LANDMARK SURVEYING, INC.	
802 E. MAIN	Wentzville, Missouri 63385
DRWN	CKD.
DATE	DATE

GBA	DATE: July, 1987
GEORGE BUTLER ASSOCIATES, INC.	DESIGN BY: F. L. K.
Engineers / Architects / Landscape Architects / Planners	DRAWN BY: R. R. H.
Kansas City, Mo. / Lenexa, Ks. / O'Fallon, Mo. / Ames, Ia. / Oklahoma City, Ok.	PROJECT NO.: 4955

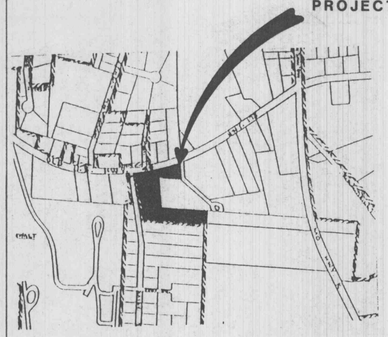
DOMINO'S PIZZA SANITARY SEWER	SHEET NO.	TOTAL SHEETS
	2	6

REVISIONS	BY	DATE
Sanitary sewer slopes, property lines.	J. Barron	8-6-87

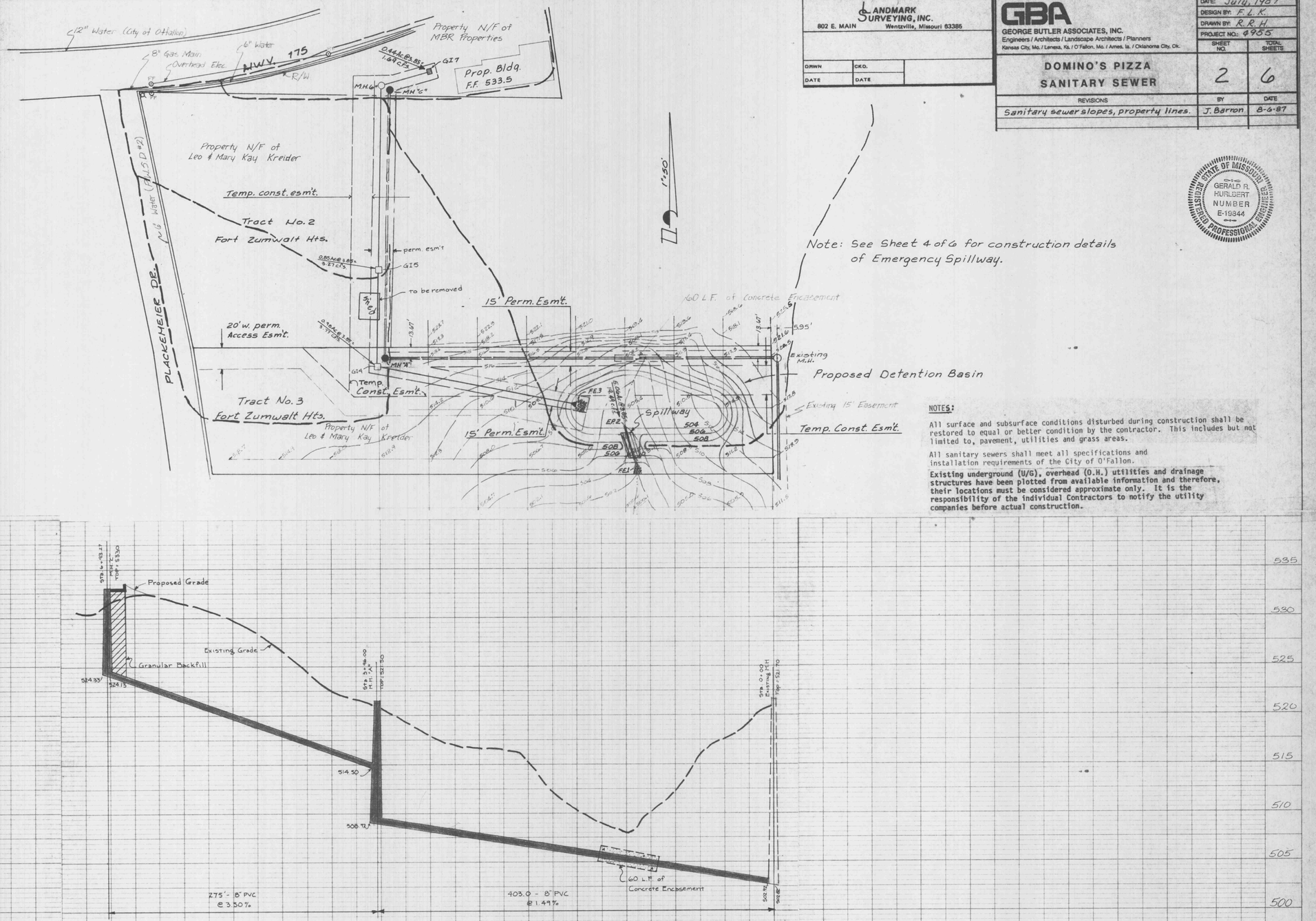
PLAN — SURVEYED, DRAWN, ALIGNMENT CHECKED, RT. OF WAY CHECKED. NOTE BOOK NO. DATE BY

PROFILE — SURVEYED, DRAWN, CHECKED, H. & V. NOTED, STRUCTURE NOTATIONS CHECKED. NOTE BOOK NO. DATE BY

PROJECT LOCATION



Note: Detention provided for Tracts 1,2,& 3 of Fort Zumwalt Heights.



