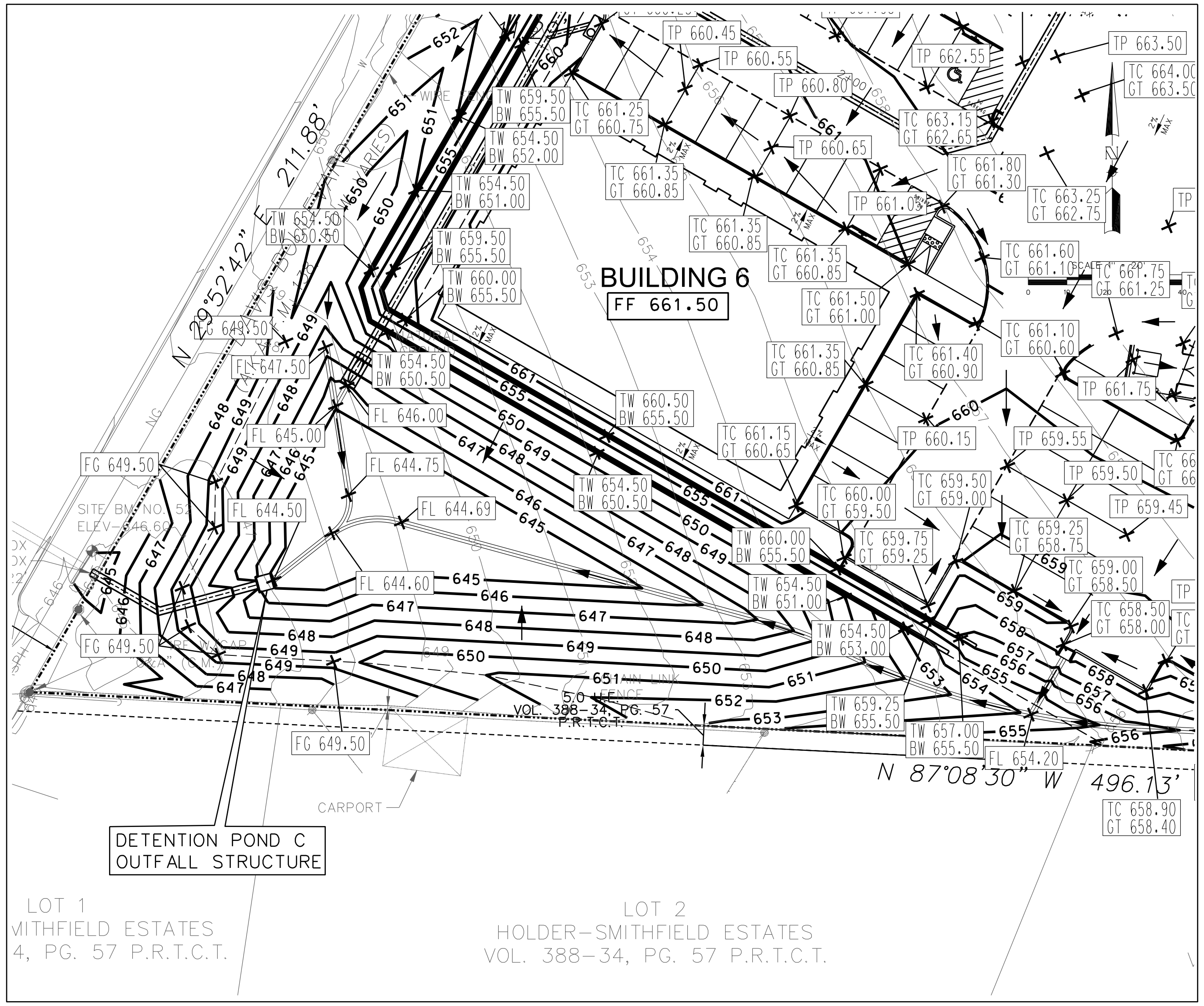


DETENTION POND C DESIGN (100 YEAR EVENT)

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 = $\boxed{13.2\text{ CFS}}$

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 (t/c)	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 (t/c)	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	56549	98771	-42222	
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'

$\boxed{Q = 11.9\text{ CFS}}$

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'

