

CITY OF LOGANVILLE

STORM SEWER CULVERT AND PIPED DRAINAGE SYSTEM STANDARD SPECIFICATIONS

1.0 Drainage Improvements Required

1.1 Storm water conveyance facilities, which may include but are not limited to culverts, storm drainage pipes, catch basins, drop inlets, junction boxes, headwalls, gutter, swales, channels, and ditches, shall be provided for the protection of public right-of-way and private properties adjoining project sites and/or public rights-of-way. Storm water conveyance facilities that are designed to carry runoff from more than one parcel, existing or proposed, shall meet the requirements of these standard specifications.

2.0 Standard Specifications

2.1 Unless otherwise specifically set forth herein or in the City of Loganville Standard Drawings, all of the materials, methods of the construction, and workmanship for the work covered in reference to stormwater conveyance facility construction shall conform to the most recent Standard Specifications of the Georgia Department of Transportation (Georgia DOT).

2.2 The only allowable pipe material for all applications within drainage easements, public rights-of-way, and inside of stream buffers is reinforced concrete pipe (RCP). Allowable pipe material outside of drainage easements, public street rights-of-way, and outside of stream buffers, except as specified below, include Aluminum Coated (Type 2) Corrugated Steel Pipe (ASP), Corrugated Aluminum Alloy Pipe, Smooth Lined Corrugated Polyethylene Pipe (HDPE), or Reinforced Concrete Pipe (RCP). Usage is summarized in the table below titled Pipe Material Alternatives. Allowable pipe materials are indicated by an “X” in the table.

2.3 For roads constructed with public funds, either wholly or in part, or roads classified as Major Thoroughfares, materials which meet the Georgia DOT design standards shall be used unless an alternative is specifically approved by the City of Loganville.

2.4 Only Reinforced Concrete Pipe (RCP) shall be used for all dams unless the Georgia Safe Dams Program requires another material. Only RCP shall be used for pipes carrying live streams.

2.5 The City of Loganville Director of Public Works or their designee may approve a variance for use of an alternative pipe material.

2.6 Storm sewer utility easements off the street right-of-way shall be clearly defined on the Final Plat or Boundary Survey Plat. Such easements are for ingress and egress to reach facilities and for the purposes of installing, servicing, replacing, repairing, removing, maintaining, and improving the underground utility uses as determined by the City. The property owner will be required to keep the easement free of obstruction in such a way as to assure the maximum accessibility at all times. The property owner shall not alter any utility improvements without the prior written approval from the City. Permanent structures, except paved driveways, shall not be constructed or erected in an easement or any part thereof without the prior written approval from the City. Driveways shall cross an easement as close to perpendicular as practical. Property owners may plant landscaping in an easement; however, the City is not responsible for replacing the

landscape material located in the easement when it is removed to maintain, repair, replace, remove, or improve the utility system. The City is not responsible for replacing or repairing existing structures or structure damage located in the easement when it is removed to maintain, repair, replace, remove, or improve the utility.

3.0 Design Criteria – General

- 3.1** All storm water conveyance facility design calculations shall be certified by a Professional Engineer registered in the State of Georgia.
- 3.2** Methods to calculate storm water flows shall be in accordance with the Gwinnett County Storm Water Design Manual. The USGS Method shall be used where applicable to check the magnitude of peak flows when other hydrologic methods recommended in the manual are used.
- 3.3** All portions of a storm water conveyance system which drain areas falling within the same size category above shall be analyzed using the same methodology.
- 3.4** Run-off coefficients used for the Rational Method and runoff Curve Numbers used for the SCS Method shall be consistent with those shown in the Gwinnett County Storm Water Design Manual.
- 3.5** Smooth interior corrugated polyethylene (PE) pipe shall not be used or installed under the road surface of existing or proposed to be dedicated public streets except where authorized for use by the Georgia DOT.
- 3.6** For private developments, the developer is responsible for demonstrating in the design plans that the proposed storm drainage system will not have conflicts with the tie-in elevation of existing storm drain systems in elevation. If there is an elevation conflict, the developer will be responsible for re-establishing proposed elevations or re-constructing the proposed stormwater system to provide positive drainage.