Note: See Sheet 4 of 6 for construction details of Emergency Spillway.

STATE OF MISSOURI — GERALD R. HURLBERT — NUMBER E-19844 — REGISTERED PROFESSIONAL ENGINEER

Detention Basin Volume

508	4.50 s.f.	11,250 s.f.	10,562.50 c.f.	37,850 c.f.
507		9,875 s.f.	9,187.5 c.f.	27,287.5 c.f.
506	3.40 s.f.	8,500 s.f.	7,975 c.f.	18,100 c.f.
505		7,450 s.f.	6,925 c.f.	10,125 c.f.
504	2.56 s.f.	6,400 s.f.	3,200 c.f.	3,200 c.f.
503.05		0	0	0

Maximum proposed discharge from detention facility -

15 year existing discharge from Domino's & tracts 2&3
3.41 Ac. @ 1.87 cfs/Ac. = 6.38 c.f.s.

25 year offsite discharge (existing development) routed thru tract to be developed
3.89 Ac. @ 4.43 cfs/Ac. = 17.23 c.f.s.

25 year developed discharge from tract being developed which cannot be intercepted by the storm sewer system & routed thru the detention facility:
0.93 Ac. @ 4.43 cfs/Ac. = 4.12 c.f.s.

Maximum allowable discharge from proposed detention facility:
Q = 6.38 + 17.23 - 4.12
Q = 19.49 c.f.s.

Maximum inflow to detention facility -

15 year inflow = 3.89 Ac. @ 3.85 cfs/Ac. = 14.98 c.f.s.
13.41 - 8.93 Ac. @ 2.35 cfs/Ac. = 9.55 c.f.s.
14.98 c.f.s. + 9.55 c.f.s. = 24.53 c.f.s.

25 year inflow = 24.53 x 1.15 = 28.21 c.f.s.

Required detention volume = (28.21 - 19.49) (1800)
= 15,696 c.f.s.

Stage	Volume
506.00	10,100 c.f.
+	15,696 c.f.
505.00	90,125 c.f.

$\frac{10.1}{13.75} < 0.70$

Required 25 year elevation is 505.70

Maximum allowable discharge Q=19.48 c.f.s.

Try 24" pipe A = $\frac{\pi (2)^2}{4}$ = 3.14 ft.^{2}

Available Head 505.70 - 503.05 - 0/2 = 1.65'

Q_{max} = .602 A $\sqrt{2gh}$ = .602(3.14) $\sqrt{(64.32)(1.65)}$

Q_{max} = 19.49 c.f.s.

∴ Desired max. flow rate is good.

Now design 100 year spillway:

15 year inflow = 24.53 c.f.s.
100 year flow = 24.53 x 1.35 = 34.10 c.f.s.

Place weir at 25 year elevation = 505.70

Available Head 507.00 - 505.70 = 1.30'

Assuming 3:1 side slopes & 1.0' of freeboard.

Flow from triangular portion of weir @ h=1.30'
Q = 0.67 [4/15] $\sqrt{2gh}$ (1.80)(h) $\sqrt{(64.32)(1.30)}$ L = 6h = 6 (1.30) L = 7.80'
Q = 14.10 c.f.s.

Remaining flow for rectangular portion of weir -
34.10 - 14.10 = 20.00 c.f.s.

$Q = 3.33\,(L - .2h)h^{1.5}$

$\frac{Q}{3.33\,h^{1.5}} + .2h = L$

$\frac{20.00}{3.33\,(1.30)^{1.5}} + .2(1.30) = L$

L = 4.18 ft.

So, use spillway with 5' flat bottom with 3:1 side slopes and @ at 506.70

Now find W.S. during a 15 year storm event for the tailwater elevation for storm sewer design.

Try W.S. = 505.35 ; 24" pipe A=3.14 ft.^{2}
Available Head = 505.35 - 503.05 -2/2 = 1.30'
use H = 1.30'

Q_{max} = .602 (3.14) $\sqrt{(64.32)(1.30)}$ = 17.30 c.f.s.

Volume @ W.S. (18000 - 10125)(.35) = 10125 = 12916 cf

Required Volume 1800 (24.53 - 17.30) = 13014 cf

Close enough. W.S. = 505.35 for 15 year storm.

Scale: Horiz. 1"=50'
Vert. 1"=5'