



CITY OF HOUSTON

Houston Public Works

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October 4, 2019

Infrastructure Design Manual

9.2.01.B.1 Design Rainfall Events

9.2.01.C.2.b.4 Pipe Sizes and Placement

9.2.01.C.7 Inlet

To: All Interested Parties:

The 2019 edition of the City of Houston Infrastructure Design Manual was effective July 1, 2019. The manual has been recently updated and revised to reflect changes to the storm water design requirements.

Supplements to Chapter 9 have been approved that adopt the Atlas 14 hydrologic data, clarify storm sewer connection locations to inlets and clarify when a storm sewer needs to be extended to provide service.

Please keep in mind that the purpose of this manual is to establish the basic criteria from which engineers can design infrastructure in a manner acceptable to the Department and is not intended to address all design conditions or specialized situations.

For Houston Public Works capital improvement projects managed by the Capital Projects Service Line, Phase II final designs that have not started design activities prior to September 1, 2019, will be required to comply with the new Atlas 14 standards. Projects that are already under design will be evaluated on a case by case basis.

The changes to Section 9.2.01.C are to be implemented immediately. Hardships can be presented to the City Engineer for consideration.

All other projects in the public/private sector that submit plans for initial review after January 2, 2020 will be required to comply with these new standards.

Respectfully,

A handwritten signature in blue ink, appearing to read "Joseph T. Myers".

Joseph T. Myers, P.E. CFM
City Engineer
Houston Public Works

Attachment:	Proposed IDM Supplement 9.2.01.B.1	Design Rainfall Events
	Proposed IDM Supplement 9.2.01.C.2.b.4	Pipe Sizes and Placement
	Proposed IDM Supplement 9.2.01.C.7	Inlet

Council Members: Brenda Stardig Jerry Davis Ellen R. Cohen Dwight A. Boykins Dave Martin Steve Le Greg Travis Karla Cisneros
Robert Gallegos Mike Laster Martha Castex-Tatum Mike Knox David W. Robinson Michael Kubosh Amanda K. Edwards Jack Christie

Controller: Chris B. Brown

IDM Ch. 9

STORMWATER DESIGN AND WATER QUALITY REQUIREMENTS

The following supplement modifies IDM Ch 9. Where a portion of the IDM Ch 9 is deleted by this Supplementary, the unaltered portions of the IDM shall remain in effect.

Delete existing 9.2.01.B.1 Design Rainfall Events and replace with the following:

9.2.01.B Determination of Runoff.

1. Design Rainfall Events.

a. Rainfall Intensity:

- (1) Intensity Duration Frequency (IDF) Curves, Figure 9.1 IDF Curves, depict the intensity-duration curves to be used for storm sewer and roadside ditch design in the City and the ETJ. The source of these curves is data from Atlas 14 IDF Curves, assistance with NOAA Atlas 14 Updates to the Harris County Flood Control District (HCFCD) Policy Criteria & Procedure Manual adopted July 9, 2019. The Atlas 14 IDF Curves report is based upon the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0 Texas (Atlas 14).

Harris County Flood Control District (HCFCD) developed three (3) Hydrologic Regions based on the Atlas 14 rainfall distribution. The City of Houston requires that rainfall intensity for storm sewer design must be determined using the Region 3 data.

- (2) Calculate Intensity: The intensity calculation is based on duration equal to the time of concentration. The intensity is calculated as follows:

$$I = b / (d + T_c)^e$$

Where b, d, and e are coefficients dependent on the rainfall event, as provided in Table 9.1, below and are based on City depth – duration - frequency values.

Table 9.1
Rainfall Intensity Parameters

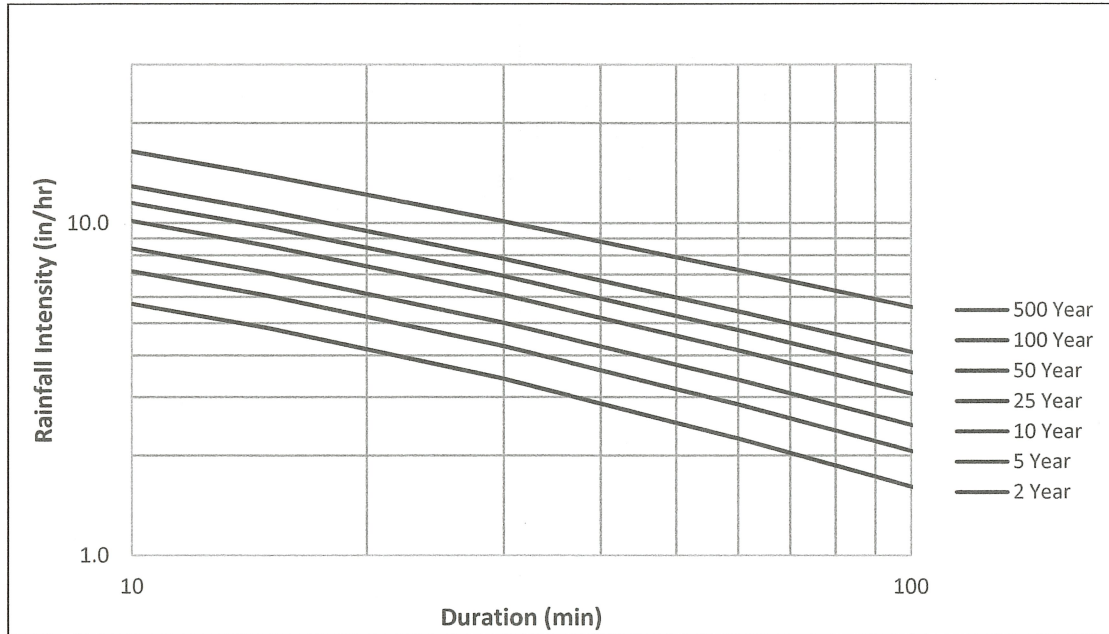
Rainfall Frequency	b (in)	d (min)	e
2-year	48.35	9.07	0.7244
5-year	52.32	7.88	0.6900
10-year	54.68	6.96	0.6623
25-year	57.79	5.89	0.6294
50-year	61.00	5.46	0.6096
100-year	60.66	4.44	0.5797
500-year	62.17	2.95	0.5196

