

First Church of God Evansville, IN

Due to the increased run-off from the site, a storm-water detention basin must be placed on-site. This basin allows for stormwater runoff to be detained and released to the downstream receiving tributaries and streams at the same rate as stormwater left the site prior to development. For the basin to work effectively it must be properly maintained. The outlet pipe through the south end of the detention basin must be kept free of debris. The 12" outlet pipe allows for a flowrate to leave the site which would exceed the allowable. Thus, the pipe requires an orifice to control the outflow. The basin shall be seeded with grass to prevent erosion during detention cycles. Rip-rap shall be placed at the exit end of the outlet to prevent erosion and act as an energy dissipater. The basin is designed to provide 6" of freeboard above the storage elevation 0.49 acre-feet for the 25 year storm event. The basin also has the capacity to store the 100 year storm event before discharging through the surface emergency overflow. The surface emergency overflow is for storm events, exceeding a 100-year storm. The storm sewer pipe system on the site is an integral part of the infrastructure. Storm inlets, end-sections, pipes, and manholes must be kept free from debris and silt to achieve maximum flow capacity. Rip-rap shall be placed at the ends of both pipes discharging into the detention basin from the storm sewer system to prevent erosion. The detention basin has been sized to allow for the increased flow into the basin when the future recreation education building is constructed.

First Church of God Evansville, IN

The First Church of God site is located on the west side of Baumgart Road, just north of Mt. Pleasant Road. The site consist of 9.25 acres, sloping primarily to the south, west, and southwest between 2% and 5%. The ground vegetation consists of mainly meadow grass, with some wooded area.

Summary of Values

Time of concentration:

Slope of flow = 4.32%

Length of flow = 925'

tc = 27.36 min.

Runoff coefficients:

Un-developed C = 0.24

Impervious surface 2.14 acres @ C = 0.94 Pervious surface 7.11 acres @ C = 0.25
Developed C = 0.409

Runoff:

Un-developed runoff (10 year) = 7.66 cfs Developed runoff (25 year) = 15.06 cfs

Required Storage:

25 Year storm event = 0.49 acre-ft

100 Year storm event = 0.68 acre-ft

Discharge Rate:

Un-developed runoff (10 year) = 7.66 cfs

Direct developed runoff (25 year) = 4.65

Allowable detention release (25 year) = 3.01 cfs

Stormwater shall be detained in a dry basin on the west side of the property in the low, wooded area. Storage will be 3.5' deep and provide 0.72 acre-ft of storage. Since part of the stormwater runoff discharges directly from the site without being routed through the detention basin, the detention basin outflow will be required to be less then 7.66 cfs. With 4.65 cfs leaving the site directly, the detention basin release rate is lowered to 3.01 cfs. The water discharges from the detention basin into an existing swale and eventually into Little Pigeon Creek. An emergency spillway will be located at 406.50. An orifice will be required on the outlet pipe from the detention basin, with a 0.61' diameter opening for stormwater to flow through. The detention basin has been sized to allow for the increased flow into the basin when the future recreation education building is constructed.

Orifice Design Calculation

Q = Flowrate (cfs)

Cd = Discharge coefficient

g = Gravity (ft/sec²)

h = Height of water above the centerline of the orifice (ft)

d = Diameter of orifice (ft)

A = Area of orifice (ft²)

$$Q = C_d * A * (2 * g * h)^{.5}$$

$$Q = 3.01$$

$$C_d = 0.80$$

$$g = 32.20$$

$$\text{head} = 2.90$$

$$d = 0.61$$

$$A = 0.29$$

Vanderburgh Co Drainage Ordinance (Nov. 28, 1994)

$$\frac{40 \text{ ft}}{925 \text{ ft}} = 0.043 \times 100\% = 4.32\%$$

Surface type = Woodland, turfed meadows, etc. (Table 803)

Slope: 4.32% C = 0.24 - Undeveloped Conditions

- Developed Conditions:

Pavement, Rooftop, etc.

