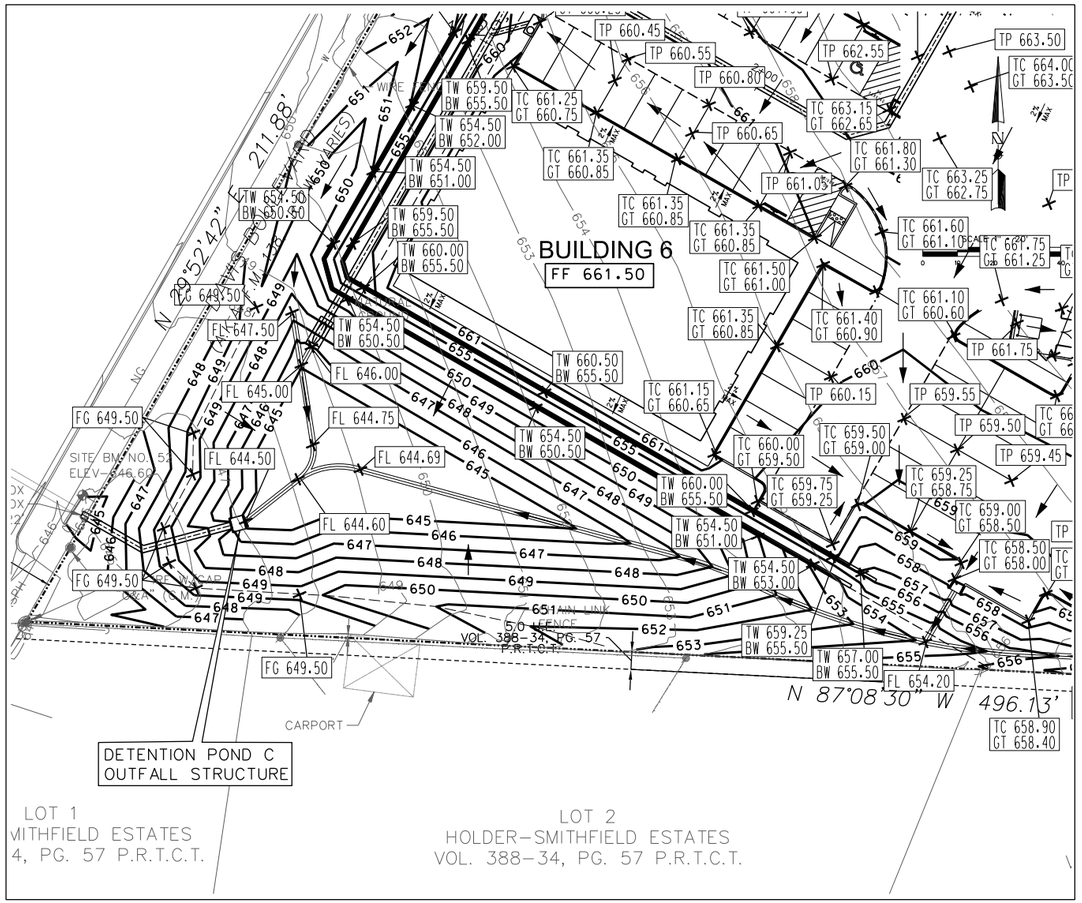


DETENTION POND C DESIGN (100 YEAR EVENT)

PRE-DEVELOPED FLOWS LEAVING SITE SHALL BE MAINTAINED BY USE OF DETENTION. SITE HAS BEEN DESIGNED FOR 100-YEAR EVENT SUCH THAT 100 YR POST-DEVELOPED FLOWS ARE DETAINED AND RELEASED AT THE TXDOT ULTIMATE 10 YEAR DESIGN FLOW RATE (CONSERVATIVE)

Q10 (PRE) = 13.5 CFS (SEE PRE-DEVELOPED MAP)
Q100 (BYPASS) = C7 = 0.3 CFS
Q100 (ALLOWABLE) = QPRE - QBYPASS = 13.5 - 0.3 = 13.2 CFS

FLOWS TO POND ARE AS FOLLOWS:

AREA = 3.40 ACRES
C = 0.77
TC = 10 MIN
I100 = 11.6 IN/HR
Q100 = 30.4 CFS

DETENTION POND
ELEVATION VS. VOLUME

ELEVATION ABOVE DATUM (FT.)	VOLUME CU FT
644.50 (POND BOTTOM)	0
645	553
646	3299
647	7253
648	12620
649	19545

$$\frac{649-648}{19545-12620} = \frac{X-648}{14839-12620}$$

X = 648.32

HEAD IN POND
648.32 - 644.50 = 3.82'

STORMWATER DETENTION WORKSHEET

HAMILTON DUFFY, PC

PROJECT NAME: THE HILLS AT DAVIS PARK - NRH
SUB AREAS TOTAL AREA COMBINED FLOW

TOTAL VOLUME CALCULATIONS

EXISTING CONDITIONS: (100 YR)

RUNOFF COEFFICIENT (c)	0.5
TIME OF CONCENTRATION (tc)	10 mins
RAINFALL INTENSITY (i)	7.9 in/hr
AREA (A acres)	3.41 acres
DISCHARGE (Q)	13.5 cfs

PROPOSED CONDITIONS: (100 YR)

RUNOFF COEFFICIENT (c)	0.77
TIME OF CONCENTRATION (tc)	10 mins
RAINFALL INTENSITY (i)	11.6 in/hr
AREA (A acres)	3.4 acres
DISCHARGE (Q)	30.4 cfs

MAXIMUM PERMISSIBLE RELEASE RATE (Qp = Q existing) : 13.5 cfs
MAX RUNOFF RATE LESS FREE RELEASE (IF APPLICABLE) 13.5 - 0.3 = 13.2 cfs
FREE RELEASE CALCULATION = 0.3 cfs

REQUIRED STORMWATER VOLUME

Rainfall Duration T	Rainfall Intensity I	Peak Runoff Rate Q	Storm Runoff Volume V	Release Rate Volume Qr	Storage Volume Sv
5	14.70	38.5	11545	5926	5619
10	11.60	30.4	18221	7902	10320
15	9.60	25.1	22620	9877	12742
20	8.20	21.5	25761	11853	13909
25	7.30	19.1	28667	13828	14839 ← MAX
30	6.50	17.0	30631	15803	14827
40	5.40	14.1	33929	19754	14175
50	4.70	12.3	36914	23705	13209
60	4.20	11.0	39584	27656	11928
120	2.60	6.8	49009	51361	-2352
180	1.90	5.0	53721	75066	-21345
240	1.50	3.9	56540	98771	-42232
300	1.30	3.4	61261	122476	-61215
360	1.10	2.9	62204	146181	-83978

REQUIRED STORAGE VOLUME (MAX. Sv): Rsv = 14839 Cu. Ft.

OUTFALL DESIGN

MAX RELEASE RATE = 13.2 CFS
STORAGE REQUIRED = 14839 CF

NOTE: STARTING WATER SURFACE FOR POND IS 644.50 FEET

OUTFALL STRUCTURE IS A 16" DIA. ORIFICE BUILT INTO A 4' Y-INLET (WEIR OPENING) (SEE CALCS):

ORIFICE FLOW EQUATION

$Q = CA\sqrt{2GH}$
C = 0.60
A = 1.39 SQ. FT.
G = 32.2
H = (3.82')-0.5(1.33') = 3.16'

Q = 11.9 CFS

4'x4' Y INLET CAPACITY

$Q = 3.0\ Y^{1.5}L$ (WEIR EQUATION)

Q = INLET CAPACITY (CFS)
Y = HEAD AT INLET (FT) 648.32 - 648.50 = 0
L = LENGTH OF OPENING (FT) = 4 @ 4' = 16'