Note: The rainfall data presented above is the latest available as of the date of Ch 9 issuance. The City may adopt revised data not reflected in this table. It is the engineer's responsibility to ensure that current accepted rainfall intensity calculations are being utilized for the analysis.

- (3) The City acknowledges that Harris County and Harris County Flood Control District have adopted new data based on Atlas 14.

Delete existing FIGURE 9.1 – City of Houston IDF Curves, Intensity vs. Time of Concentration vs Rainfall Frequency, Source: Hydro 35/RP - 40 and replace with the following:

Figure 9.1 IDF Curves
Intensity vs Time of Concentration vs Rainfall Frequency
Source: Atlas 14



Source: Atlas 14 IDF Curves, assistance with NOAA Atlas 14 Updates to the Harris County Flood Control District (HCFCD) Policy Criteria & Procedure Manual adopted July 9, 2019. The Atlas 14 IDF Curves report is based upon the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0 Texas (Atlas 14).

The intensity is calculated as follows:

$$I = b / (d + T_C)^e \quad ; \quad T_C = 10 A^{0.1761} + 15$$

Where b, d, and e are coefficients dependent on the rainfall event; A is the area in acres.

Rainfall Intensity Parameters

Rainfall Frequency	b (in)	d (min)	e
2-year	48.35	9.07	0.7244
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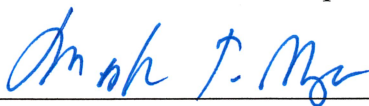
Note: The rainfall data presented above is the latest available as of the date of CH 9 issuance. The City may adopt revised data not reflected in this table. It is the engineer's responsibility to ensure that current accepted rainfall intensity calculations are being utilized for the analysis.

The City acknowledges that Harris County and Harris County Flood Control have adopted new data based on Atlas 14. This data reflects those efforts.

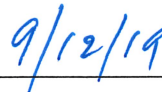
END OF SECTION

END OF SUPPLEMENT

To be included in the next publication of Standard Infrastructure Design Manual:



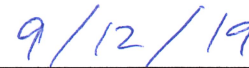
City Engineer
Joseph T. Myers, P.E., CFM
Houston Public Works



Date



Director
Carol Ellinger Haddock, P.E.
Houston Public Works



Date

IDM Ch. 9

STORMWATER DESIGN AND WATER QUALITY REQUIREMENTS

The following supplement modifies IDM Ch 9. Where a portion of the IDM Ch 9 is deleted by this Supplementary, the unaltered portions of the IDM shall remain in effect.

Delete existing 9.2.01.(C)(2)(b)(4)(b) Pipe Sizes and Placement replace with the following:

9.2.01.C.2.b.4. Pipe Sizes and Placement.

- b. Larger pipes upstream should not flow directly (via inlet, junction box, manhole) into smaller pipes downstream unless construction constraints prohibit the use of a larger pipe downstream, or the upstream system is intended for use as detention.

Delete existing 9.2.01.(C)(7)(l) replace with the following:

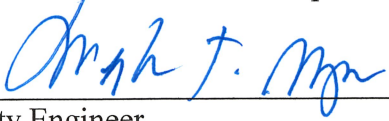
9.2.01.C.7. Inlet.

1. Only the private development directly behind the inlet shall be permitted to make one connection to that inlet and that connection (lead) shall be made to the back of the inlet. All other private developments must connect directly to the storm sewer trunkline even if the trunkline must be extended to the front of such development. The extension is to be designed and constructed in accordance with Section 9.2.01C(2)(b)(4) Pipe Sizes and Placement. Connection shall not be made to the front face or to the short sides of the inlet. Design of the connection is not to exceed the pipe capacity minus either the capacity listed in Table 9.2, Standard Storm Sewer Inlets, or calculated inlet inflow.

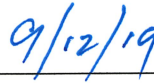
END OF SECTION

END OF SUPPLEMENT

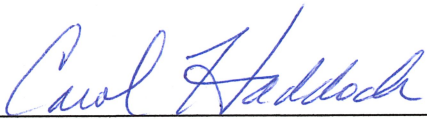
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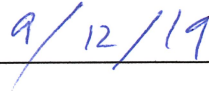
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