

STORM SEWER CALCULATION TABLE

CITY OF HOUSTON 2-YEAR STORM, USE $T_c = 26.28$ MIN ALL INLETS, $C = 0.80$ ALL AREAS, $I(2) = 3.32$ IN/HR

No.	INLET No.	INLET No.	AREA AC	TOTAL AC	C	I(2)	TC	Q	SIZE	SLOPE	Manning's	V	CAPACITY
							(MIN)	(CFS)	(INCHES)	(%)		(FT/SEC)	(CFS)
1	Inlet 1	Junct 1	0.0600	0.0600	0.80	3.32	26.28	0.16	6	1.00	0.011	3.39	0.66
2	Inlet 2	Junct 2	0.1400	0.1400	0.80	3.32	26.28	0.37	12	0.30	0.011	2.94	2.31
3	Junct 1	Junct 2	0.0000	0.2000	0.80	3.32	26.28	0.53	12	0.30	0.011	2.94	2.31
4	Junct 2	Junct 3	0.1800	0.3800	0.80	3.32	26.28	1.01	12	0.30	0.011	2.94	2.31
5	Inlet 3	Junct 3	0.1500	0.5300	0.80	3.32	26.28	1.41	12	0.30	0.011	2.94	2.31
6	Junct 3	Junct 4	0.0000	0.5300	0.80	3.32	26.28	1.89	12	0.30	0.011	2.94	2.31
7	Inlet 4	Inlet 5	0.1800	0.7100	0.80	3.32	26.28	2.15	15	0.22	0.011	2.93	3.59
8	Inlet 4	Inlet 5	0.1000	0.8100	0.80	3.32	26.28	2.31	15	0.22	0.011	2.93	3.59
9	6	7	0.0600	0.8700	0.80	3.32	26.28	2.42	15	0.22	0.011	2.93	3.59
10	6	7	0.04	0.91	0.80	3.32	26.28	2.90	15	0.22	0.011	2.93	3.59
11	10	11	0.15	0.15	0.80	3.32	26.28	0.40	8	0.67	0.011	3.36	1.17
12	10	11	0.15	0.3	0.80	3.32	26.28	0.80	12	0.30	0.011	2.94	2.31
13	12	12	0.08	0.38	0.80	3.32	26.28	1.01	12	0.30	0.011	2.94	2.31
14	12	8	0.22	0.6	0.80	3.32	26.28	1.59	15	0.22	0.011	2.93	3.59
14	8	Exist MH	0.04	1.73	0.80	3.32	26.28	4.59	30	0.13	0.013	3.02	14.83

PLAY GROUND SETS' (INCLUDING SPLASH PAD) DESIGN AND INSTALLATION SHALL BE BY PLAY GROUND VENDOR(S). PLAY GROUND VENDOR(S) IS (ARE) RESPONSIBLE FOR REVIEW AND APPROVAL. GENERAL CONTRACTOR IS RESPONSIBLE FOR A COMPLETE COORDINATION, INCLUDING BUT NOT LIMITED TO PROVIDE/INSTALLED/MAINTAIN A PROPER DRAINAGE SYSTEM. USE PERMEABLE BASE, 4" PERFORATED PVC PIPES TO COLLECT RAIN WATER AND CONVEY TO NEARBY STORM SEWER PIPES AND INLETS. INSTALLER MAY ALSO RAISE PLAYGROUND PADS A MINIMUM OF 6" FROM ADJACENT GROUND. CONSTRUCT SWALES IN BETWEEN PLAYGROUND PADS AND CONVEY SHEET FLOW TO INLETS IN COMPLIANCE WITH DRAINAGE AREA BOUNDARIES AS DEFINED ON THIS SHEET.