4.0 Design Criteria – Culverts

- 4.1** Culverts or pipe systems designed to convey water from one side of a public right-of-way to the other shall be designed to pass the fully developed peak flow associated with a 100-year storm with at least 1.5 feet of freeboard between the 100-year ponding elevation and the centerline of the road, without raising the 100-year flood elevation on upstream properties, and in accordance with the Floodplain Management Ordinance. Fully developed flows shall be based on the Land Use Plan adopted by the Mayor and City Council.
- 4.2** The 100-year ponding limits at and upstream of the culvert shall be shown on the Development Plans and on the Final Plat (if applicable).
- 4.3** The minimum allowable culvert diameter shall be 18 inches. Culverts carrying a live stream shall be reinforced concrete pipe (RCP)
- 4.4** Culvert design is to be in accordance with the methods contained in the Gwinnett County Storm Water Design Manual and shall include a thorough analysis of both inlet and outlet control

conditions.

5.0 Piped Collection Systems

- 5.1** The preliminary design (initial pipe sizing and profile design) of piped collection systems required under 1.1 of the herein shall be based upon conveyance of the peak flows associated with a fully developed 25-year storm with the hydraulic grade line (HGL) being one foot or more below the top of each structure, gutter line or proposed final ground surface elevation, whichever is lowest.
- 5.2** Once the preliminary design of a piped collection system has been prepared, it shall be analyzed for its behavior during conditions of 100-year flow, with the objective of this analysis being to ascertain the quantities of flow and flow paths followed by flows exceeding the capacity of the system, whether these pond at inlets or flow along the ground's surface.
- 5.3** Based on the analysis of 100-year conditions, the preliminary design shall be revised where necessary to produce a final design for which the likelihood of dwelling flooding, major property damage, or substantial public access and/or utility interruption shall be less than one chance in 100 years.
- 5.4** The minimum allowable pipe diameter shall be 15 inches.
- 5.5** Catch basins shall be spaced so that the spread in the street for a 10-year design flow shall not exceed the following, as measured from the face of the curb:
- 5.5.1 8 feet if the street is classified as a Minor Collector or Major Thoroughfare;
 - 5.5.2 16 feet at any given section, but in no case greater than 10 feet on one side of the street, if the street is classified as a Local Street.

Gutter spread calculations shall be submitted to the City for review and approval prior to issuance of a Development Permit.

- 5.6** Complete flow, velocity, and hydraulic grade line computations, shall be provided for all portions of a piped collection system. Hydraulic grade lines shall be shown on the storm drainage profiles contained within the Development Plans for the 25-year and 100 year storms.
- ## **6.0 Energy Dissipation – Piped Systems and Culverts**
- 6.1** Energy dissipation devices, such as splash pads, rip-rap, stilling basins, etc., shall be provided at the outlet of every culvert and piped collection system (please refer to the Standard Drawings.) Velocity protection shall be in accordance with the Gwinnett County Storm Water Design Manual. Velocities for the fully developed 25-year flow shall not exceed the non-erosive velocity as shown in the design manual for the receiving conveyance.
- 6.2** Energy dissipation devices shall be located entirely within the project site, and shall not encroach upon any required buffer.

6.3 When uniform, graded stone rip-rap is used for energy dissipation, ultraviolet resistant filter fabric (200-pound test) shall be used between the stone layers.

7.0 Minimum Pipe and Pipe Coating Requirements

7.1 The type of pipe material used shall be in accordance with section 1.0 herein.

7.2 Reinforced concrete pipe shall be manufactured in not less than 8 foot joint lengths. All joints shall be bell and spigot type, with a rubber gasket conforming to ASTM C-443. Pipe shall be manufactured in accordance with AASHTO M-170 and/or ASTM C-76. Class of pipe and wall thickness shall be in accordance with Georgia DOT Standard 1030-D, Table No.1.

7.3 Aluminum coated (Type 2) steel pipe shall comply with AASHTO M-274 for the coating and AASHTO M-36 for the pipe fabrication. Aluminum alloy pipe shall comply with AASHTO M-196 and AASHTO M-197. Polymer precoat steel pipe shall comply with AASHTO M-245 and AASHTO M-246.

7.3.1 See Georgia DOT Standard 1030-D, Tables 1 and 1R for the minimum acceptable combinations of gages, diameters, and corrugation configurations for corrugated aluminum alloy pipe and pipe arches, and for corrugated aluminum coated steel pipe and pipe arches. However, the minimum pipe thickness shall be 14 gage.

