if applicable. Make note of any modifications or upgrades to existing lines covered in the permit.
- H: All roads/streets must have names shown on as built drawing
- I: List water table elevations during pipe installation and/or testing. Describe methods implemented to alleviate water accumulation. If no water was encountered include statement in certification letter that “No groundwater was encountered during construction or testing.”

EXAMPLE ENGINEER'S CERTIFICATION LETTER

Underlined features to be customized:

May 4, 2018

Robert Arms
Metropolitan Sewer Subdistrict
120 Augusta Arbor Way
Greenville SC 29605-5226

Re: Jasper Mill Subdivision
Project # 18100
DHEC Permit 12345-WW

Dear Mr. Arms,

Representatives of ABC Engineering & Associates, Inc. have made field inspections and conducted the required testing for the above referenced project. No groundwater was encountered during construction and testing. To the best of my knowledge, information, and belief, I certify that construction is complete and in accordance with the approved plans and specifications. This certification is based on periodic observations of construction and a final inspection for design compliance by me or a representative of this office who is under my supervision.

The overall permit to construct covers 2,000 LF of 8" sewer main, (14) manholes and service 65 single family residences of the Jasper Mill Subdivision.

We are requesting a Permit to Operate for the following sewer lines:

Line "A"MH# 1-9

Line "B"MH# 1-3

Line "C"MH# 1-2

Length of 8" main: +/- 2,000 LF

Number of manholes: 14

Serving lots 1-65: (single family residences)



Included for your information is the testing data, a copy of the construction permit, two sets of record drawings and a CD containing pdf's of the record drawings. We are requesting a letter accepting ownership, operations, and maintenance for the above mentioned sewer system. If you have any questions or need any additional information, please give me a call.

Sincerely,

M. Engineer

Mr. / Ms. Engineer, P.E.

ABC Engineering & Associates, Inc.

cc: Project owner

CCTV Inspection Report

Sent To - Engineer: _____ Attention: _____

Metropolitan Sewer Subdistrict (Metro) has completed a CCTV inspection for _____ (project name) to verify that the sanitary sewer system has been constructed to Metro specifications and standards. The results of the CCTV inspection are:

- Deficiencies have been identified and shall be repaired prior to MSSD acceptance of the sewer system.
 - Copies of the CCTV video and punch list are available to the Engineer and may be picked up at Metro.*
 - Copies of the punch list are included with this form.*

The Engineer shall notify the contractor of these deficiencies and verify that repairs have been made. Any sewer lines that are repaired shall be retested in accordance with Metro testing procedures. The Engineer shall notify Metro after repairs and testing are complete by filling out the information below, signing and returning this document to Metro.

By: _____ (Metro) Date: _____

I _____ (engineer), certify to the best of my knowledge and belief, that all repairs required to correct the deficiencies identified by the CCTV inspection have been completed and that the project is ready for a follow-up inspection. (attach test forms)

_____ (signature) Date: _____

- A follow-up CCTV inspection indicates that deficiencies remain and that additional work is required. The Engineer shall follow the procedure as outlined above.

Follow-Up #1	By: _____ (Metro)	Date: _____
Follow-Up #2	By: _____ (Metro)	Date: _____
Follow-Up #3	By: _____ (Metro)	Date: _____
Follow-Up #4	By: _____ (Metro)	Date: _____

I _____ (engineer), certify to the best of my knowledge and belief, that all repairs required to correct the deficiencies identified by the follow-up CCTV inspection have been completed and that the project is ready for a follow-up inspection. (attach test forms)

Follow-Up #1	_____ (signature)	Date: _____
Follow-Up #2	_____ (signature)	Date: _____
Follow-Up #3	_____ (signature)	Date: _____
Follow-Up #4	_____ (signature)	Date: _____

- The sanitary sewer system meets all Metro requirements and specifications. The Metro final approval letter shall be mailed to your office within several working days.

