



# **Brookshire-Katy Drainage District (BKDD)**

## *Master Drainage or Design Report Requirements & Guidelines*

Last Revised on 09-29-22

## OVERVIEW & PURPOSE

A drainage study report is essential to confirm that a proposed project is designed per Brookshire-Katy Drainage District's (District) latest Rules and Regulations and sound engineering practices. The report communicates the justification of the drainage plan or design for review and approval purposes. It is a reference document for others in the future who want to perform additional improvements to the proposed development and/or tract and adjacent developments.

The purpose of a drainage study report is to document, identify, and resolve as many design issues as possible early in the project development phase to facilitate a review of the drainage plans, plat, and, ultimately, a successful project.

The proposed study must provide detailed information to adequately justify the drainage and detention design components for the proposed development to satisfy the District's Rules and Regulations. The proposed development shall include the appropriate drainage and detention design measures to not cause any adverse impacts to neighboring properties or downstream/upstream facilities. In the event that the proposed development increases the runoff discharge rate, the peak discharge flow, or water level in any drainage artery, the developer, at his own expense, **shall** implement drainage system corrections to prevent any such increase.

## REPORT CONTENT

Prepare clear, concise, and complete reports for the proposed project that:

- Cover applicable topics.
- Explain the results of the findings from the drainage study.
- Indicate where and why the District's criteria were not followed.
- Include in the Executive Summary Drainage and Detention Summary Table – See Attached Template.
- Include tables, maps, exhibits, pictures, calculations, etc.

The length of the report is not important, provided the applicable design topics are covered clearly and completely commensurate with the scale of the project and the project phase. Indicating report sections do not apply or will be covered in a later version is acceptable.

## TEXAS STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS REQUIREMENT

- All reports submitted to the District must be properly identified, sealed, signed, and dated as required by the Texas State Board of Registration for Professional Engineers.
- Reports submitted for preliminary review must be clearly labeled as preliminary and comply with Texas State Board requirements.

## REPORT OUTLINE

To facilitate the preparation and review of drainage study reports, an outline for a typical new development project is provided below. The applicant shall include all applicable sections.

## EXECUTIVE SUMMARY

- Include a conclusion statement "the Professional Engineer who prepared, signed, dated, and sealed this Report certifies that the proposed development will be constructed in accordance with the approved District permit and will not cause any adverse impacts to neighboring properties or downstream/upstream facilities."
- Include Drainage and Detention Summary Tables – See Attached Template.





## 1. INTRODUCTION

- 1.1. Project Name and Purpose
- 1.2. Project Limits
- 1.3. Project Objectives, Assumptions, and Constraints
- 1.4. (If applicable) Prior Studies and BKDD Permits

## 2. EXISTING CONDITIONS

- 2.1. Location and Topography
- 2.2. Land Use
- 2.3. BKDD Facilities
- 2.4. Right-of-Way/ Easements

## 3. HYDROLOGY AND HYDRAULICS

- 3.1. Analysis Objective
- 3.2. Hydrologic and Hydraulic Methodologies
- 3.3. Existing & Proposed Conditions
  - *Include Drainage Summary Table*

## 4. PROPOSED DRAINAGE PLAN

- 4.1. Description
- 4.2. Channel and/or Detention Layout
  - *Include Detention Summary Table*
- 4.3. Hydrologic and Hydraulic Analysis
- 4.4. Results and No Adverse Impact Evaluation
- 4.5. Maintenance Access Plan Requirements
- 4.6. Right-of-Way Requirements
- 4.7. Special Erosion Control Features
- 4.8. Geotechnical Report
  - *i.e., If proposing pond is over six (6) feet deep or side slopes less than 3:1 (H: V) or over two (2) acres in size*
- 4.9. Other Considerations



## 5. MAPS AND EXHIBITS

- Vicinity Map
- Drainage Area Map, Showing Existing and Proposed
- Project Area Map, Showing Existing and Proposed:
  - *Land Use*
  - *Topography/Grading*
  - *Drainage Facilities (Public and/or Private)*
  - *Right-of-Way*
  - *Floodplain Limits*
  - *Stationing Used in Hydraulic Calculations*
- Channel Hydraulic Profile Showing:
  - *Existing, Proposed, and Ultimate Flowlines, Bottom Widths, and Side Slopes*
  - *Typical Natural Ground Elevations at the Right-of-Way Lines*
  - *Bridge, Culvert, Utility, and Pipeline Crossings for Existing, Proposed, and Ultimate Conditions*
  - *Locations of Major Confluences*
  - *Drop Structures, Transitions, Inflow and Outflow Structures, Stormwater Quality Features, and other Items Influencing the Design*
  - *Existing, Proposed, and Ultimate 1%, 10% and 50% Exceedance Probability Water Surface Profiles and Other Frequencies as Appropriate*
  - *Datum and Year of Adjustment*
- Detention Hydraulic Profile Showing:
  - *Existing, Proposed, and Ultimate Flowlines, Bottom Widths, and Side Slopes*
  - *Typical Natural Ground Elevations at the Right-of-Way Lines*
  - *Bridge, Culvert, Utility, and Pipeline Crossings for Existing, Proposed, and Ultimate Conditions*
  - *Inflow and Outflow Structures, Stormwater Quality Features, and other Items Influencing the Design*
  - *Existing, Proposed, and Ultimate 1%, 10%, and 50% Exceedance Probability Water Surface Profiles and Other Frequencies as Appropriate*
  - *Datum and Year of Adjustment*
- Existing, Proposed, and Ultimate Cross-Sections, Including Datum and Year of Adjustment
- Existing and Proposed Hydrographs at Critical Locations