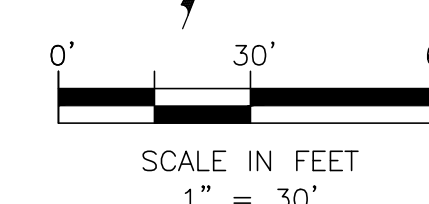
FLOOD NOTE:
SUBJECT TRACT IS LOCATED IN ZONE "X" AREAS DETERMINED TO BE OUTSIDE THE 0.20% ANNUAL CHANCE FLOOD PER FEMA MAP 48157C0105 L DATED 04/02/14.

BENCHMARK:
SQUARE CUT ON TOP OF "C" INLET LOCATED NEAR THE NORTHEAST CORNER OF THE SUBJECT TRACT AND ON THE SOUTH R.O.W. LINE OF CROSS CREEK BEND LANE AS SHOWN ON SURVEY.
ELEV. = 134.76'

ELEVATIONS HEREON ARE BASED ON CROSS CREEK RANCH T.B.M. DISK NO. 1
ELEV. = 138.04', NAVD 88, 2001 ADJUSTMENT.

REVISIONS AND ISSUANCE

NO.	DATE	DESCRIPTION



LEGEND

- EXISTING STORM SEWER BY OTHERS
- EXISTING INLET BY OTHERS
- EXISTING SPOT GRADE
- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED STORM INLET
- DRAINAGE BOUNDARY
- CUMULATIVE AREA (AC)
- CUMULATIVE RUNOFF (CFS) (2-YR)
- DIRECTION OF FLOW OR SWALE
- DRAINAGE AREA

NOTES:

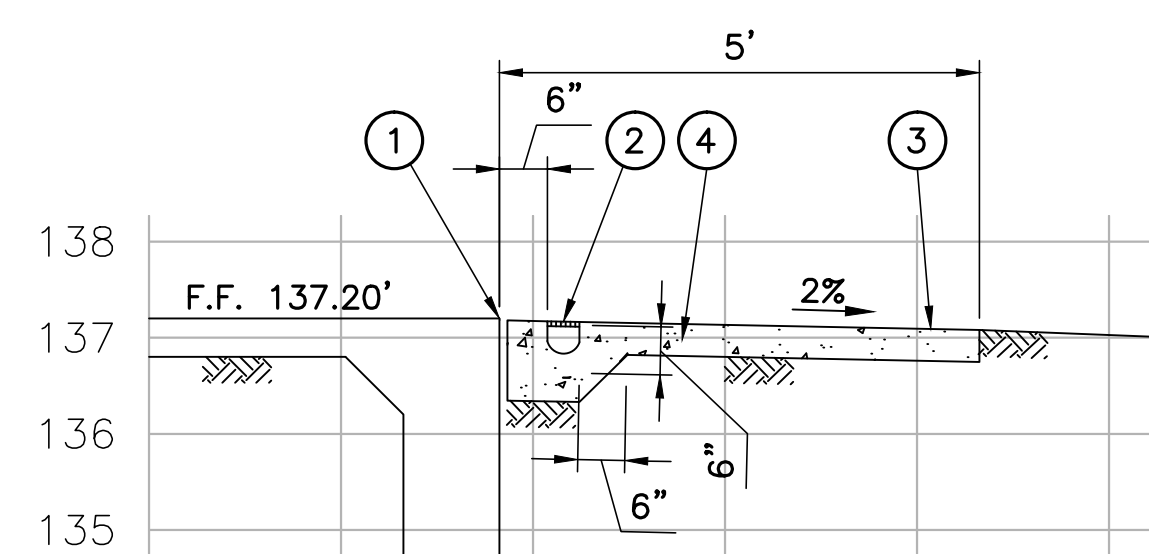
- ALL HDPE STORM SEWERS SHALL BE HEAVY DUTY WITH SMOOTH INTERIOR WALLS WITH GASKETED BELL AND SOCKET JOINTS.
- ALL PVC STORM SEWERS SHALL BE SDR 35.
- COEFFICIENT OF FRICTION VALUES FOR RCP=0.013, HDPE=0.011 AND PVC=0.010
- SUB-GRADE DRAINAGE SYSTEMS FROM ANY FUTURE PLAYGROUND EQUIPMENT INSTALLED WITHIN LANDSCAPED AREAS OR ANY INDIVIDUAL LANDSCAPE DRAINS SHALL CONNECT TO STORM DRAIN SYSTEM AT 4" STUB OUT.
- SIDEWALK DRAIN PER SECTION A-A SHALL BE SPEE-D CHANNEL PER NDS PRODUCTS WITH WHITE ADA COMPLIANT GRADES AND CHANNEL BOTTOM OUTLETS.
- INLETS 1, 2 & 3 SHALL BE MODEL CB 18. INLETS 4, 5, 6, 7, 10, 11 & 12 SHALL BE MODEL CB 24. INLET 9 SHALL BE MODEL CB 20. INLET 8 SHALL BE MODEL CB 48. ALL PER PARK EQUIPMENT DETAIL ON SHT C8 OR APPROVED EQUIVALENT.

