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

GBA
GEORGE BUTLER ASSOCIATES, INC.
Engineers / Architects / Landscape Architects / Planners
Kansas City, Mo. / Lenexa, Ks. / O'Fallon, Mo. / Ames, Ia. / Oklahoma City, Ok.

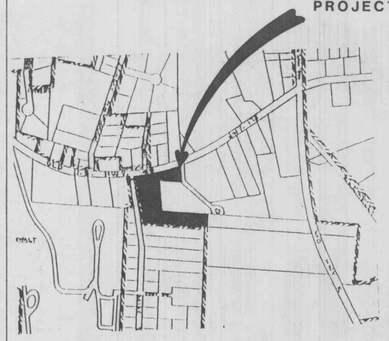
DATE:	July, 1987
DESIGN BY:	F.L.K.
DRAWN BY:	R.R.H.
PROJECT NO.:	4955
SHEET NO.	2
TOTAL SHEETS	6

DOMINO'S PIZZA
SANITARY SEWER

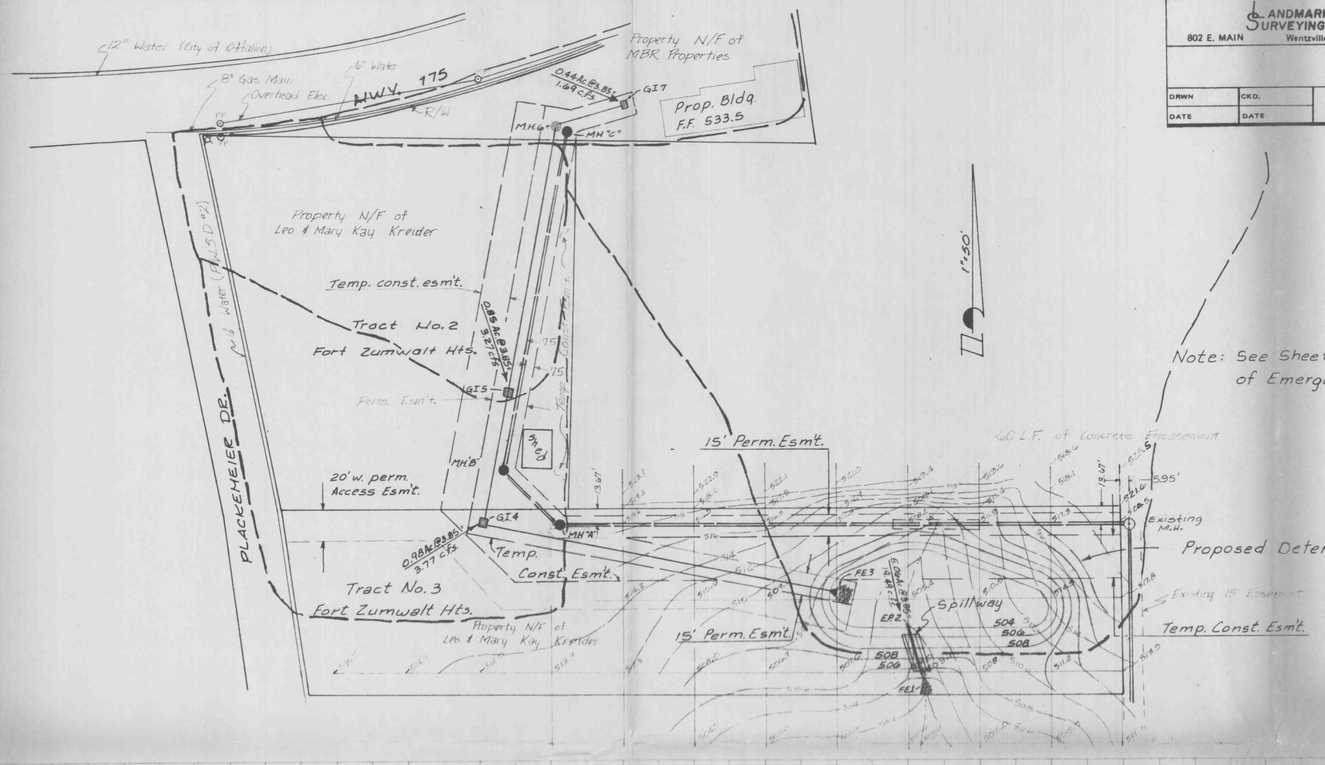
REVISIONS	BY	DATE
Sanitary sewer slopes, property lines.	J. Barron	8-6-87

STATE OF MISSOURI — GERALD R. HURLBERT — NUMBER E-19344 — PROFESSIONAL ENGINEER

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.