7.3.2 The following environmental ranges shall be allowed for aluminized Type 2 CSP:

- i. $4.5 \leq \text{pH} < 5.0$ with Soil Resistivity $> 5,000$ ohm-cm
- ii. $5.0 \leq \text{pH} \leq 9.0$ with Soil Resistivity $\geq 1,500$ ohm-cm

If the NRCS Soil Survey of Loganville shows a potential for soils with a $\text{pH} \leq 5$ anywhere on the site, the City of Loganville may require pH and soil resistivity testing. If required, tests are to be completed by an independent testing firm at the Contractor/Developer's expense. All testing to be in accordance with ASTM G51 for pH and ASTM G57 for soil resistivity.

7.3.3 Each end of each pipe section to be joined by a coupling band shall have a minimum of two annular corrugations. Coupling bands shall be so constructed to lap on an equal portion of each of the pipe sections to be joined. The connecting bands shall have a minimum of two annular corrugations and fully engage, over the entire pipe periphery, one corrugation on each pipe end. Bands shall be fabricated from the same material as the pipe. The minimum band gauges for aluminum pipe and aluminized pipe shall be as specified in AASHTO M-196, Section 9, and AASHTO M-36, Section 9, respectively.

7.3.4 Gaskets may be required as determined by the City in the field, and shall be either sleeve type or O-ring type and shall meet the requirements for gaskets as specified in AASHTO M-36, Section 9.5.

- 7.3.5 Corrugated metal pipe laid at slopes less than 1% shall have a paved invert.
- 7.4** Structural plate drainage structures shall be designed by a Registered Professional Engineer in Georgia and conform to the requirements of AASHTO M-219.
- 7.5** Smooth Interior Corrugated High Density Polyethylene Pipe
- 7.5.1 High density polyethylene pipe shall be corrugated with an integrally formed smooth interior (HDPE). HDPE pipe manufacturers shall be approved by the City.
- 7.5.2 This pipe shall conform to the requirements of AASHTO M-294, Type S.
- 7.5.3 Joints shall be as recommended by the manufacturer and approved by the City. Connections shall create a soil tight joint at a minimum and shall use a rubber gasket, which conforms to ASTM F-477.
- 7.5.4 Installation shall be in accordance with GDOT Standard Detail 1030P. The internal diameter of the barrel shall not be reduced by more than 5% of its base inside diameter when measured not less than 30 days following completion of installation.
- 7.6** Certification from the manufacturer that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the City upon request.

Table 1 Pipe Materials

Pipe Type	Reinforced Concrete Pipe	Metal Pipe			Plastic Pipe	
		Aluminized Type 2 Steel	Polymer Precoat Steel	Aluminum Alloy	Corrugated Polyethylene	Smoothed Lined High Density Polyethylene Type "S"
Specifications (See Note 1)	ASTM C76, AASHTO M170	ASTM A760, A929; AASHTO M36, M274	ASTM A742, A762; AASHTO M245, M246	ASTM B744, B745; AASHTO M196, M197	AASHTO M252	ASTM F-2306; AASHTO M294
Minimum Thickness / Class	III	14 Ga.	14 Ga.	14 Ga.	AASHTO M252	AASHTO M294
Installation Type						
Longitudinal		X	X	X	X	X
Public Road ADT <5000	Cross Drain < 10% Slope	X	X	X	X	X
	Cross Drain > 10% Slope			X		X
Public Road ADT ≥5000	Cross Drain < 10% Slope	X				X (See Note 2)
	Cross Drain > 10% Slope			X		X (See note 2)
Lateral Systems		X	X	X	X	X
Slope Drain			X	X	X	X
Perforated Underdrain			X	X	X	X
Dams		X				
Perennial Streams		X				
Minimum Allowable Design Velocity		2.5 fps	2.5 fps	2.5 fps	- -	2.5 fps
Maximum Allowable Design Velocity		15 fps	15 fps	15 fps	- -	15 fps
Notes:						
1.) All pipe materials shall meet the minimum requirements of the Georgia Department of Transportation's Standard Specifications for Construction of Transportation Systems, most current edition.						
2.) HDPE not allowed on roads with ADT ≥15,000.						

8.0 Pipe Length

- 8.1** Culverts carrying live streams shall extend to where the crown of the pipe intersects the roadway slope.
- 8.2** Pipes that do not carry live streams shall extend at least 50 feet beyond the front building setback lines, and may be required to extend farther where necessary to provide an adequately protected building site on the property. In nonresidential subdivisions, these pipes may temporarily end at the right-of-way line, but shall be extended as part of a subsequent development permit approved for the individual site.
- 8.3** The length requirement, however, shall be subject to requirements for maintaining stream buffers in accordance with Georgia law and County or City regulations.

