

DRAINAGE REPORT
for
ST. JUDE THADDEUS CHURCH

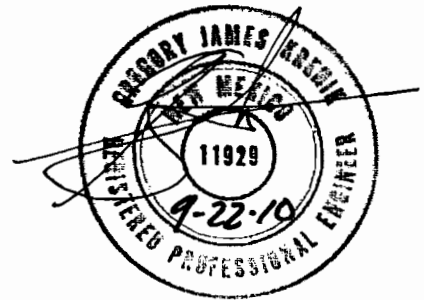
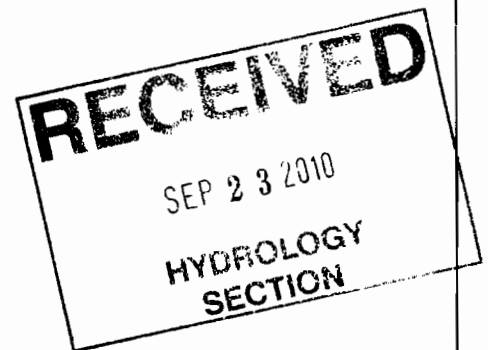
Prepared for

*St. Jude Thaddeus Church
5712 Paradise Blvd NW
Albuquerque, NM, 87114
(505) 898-0826*

Prepared by

*Mark Goodwin & Associates, PA
PO Box 90606
Albuquerque, NM 87199
(505) 828-2200*

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D. Mark Goodwin & Associates, P.A.
Consulting Engineers

P.O. BOX 90606, ALBUQUERQUE, NM 87199
(505) 828-2200 FAX 797-9539

PROJECT ST. JUNE THADDEUS

SUBJECT DRAINAGE CALCS

BY GJK DATE 7-16-10

CHECKED _____ DATE _____

SHEET 1 OF

- SITE CONSISTS OF 9.4772 ACRES - $\frac{2}{3}$ DEVELOPED
- SITE IS NOT IN A 100 YR FLOOD PLAIN PER FIRM MAP 35001C0104E
- NO OFFSITE FLOWS ENTER THIS SITE.
- SITE HAS TWO EXISTING RETENTION PONDS IN THE UNDEVELOPED AREA.
- THIS PROJECT WILL RELOCATE THE TEMPORARY RETENTION POND TO THE SE CORNER. IN THE FUTURE, A STORM DRAIN IS TO RUN ACROSS THE ADJACENT PROPERTY FROM UNSER BLVD. THIS PROJECT, AT THAT TIME WILL TIE INTO THAT STORM DRAIN AND ELIMINATE THE TEMPORARY RETENTION POND.
- SITE IS DIVIDED INTO FOUR DRAINAGE BASINS
 - BASIN 1 - FLOW THAT DRAINS OFFSITE TO THE NE AND CAN NOT REACH THE POND.
 - BASIN 2 - THE MAIN PORTION OF THE SITE THAT ENTERS THE POND FROM THE NORTH
 - BASIN 3 - THIS IS THE RECTORY AREA THAT DRAINS TO THE POND FROM THE WEST. THIS WILL BE PHASE II BUT WILL INCLUDE BUILDOUT OF THIS AREA INTO POND VOLUME NEEDED.
 - BASIN 4 - THIS IS THE POND
 - BASIN 4A - THIS IS THE POND AREA IN THE BUILDOUT CONDITION AS A PARKING LOT.

$$P_1 = 1.90 \text{ in}$$

$$P_6 = 2.25 \text{ in}$$

$$P_{24} = 2.70 \text{ in}$$

BASIN	AREA (AC)	'B' %	'C' %	'D' %
1	0.5644	17.59	17.58	64.83
2	7.3303	9.49	9.48	81.03
3	0.9748	18.70	18.70	62.60
4	0.6077		100	
4A	0.6077	13.18	13.18	73.64



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PROJECT ST. JOSE THADDEUS
SUBJECT DRAINAGE CALCS
BY GJK DATE 9-16-10
CHECKED _____ DATE _____
SHEET 2 OF _____

FROM AHYMO OUTPUT SHEETS 4-8

BASIN	Q_{100} (CFS)	V_{100} (AC-FT)
1	2.14	0.0754
2	29.90	1.0953
3	3.64	0.1282
4	1.80	0.0521
4A	2.41	0.0865

- SIZE RETENTION POND FOR BASINS 2-4

ELEV	AREA (CF)	VOLUME (AC-FT)
41	10,173	0
42	11,569	0.2496
43	13,033	0.5320
44	14,564	0.8487
45	16,160	1.2014
46	17,820	1.5914
47	19,543	2.0203
48	21,329	2.4894

