

These example calculations of storm detention are based on Chapter 9 detention criteria in Infrastructure Design Manual (IDM), effective March 31, 2021, and related governing documents.

- Outside of these examples, the IDM shall govern.

Note: this information may be subject to change due to proposed changes to the IDM.

1: Stormwater Information Form

- a) **Stormwater Information Form** - Complete the following form and resubmit it with your plans.
- b) Also include a copy of the following (all 3 are required):
 - 1) Most recent survey or recorded plat (please provide survey and/or plat)
 - 2) A copy of the tax account information
 - 3) A copy of the recorded dee or title report in the owner's name

- Upload Stormwater Information Form and required documents in the "Utility Letters" subfolder.

2: Roof Drainage (Residential and Commercial)

- Show the approximate location of downspouts and how they connect to the on-site drainage system.

3: Grading Permit for Excavation and Fill Worksheet (Residential and Commercial)

Complete the worksheet titled "**Grading Permits for Excavation and Fill**".

- Additional permits may be required.

4: Grading Plan (Residential)

- a) No Detention:
How relative are site elevations along with the proposed additions on-site? These elevations will need to convey the flow from the "additions" toward the inlet/outfalls.
 - Elevations are required.
 - (Relative elevations are elevations that are shown using a reference point on the property or Right of Way (ROW) as zero. Once you find a reference point provide elevations throughout the property to show the natural flow of drainage in reference to the elevations provided.)
- b) Detention:
Provide a grading plan that shows site elevations along the perimeter of the property line every 10-15 feet for the entire perimeter of the property and 12 inches inside the property line every 10-15 feet, as well as at points in every direction approximately 15-20 feet apart.
 - Elevations are required.

5: Drainage Plan (Residential)

Provide site drainage plan showing:

1. Sheet flowing into the R.O.W or adjacent properties is not allowed.
 - Drainage must be directed to an outfall.
2. Show design calculations on a plan for the time of concentration, rainfall intensity, and flow for 2-year year rain events based on updated values in the 2021 IDM.
3. A Grading plan that shows the adequate number of spot elevations to indicate the area drained to each inlet.
 - Illustrate clearly that grading does not result in draining any part of the area onto adjacent private property or piped to an unapproved location.
4. If inlets are proposed, provide the top elevation and flow line elevation at each inlet.
5. Show the flow line elevation at the outlet (and ditch flow line elevations, if appropriate).
6. Show all internal site drainage including pipe sizes, % of slope, distance of run, and the material type used.
7. If the design is proposing a swale, show swale dimensions, slope, and details, if applicable.
8. All grass/dirt swales and detention ponds must have a 2ft minimum grading set-back between the top of the cut and the property line.
9. Provide this note on the plan near the swale if they are only being used to convey stormwater, not for detention purposes: *“Swale will not be compacted after excavation and will be sodded back.”*

6: Curb Cut (Residential)

Comply with one of the following:

- a) If curb cut is existing, show how proposed drainage will connect to the existing curb cut and call out curb cut and its location on the plan.

OR

- b) If a curb cut is to be proposed and necessary, a 6” restrictor shall be reduced to a 4” PVC SCH. 40 pipe connection before going through the curb.
 - Residential Storm Water outfall piping to curb cut shall be schedule 40 PVC from the private property through ROW and curb.

7: Stormwater Pollution Prevention Plan (SWPPP) (Residential & Commercial)

Please provide **Stormwater Pollution Prevention Plan Detail** (DWG No. 01571-01) in your plans. (COH IDM 9.9.01.B)

8: Detention (Residential & Commercial)

On-site stormwater detention will be required for this project.

Provide design and calculations for detention according to the specific criteria found in the city ordinance (2021 COH Infrastructure Design Manual 9.2.01(H)(3)).

To explain your design above, please provide the information below for the plan:

1. Please comply with the detention rates based off the 2021 City of Houston COH Infrastructure Design Manual 9.2.01(H)(3)).
2. Detention design must be designed, sealed, signed & dated by a Texas P.E.
3. The location of the restrictor(s) on the plan(s) within the private property.
4. The cross-section for the restrictor(s) with the water surface elevations for 25%, 75%, and full detention capacity.
5. The location and elevation of the overflow structure, if any.
6. Identify the overflow channel and provide details, if any.
7. Calculations of all storage area volume. If there are multiple detention areas, show each one on the plans.
8. When storing water in the parking area, the actual water storage line (perimeter of ponding) is required to be marked on the plan view.
9. When storing detention volume in swales, parking areas, and/or detention ponds, the cross-section view with elevations, dimensions, slopes, details, top of the pavement, top of the curb, flowline, top of the rim, and maximum WSE must be on the plan.
10. Responsibility for maintenance of the detention facility will be by the property owner.
 - A similar statement should be on the plans.
11. Subsurface drainage systems are required to be drained in 48 hours.
 - A similar statement should be on the plans.

9: Right-of-Way work (Commercial)

A separate permit is required to be submitted to the Office of the City Engineer (OCE) for your proposed right-of-way work. Engineered plan and profile drawings prepared by a licensed Texas Professional Engineer are required. (2021 COH IDM 1.06.D and 2021 COH IDM 3.2.01(3)).

- Please e-mail OCE@houston.tx.gov or call 832-394-9149 for instructions on how to submit this separate permit.

To demonstrate this process has been started, provide the 8-digit ILMS project # for the right-of-way drawings and reference that # on the drainage plan.

- The separate OCE project must also be administratively complete in the City's system prior to approving this comment.

10: Drainage Plan (Residential)

Provide site drainage plan showing:

1. Single Family Residential properties that have an open ditch with required detention must provide a 12-inch schedule 40 with a 6-inch restrictor pipe at the outfall location.
 - Callout on the drainage plan.
2. Where site drainage systems outfall into roadside ditches, the piping must connect perpendicular to the ditch.
 - No bends will be allowed into the City Right-of-Way.
 - Outfall pipe shall connect to ditch downstream of culverts.
3. Provide a cross-section of ditch connection and callout on the drainage plan.
4. Provide and call out head wall protection for the outfall pipe.

11: Drainage Plan (Commercial)

Provide site drainage plan showing:

1. Total area of the site to be drained with dimensions.
2. Design calculations for the time of concentration, storm line sizes, and grades, and for detention facilities, if any.
3. Design calculations for the Hydraulic Grade Line of each storm line or ditch, and for detention facilities, if any, for 2-year and 100-year rain events.
 - This information can be summarized by following Figure 9.3 or 9.4 in the COH IDM.
4. Design velocities of storm lines should not be less than 3 feet per second or should not exceed 12 feet per second with the pipe flowing full.
 - This information can be summarized by following Figure 9.3 or 9.4 in the COH IDM.
5. An Adequate number of spot elevations to indicate the area drained to each inlet.
 - Illustrate clearly that grading does not result in draining any part of the area onto adjacent private property or piped to an unapproved location.
6. Top elevation and flow line elevation at each inlet.
7. Flow line elevation at the outlet (and ditch flow line elevations, if appropriate).
8. Show all internal site drainage including pipe sizes, % of slope, distance of run, and the material type used.
9. Use storm sewer and inlet lead with at least 24 inches inside diameter or equivalent cross-section if making a new storm connection into the Right-of-Way.
10. Do not place manholes, if any, in driveways or in the street in front of or immediately adjacent to a driveway.