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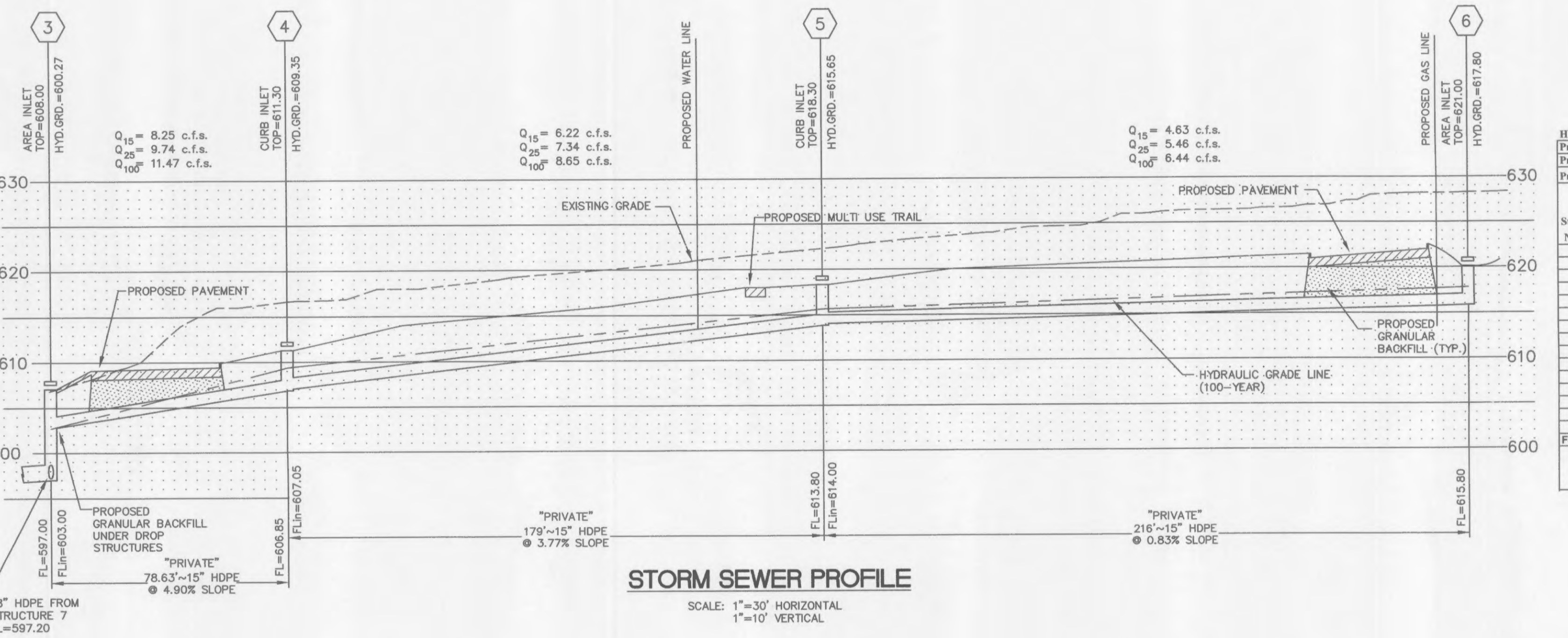
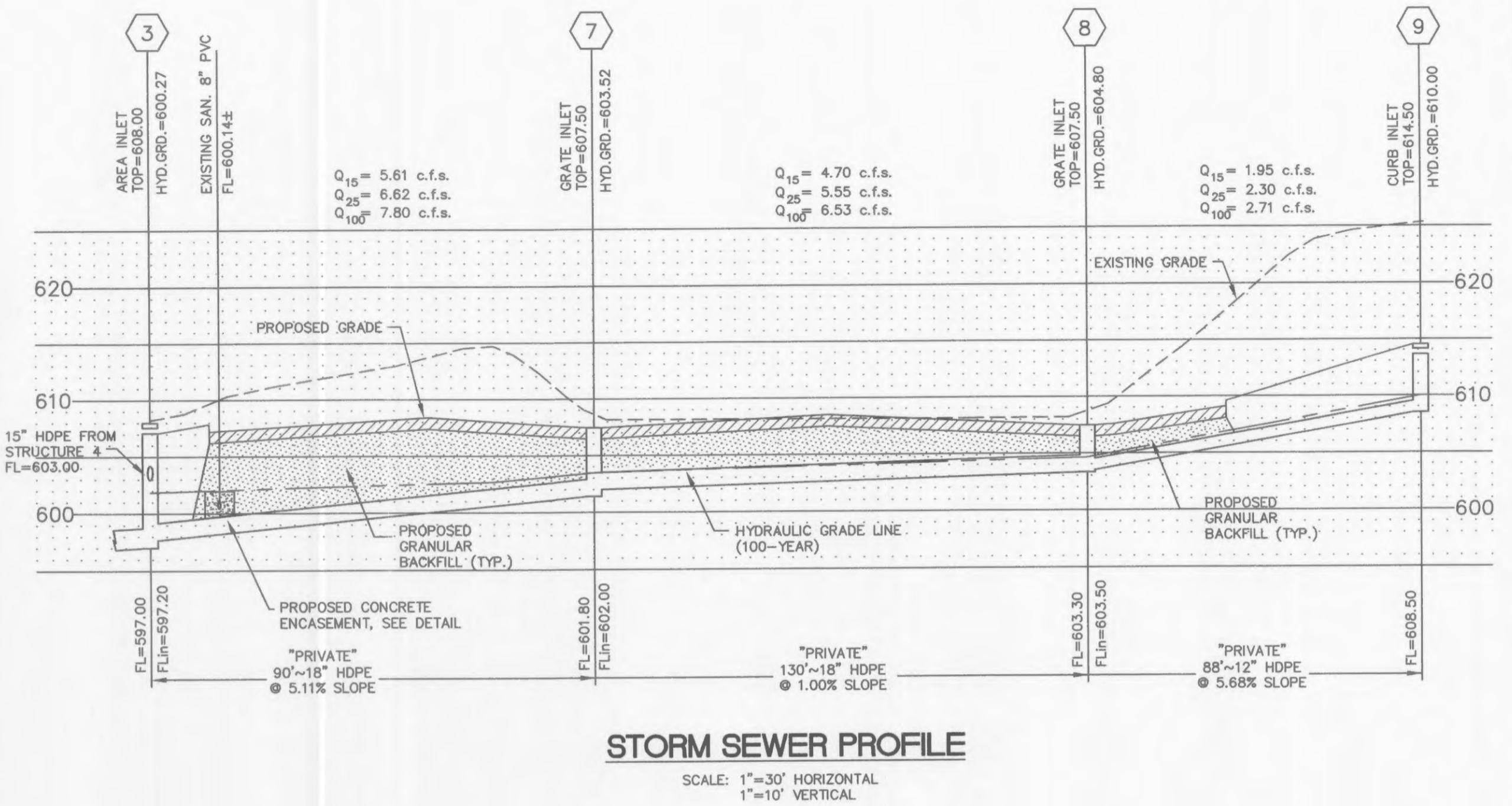