9.0 Pipe Installation

- 9.1** Reinforced concrete pipe, corrugated aluminum alloy pipe, corrugated aluminum coated steel pipe and smooth interior corrugated polyethylene pipe shall be installed in accordance with Section 550 of the Georgia DOT Standard Specifications Construction of Transportation Systems.

9.2 Bedding

All pipe structures shall be placed on stable earth or fine granular foundation, the characteristics of which would be expected to provide long-term stability. In all live stream pipe installations, in areas of low bearing solid or non-uniform foundations, in areas where rock is encountered at the foundation level, or in other locations where conditions warrant, a minimum of 6" of crushed stone bedding is required, (maximum size of stone shall be 3/4"). Geotextiles or geogrids may also be required by the City in problem areas.

9.3 Backfill

Backfill on all pipe installations shall be constructed using foundation backfill material Type I or Type II, as specified in Section 812.01 and 812.02 respectively, in Georgia DOT Standard Specifications Construction of Transportation Systems.

These materials shall be placed in layers of not more than six inches loose. Compaction of these materials shall be accomplished by hand tamping or machine tamping. Required compaction levels are as follows:

- 9.3.1** Backfill within all street rights-of-way shall be compacted to 95% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.
- 9.3.2** Backfill in all other areas shall be compacted to 85% maximum density, tested using the AASHTO Method T-99 or ASTM D-698.

9.4 Bedding and Backfill Detail

Trench construction, bedding and backfill shall be in accordance with Georgia DOT Standard

1030-D for RCP and metal pipes and 1030-P for HDPE. HDPE not installed under pavement of County-maintained roads may follow the bedding requirements for Side Drain (Driveway) Installations shown on Georgia DOT Standard 1030-P.

9.5 Inspection and Testing

9.5.1 The City Inspector will make periodic job site visitations without advance notice to the Contractor. However, it is the responsibility of the Contractor to contact the Inspector during each phase of the installation for inspections and or re-inspections.

9.5.2 Compaction testing shall be completed by an approved independent geotechnical firm listed on the Gwinnett County Authorized Geotechnical Testing Firms list at the Contractor/Developer's expense. The contractor must maintain a geotechnical engineer on-site during all storm sewer pipe installation to ensure proper compaction and backfill. The frequency of testing shall be a minimum of one test per 500 cubic yards of material placed, or one test per section of pipe from structure to structure. Each compaction test will include testing of each 8-inch lift to final grade. Copies of compaction tests shall be made available to City of Loganville Department of Public Works prior to approval of as-built drawings.

9.6 Construction loads and minimum covers

If drainage pipe is installed prior to the completion of grading, a minimum of 4 feet of fill should be provided where needed to adequately protect the drainage structure during the land development phase, unless the structure itself is designed to withstand the anticipated live load during construction.

10.0 End Finish

10.1 Headwalls or other end treatments are required on all culverts (except under residential driveways) and at the outlet of all piped collection systems.

10.1.1 Headwalls are to be precast concrete, stone masonry with reinforced concrete footings, or poured-in-place reinforced concrete with reinforced concrete footings. Precast concrete headwalls for corrugated aluminum coated steel pipe or aluminum alloy pipe shall be made with aluminum coated steel or aluminum alloy pipe stubs.

10.1.2 End treatments that conform to the slope may be pre-cast concrete end sections, aluminum coated steel or aluminum alloy end sections, masonry, PE end sections, reinforced poured-in-place slope collars, or grouted rip-rap. Concrete and metal flared end sections shall conform to Georgia DOT Standard Drawing 1120.

11.0 Junction Boxes and Catch Basins

11.1 Junction boxes and catch basins shall have metal manhole frames and lids for access. Ladder must line up with the manhole cover to ensure accessibility.

11.2 Lids for storm drainage facilities shall be engraved in accordance with the City of Loganville

Standard Drawings.

- 11.3 Manhole lids must be accessible and shall not be buried or paved over.
- 11.4 Maximum invert to invert drop in a stormwater manhole or junction box shall be 10 feet.
- 11.5 Manholes placed within stream buffers and/or within flood plains shall have bolt-down covers.