VOLUME REQUIRED IS THE 10 DAY STORM

$$V_{10day} = V_{100} + A_b \left(\frac{3.67 - 2.25}{12} \right)$$

$$= 1.0953 + 0.1282 + 0.0521 + \left[5.9397 + 0.6102 \left(\frac{3.67 - 2.25}{12} \right) \right]$$
$$= 2.0507 \text{ AC-FT}$$

- THIS CORRESPONDS TO AN ELEVATION OF 47.06

- IF THE POND FILLS IT WILL SPILL INTO THE PARKING LOT UNTIL IT REACHES ELEVATION 50.00, THEN IT WILL SPILL ONTO THE PROPERTY TO THE SOUTH AND EAST.



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PROJECT ST JUNE THADDEUS

SUBJECT DRAINAGE CALCS

BY GJK DATE 9-16-10

CHECKED _____ DATE _____

SHEET 3 OF _____

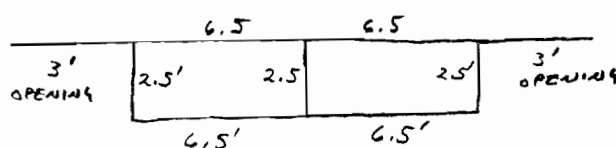
- DETERMINE FLOW ENTERING THE FUTURE INLETS
IN BASIN 4A

FROM HYMO OUTPUT SHEETS 4-8

$$Q = 35.34 \text{ CFS}$$

- DETERMINE INLET

USE TWO "DBL A" SIDE BY SIDE IN SUMA



$$\begin{aligned} \text{PERIMETER} &= (3' \times 2) + (2.5' \times 2) + (6.5' \times 4) \\ &= 37.0' \end{aligned}$$

$$\frac{Q}{P} = 3.0 H^{1.5}$$

$$H = 0.47 < 0.67 \text{ OK}$$

- THE GATE = 47.00

- THE INVERT = 43.00

- PIPE SIZE TO BE DETERMINED WHEN FUTURE
CONNECTION TO BE MADE

30" RCP AT 1% CARRIES 42 CFS

24" RCP AT 3% CARRIES 40 CFS

- DETERMINE CURB OPENINGS TO TEMPORARY POND

$$Q_{\text{NORTH}} = 29.90 \text{ CFS}$$

$$Q_{\text{WEST}} = 3.64 \text{ CFS}$$

$$Q = 2.95 < H^{1.5}$$

$$H = 0.5'$$

$$H = 0.5'$$

$$L = 3.49'$$

$$L = 28.67'$$

USE 4' ALONG
WEST SIDE OF POND

USE 30' ALONG

NORTH SIDE OF POND

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START                TIME=0.0
***** HYDROGRAPH FOR ST. JUDE THADDEUS CHURCH
RAINFALL             TYPE=1 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.90 IN RAIN SIX=2.25 IN
                     RAIN DAY=2.70 IN DT=0.03333 HR
*****BASIN 1 - DRAINS OFFSITE TO THE NORTH
COMPUTE NM HYD       ID=1 HYD NO=101 AREA=0.000882 SQ MI
                     PER A=0 B=17.59 C=17.58 D=64.83
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*****BASIN 2 - DRAINS TO POND
COMPUTE NM HYD       ID=2 HYD NO=102 AREA=0.011454 SQ MI
                     PER A=0 B=9.49 C=9.48 D=81.03
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=2 CODE=1
*****BASIN 3 - PHASE 2 DRAINS TO POND
COMPUTE NM HYD       ID=3 HYD NO=103 AREA=0.001523 SQ MI
                     PER A=0 B=18.7 C=18.7 D=62.6
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=3 CODE=1
*****BASIN 4 - POND
COMPUTE NM HYD       ID=4 HYD NO=104 AREA=0.000950 SQ MI
                     PER A=0 B=0 C=100 D=0
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1
*****BASIN 4A - POND AREA BUILTOUT
COMPUTE NM HYD       ID=5 HYD NO=104A AREA=0.000950 SQ MI
                     PER A=0 B=13.18 C=13.18 D=73.64
                     TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=5 CODE=1
*
ADD HYD              ID=6   HYD NO=6           ID I=2       ID II=3
PRINT HYD            ID=6 CODE=1
***** FLOW LEAVING SITE IN FUTURE STORM DRAIN
ADD HYD              ID=7   HYD NO=7           ID I=5       ID II=6
PRINT HYD            ID=7 CODE=1
FINISH

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AHYMO PROGRAM (AHYMO_97) - - Version: 1997.02d
 RUN DATE (MON/DAY/YR) = 09/16/2010
 START TIME (HR:MIN:SEC) = 12:59:05 USER NO.= AHYMO-I-9702dGoodwinM-AH
 INPUT FILE = st jude.dat

START TIME=0.0
 ***** HYDROGRAPH FOR ST. JUDE THADDEUS CHURCH
 RAINFALL TYPE=1 RAIN QUARTER=0.0 IN
 RAIN ONE=1.90 IN RAIN SIX=2.25 IN
 RAIN DAY=2.70 IN DT=0.03333 HR

COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK
 AT 1.40 HR.

