City of New Braunfels

PUBLIC WORKS

Engineering Bulletin

Subject: Floodplain permits to reflect Atlas 14 rainfall data and planned update to Section 3.0 of the City of New Braunfels Design and Erosion Control Design Manual

Date: October 16, 2020

Effective October 27, 2020 (10 days after the date of this posting) all new floodplain permits and City capital improvement projects submitted for new application after the effective date are required to adhere to Atlas 14 rainfall data. These changes are required for all floodplain models and designs within the floodplain as required by the Federal Emergency Management Agency (FEMA) as the data is represented as the most current and best available hydrology information. The new rainfall data is recommended in new development designs and proposed to be adopted revisions to the Drainage and Erosion Control Manual (DCM).

On September 27, 2018, the National Oceanic and Atmospheric Administration (NOAA) released an analysis finding significantly higher rainfall frequency values in parts of Texas, redefining the amount of rainfall it takes to qualify as a 100-year event. The study, published as NOAA Atlas 14, Volume 11 Precipitation-Frequency Atlas of the United States, Texas, found increased values in parts of Texas, that would result in changes to the rainfall amounts that define 100-year events, which are those that on average occur every 100 years or have a one percent chance of happening in any given year.

In New Braunfels 100-year rainfall amounts for 24 hours increased to 13.1 inches from 12.3 inches.

The updated values supersede those currently available for Texas from the 1960s and 1970s. The new values are more accurate than estimates developed 40 to 50 years ago due to decades of additional rainfall data, an increase in the amount of available data, both in the number of stations and their record lengths, and improved methods used in the analysis. NOAA's Atlas 14 is a peer-reviewed publication that serves as the official government source of precipitation frequency values for the U.S.

NOAA Atlas 14 rainfall values are used for infrastructure design and planning activities under federal, state and local regulations. They also help delineate flood risks, manage development in floodplains for FEMA's National Flood Insurance Program and are used to monitor precipitation observations and forecasts that can indicate flooding threats by NOAA's National Weather Service.

"NOAA's new rainfall frequency values for Texas will help state and local authorities better understand their flood risk and more accurately plan and design infrastructure to minimize the threat of flooding," said Thomas Graziano, Ph.D., director, NOAA Office of Water Prediction.

City of New Braunfels

PUBLIC WORKS

The proposed revisions to the DCM for new development are planned to follow the standard revision process to include a stakeholder comment. A presentation of the proposed rainfall data revisions in addition to other drainage criterial and floodplain is planned for the Watershed Advisory Committee Quarterly Meeting on October 29, 2020 at 3 p.m. Meeting details will be provided on the City's website.

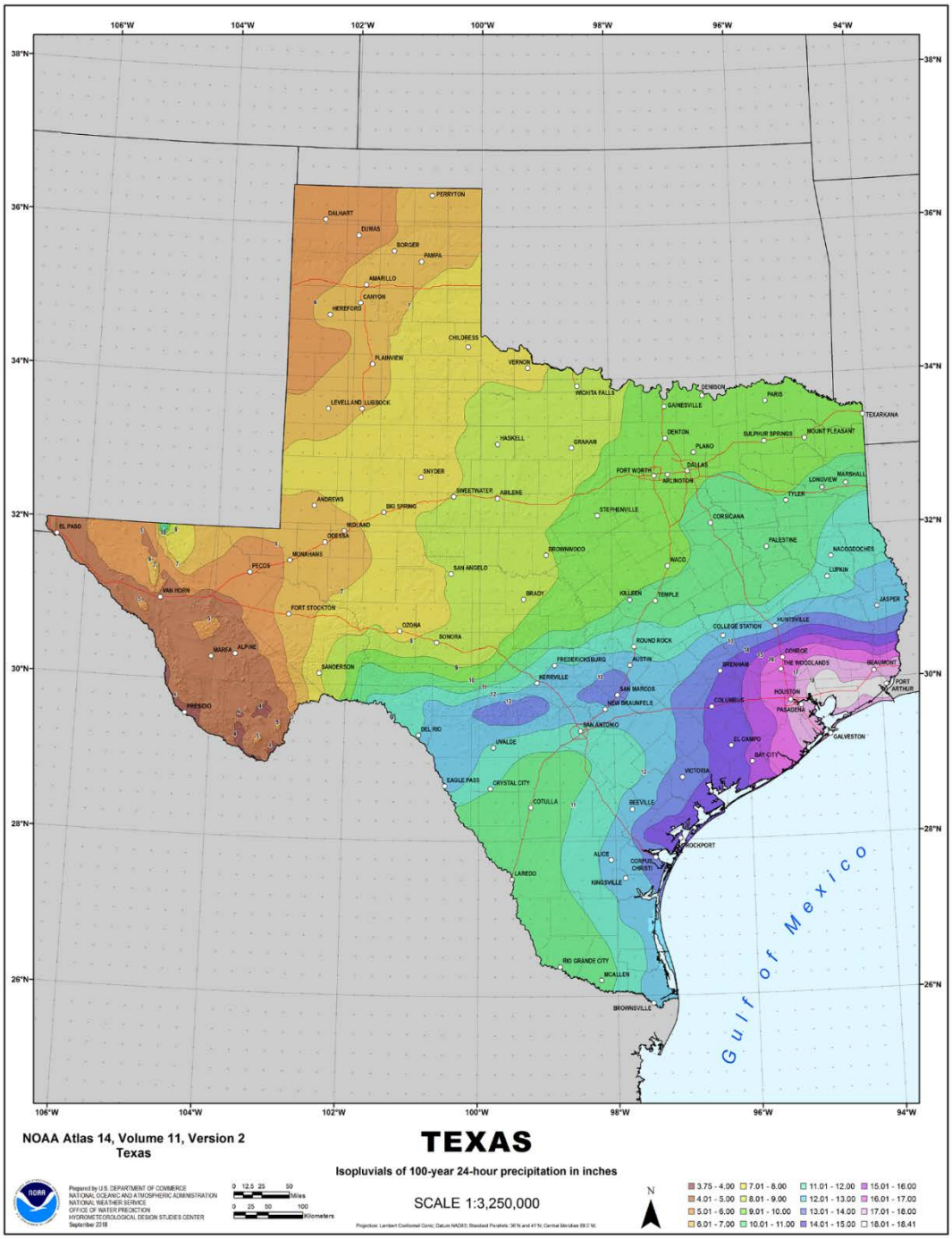
Please contact Melissa Reynolds, Assistant City Engineer, at 830-221-4020 if you have any questions or comments.