## 6. APPENDIX

- Detailed Hydrologic and Hydraulic Analysis
- Geotechnical Report
- Maintenance Access Plan
- Operation and Maintenance Plan for Pumped Detention Basins





## TEMPLATE - Drainage & Detention Summary Tables

A.

Pre-Development (Existing)	Areas (acres)	Areas (%)
Total Project Tract Site		
Impervious		
Pervious		
<b>Total</b>	<b>0</b>	<b>0%</b>

B.

Post-Development (Assumed Ultimate)	Areas (acres)	Areas (%)
Building		
Parking Area		
Detention Pond(s)		
Other Impervious (assumed)		
Pervious		
<b>Total</b>		<b>0%</b>

C.

DRAINAGE AREAS	Pre-Development (Existing)	Post- Development (Proposed)
2-yr (acres)		
A. 100-yr (acres)		
B. 100-yr OFFSITE* (acres) *All <b>OFFSITE</b> sheet flow from adjacent properties and/or areas beyond the tract must be identified, properly accounted for, and mitigated as part of the project.		
<b>Total 100-yr (acres) [A + B]</b>		



D.	Storm Frequencies(includes Offsite Areas)	2-yr (50%)	10-yr (10%)	100-yr (1%)
Total Peak Flow Rate (cfs)	<b>Pre-Development (Existing)</b> Max. Allowable Outflow			
	<b>Post-Development (Proposed)</b> <u>BEFORE</u> Detention/Restrictor			
	<b>Post-Development (Proposed)</b> <u>WITH</u> Detention/Restrictor (from detention basin)			
	<b>Flow Results</b>	<b>Post &lt; Pre OK</b>	<b>Post &lt; Pre OK</b>	<b>Post &lt; Pre OK</b>
Elevation (1988 NGVD, 2001 Adj.)	Lowest Natural or Finished Ground Elevation Estimate			
	Lowest Finish Floor Elevation (FFE) of Existing/ Proposed building(s)			
	Maximum Allowable Water Surface Elevation Based on:			
	Design Water Surface Elevation			
	Water Surface Elevation Calculated			
Detention Basin Storage	*100-yr Detention Basin Storage <b>Required</b> (ac-ft)			
	100-yr Detention Basin Storage <b>Provided</b> (ac-ft)			
	100-yr Detention Basin Storage Rate <b>Provided</b> (acre-feet/acre)			
	<i>*Provide calculation in Drainage Memo and Plans</i>			
Outflow Structure	If applicable - Restrictor Size (ft or ft2)			
	Outflow Pipe Size (ft or ft2)			
	Outflow Velocity (ft/second)			
	Gravity Outfall Rate Provided (cfs)			
	Explain tail water/HGL used from roadside ditch for 2 & 100-yr to calculate your discharge rate			
	The existing channel/ roadside ditch's full bank capacity (open channel hydraulics)			
	Outflow Velocity into existing channel/roadside ditches (ft/ second)			
	If applicable - % Pumped discharge volume (ac-ft)			
	If applicable - Weir Description (type, size, elevation, etc.)			
	Drain Time 100-yr only (hours)			
	Emergency Overflow (type, size, elevation, etc.)			



If proposing multiple detention ponds, please include the summary table below.

Detention Storage Provided For Project Area			
Project Name	BKDD Permit No.	Pond Name	Proposed Detention (acre-ft)
Project "A"	202X-YYY	PO-1	26.305
		PO-2	81.476
		PO-3	32.901
		TOTAL	140.682

If proposing multiple projects, please include the summary table below:

Applied Detention Summary					
Project Name	BKDD Permit No.	Acreage (acres)	Impervious Cover (acres)	Applied Detention (acre-ft)	Remaining Detention (acre-ft)
Project "A"	202X-YYY	100.00	80.00	50.00	90.68
Project "B"	202X-ZZZ	89.00	70.00	50.00	40.68
Project "C"	202X-RRR	50.00	45.00	10.00	30.68

