

16.0 DRAINAGE CRITERIA AND STANDARDS

The City of Tomball, Texas, authorized an update to the City's Drainage Criteria Manual (DCM), which was originally published and adopted in 2011, updated in June 2021. The DCM establishes rules and regulations that must be consistently followed and enforced throughout the City for drainage design and implementation.

16.1 Disclaimer

This manual is intended to provide criteria for the most commonly encountered drainage and control designs in City of Tomball. The manual was written for users with knowledge and experience in the applications of standard engineering principles and practice of stormwater design and management. The purpose of the Drainage Criteria Manual is to provide a property owner, developer, and/ or engineer with information and instruction necessary for creating drainage plans that will promote the owner's interests and objectives while protecting the health and safety of the community.

The DCM policies and design criteria shall not create liability on the part of City of Tomball or any office or employee thereof for any flood damage, property damage, or personal injury that results from reliance on these policies or any administrative decision lawfully made.

16.2 No Adverse Impact

No adverse impact is the principle that the actions of any community or property owner, public or private, should not adversely impact the property and rights of others. No adverse impact management offers a way to prevent the worsening of flooding and other negative impacts on the community. Adverse impacts as they relate to drainage improvements can be measured by flow rate, water surface elevation, velocity, flow type, erosion and sedimentation, or other measurable adverse impacts to a community's well-being.

For all drainage projects located in the City of Tomball and its ETJ, the following criteria must be met for drainage plan approval:

- **Peak Flow:** No increase to peak flow leaving the project. This is determined by comparing pre-project versus post-project flow rates.
- **Water Surface:** No increase to the water surface elevations upstream, downstream, or to adjacent properties as this would result in increased flooding.
- **Velocity:** No increase to the velocity so as to cause scour or erosion within or around the project site.
- **Flow type:** Consideration of flow type changes (e.g., overland sheetflow versus concentrated point discharge) with regard to receiving system and potential erosion.

16.3 Drainage Facility Maintenance

All detention facilities constructed by a property owner or developer shall be maintained by the property owner or developer, their legal heir(s), grantee(s), successor(s), or assignee(s). The maintenance party responsible at the time of development must be noted on the Engineering Plans.

The maintenance of detention and drainage facilities is critical for ensuring that these facilities will operate as intended during rainfall events. The property owner or developer shall ensure that the drainage facilities are functioning as designed and being properly maintained.

The City of Tomball will not be responsible for the maintenance of any detention pond within the City unless specific criteria have been met and the City has formally accepted the facility for maintenance.

16.4 Design Criteria Manual Updates

This Design Criteria Manual update supersedes the previous document of the same name date June 7, 2021. All items listed herein are intended to supersede those documents.

The City of Tomball recognizes the need to control flooding and detain excess runoff from orderly development. Due to updates to technology and methodologies used to analyze hydrologic and hydraulic conditions, this update is intended to capture best practices in development and redevelopment while continuing to provide sufficient criteria to decrease the likelihood of flooding due to development and construction.

Below are major revisions to the DCM. A copy of the DCM can be found in **Appendix A**.

- Application of Rational Method – Calculation of Runoff Coefficient using composite C factor calculations
- Time of Concentration (Tc) Determination – Replaced area-based Tc methodology with velocity-based Tc methodology
- Added Roadway Drainage Criteria Hierarchy – Roadway classification will determine allowable ponding widths using a 25-year design storm event with design HGL one foot below gutter elevations
- Storm Sewer Placement – Storm sewer shall be placed under the outside curb or edge of pavement, as opposed to the center of the roadway, for consideration of future maintenance and traffic control
- Detention Criteria
 - A minimum 0.75 ac-ft/ac storage rate is required for all development, regardless of development size
 - Provided detention criteria for SFR tracts with a single structure based on tract size and impervious cover

- A minimum 0.75 ac-ft/ac for all development, regardless of development size
- For projects over 5 acres, either the Small Watershed Method (Malcolm's Method) or Clarks Unit Hydrograph shall be used to estimate detention volume with appropriate computer modelling software
- Approval of detention through ponding in truck courts/parking area at the discretion of City staff.
- Minimum detention pond maintenance berm widths based on pond depth.

16.5 Technical Specifications

Part of the drainage master plan included review of City drainage standards and specifications based on adjacent municipality standards, constructability, and maintenance issues and needs. The updated specifications (redlined copy) are provided in **Appendix B**. Below are descriptions of major revisions to the City drainage specifications.

Private development has been using thermoplastic pipe, specifically high-density polyethylene (HDPE) pipe and polypropylene (PP) pipe, for stormwater drainage application for many years due to the lightweight composition and cost efficiency. In the past, state and local governments did not allow such materials to be used in transportation projects, rather they used conventional reinforced concrete pipe sections. However, the Texas Department of Transportation and Harris County Engineering Department have recently adopted the use of PP pipe and HDPE pipe. In general, polypropylene pipe provides a more rigid section than the HDPE option. One key component to the use of thermoplastic pipe is proper installation related to the soil envelope, or the bedding and backfill, of the drainage conduit.

Specific use of PP and HDPE pipe in lieu of current standards within City right-of-way shall be as follows:

- Storm Drain (Trunkline and Inlet Leads) – PP Pipe
- Cross Culverts – PP Pipe
- Parallel Culverts – PP Pipe or HDPE Pipe

The City's Technical Specifications and Construction Standards have been revised to accommodate the use of thermoplastic pipe within the right-of-way. Listed below are specifications that have been added and/or revised. These specifications and construction standards are included in **Appendix B**.

- Section 02505 – High Density Polyethylene (HDPE) Solid and Profile Wall Pipe
- Section 02509 – Thermoplastic Pipe Culverts and Drains
- Section 02631 – Storm Sewers
- COT STM-40 Storm Bedding and Backfill for Thermoplastic Pipe