$Q = 3.0\ (0)^{1.5}\ (16)$

Q = 0 CFS

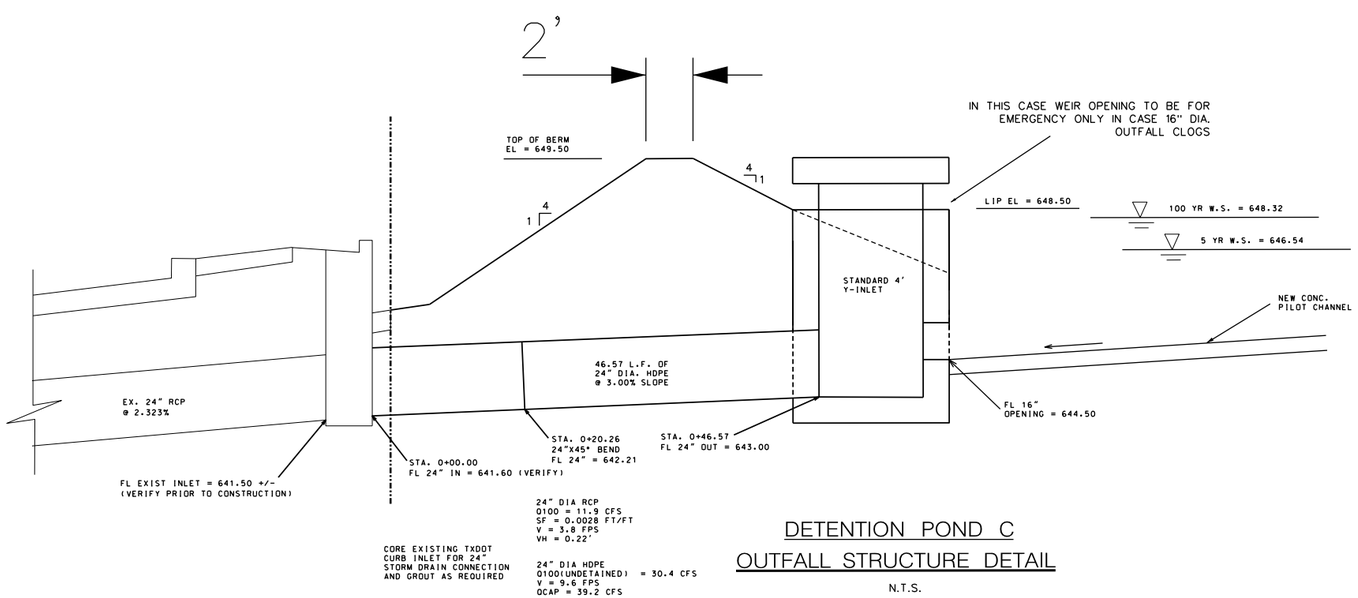
Q100 = 11.9 + 0 = 11.9 CFS < 13.2 CFS (OK)

Y-INLET SHOULD ONLY OPERATE IN CASE OF AN EMERGENCY (CLOGGING OF ORIFICE). MAX. DISCHARGE RATE OF Y-INLET CONSIDERING POND IS 1' ABOVE LIP SHOWN BELOW:

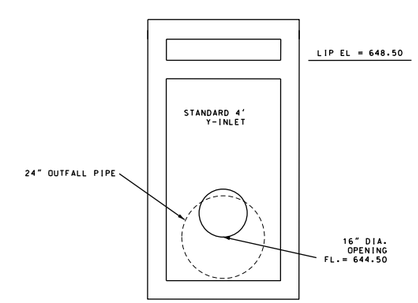
HEAD AT POND ELEV. = 649.32 = 1' ABOVE 100 YEAR POND SURFACE (STILL BELOW BERM)

$Q = 3.0\ (1)^{1.5}\ (16)$

Q = 48 CFS (PASSES 100 YEAR UN-DETAINED EVENT)



DETENTION POND C
OUTFALL STRUCTURE DETAIL
N.T.S.



FRONT VIEW DETAIL
N.T.S.

HAMILTON DUFFY, PC
CONSULTING
CIVIL & ENVIRONMENTAL ENGINEERS - PLANNERS - CONSTRUCTION MANAGERS
8241 MID-CITIES BLVD., SUITE 100 - NORTH RICHLAND HILLS, TEXAS 76182
PHONE (817) 268-0408 www.hamiltonduffy.com

SITE CONSTRUCTION PLANS
THE HILLS AT DAVIS PARK
CITY OF NORTH RICHLAND HILLS, TEXAS
DETENTION POND PLAN AND PROFILE

PRELIMINARY
FOR REVIEW ONLY
THESE DOCUMENTS ARE FOR DESIGN REVIEW AND NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. THEY WERE PREPARED BY, OR UNDER SUPERVISION OF:
KEITH M. HAMILTON 87384
PE NO. DATE

JOB	999-515
DATE	DATE
DESIGNED	K.M.H.
DRAWN	K.M.H.
CHECKED	K.M.H.
TEXAS REGISTERED ENGINEERING FIRM NUMBER F-2260	

NO.	REVISION	BY	DATE

SHEET
C1.12