Garry Ford, Jr., P.E.
Assistant Public Works Director/City Engineer

Attachments:

Updated Rainfall Values of Texas Graphic

Design Rainfall for Floodplain Permits and Capital Improvement Projects (Effective October 27, 2020)



Graphic of Texas shows the updated rainfall values in inches that define certain extreme events, such as the 100-year storm. (NOAA)

Design Rainfall for Floodplain Permits and Capital Improvement Projects
(Effective October 27, 2020)

Design Rainfall

Rainfall Intensity Duration Frequency

The City evaluated precipitation based on NOAA Atlas 14, Volume 11 Texas statewide precipitation study. This study updated precipitation frequency estimates for Texas and replaces previous precipitation estimate studies. The revised rainfall data will be the standard for Design for the City of New Braunfels.

Runoff shall be calculated in accordance with Section 4 using the updated precipitation values as shown in Tables 3-1 and 3-2. The 100-year (1% AC) 24-hour rainfall depth for City of New Braunfels is 13.1 inches. The data published by NOAA Atlas 14 varies linearly across the City. The values shown below are taken from the highest rainfall data within the City limits.

Table 3-1: New Braunfels Atlas 14 Area Depth-Duration Value

Year	Depth-Duration-Frequency (inches)									
	5-Min	15-Min	1-Hr	2-Hr	3-Hr	6-Hr	12-Hr	24-Hr	2-day	3-day
2	0.528	1.06	1.96	2.4	2.67	3.13	3.59	4.08	4.66	5.05
5	0.664	1.33	2.45	3.08	3.47	4.14	4.79	5.48	6.27	6.78
10	0.781	1.66	2.88	3.71	4.23	5.13	5.97	6.86	7.82	8.43
25	0.946	1.88	3.5	4.63	5.39	6.66	7.82	8.99	10.2	10.9
50	1.08	2.14	3.97	5.4	6.39	8.03	9.46	10.9	12.3	13.1
100	1.22	2.41	4.49	6.26	7.54	9.62	11.4	13.1	14.7	15.6
500	1.57	3.09	5.95	8.74	10.8	14.2	17.1	19.8	22	23.1

Table 3-2 shows rainfall intensities by storm event. The intensities were calculated based off the depth duration table for each frequency storm. Durations range from 5 minutes up to 1 day for recurrence intervals from the 2-year to 500-year storm events, which will be the standard design for New Braunfels.

The City requires all flood study submittals to be performed using rainfall data presented in the document. If a FEMA submittal is required for the purpose of a map revision or amendment such as a Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) or a Letter of Map Amendment (LOMA), FEMA will require the hydrologic and hydraulic models to be updated based on the information used for the Current Effective Flood Insurance Study (FIS). In which case, the City requires two separate submittals. One, which uses FEMA data and will be submitted for FEMA map revisions and incorporation upon City Floodplain Administrator's (FPA) approval; another which uses the guidelines published in this manual and will be submitted for review and approval by the City Engineer or his/her designee.

Regardless of a FEMA submittal, the City will require a signed and sealed memo or report, summarizing the hydrologic and hydraulic analysis as illustrated in this manual, for all improvements adjacent to a mapped or un-mapped stream with a contributing drainage area greater than 200 acres.