By: _____ (Metro) Date: _____

**TITLE CERTIFICATION
TO METROPOLITAN SEWER SUBDISTRICT**

The undersigned has carefully examined the public records of Greenville County, South Carolina and hereby makes the following certifications to Metropolitan Sewer Subdistrict (“Metropolitan”):

1. The undersigned has served as legal counsel for _____ [insert name of developer] (the “Owner”) in connection with that certain Dedication and Conveyance of Sanitary Sewer Line and Right of Way attached hereto as Exhibit A (the “Dedication Agreement”).
e)
2. The Owner is the fee simple owner and has good marketable title to the real property, easement areas, right of way areas, equipment, facilities, pipes, valves, wastewater lines, pump stations and all other property comprising the sanitary sewer system being conveyed to Metropolitan under the Dedication Agreement (the “Sewer Facilities”).
f)
3. The Sewer Facilities are being conveyed to Metropolitan under the Dedication Agreement free and clear of all liens and encumbrances.
g)
4. The Owner and has the full power and authority to convey the Sewer Facilities to Metropolitan pursuant to the terms and conditions of the Dedication Agreement.
h)
5. This Title Certificate is made and delivered for the benefit of Metropolitan Sewer Subdistrict and may be relied upon by Metropolitan in accepting the transfer and ownership Sewer Facilities from the Owner pursuant to the terms and conditions of the Dedication Agreement.

IN WITNESS WHEREOF, this Title Certification is executed to be effective as of _____, 20__.

[Insert Name of Law Firm]

By: _____

Its: _____

Print Name: _____



EXHIBIT A

DEDICATION AGREEMENT



STATE OF SOUTH CAROLINA) DEDICATION AND CONVEYANCE OF
) SANITARY SEWER LINE AND RIGHT OF WAY
COUNTY OF GREENVILLE)

[GRANTEE IS A POLITICAL SUBDIVISION OF THE STATE OF SOUTH CAROLINA EXEMPT FROM RECORDING FEES UNDER S.C. CODE ANN., SECTION 12-24-40(2)]

KNOW ALL MEN BY THESE PRESENTS, that _____ ("Grantor"), in consideration of One (\$1.00) Dollar to the Grantor paid in hand at and before the sealing of these presents by the Grantee, the receipt of which is hereby acknowledged, has granted, bargained, sold, released, dedicated and conveyed, and by these presents does grant, bargain, sell, release, dedicate and convey to the METROPOLITAN SEWER SUBDISTRICT, its successors and assigns ("Grantee"):

Those certain sanitary sewer lines, manholes, valves, adjuncts and appurtenances (but excluding any service line or lines, or any part thereof, outside of the easement herein dedicated and conveyed) installed and located in, under or along the property of Grantor as shown on a plat entitled _____, prepared by _____, dated _____, recorded in Plat Book ____, Page ____, and also being more particularly shown and described on an As-Built drawing of said lines entitled "_____" prepared by _____, dated _____, on file with Grantee, which are by reference made a part of this description;

Together with and including a permanent right of way and easement extending twelve and one-half (12.5) feet on each side of the centerline of the sanitary sewer line(s) for purposes of the operation, maintenance, repair, replacement or relocation of such lines and appurtenances (the "Right(s) of Way").

The above described property is all or a portion of that conveyed to Grantor herein by Deed of _____, recorded _____ in the Office of the Register of Deeds for Greenville County, South Carolina in Deed Book ____, Page ____.

[Complete the following paragraph if off-site easements are to be conveyed.]

ALSO, certain off-site easements acquired by Grantor as more particularly described on Exhibit "A" attached hereto and incorporated herein.