DT =	.033330 HOURS						END TIME =	5.999400 HOURS					
.0000	.0018	.0036	.0055	.0074	.0094	.0114							
.0134	.0155	.0177	.0199	.0222	.0245	.0269							
.0293	.0319	.0345	.0372	.0399	.0428	.0458							
.0489	.0521	.0554	.0589	.0625	.0663	.0703							
.0745	.0789	.0836	.0888	.0944	.1004	.1133							
.1421	.1865	.2502	.3372	.4515	.5973	.7788							
1.0003	1.2059	1.2918	1.3643	1.4288	1.4874	1.5414							
1.5916	1.6384	1.6823	1.7237	1.7627	1.7995	1.8344							
1.8674	1.8987	1.9284	1.9566	1.9834	1.9898	1.9958							
2.0014	2.0068	2.0120	2.0169	2.0216	2.0262	2.0306							
2.0349	2.0390	2.0430	2.0469	2.0507	2.0543	2.0579							
2.0614	2.0648	2.0681	2.0713	2.0745	2.0776	2.0806							
2.0836	2.0865	2.0894	2.0922	2.0949	2.0976	2.1003							
2.1029	2.1055	2.1080	2.1105	2.1129	2.1153	2.1177							
2.1201	2.1224	2.1247	2.1269	2.1291	2.1313	2.1335							
2.1356	2.1377	2.1398	2.1418	2.1439	2.1459	2.1478							
2.1498	2.1517	2.1537	2.1555	2.1574	2.1593	2.1611							
2.1629	2.1647	2.1665	2.1683	2.1700	2.1718	2.1735							
2.1752	2.1769	2.1785	2.1802	2.1818	2.1834	2.1850							
2.1866	2.1882	2.1898	2.1914	2.1929	2.1944	2.1959							
2.1975	2.1990	2.2004	2.2019	2.2034	2.2048	2.2063							
2.2077	2.2091	2.2105	2.2119	2.2133	2.2147	2.2161							
2.2174	2.2188	2.2201	2.2215	2.2228	2.2241	2.2254							
2.2267	2.2280	2.2293	2.2306	2.2318	2.2331	2.2343							
2.2356	2.2368	2.2381	2.2393	2.2405	2.2417	2.2429							
2.2441	2.2453	2.2465	2.2476	2.2488	2.2500								

*****BASIN 1 - DRAINS OFFSITE TO THE NORTH
 COMPUTE NM HYD ID=1 HYD NO=101 AREA=0.000882 SQ MI
 PER A=0 B=17.59 C=17.58 D=64.83
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE
 CONSTANT, N = 7.106420
 UNIT PEAK = 2.2575 CFS UNIT VOLUME = .9941 B = 526.28
 P60 = 1.9000
 AREA = .000572 SQ MI IA = .10000 INCHES INF = .04000 INCHES
 PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
 .033330

K = .118486HR TP = .133300HR K/TP RATIO = .888870 SHAPE
 CONSTANT, N = 3.990427
 UNIT PEAK = .82502 CFS UNIT VOLUME = .9846 B = 354.53
 P60 = 1.9000
 AREA = .000310 SQ MI IA = .42502 INCHES INF = 1.04006 INCHES
 PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =

6
.033330

PRINT HYD

ID=1 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = 1.60384 INCHES = .0754 ACRE-Feet
PEAK DISCHARGE RATE = 2.14 CFS AT 1.500 HOURS BASIN AREA = .0009
SQ. MI.

*****BASIN 2 - DRAINS TO POND

COMPUTE NM HYD ID=2 HYD NO=102 AREA=0.011454 SQ MI
PER A=0 B=9.49 C=9.48 D=81.03
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE
CONSTANT, N = 7.106420
UNIT PEAK = 36.643 CFS UNIT VOLUME = .9990 B = 526.28
P60 = 1.9000
AREA = .009281 SQ MI IA = .10000 INCHES INF = .04000 INCHES
PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

K = .118489HR TP = .133300HR K/TP RATIO = .888893 SHAPE
CONSTANT, N = 3.990315
UNIT PEAK = 5.7788 CFS UNIT VOLUME = .9982 B = 354.52
P60 = 1.9000
AREA = .002173 SQ MI IA = .42504 INCHES INF = 1.04011 INCHES
PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

PRINT HYD

ID=2 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.79303 INCHES = 1.0953 ACRE-Feet
PEAK DISCHARGE RATE = 29.90 CFS AT 1.500 HOURS BASIN AREA = .0115
SQ. MI.

