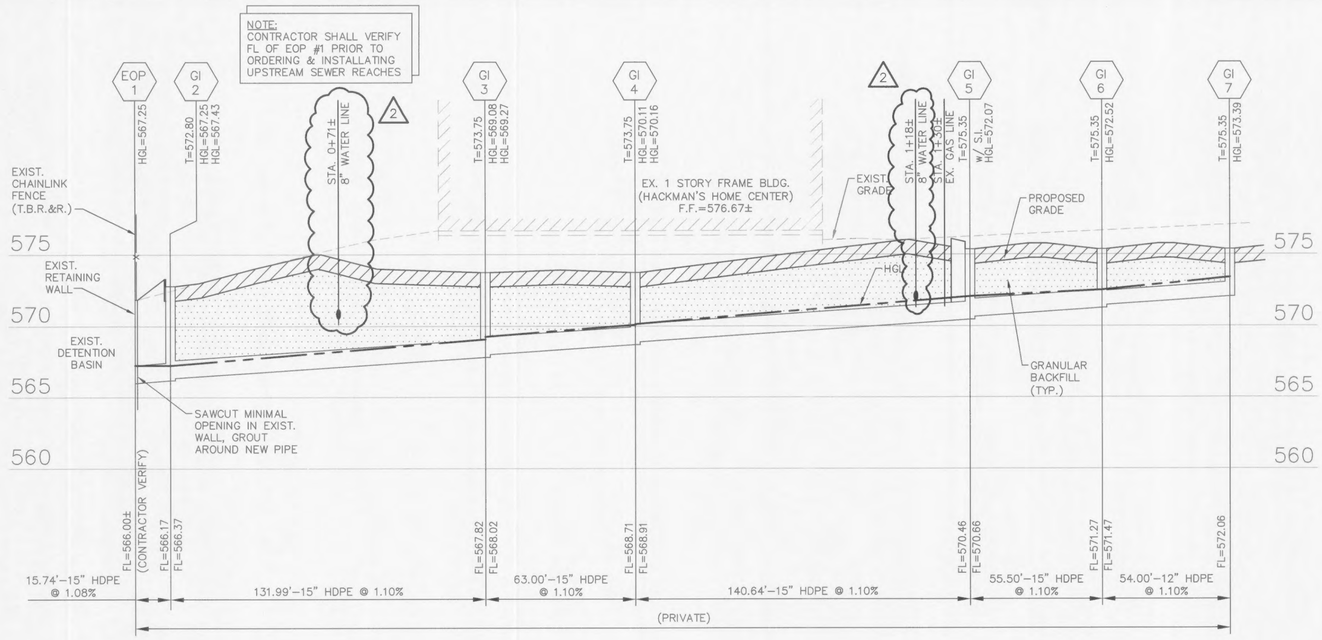

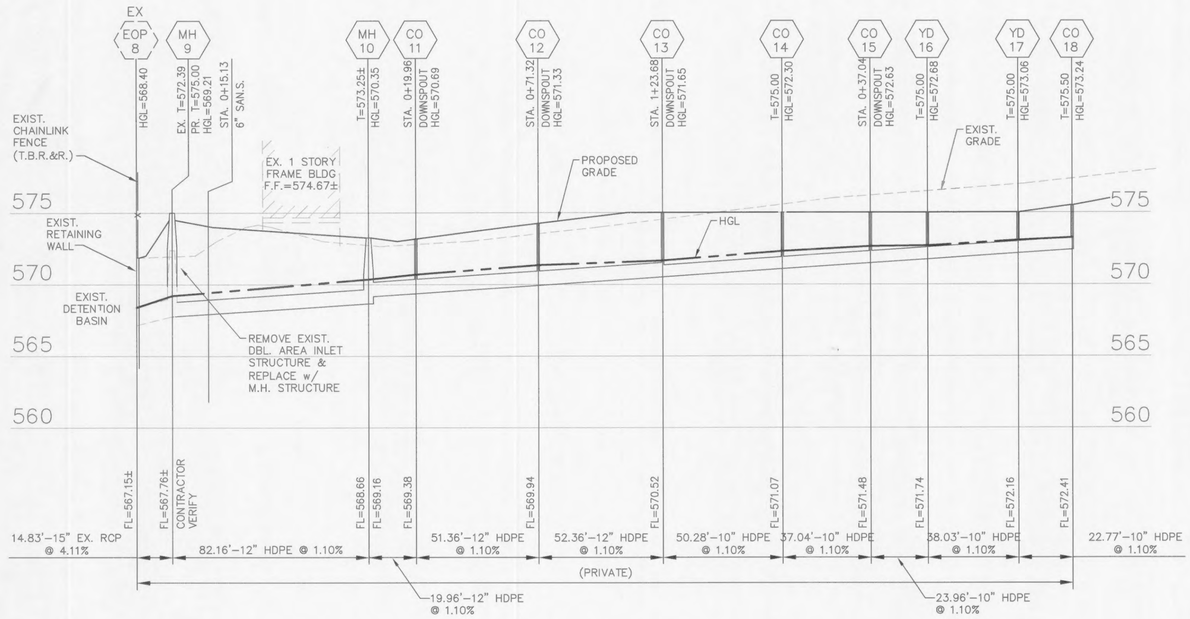

STORM SEWER PROFILES

SCALE: 1"=30' HORIZ.
1"=5' VERT.

NOTE:
CONTRACTOR SHALL VERIFY LOCATION, SIZE & DEPTH OF DOWNSPOUT DRAINLINES, PRIOR TO SEWER ORDERING & INSTALLATION

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

Project name:	*Golds Gym*	**Calculated By:**	*CAM*
Project number:	*206-3850*	**Checked By:**	*GMS*
Project Location:	*O'Fallon, MO*	**Date:**	*9/20/2006*

15yr 20min

Bend Coefficients :

5^0 = 0.06	20^0 = 0.24	35^0 = 0.4	50^0 = 0.50	65^0 = 0.57	80^0 = 0.65
10^0 = 0.11	25^0 = 0.30	40^0 = 0.43	55^0 = 0.52	70^0 = 0.60	85^0 = 0.67
15^0 = 0.18	30^0 = 0.35	45^0 = 0.47	60^0 = 0.55	75^0 = 0.62	90^0 = 0.70