(Table 804)

2.14 Ac Slope 2-5% C = 0.94

Lawns w/turf

7.11 Ac slope 2-5% C = 0.25

Weighted $2.14 + 7.11 = 9.25$

$$\frac{7.11}{9.25} (.25) = 0.192$$

$$\frac{2.14}{9.25} (.94) = 0.217$$

$$0.192 + 0.217 = 0.409$$

$$\underline{\underline{\text{Weighted } C = 0.409}}$$

- Time of Concentration - t_c

Kerby (1959) Table 3.2.4 (cont)

$$t_c = K(L \cdot N \cdot s^{-0.5})^{0.467} \Rightarrow .83[(925)(.40) \cdot (0.0432)^{-0.5}]^{0.467}$$

$$\underline{\underline{t_c = 27.36 \text{ min}}}$$

Undeveloped 10 yr Storm (Table 807)

27.36 min Intensity in/hr = 3.45 in/hr

Developed 25 yr Storm

Intensity in/hr = 3.891 in/hr

Undeveloped Runoff

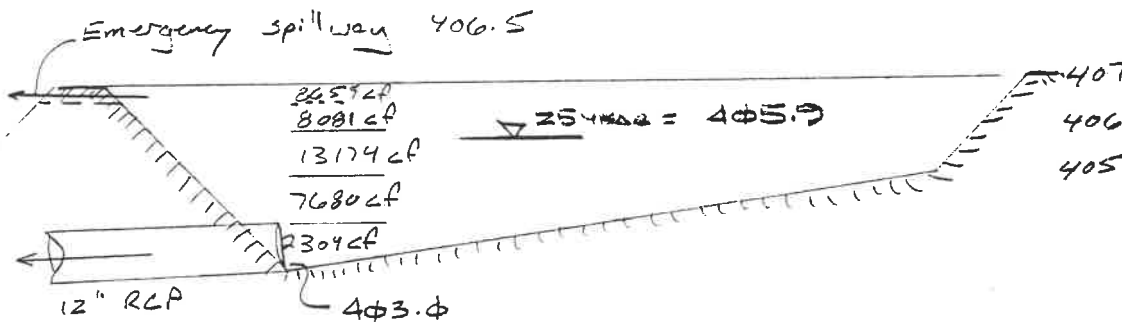
$Q = CIA$

$Q = 0.24(3.45) \text{ in/hr} (9.25) \text{ hr} = \underline{\underline{7.659 \text{ cfs}}}$

Developed Runoff

$Q = C_w I A$

$Q = 0.409(3.891)(9.25) = \underline{\underline{14.721 \text{ cfs}}}$



Storage capacity @ 406.5 = 0.72 acre-ft

VANDEBURGH COUNTY DRAINAGE BOARD
FORM 800

PROJECT: First Church of God DETENTION FACILITY DESIGN RETURN PERIOD: 25 YRS
DESIGNER: MORLEY & ASSOC. RELEASE RATE RETURN PERIOD: 10 YRS

WATERSHED AREA: 9.25 ACRES
TIME OF CONCENTRATION (UNDEVELOPED WATERSHED): 27.36 MINUTES
RAINFALL INTENSITY (Iu): 3.45 INCHES/HR
UNDEVELOPED RUNOFF COEFFICIENT (Cu): 0.24
UNDEVELOPED RUNOFF RATE (O = Cu*Iu*A): 7.66 CES
DEVELOPED RUNOFF COEFFICIENT (Cd): 0.409

STORM DURATION Td (HRS)	RAINFALL INTENSITY Id (INCH/HR)	INFLOW RATE I(Td) (Cd*Id*A) (CES)	OUTFLOW RATE O (Cu*Iu*A) (CES)	STORAGE RATE I(Td)-O (CES)	REQUIRED STORAGE Td-O)*Td/12 (ACRE-FT)
0.08	7.208	27.27	3.01	24.26	0.168
0.17	5.925	22.42	3.01	19.41	0.270
0.25	5.033	19.04	3.01	16.03	0.334
0.33	4.571	17.29	3.01	14.28	0.397
0.42	4.108	15.54	3.01	12.53	0.435
0.50	3.646	13.79	3.01	10.78	0.449
0.58	3.385	12.81	3.01	9.80	0.476
0.67	3.123	11.82	3.01	8.81	0.489
0.75	2.862	10.83	3.01	7.82	0.489
0.83	2.601	9.84	3.01	6.83	0.474
0.92	2.339	8.85	3.01	5.84	0.446
1.00	2.078	7.86	3.01	4.85	0.404
1.25	1.909	7.22	3.01	4.21	0.439
1.50	1.739	6.58	3.01	3.57	0.446
1.75	1.570	5.94	3.01	2.93	0.427
2.00	1.400	5.30	3.01	2.29	0.381
2.50	1.210	4.58	3.01	1.57	0.326
3.00	1.019	3.86	3.01	0.85	0.311
4.00	0.836	3.16	3.01	0.15	0.051