*****BASIN 3 - PHASE 2 DRAINS TO POND

COMPUTE NM HYD ID=3 HYD NO=103 AREA=0.001523 SQ MI
PER A=0 B=18.7 C=18.7 D=62.6
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE
CONSTANT, N = 7.106420
UNIT PEAK = 3.7641 CFS UNIT VOLUME = .9965 B = 526.28
P60 = 1.9000
AREA = .000953 SQ MI IA = .10000 INCHES INF = .04000 INCHES
PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
.033330

K = .118483HR TP = .133300HR K/TP RATIO = .888844 SHAPE

CONSTANT, N = 3.990548
 UNIT PEAK = 1.5150 CFS UNIT VOLUME = .9914 B = 354.54
 P60 = 1.9000
 AREA = .000570 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES
 PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
 .033330

PRINT HYD ID=3 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.57782 INCHES = .1282 ACRE-FEET
 PEAK DISCHARGE RATE = 3.64 CFS AT 1.500 HOURS BASIN AREA = .0015
 SQ. MI.

*****BASIN 4 - POND

COMPUTE NM HYD ID=4 HYD NO=104 AREA=0.000950 SQ MI
 PER A=0 B=0 C=100 D=0
 TP=0.1333 HR MASS RAINFALL=-1

K = .106205HR TP = .133300HR K/TP RATIO = .796738 SHAPE
 CONSTANT, N = 4.498737
 UNIT PEAK = 2.7591 CFS UNIT VOLUME = .9957 B = 387.15
 P60 = 1.9000
 AREA = .000950 SQ MI IA = .35000 INCHES INF = .83000 INCHES
 PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
 .033330

PRINT HYD ID=4 CODE=1

PARTIAL HYDROGRAPH 104.00

RUNOFF VOLUME = 1.02876 INCHES = .0521 ACRE-FEET
 PEAK DISCHARGE RATE = 1.80 CFS AT 1.500 HOURS BASIN AREA = .0010
 SQ. MI.

*****BASIN 4A - POND AREA BUILTOUT

COMPUTE NM HYD ID=5 HYD NO=104A AREA=0.000950 SQ MI
 PER A=0 B=13.18 C=13.18 D=73.64
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000 SHAPE
 CONSTANT, N = 7.106420
 UNIT PEAK = 2.7620 CFS UNIT VOLUME = .9955 B = 526.28
 P60 = 1.9000
 AREA = .000700 SQ MI IA = .10000 INCHES INF = .04000 INCHES
 PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
 .033330

K = .118483HR TP = .133300HR K/TP RATIO = .888844 SHAPE
 CONSTANT, N = 3.990548
 UNIT PEAK = .66604 CFS UNIT VOLUME = .9795 B = 354.54
 P60 = 1.9000
 AREA = .000250 SQ MI IA = .42500 INCHES INF = 1.04000 INCHES

PER HOUR
 .033330 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =

PRINT HYD ID=5 CODE=1

HYDROGRAPH FROM AREA 104A

RUNOFF VOLUME = 1.70675 INCHES = .0865 ACRE-Feet
 PEAK DISCHARGE RATE = 2.41 CFS AT 1.500 HOURS BASIN AREA = .0010
 SQ. MI.

*
 ADD HYD ID=6 HYD NO=6 ID I=2 ID II=3
 PRINT HYD ID=6 CODE=1

OUTFLOW HYDROGRAPH REACH 6.00

RUNOFF VOLUME = 1.76773 INCHES = 1.2235 ACRE-Feet
 PEAK DISCHARGE RATE = 33.54 CFS AT 1.500 HOURS BASIN AREA = .0130
 SQ. MI.

***** FLOW LEAVING SITE IN FUTURE STORM DRAIN
 ADD HYD ID=7 HYD NO=7 ID I=5 ID II=6
 PRINT HYD ID=7 CODE=1

OUTFLOW HYDROGRAPH REACH 7.00

RUNOFF VOLUME = 1.76355 INCHES = 1.3099 ACRE-Feet
 PEAK DISCHARGE RATE = 35.94 CFS AT 1.500 HOURS BASIN AREA = .0139
 SQ. MI.

FINISH

NORMAL PROGRAM FINISH END TIME (HR:MIN:SEC) = 12:59:05