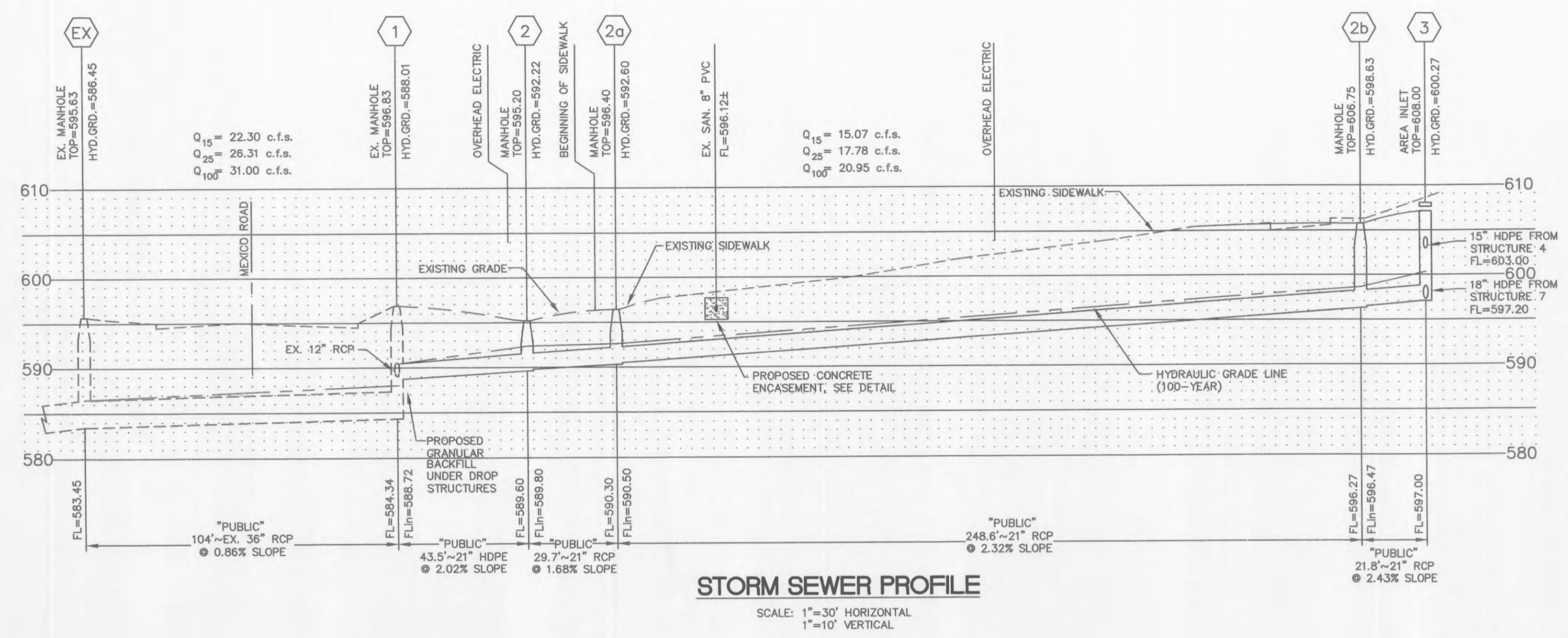
Improvement Plans
Hillman Farm Plaza
1260 Bryan Road
O'Fallon, Missouri 63366