PEAK STORAGE (ACRE/FT): 0.49
PEAK STORAGE (CUBIC FT): 21.311

VANDERBURGH COUNTY DRAINAGE BOARD
FORM 800

PROJECT: First Church of God
DESIGNER: MORLEY & ASSOC.

DETENTION FACILITY DESIGN RETURN PERIOD: 100 YRS
RELEASE RATE RETURN PERIOD: 10 YRS

WATERSHED AREA: 9.25 ACRES
TIME OF CONCENTRATION (UNDEVELOPED WATERSHED): 27.36 MINUTES
RAINFALL INTENSITY (Iu): 3.45 INCHES/HR
UNDEVELOPED RUNOFF COEFFICIENT (Cu): 0.24
UNDEVELOPED RUNOFF RATE (O = Cu*Iu*A): 7.66 CFS
DEVELOPED RUNOFF COEFFICIENT (Cd): 0.409

STORM DURATION Td (HRS)	RAINFALL INTENSITY Id (INCH/HR)	INFLOW RATE I(Td) (Cd*Id*A) (CFS)	OUTFLOW RATE O (Cu*Iu*A) (CFS)	STORAGE RATE I(Td)-O (CFS)	REQUIRED STORAGE Td)-O)*Td/12 (ACRE-FT)
0.08	3.469	32.04	3.01	29.03	0.202
0.17	7.126	26.96	3.01	23.95	0.333
0.25	6.194	23.43	3.01	20.42	0.425
0.33	5.665	21.43	3.01	18.42	0.512
0.42	5.137	19.43	3.01	16.42	0.570
0.50	4.608	17.43	3.01	14.42	0.601
0.58	4.284	16.21	3.01	13.20	0.642
0.67	3.960	14.98	3.01	11.97	0.665
0.75	3.636	13.75	3.01	10.74	0.672
0.83	3.311	12.53	3.01	9.52	0.661
0.92	2.987	11.30	3.01	8.29	0.633
1.00	2.663	10.07	3.01	7.06	0.589
1.25	2.444	9.24	3.01	6.23	0.649
1.50	2.224	8.41	3.01	5.40	0.675
1.75	2.005	7.58	3.01	4.57	0.667
2.00	1.785	6.75	3.01	3.74	0.624
2.50	1.538	5.82	3.01	2.81	0.585
3.00	1.291	4.88	3.01	1.87	0.469
4.00	1.062	4.02	3.01	1.01	0.336

PEAK STORAGE (ACRE/FT): 0.68
PEAK STORAGE (CUBIC FT): 29.424

MORLEY AND ASSOCIATES INC.
STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: First Church of God
OUR PROJECT # 96-3363-1
MANNINGS n 0.011