TOGETHER WITH all and singular the rights, members, hereditaments and appurtenances to said premises belonging or in any wise incident or appertaining, including, without limitation, the right of ingress and egress to the above Right(s) of Way over and through lands of Grantor and Grantor's heirs or successors and assigns; to have and to hold all and singular the premises before mentioned unto the Grantee, and the Grantee's successors and assigns, forever, subject to the terms and provisions hereof. The Right(s) of Way herein dedicated and granted include the right, privilege and easement of the Grantee to install, repair, and/or add to and extend existing lines and appurtenances now or hereafter constructed, within the boundaries of the Right(s) of Way herein described and conveyed for the purpose of serving other properties or otherwise, without any further approval, consent or authorization of the Grantor, or the Grantor's heirs,

successors or assigns, and to operate, maintain, repair and replace such lines as installed or extended. No building, improvement or other structure shall be constructed or installed within the boundaries of the Right(s) of Way nor so close thereto as to impose any load on the existing lines and appurtenances; and the Grantee shall have the right to cut away and keep clear of the sanitary sewer lines and appurtenances any and all vegetation that might, in the opinion of Grantee, endanger or injure the sewer lines or their appurtenances, or interfere with their proper operation and maintenance.

Without limiting the right of ingress and egress to and from the Right(s) of Way and sanitary sewer system herein dedicated and conveyed for the purpose of exercising the rights, privileges and easements hereby granted, in the event that said Right(s) of Way and sanitary sewer system are within the boundaries of a gated subdivision, community or development, or in any location where access is otherwise controlled or restricted, the Grantee shall at all times be afforded access and shall be given an access code for any coded entrance gate by the Grantor or its heirs, successors and assigns. Said access code shall not be changed, altered or deleted without the prior consent and approval of the Grantee or its successors and assigns.

The Grantor hereby acknowledges and agrees that in the event a building or other structure should be erected contiguous to the Right(s) of Way, no claim for damages shall be made by the Grantor, his heirs or assigns, on account of any damage that might occur to such structure, building or contents thereof due to the operation or maintenance, or negligent operation or maintenance of the lines and appurtenances within said Right(s) of Way, or any accident or mishap that might occur therein or thereto.

GRANTOR WARRANTS AND REPRESENTS that except as provided below, the property and the rights and easements herein conveyed are not subject to any mortgage, judgment or lien other than for property taxes which are not yet past due, nor to any encumbrance which would interfere with Grantee's ability to operate, maintain, repair, replace, relocate or otherwise own and utilize the lines and system described above. In the event of a mortgage on the property herein conveyed, Grantor has obtained the consent and joinder of the Lender/Mortgagee as provided in the attached Joinder and Consent of Lender/Mortgagee attached hereto.

GRANTOR DOES HEREBY bind itself and its heirs or successors to warrant and forever defend all and singular said premises unto the Grantee and the Grantee's heirs or successors and against the Grantor and the Grantor's heirs or successors and against every person whomsoever lawfully claiming or to claim the same or any part thereof.

[SIGNATURE PAGE TO FOLLOW]

[ENTITY GRANTOR SIGNATURE PAGE]

IN WITNESS WHEREOF, the Grantor has executed this Dedication and Conveyance of Sanitary Sewer Line and Right of Way this ____ day of _____, 20__.

SIGNED, sealed and delivered
in the presence of:

GRANTOR:

Name of Entity

By: _____

Its: _____

Print Name: _____

Witness 1

Print Name: _____

Witness 2

Print Name: _____

STATE OF _____)

)

COUNTY OF _____)

ACKNOWLEDGMENT
(Entity)

I, the undersigned Notary Public, do hereby certify that _____ **[name of individual]**, the _____ **[title of individual]** of the above named Grantor personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and seal this ____ day of _____, 20__.

(SEAL)

Notary Public for State of _____

Print Name: _____

My commission expires: _____

EXHIBIT "A"

Off-site Easements

A certain off-site easement acquired by Grantor from _____, by instrument dated _____ and recorded in the Office of the Register of Deeds for Greenville County in Deed Book _____, Page _____, together with the lines, manholes, valves, adjuncts and appurtenances constructed and installed thereon.