Table 3-2: New Braunfels Rainfall Intensities by Storm Event

Rainfall Intensity (inches/hour) by Storm Frequency							
Time (minutes)	**2**	**5**	**10**	**25**	**50**	**100**	**500**
5	6.34	7.97	9.37	11.35	12.96	14.64	18.84
6	5.98	7.53	8.88	10.78	12.29	13.88	17.72
7	5.70	7.18	8.47	10.30	11.73	13.24	16.83
8	5.45	6.88	8.11	9.87	11.24	12.68	16.08
9	5.24	6.61	7.79	9.48	10.79	12.17	15.42
10	5.05	6.36	7.50	9.12	10.38	11.70	14.82
11	4.87	6.13	7.23	8.78	9.99	11.26	14.27
12	4.70	5.92	6.97	8.45	9.61	10.83	13.76
13	4.54	5.71	6.72	8.13	9.25	10.42	13.27
14	4.39	5.51	6.47	7.82	8.90	10.03	12.81
15	4.24	5.32	6.24	7.52	8.56	9.64	12.36
16	4.10	5.14	6.03	7.26	8.25	9.29	11.93
17	3.97	4.98	5.83	7.02	7.98	8.98	11.54
18	3.86	4.83	5.66	6.81	7.74	8.71	11.19
19	3.75	4.69	5.50	6.62	7.51	8.46	10.88
20	3.65	4.57	5.36	6.45	7.31	8.23	10.59
21	3.57	4.46	5.23	6.29	7.12	8.01	10.33
22	3.48	4.35	5.10	6.14	6.95	7.82	10.09
23	3.41	4.26	4.99	6.00	6.79	7.64	9.86
24	3.34	4.17	4.88	5.87	6.64	7.47	9.65
25	3.27	4.08	4.78	5.75	6.50	7.32	9.46
26	3.20	4.00	4.69	5.64	6.37	7.17	9.27
27	3.14	3.93	4.60	5.53	6.25	7.03	9.10
28	3.09	3.85	4.52	5.43	6.13	6.90	8.94
29	3.03	3.79	4.44	5.33	6.02	6.78	8.79
30	2.98	3.72	4.36	5.24	5.92	6.66	8.64
31	2.93	3.66	4.29	5.15	5.82	6.55	8.50
32	2.88	3.60	4.22	5.07	5.73	6.44	8.37
33	2.84	3.54	4.15	4.99	5.63	6.34	8.24
34	2.79	3.49	4.09	4.91	5.55	6.24	8.12
35	2.75	3.43	4.02	4.84	5.46	6.15	8.00
36	2.71	3.38	3.96	4.77	5.38	6.06	7.89
37	2.67	3.33	3.90	4.70	5.30	5.97	7.78
38	2.63	3.28	3.85	4.63	5.23	5.89	7.68
39	2.59	3.24	3.79	4.57	5.16	5.80	7.58
40	2.55	3.19	3.74	4.50	5.09	5.73	7.48
41	2.52	3.14	3.69	4.44	5.02	5.65	7.38
42	2.48	3.10	3.64	4.38	4.95	5.58	7.29
43	2.45	3.06	3.59	4.32	4.88	5.50	7.20
44	2.42	3.02	3.54	4.27	4.82	5.43	7.12
45	2.38	2.98	3.49	4.21	4.76	5.36	7.03
46	2.35	2.94	3.45	4.16	4.70	5.30	6.95
47	2.32	2.90	3.40	4.11	4.64	5.23	6.87
48	2.29	2.86	3.36	4.06	4.58	5.17	6.79
49	2.26	2.82	3.31	4.00	4.53	5.11	6.71
50	2.23	2.79	3.27	3.95	4.47	5.04	6.64
51	2.20	2.75	3.23	3.91	4.42	4.98	6.56
52	2.17	2.72	3.19	3.86	4.36	4.93	6.49
53	2.14	2.68	3.15	3.81	4.31	4.87	6.42
54	2.11	2.65	3.11	3.76	4.26	4.81	6.35
55	2.08	2.61	3.07	3.72	4.21	4.76	6.28
56	2.06	2.58	3.03	3.67	4.16	4.70	6.21
57	2.03	2.55	2.99	3.63	4.11	4.65	6.14
58	2.00	2.51	2.95	3.59	4.06	4.59	6.08
59	1.98	2.48	2.92	3.54	4.02	4.54	6.01
60	1.95	2.45	2.88	3.50	3.97	4.49	5.95
120	1.20	1.54	1.86	2.32	2.70	3.13	4.37

180	0.89	1.16	1.41	1.80	2.13	2.51	3.60
240	0.71	0.93	1.14	1.47	1.75	2.08	3.02
360	0.52	0.69	0.85	1.11	1.34	1.60	2.37
720	0.30	0.40	0.50	0.65	0.79	0.95	1.43
1440	0.17	0.23	0.29	0.37	0.45	0.55	0.83