Structure	LINE Upper	LINE Lower	FLOW LINE ELEVATIONS Upper	FLOW LINE ELEVATIONS Lower	Length	Flowline	Pipe Size	Full Flow	Total	Mean Full Flow	Bend	Velocity		Pipe Coef.	HEAD LOSS H_f	HEAD LOSS Junction	HEAD LOSS Bend		Hydraulic Elevations			Structure	TOP	Free	
Number	structure	structure		Structure	(ft)	Grade ft/ft	(in.)	Cap. (cfs)	(Q) (cfs)	Vel.(V) (ft/s)	Coef.	Head (V_h) (ft)	(ft^3/s)	(n)	(ft)	(ft)	(ft)	H_{tot}	Upper F.E. + Dia.	Lower H.E. +H_f	Lower H.E.	Upper H.E. + H_{tot}	Structure Elevation	Board	Number
EX22	EX22	EX21	571.28	569.38	142.00	0.0134	15	7.49	1.46	1.19	0	0.02	0.03	0.013	0.07	0.00	0.00	0.00	572.53	570.89	570.82	572.53	575.82	3.29	EX22
EX21	EX21	EX20	569.38	567.20	111.00	0.0196	15	9.08	3.85	3.14	0	0.15	0.59	0.013	0.39	0.19	0.00	0.19	570.63	569.54	569.15	570.82	575.60	4.78	EX21
EX20	EX20	EX19	567.20	566.90	15.00	0.0200	15	9.16	7.16	5.83	0.7	0.53	3.78	0.013	0.18	0.59	0.11	0.70	568.45	568.33	568.15	569.15	571.49	2.34	EX20
EX19													HYDRAULIC FLOW LINE = assume top of pipe									568.15			
18	18	17	572.41	572.16	22.77	0.0110	10	2.30	0.19	0.35	0	0.00	0.00	0.013	0.00	0.00	0.00	0.00	573.24	573.07	573.06	573.24	575.50	2.26	18
17	17	16	572.16	571.74	38.03	0.0110	10	2.31	1.00	1.83	0	0.05	0.05	0.013	0.08	0.07	0.00	0.07	572.99	572.76	572.68	573.06	575.00	1.94	17
16	16	15	571.74	571.48	24.00	0.0108	10	2.29	1.00	1.83	0	0.05	0.05	0.013	0.05	0.00	0.00	0.00	572.57	572.68	572.63	572.68	575.00	2.32	16
15	15	14	571.48	571.07	37.00	0.0111	10	2.31	1.58	2.90	0	0.13	0.21	0.013	0.19	0.13	0.00	0.13	572.31	572.50	572.30	572.63	575.00	2.37	15
14	14	13	571.07	570.52	50.68	0.0109	10	2.29	2.12	3.89	0	0.23	0.50	0.013	0.47	0.18	0.00	0.18	571.90	572.12	571.65	572.30	575.00	2.70	14
13	13	12	570.52	569.94	52.00	0.0112	12	3.77	2.74	3.49	0	0.19	0.52	0.013	0.31	0.01	0.00	0.01	571.52	571.64	571.33	571.65	575.00	3.35	13
12	12	11	569.94	569.38	51.06	0.0110	12	3.74	3.39	4.32	0	0.29	0.98	0.013	0.46	0.18	0.00	0.18	570.94	571.15	570.69	571.33	575.00	3.67	12
11	11	10	569.38	569.16	20.00	0.0110	12	3.75	3.74	4.76	0	0.35	1.32	0.013	0.22	0.12	0.00	0.12	570.38	570.57	570.35	570.69	573.50	2.81	11