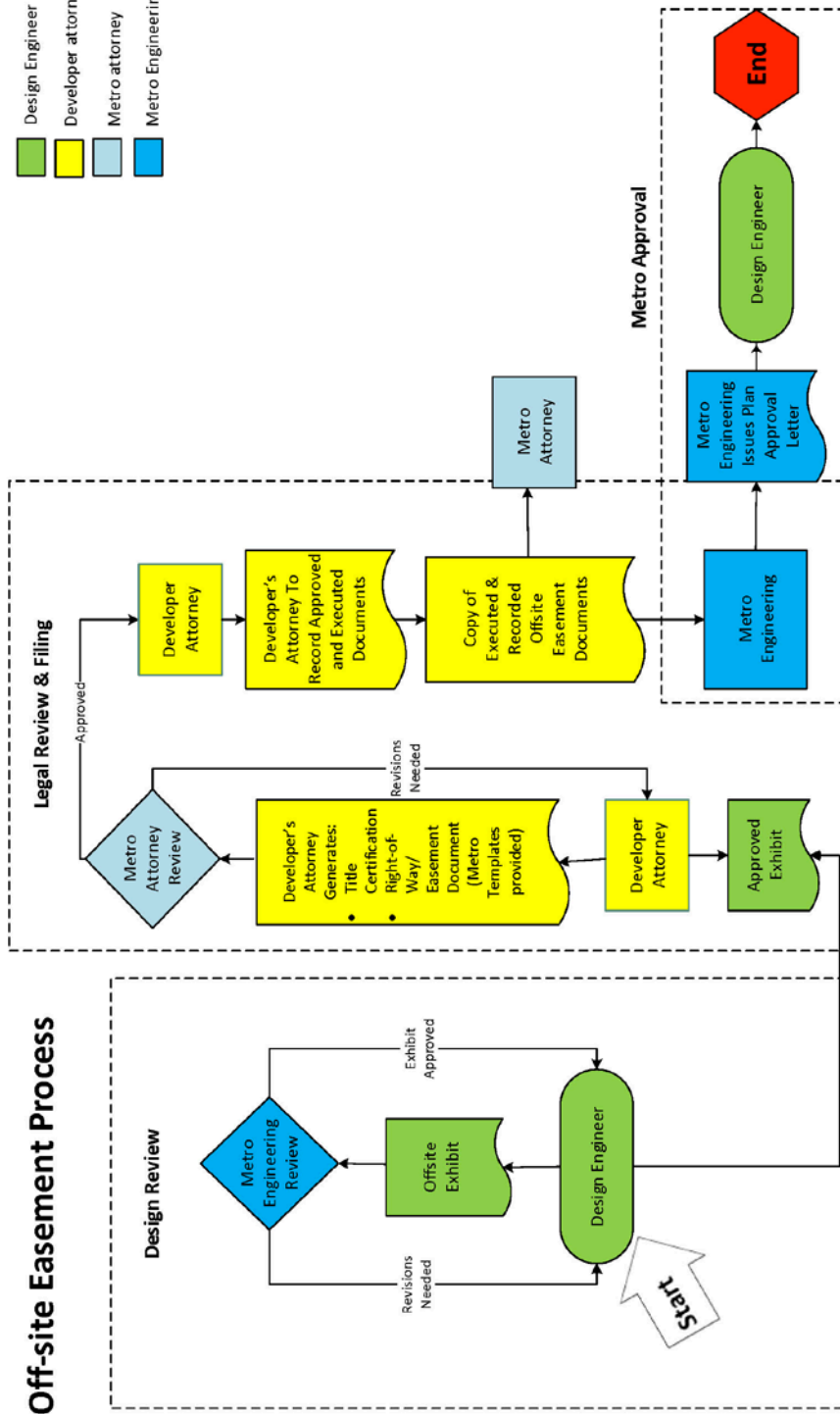
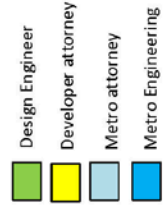
A certain off-site easement acquired by Grantor from _____, by instrument dated _____ and recorded in the Office of the Register of Deeds for Greenville County in Deed Book _____, Page _____, together with the lines, manholes, valves, adjuncts and appurtenances constructed and installed thereon.