DATE: 8/22/96
DESIGN PERIOD: 25 YEARS

LINE NO.	UPSTREAM MANHOLE #	STR. #	DOWNSTREAM MANHOLE #	LENGTH (ft)	Cj	Aj (sq.)	CjAj	SUM CjAj	Tj (min)	Tcum (min)	I (in/hr)	Q (cfs)	PIPE DIA. (in)	PIPE SLOPE (ft/ft)	PIPE CAP. (cfs)	VELOCITY (ft/sec)	TRAVEL TIME (min)
1	1013	*	1012	226	0.70	0.54	0.38	0.38	10.17	10.17	5.895	2.24	12	0.0050	2.98	3.79	0.99
1	1012	*	1011	59	0.76	0.56	0.43	0.81	7.13	11.16	5.717	4.62	15	0.0050	5.40	4.40	0.22
1	1011	*	1010	114	0.95	0.10	0.10	0.90	5.00	11.39	5.678	5.12	15	0.0050	5.40	4.40	0.43
1	1010	*	Outfall	82	0.00	0.00	0.00	0.90	5.00	11.82	5.601	5.05	15	0.1158	25.97	21.17	0.06
2	1005	*	1004	64	0.38	0.63	0.24	0.24	17.57	17.57	4.795	1.16	12	0.0050	2.98	3.79	0.28
2	1004	*	1003	135	0.95	0.29	0.28	0.52	5.00	17.85	4.769	2.46	12	0.0050	2.98	3.79	0.59
2	1008	*	1007	65	0.62	0.20	0.12	0.12	8.37	8.37	6.343	0.79	12	0.0050	2.98	3.79	0.29
2	1007	*	1006	65	0.95	0.16	0.15	0.28	5.00	8.66	6.270	1.73	12	0.0050	2.98	3.79	0.29
2	1006	*	1003	109	0.55	0.27	0.15	0.42	10.66	10.66	5.807	2.47	12	0.0319	7.52	9.58	0.19
2	1003	*	1002	144	0.92	0.13	0.12	1.06	5.00	18.44	4.714	5.00	15	0.0100	7.63	6.22	0.39
2	1002	*	Outfall	120	0.00	0.00	0.00	1.06	5.00	18.83	4.679	4.96	15	0.0226	11.47	9.35	0.21
3	*	1000	*	69	0.00	0.00	0.00	0.00	0.00	0.00	0.000	2.88	12	0.0051	3.01	3.83	0.30
4	1016	*	1017	110	0.38	0.21	0.08	0.08	13.24	13.24	5.347	0.43	12	0.0259	6.77	8.63	0.21
4	1015	*	1014	178	0.42	0.50	0.21	0.29	16.06	16.06	4.935	1.43	12	0.0618	10.46	13.33	0.22

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No. : 1 Total Area = 131.987 S.F. = 3.03 Ac.

						C	N
Surface							
Structures	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02	
Pavement	1 Total	4.356 S.F. =	4.356 S.F. =	0.10 Ac.	0.95	0.02	
Drives	0 L.F.	0.0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02	
Patios	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02	
Sidewalks	0 L.F.	0 Width =	0 S.F. =	0.00 Ac.	0.15	0.40	
Lawn (0-2%)		0 S.F. =		0.00 Ac.	0.25	0.40	
Lawn (2-5%)		0 S.F. =		2.93 Ac.	0.40	0.40	
Lawn (5-10%)	127	631 S.F. =		0.00 Ac.	0.55	0.40	
Lawn (>10%)		0 S.F. =		0.00 Ac.	1.00	0.00	
Water		0 S.F. =		0.00 Ac.			
Misc.		0 S.F. =					

Weighted c =	0.418
Weighted N =	0.387
L =	500 Ft.
H =	38.0 Ft.
S =	0.0760 Ft./Ft.
tc =	17.66 Minutes
I(25) =	4.787 In./Hr.
Q(25) =	6.07 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No. : 2 Total Area = 91.476 S.F. = 2.10 Ac.

						C	N
Surface							
Structures	1 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.92	0.02	
Pavement	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02	
Drives	0 L.F.	0.0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02	
Patios	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.92	0.02	
Sidewalks	0 L.F.	0 Width =	0 S.F. =	0.00 Ac.	0.15	0.40	
Lawn (0-2%)		0 S.F. =		2.10 Ac.	0.25	0.40	
Lawn (2-5%)	91.476	S.F. =		0.00 Ac.	0.40	0.40	
Lawn (5-10%)		0 S.F. =		0.00 Ac.	0.55	0.40	
Lawn (>10%)		0 S.F. =		0.00 Ac.	1.00	0.00	
Water		0 S.F. =		0.00 Ac.			
Misc.		0 S.F. =					

Weighted c =	0.250
Weighted N =	0.400
L =	320 Ft.
H =	16.0 Ft.
S =	0.0500 Ft./Ft.
tc =	16.05 Minutes
I(25) =	4.846 In./Hr.
Q(25) =	2.54 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No.: 3 Total Area = 27,443 S.F. = 0.63 Ac.