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

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.
1.99 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 -

25 year inflow = 3.99 Ac. @ 7.05 cfs/Ac. = 14.08 c.f.s.
13.38 - 6.38 Ac. @ 1.87 cfs/Ac. = 7.15 c.f.s.
= 14.08 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	18,100 c.f.
	15,696 c.f.
505.00	10,125 c.f.

$\frac{5571}{7975} = 0.70$

Required 25 year elevation is 505.70

Maximum allowable discharge Q=19.49 c.f.s.

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

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

Q_{max} = .602 A $\sqrt{2gH}$ = .602(3.14) $\sqrt{(2)(32.2)(1.65)}$

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

∴ Desired max. flow rate is good.

Now design 100 year spillway

25 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 = 0.57 (4/3) (H $\sqrt{2gH}$) L = 2h = 2 (1.30)
L = 7.80'

Q = 0.57 (4/3)(7.80)(1.30) $\sqrt{(2)(32.2)(1.30)}$
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 ft at 506.70

Now find W.S. during a 25 year storm event for the tailwater elevation for storm sewer design.

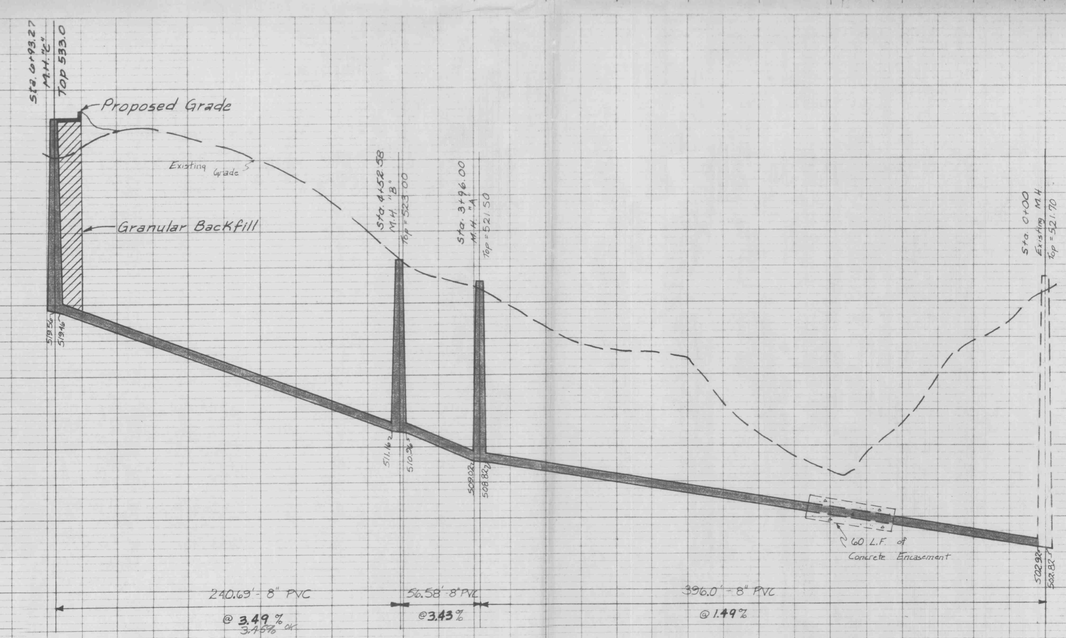
Try W.S. = 505.35, 24" pipe A=3.14 ft.^{2}
Available Head = 505.35 - 503.05 -2/2 = 1.30'
ΔH = 1.30'

Q_{max} = .602 (3.14) $\sqrt{(2)(32.2)(1.30)}$ = 17.30 c.f.s.

Volume @ W.S. (18.00 - 10.25)(.35) + 10.25 = 12916 cf

Required Volume 1800 (24.53) - 17.30) = 13014 cf

Close enough. W.S. = 505.35 for 25 year storm.



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

NOTES:

All surface and subsurface conditions disturbed during construction shall be restored to equal or better condition by the contractor. This includes but not limited to, pavement, utilities and grass areas.

All sanitary sewers shall meet all specifications and installation requirements of the City of O'Fallon.

Existing underground (U/G), overhead (O.H.) utilities and drainage structures have been plotted from available information and therefore, their locations must be considered approximate only. It is the responsibility of the individual Contractors to notify the utility companies before actual construction.

APPROVED
August 19, 1987
John A. Hurley

PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, RT. OF WAY CHECKED. NOTE BOOK NO. BY DATE

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, B.M. NOTED, STRUCTURE NOTATIONS CHECKED. NOTE BOOK No. BY DATE

HIGHWAY (FEDERAL AID SHEET) PLATE 1-SINGLE PLAN AND PROFILE-FULL LINE WITH ZONE