A certain off-site easement acquired by Grantor from _____, by instrument dated _____ and recorded in the Office of the Register of Deeds for Greenville County in Deed Book _____, Page _____, together with the lines, manholes, valves, adjuncts and appurtenances constructed and installed thereon.

A certain off-site easement acquired by Grantor from _____, by instrument dated _____ and recorded in the Office of the Register of Deeds for Greenville County in Deed Book _____, Page _____, together with the lines, manholes, valves, adjuncts and appurtenances constructed and installed thereon.

A certain off-site easement acquired by Grantor from _____, by instrument dated _____ and recorded in the Office of the Register of Deeds for Greenville County in Deed Book _____, Page _____, together with the lines, manholes, valves, adjuncts and appurtenances constructed and installed thereon.

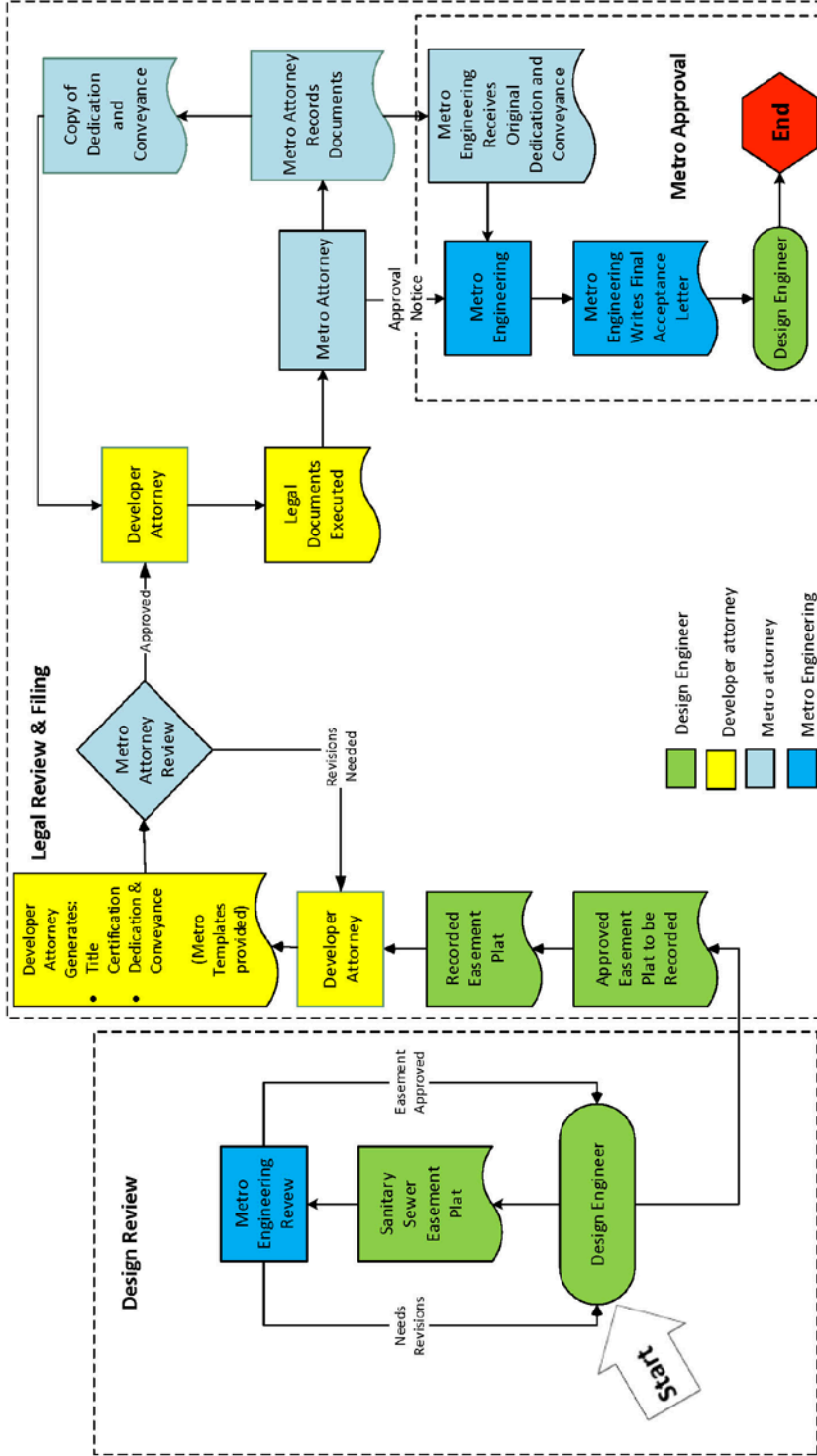
GREENVILLE 1528511.3



Revised 8/7/19

Revised 8/2/19

On-site Dedication and Conveyance Process



clear of the Permanent Right of Way any and all vegetation that might, in the opinion of the Grantee, endanger or injure the pipe lines or their appurtenances, or interfere with their proper operation or maintenance; the right of ingress to and egress from the Permanent Right of Way across the Grantor Property for the purpose of exercising the rights herein granted; provided that the failure of the Grantee to exercise any of the rights herein granted shall not be construed as a waiver or abandonment of the right thereafter at any time and from time to time to exercise any or all of same. No building or other structure shall be erected over or within said Permanent Right of Way nor so close thereto as to impose any load on the pipes lines.

5. It is acknowledged and agreed that the Grantor may plant crops within the Permanent Right of Way, provided however, that any such crops shall not be planted over any sewer pipes where the tops of the pipes are less than eighteen (18) inches under the surface of the ground. Further, the use of the Permanent Right of Way by the Grantor shall not, in the opinion of the Grantee, interfere or conflict with the use of the Permanent Right of Way by the Grantee for the purposes herein mentioned, and that no use shall be made of the Permanent Right of Way that would, in the opinion of the Grantee, injure, endanger or render inaccessible the sewer pipe line or their appurtenances.