10	10	9	568.66	567.76	82.16	0.0110	12	3.74	3.74	4.76	0.7	0.35	1.32	0.013	0.90	0.00	0.24	0.24	569.66	570.11	569.21	570.35	573.25	2.90	10
9	9	8	567.76	567.15	14.83	0.0411	15	13.14	3.74	3.05	0.57	0.14	0.54	0.013	0.05	0.00	0.20	0.20	569.01	568.45	568.40	569.21	575.00	5.79	9
8													HYDRAULIC FLOW LINE = assume top of pipe									568.40			
7	7	6	572.06	571.47	54.00	0.0109	12	3.73	4.53	5.77	0	0.52	2.34	0.013	0.87	0.00	0.00	0.00	573.06	573.39	572.52	573.39	575.35	1.96	7
6	6	5	571.27	570.66	55.50	0.0110	15	6.79	4.53	3.69	0	0.21	0.96	0.013	0.27	0.00	0.00	0.00	572.52	572.34	572.07	572.52	575.35	2.83	6
5	5	4	570.46	568.91	140.64	0.0110	15	6.80	6.38	5.20	0.55	0.42	2.68	0.013	1.37	0.07	0.29	0.36	571.71	571.53	570.16	572.07	575.35	3.28	5
4	4	3	568.71	568.02	63.00	0.0110	15	6.78	1.73	1.41	0.35	0.03	0.05	0.013	0.05	0.00	0.15	0.15	569.96	569.32	569.27	570.11	573.75	3.64	4
3	3	2	567.82	566.37	131.99	0.0110	15	6.79	1.73	1.41	0.18	0.03	0.05	0.013	0.09	0.00	0.01	0.01	569.07	567.71	567.62	569.08	573.75	4.67	3
2	2	1	566.17	566.00	15.74	0.0108	15	6.73	1.73	1.41	0.18	0.03	0.05	0.013	0.01	0.00	0.01	0.01	567.42	567.26	567.25	567.43	572.80	5.37	2
1													HYDRAULIC FLOW LINE = assume top of pipe									567.25			

FORMULAS:

MEAN FULL FLOW VELOCITY: $V = Q_{ACT}/A_{PIPE}$
FRICTION LOSS (H_f) : $Hf = 2.87\ n^2\ (LV^2/d^{1.33})$
VELOCITY HEAD : $V_h = V^2/2g$

JUNCTION LOSES (JUNC.) = $[\ Q_{out}Vh_{out} - Sum\ (Q_{in}V_{in})]x1.33/[Q_{out}\ ]$
BEND LOSES (BEND) = (V^2) * ANGLE COEFFICIENT

Note:
1. IF MORE THAN ONE INCOMING LINE, CALC. EACH BEND LOSS AND ADD TOGETHER.
2. NO STRUCTURE LOSSES TO BE CALCULATED AT A DROP
3. IF $QV_{main} > QV_{tributs}$ NO JUNCTION LOSES TO BE CALCULATED.

2 MoDOT, WATER COMMENTS 11/10/06
1 CITY, MoDOT, FIRE COMMENTS 11/7/06

GOLD'S GYM – O'FALLON, MO

STORM SEWER PROFILES

STATE OF MISSOURI — GEORGE MICHAEL STOCK NUMBER E-25116 — REGISTERED PROFESSIONAL ENGINEER
11/10/06
GEORGE M. STOCK E-25116

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FAX (636) 530-9130
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Web: www.stockassoc.com

DRAWN BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER:	SHEET:
H.L.T.	8/14/06	C.A.M.	8/14/06	206–3850	C9