Proj. # 0266

No.	Description	Date
Owner Review		12.01.04
Per Engineer		12.07.04
Permit / Bidding		01.10.05
Per City		03.17.05
Per City		04.11.05
Per City		04.22.05
Per Contractor		09.07.05
Per Contractor		09.22.05

SEWER PROFILES

C6



HYDRAULIC CALCULATION SHEET (SEE DRAINAGE AREA MAP SHEET C9 FOR F.I. AND Q (inflow) FOR EACH STRUCTURE)

Project name: Hillman Farm Plaza
Project number: 0266
Project Location: O'Fallon, Missouri
Date: 09/07/2005
Calculated by: MWE
Checked by: BAH

Structure Number	Upper structure	Lower structure	FLOW LINE ELEVATIONS		Length (ft)	Flowline Grade (ft)	Pipe Size (in.)	Full Flow Cap. (cfs)	Total (cfs)	Mean Full Flow Vel. (ft/s)	Bend Coef.	Velocity Head (ft)	Q _v (ft ³ /s)	Pipe Coef. (n)	H _f (ft)	Junction (ft)	Bend (ft)	Total H _f (ft)	Hydraulic Elevations				Structure TOP Elevation	Free Board	Structure Number
			Upper	Lower															Upper F.L.	Lower H.L.	Upper H.L.	Lower H.L.			
6	6	5	615.8	614.00	216.00	0.0083	15	5.91	6.44	5.25	0.43	2.75	0.013	0.13	0.00	0.00	0.00	610.00	605.34	605.00	610.00	614.5	4.50	9	
5	5	4	613.8	607.05	179.00	0.0377	15	12.58	8.65	7.65	0.013	3.21	0.013	0.14	0.00	0.00	0.00	617.05	617.80	615.65	617.80	621	3.20	6	
4	4	3	606.85	603.00	78.63	0.0490	15	14.33	11.47	9.35	0.28	1.36	15.56	0.013	1.03	0.22	1.25	608.10	602.75	600.27	609.35	611.3	1.95	4	
9	9	8	608.5	603.50	88.00	0.0568	18	25.11	6.53	3.70	0.53	0.21	1.38	0.013	0.34	0.00	0.00	610.00	605.34	605.00	610.00	614.5	4.50	9	
8	8	7	603.3	602.00	130.00	0.0100	18	10.53	7.51	4.25	0.56	0.28	2.11	0.013	0.66	0.00	0.00	604.80	604.18	603.52	604.80	607.5	2.70	8	
7	7	3	601.8	597.20	90.00	0.0511	18	23.81	7.80	4.41	0.62	0.30	2.36	0.013	0.60	0.17	0.22	603.30	600.77	600.27	603.52	607	3.48	7	
3	3	2b	597	596.47	21.81	0.0245	21	24.77	20.95	8.71	0.35	1.18	24.68	0.013	0.38	1.42	0.11	1.52	598.75	598.60	598.22	600.27	608	7.73	3
2b	2b	2a	596.47	590.50	248.63	0.0240	21	24.62	20.95	8.71	0.35	1.18	24.68	0.013	4.35	0.00	0.41	0.41	598.22	596.60	592.25	598.63	606.75	8.12	2b
2a	2a	2	590.5	589.80	29.68	0.0236	21	24.40	20.95	8.71	0.3	1.18	24.68	0.013	0.52	0.00	0.35	0.35	592.25	592.07	592.00	596.4	3.80	2a	
2	2	1	589.8	588.72	43.49	0.0248	21	25.04	20.95	8.71	0.57	1.18	24.68	0.013	0.76	0.00	0.67	0.67	591.55	591.23	590.47	592.2	2.98	2	
1	1	DS	584.34	583.45	104.00	0.0086	36	61.87	31.00	4.39	0.57	0.30	9.26	0.013	0.23	0.00	0.67	0.67	587.34	586.68	586.45	588.01	596.83	8.82	1

FORMULAS:
MEAN FULL FLOW VELOCITY: $V = Q_{full} / A_{pipe}$
FRICTION LOSS (H_f): $H_f = 2.47 K (L/V^{1.48})^2$
VELOCITY HEAD: $V_v = V^2 / 2g$
JUNCTION LOSSES (JUNC.): $J = Q_{in} V_{in} / \sum (Q_{in} V_{in}) + 1.33 Q_{out}$
BEND LOSSES (BEND): $B = (V_v / g) * ANGLE COEFFICIENT$
Note: 1. IF MORE THAN ONE INCOMING LINE, CALCULATE EACH BEND LOSS AND ADD TOGETHER.
2. NO STRUCTURE LOSSES TO BE CALCULATED AT A DROP.
3. IF $Q_{in} > Q_{out}$, NO JUNCTION LOSSES TO BE CALCULATED.