DRAINAGE DESIGN

- TOTAL SITE AREA = 1.9874 AC
- $TC = 10 \times 0.1761 + 15$
 $TC = 10(1.9874) + 0.1761 + 15 = 26.28$ MIN.
- $C = 0.80$ ALL AREAS
- INTENSITIES PER COH IDM 2019 - TABLE 9.1
 $I(2) = (75.01) / (16.24 + 26.28) \times 0.8315 = 3.32$ IN/HR
 $I(100) = (125.4) / (21.80 + 26.28) \times 0.75 = 6.87$ IN/HR
- DETENTION IS PROVIDED REGIONALLY, NO ON-SITE DETENTION REQUIRED.

KEY NOTES

- PROVIDE AND INSTALL SPEE-D CHANNEL DRAIN WITH BOTTOM OUTLET.
- CONNECT TO OUTLET WITH WATER TIGHT CONNECTION AND CONSTRUCT 4" LATERAL AT 2.00% MIN. SLOPE.
- CONNECT TO 6" ROOF DRAIN BELOW GRADE WITH WATER TIGHT CONNECTION. CONSTRUCT 6" LATERALS AT 1.00% MIN. SLOPE. CONNECT TO 8" STORM WITH 1-8"x6" WYE, 1-6"x45" BEND, AND 1-8"x6" REDUCER.
- CONSTRUCT STORM CLEANOUT.
- CONNECT TO 10"x8" METAL DOWNSPOUT BELOW GRADE WITH WATER TIGHT CONNECTION. CONSTRUCT 12" STORM AT 0.50% MIN. AND CONNECT TO ADJACENT 12" STORM WITH 12"x4" WYE AND 1-12"x45" BEND.
- PROVIDE AND INSTALL 4" DRAIN AT 2% MIN. FOR FUTURE SUB-DRAIN FROM PLAYGROUND EQUIPMENT.
- CONNECT TO 3" CANOPY ROOF DRAINS BELOW GRADE WITH WATER TIGHT CONNECTION CONSTRUCT 4" LATERALS AT 2.00% MIN. AND CONNECT TO ADJACENT 12" STORM WITH 12"x4" WYE AND 1-4"x45" BEND.
- PROP INLET TO JOIN EXIST 30" RCP (WEST).
- CONSTRUCT 27 LF 12" STORM @ 0.30%.
- CONSTRUCT 15 LF 12" STORM @ 0.30%.
- CONSTRUCT 59 LF 12" STORM @ 0.30%.
- CONSTRUCT 12 LF 12" STORM @ 0.30%.