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

$\boxed{Q = 0\text{ CFS}}$

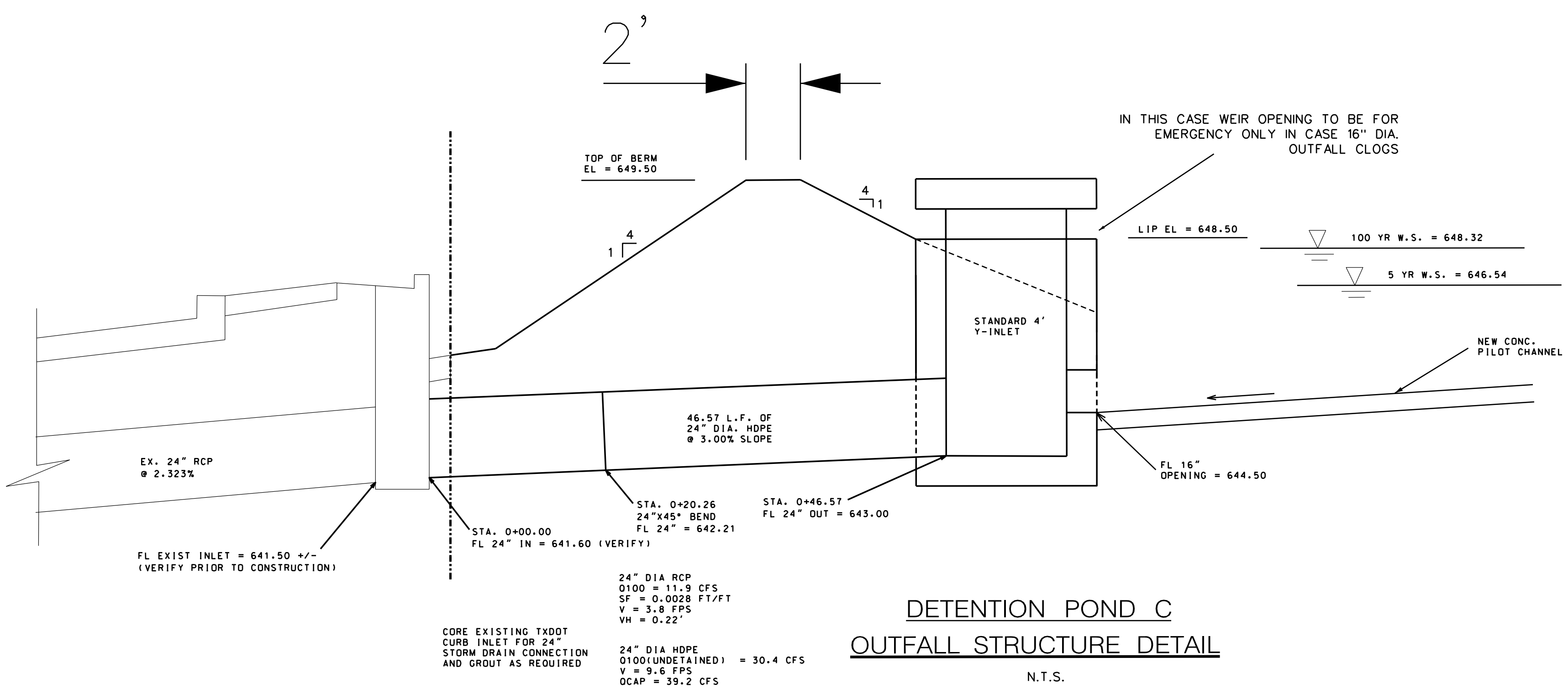
Q100 = 11.9 + 0 = 11.9 CFS < 13.2 CFS (OK)

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:

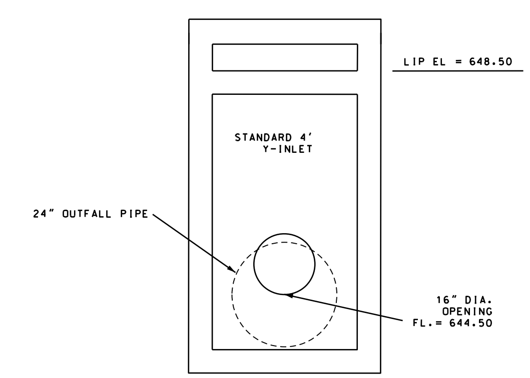
HEAD AT POND ELEV. = 649.32 = 1' ABOVE 100 YEAR POND SURFACE (STILL BELOW BERM)

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

Q = $\boxed{48\text{ CFS}}$ (PASSES 100 YEAR UN-DETAINED EVENT)



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



FRONT VIEW DETAIL
N.T.S.

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SITE CONSTRUCTION PLANS

THE HILLS AT DAVIS PARK
CITY OF NORTH RICHLAND HILLS, TEXAS

DETENTION POND PLAN AND PROFILE

PRELIMINARY
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KEITH M. HAMILTON 87384
PE NO. DATE

NO.	REVISION	BY	DATE

JOB 999-515
DATE DATE
DESIGNED K.M.H.
DRAWN K.M.H.
CHECKED K.M.H.
TEXAS REGISTERED ENGINEERING FIRM NUMBER F-5260

SHEET
C1.12