12.0 Other Structures

Natural bottom arches and box culverts may be used in accordance with the latest Standard Specifications of the Georgia Department of Transportation.

13.0 Surface Drainage Design Standards

- 13.1 All new proposed channels shall be designed to carry at least the fully developed 25-year storm with freeboard equal to 20% of the design flow depth.
- 13.2 Transition channels shall be provided at the inlet and outlet ends of all culverts and pipe systems, unless otherwise provided herein.
- 13.3 The maximum flow velocity at the project site's downstream property line shall not exceed the pre-developed velocity.
- 13.4 In cases of potential erosion due to irregular channel alignment, extreme velocities, or excessive slopes, a paved ditch may be required. However, if, in the opinion of the City, the expected long-term maintenance of a surface drainage system could prove impractical, a pipe design may be required.
- 13.5 The cross-sectional shape of channels shall be as found in the City of Loganville Standard Drawings. "V" shaped cross-sections are not permitted in grassed channels.
- 13.6 If the channel will be affected by backwater from culverts, bridges, other structures or floodplains, backwater curves shall be shown in profiles of the channel.
- 13.7 All channels must be capable of conveying flows sufficient to ensure that overflow of the channel would not result in a likelihood of dwelling flooding, property damage or public access and/or utility interruption shall be greater than one (1) chance in 100 years.
- 13.8 Channels shall be designed to carry the fully developed 25-year flow in accordance with the Gwinnett County Storm Water Manual.

14.0 Surface Drainage Construction Standards

- 14.1 The channel shall be shaped to the dimensions specified on the approved plans and shall be free of overfalls, gullies, or other irregularities.
- 14.2 Channels in fills shall be lined.
- 14.3 Protective cover in grassed channels shall be installed as soon as the earthwork is completed.

15.0 Final Acceptance

- 15.1** As-built Drawings must be submitted, reviewed and approved prior to approval of a Final Plat or issuance of a Certificate of Occupancy.
- 15.2** As-built Drawings must be drawn to scale, legible and suitable for scanning.
- 15.3** As-built drawings must include a site plan, profiles, and permanent easements and include any field changes not shown on the original approved plans.
- 15.4** As-built Drawings shall be sealed by a Georgia Registered Professional Engineer, Registered Land Surveyor or Registered Landscape Architect.
- 15.5** Upon final approval of As-built Drawings and construction inspections the Contractor/Developer may request Final Inspection. The Contractor/Developer shall allow up to 21 calendar days for Final Inspections after the project Final Inspection request is submitted by the City Inspector. In the event that the City of Loganville is unable to perform the Final Inspection within 21 calendar days, Contractor/Developer has the option to have CCTV inspection performed at Contractor's / Developer's expense by a firm listed on a Pre-Qualified CCTV Inspection Contractor list. Any defects discovered by City inspection of the CCTV recording must be corrected immediately in order to receive Final Inspection approval.
- 15.6** Final Inspection, including CCTV inspection shall be performed after completion of all activities that may damage the pipe but prior to placement of base, paving or landscaping over or near the pipe.
- 15.7** The Final Inspection will be performed by City of Loganville at the Contractor/Developer's expense and kept by the City of Loganville records. Initial payment for Final Inspection fees shall be paid by the Developer or his assigns in advance at the time of project plan approval and at a rate as established by the City of Loganville Public Works Director. Following any corrections of discrepancies, the lines and structures will be re-inspected. Additional fees, as determined by the City of Loganville Public Works Director, will be assessed. These fees must be paid prior to the project being issued a "pass" Final Inspection report.
- 15.8** The requirements in GDOT 550.3.06.D, GDOT 550.3.06.E, or GDOT 550.3.06.F will be used to determine if the pipe is acceptable or if remediation or replacement must be completed prior to approval of Final Plat or issuance of a Certificate of Occupancy.

16.0 Approved Contractors

- 16.1** The City of Loganville requires that the pipe contractor be listed on the Gwinnett County Department of Water Resources (GCDWR) approved Utility Contractors List to install storm sewer pipe and structures. No contractor shall be allowed to commence installation of storm sewer pipe and structures until an application for inclusion to the Approved Utility Contractors List has been received and approved by GCDWR. Contractors will be required to re-apply once every four years to remain on the list. Previous performance and experience of the contractor will be considered in granting approval. Repeated failure to follow standards may result in removal or suspension from the GCDWR Utility Contractor List.