6. Grantor hereby acknowledges and agrees that fences are not permitted in the Permanent Right of Way in any location that is parallel to the sewer line. In the event that Grantor desires to construct a fence that is perpendicular or otherwise crosses the Permanent Right of Way, the prior written consent of Grantee shall be required and said fence shall be constructed in compliance with all rules and regulations of Grantee.

7. The Grantor hereby acknowledges and agrees that in the event a building or other structure should be erected contiguous to the Permanent Right of Way, no claim for damages shall be made by the Grantor, his heirs or assigns, on account of any damage that might occur to such structure, building or contents thereof due to the operation or maintenance, or negligences of operation or maintenance, of the Permanent Right of Way and said pipe lines or their appurtenances, or any accident or mishap that might occur therein or thereto.

8. Grantor hereby acknowledges and agrees that the right of way and easement along with all other rights and privileges conveyed to Grantee hereunder may be assigned and transferred to Metropolitan Sewer Subdistrict d/b/a MetroConnects ("Metropolitan"). From and after the date of such assignment and transfer, Metropolitan shall be considered the Grantee under this agreement and shall be deemed the legal holder of all rights and privileges granted hereunder. Grantor hereby expressly consents to such assignment and transfer to Metropolitan.

9. All other or special terms and conditions of this right of way are as follows: _____

10. The payment and privileges above specified are hereby accepted in full by Grantor as settlement of all claims and damages of whatever nature for the Construction Right of Way and Permanent Right of Way conveyed to Grantee hereunder.