SECTION A-A
SCALE: 1"=2'

HGL Starting Beginning Elevation = 132.52 - Upstream 100-Yr HGL per BGE Drainage Calculations from MH #8, Sheet 6 of 27, FBCMUD No. 171 Cross Creek Plans for Skyline Drive
 $T_c = 26.28$ Min.
Design Storm 100 Yr Per COH IDM 2019 - Table 9.1
 $I(100) = 6.87$ in/hr
 $Q(100) = C \times I \times A$

STORM SEWER RUNS FROM INLET 8 TO INLET 1 AND FROM INLET 8 TO INLET 9

Element	From	To	Area (acres)	TC (min)	I(100) (in/hr)	Length (ft)	Diameter (ft)	Slope (%)	Manning "n"	Velocity (fps)	Q(100) (cfs)	Design Q (cfs)	Design V (fps)	Sf (ft)	HGL (ft)	Upstrm HGL (ft)	Finish Grade (ft)	Cover (ft)
Exist MH	Inlet 8		1.73	26.28	6.87	13	2.5	0.13	0.013	2.42	11.89	14.83	3.02	0.01	132.52	132.53	135.10	2.57
Inlet 8	Inlet 7		1.09	26.28	6.87	14	1.25	0.22	0.011	6.11	7.49	3.59	2.93	0.13	132.53	132.67	134.90	2.23
Inlet 7	Inlet 6		0.91	26.28	6.87	86	1.25	0.22	0.011	5.10	6.25	3.59	2.93	0.58	132.67	133.24	135.60	2.36
Inlet 6	Inlet 5		0.87	26.28	6.87	62	1.25	0.22	0.011	4.87	5.98	3.59	2.93	0.38	133.24	133.62	135.80	2.18
Inlet 5	Inlet 4		0.81	26.28	6.87	62	1.25	0.22	0.011	4.54	5.56	3.59	2.93	0.33	133.62	133.95	135.80	1.85
Inlet 4	Junct. 4		0.71	26.28	6.87	70	1.00	0.30	0.011	6.21	4.88	2.31	2.94	0.94	133.95	134.89	136.00	1.11
Junct. 4	Junct. 3		0.53	26.28	6.87	27	1.00	0.30	0.011	4.64	3.64	2.31	2.94	0.20	134.89	135.09	136.00	0.91
Junct. 3	Junct. 2		0.38	26.28	6.87	15	1.00	0.30	0.011	3.33	2.61	2.31	2.94	0.06	135.09	135.15	136.00	0.85
Junct. 2	Junct. 1		0.20	26.28	6.87	59	1.00	0.30	0.011	1.75	1.37	2.31	2.94	0.06	135.15	135.21	136.00	0.79
Junct. 1	Inlet 2		0.14	26.28	6.87	12	0.50	1.00	0.011	4.90	0.96	0.66	3.39	0.25	135.21	135.47	136.00	0.53
Junct. 1	Inlet 1		0.06	26.28	6.87	66	0.50	1.00	0.011	2.10	0.41	0.66	3.39	0.25	135.21	135.47	136.50	1.03
Inlet 8	Inlet 12		0.60	26.28	6.87	101	1.00	0.30	0.011	5.25	4.12	2.31	2.94	0.97	132.53	133.50	135.00	1.50
Inlet 12	Inlet 11		0.38	26.28	6.87	128	1.00	0.30	0.011	3.33	2.61	2.31	2.94	0.49	133.50	133.99	135.00	1.01
Inlet 11	Inlet 10		0.3	26.28	6.87	38	0.67	0.52	0.011	5.85	2.06	1.05	2.97	0.77	133.99	134.76	135.00	0.24
Inlet 10	Inlet 9		0.15	26.28	6.87	118	0.67	0.52	0.011	2.92	1.03	1.05	2.97	0.60	134.76	135.36	135.50	0.14

Conclusion: The highest HGL elevation occurs at INLET 2 (HGL = 135.47) which is 1.73 feet below the FF elevation of 137.20. Cover indicates elevation difference between HGL (100 Yr) and proposed top of grate elevation.

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DRAWING TITLE
DRAINAGE PLAN

DRAWN BY
CHECKED BY
JOB NO.
DATE
06/21/2019
1903081

DRAWING NO.
C3