11. In the event plans for said sewer lines are cancelled or altered and the Construction Right of Way and the Permanent Right of Way conveyed to Grantee hereunder is not needed, then such rights may be cancelled and no money shall be due the Grantors. The payment of the consideration for the Construction Right of Way and Permanent Right of Way shall be made before construction commences.

[INDIVIDUAL GRANTOR SIGNATURE PAGE]

IN WITNESS WHEREOF, the Grantor has executed this Right of Way Agreement this _____ day of _____, 20____.

SIGNED, sealed and delivered
in the presence of:

GRANTOR:

Witness 1
Print Name: _____

Print Name: _____

Witness 2
Print Name: _____

STATE OF _____)
)
COUNTY OF _____)

ACKNOWLEDGMENT
(Individual)

I, the undersigned Notary Public for the State of South Carolina, do hereby certify that _____, [Grantor(s)], personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and seal this _____ day of _____, 20____.

_____(SEAL)
Notary Public for State of _____
Print Name: _____
My commission expires: _____

[ENTITY GRANTOR SIGNATURE PAGE]

IN WITNESS WHEREOF, the Grantor has executed this Right of Way Agreement this _____ day of _____, 20____.

SIGNED, sealed and delivered
in the presence of:

GRANTOR:

Name of Entity

By: _____

Its: _____

Print Name: _____

Witness 1
Print Name: _____

Witness 2
Print Name: _____

STATE OF _____)

)

COUNTY OF _____)

ACKNOWLEDGMENT
(Entity)

I, the undersigned Notary Public, do hereby certify that _____ **[name of individual]**, the _____ **[title of individual]** of the above named Grantor personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and seal this _____ day of _____, 20____.

(SEAL)
Notary Public for State of _____
Print Name: _____
My commission expires: _____

CONSENT AND JOINDER OF LENDER/MORTGAGEE

_____ ("Lender/Mortgagee"), the owner and holder of a certain encumbrance, to wit: that certain mortgage encumbering the property described in the foregoing Right of Way, which mortgage is recorded in Mortgage Book _____ at page _____ of the Office of the Register of Deeds of Greenville County, South Carolina, does hereby join in the grant and conveyance of the right of way and easement for the purpose of consenting to the same, hereby agreeing to honor and recognize the same hereafter, in accordance with its terms.

In Witness Whereof, the undersigned has executed this Consent and Joinder this ____ day of _____, 20____.

WITNESS

Name of Lender/Mortgagee

Witness 1
Print Name: _____

By: _____
Its: _____
Print Name: _____

Witness 2
Print Name: _____

STATE OF _____)
)
COUNTY OF _____)

**ACKNOWLEDGMENT
(Lender/Mortgagee)**

I, the undersigned Notary Public, do hereby certify that _____, the _____ of the above named Lender/Mortgagee personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and seal this _____ day of _____, 20____.

(SEAL)
Notary Public for State of _____
Print Name: _____
My commission expires: _____

EXHIBIT A

LOCATION OF RIGHT OF WAY

(attached)



Example Final MetroConnects Acceptance Letter

June 29, 2018

Mr. / Ms. Engineer
ABC Engineering & Associates, Inc.
100 Main Street, Suite 100
Greenville, SC 29601

DHEC #12345 WW

Subject: Jasper Mill Subdivision Lots: 1-100

Mr. / Ms. Engineer,

Based on information submitted and certified by the design engineer (firm), the sanitary sewer system for this project has been accepted for ownership, operation and maintenance by Metropolitan Sewer Subdistrict. This letter of acceptance is for the gravity sewer system and easements only and does not grant permission to discharge flow into the system. A "Permit to Operate" must be issued by the South Carolina Department of Health and Environmental Control (DHEC) prior to any flow being discharged into the system.

Neither this letter nor the dedication and acceptance of the system shall be deemed to waive any rights that the Subdistrict may have for defects in the line not caused by the Subdistrict.

*****Special Conditions*** Metropolitan Sewer Subdistrict will not assume responsibility for any damage claims due to manhole height, within paved areas or roadways prior to the final pavement being in place and approved by the appropriate agency.**

Sincerely,
Metropolitan Sewer Subdistrict

Engineering Representative

Engineering Representative
Engineering Department

cc: Greenville County Planning Commission
SCDHEC, Greenville
Metro Attorney
Project File

Appendix I- Fee Schedule

FEE SCHEDULE

1. **Tap Fee for Single Family Residential Use:** A fee of Six Hundred Forty-Eight Dollars (\$648.00) shall be charged for each service connection to Metropolitan’s sewer collection facilities. Such fee shall be payable upon making application for the permit to connect.

2. **Tap Fee for All Other Uses.** A fee of Six Hundred Dollars (\$600.00) plus \$0.12 per gallon for the average daily flow as calculated using the latest revision of the South Carolina Department of Health and Environmental Control’s Unit Contributory Loadings publication shall be charged for each service connection to Metro’s sewer collection facilities. Such fee shall be payable upon making application for the permit to connect.

3. **Administrative Plan Review and Inspection Fee.** In those instances where property within the jurisdiction of Metro is privately developed and the sewer system for such development is constructed and installed in accordance with the requirements and standards of Metro for dedication to Metro for operation, maintenance, and public use, the following fees and charges shall apply:
 - a. **Project Plan Review Fee:** A fee in an amount to be determined from the table below shall be charged for the project drawing/document review by Metro. Such fee shall be payable upon submittal of the project documents. The base fee shall include one follow-up review.

Project Review Base Fee (1 to 1,000 LF system)	-	\$135
(Includes Initial and One Follow-up Review)		
Add	Per Additional Foot	- \$0.02
	*Per Off-site Right of Way	- \$250
	Pump Station Review	- \$800
	Each Additional Review	- \$100

**Legal templates are not to be altered. Any legal templates that are altered will be subject to additional fees. Document negotiations will be billed at Metro’s attorney’s hourly rate. Such fee shall be paid prior to Metro issuing the final acceptance letter.*

A fee of One Hundred Dollars (\$100.00) shall be charged for a second follow-up review and each additional drawing/document review required thereafter. Such fee shall be payable upon submittal of the revised documents.

- b. **Inspection Fees:** An inspection fee shall be charged for all construction related and project close out inspections prior to final approval and acceptance of the dedication of the system by Metro. The fee shall be determined by the rate table below.

Project Inspection Fee (1 to 1,000 LF system)	-	\$375
Add	Per Additional Linear Foot	- \$0.05
	Per Pump Station	- \$2,800

In addition to the inspections listed above, Metro shall conduct a closed-circuit television (CCTV) inspection of all projects prior to final approval. The CCTV inspection fee shall be billed at an hourly rate of \$150.

All inspection fees shall be paid prior to Metro’s final letter of acceptance.

- c. **Project Dedication Administrative Fee:** A project dedication administrative fee of Five Hundred Dollars (\$500.00) shall be charged by Metro to cover its administrative costs for document review of dedication and conveyances of systems to Metro and the recording fees of such conveyances. ** Legal templates are not to be altered. Any legal templates that are altered will be subject to additional fees. Document negotiations will be billed at Metro’s attorney’s hourly rate. Such fee shall be paid prior to Metro issuing the final acceptance letter.*
4. **Illegal Tap Fines.** Any tap or connection made to Metro sewer lines or manholes without a permit is an illegal tap.

In addition to a \$500 fine, the property owner will be required to reimburse Metro for all costs associated with repairs (plus a 15% administration fee) to correct any deficiencies caused by the illegal connection. Line cleaning and CCTV inspection costs will also be charged to the property owner.

Any licensed contractor or plumber who installs an illegal tap shall be reported to the SC LLR and fined \$500 by Metro.