Surface						C	N
Structures	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Pavement	1 Total	5,227 S.F.	=	5,227 S.F.	=	0.12 Ac.	0.95 0.02
Drives	0 L.F.	0.0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Lawn (0-2%)		0 S.F.	=		=	0.00 Ac.	0.15 0.40
Lawn (2-5%)		22,216 S.F.	=		=	0.51 Ac.	0.25 0.40
Lawn (5-10%)		0 S.F.	=		=	0.00 Ac.	0.40 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	0.55 0.40
Water		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Misc.		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.383
Weighted N =	0.328
L =	300 Ft.
H =	6.0 Ft.
S =	0.0200 Ft./Ft.
tc =	17.57 Minutes
I(25) =	4.796 In./Hr.
Q(25) =	1.16 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No.: 4 Total Area = 12,632 S.F. = 0.29 Ac.

Surface						C	N
Structures	1 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	1 Total	11,761 S.F.	=	11,761 S.F.	=	0.27 Ac.	0.95 0.02
Drives	0 L.F.	0.0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Lawn (0-2%)		871 S.F.	=		=	0.02 Ac.	0.15 0.40
Lawn (2-5%)		0 S.F.	=		=	0.00 Ac.	0.25 0.40
Lawn (5-10%)		0 S.F.	=		=	0.00 Ac.	0.40 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	0.55 0.40
Water		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Misc.		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.895
Weighted N =	0.046
L =	160 Ft.
H =	7.0 Ft.
S =	0.0438 Ft./Ft.
tc =	4.37 Minutes
I(25) =	7.208 In./Hr.
Q(25) =	1.87 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No. : 5 Total Area = 8,712 S.F. = 0.20 Ac.

Surface						C	N
Structures	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Pavement	1 Total	3,485 S.F.	=	3,485 S.F.	=	0.08 Ac.	0.95 0.02
Drives	0 L.F.	0 0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.15 0.40
Lawn (0-2%)		0 S.F.	=		=	0.00 Ac.	0.25 0.40
Lawn (2-5%)		0 S.F.	=		=	0.00 Ac.	0.40 0.40
Lawn (5-10%)		5,227 S.F.	=		=	0.00 Ac.	0.55 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Water		0 S.F.	=		=	0.00 Ac.	
Misc.		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.620
Weighted N =	0.248
L =	170 Ft.
H =	15.0 Ft.
S =	0.0882 Ft./Ft.
tc =	3.37 Minutes
I(25) =	6.920 In./Hr.
Q(25) =	0.86 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No. : 6 Total Area = 6,970 S.F. = 0.16 Ac.

Surface						C	N
Structures	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	1 Total	6,970 S.F.	=	6,970 S.F.	=	0.16 Ac.	0.95 0.02
Drives	0 L.F.	0.0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Lawn (0-2%)		0 S.F.	=		=	0.00 Ac.	0.15 0.40
Lawn (2-5%)		0 S.F.	=		=	0.00 Ac.	0.25 0.40
Lawn (5-10%)		0 S.F.	=		=	0.00 Ac.	0.40 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	0.55 0.40
Water		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Misc.		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.950
Weighted N =	0.020
L =	120 Ft.
H =	3.5 Ft.
S =	0.0447 Ft./Ft.
tc =	3.19 Minutes
I(25) =	7.208 In./Hr.
Q(25) =	1.10 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins										
Sub-basin No. : 7		Total Area = 23.522 S.F. = 0.54 Ac.								
Surface										
Structures	0	Total	0	S.F. =	0	S.F. =	0.00	Ac.	0.95	0.02
Pavement	1	Total	15.246	S.F. =	15.246	S.F. =	0.35	Ac.	0.95	0.02
Drives	0	L.F.	0.0	Width =	0	S.F. =	0.00	Ac.	0.95	0.02
Patios	0	Total	0	S.F. =	0	S.F. =	0.00	Ac.	0.95	0.02
Sidewalks	0	L.F.	0	Width =	0	S.F. =	0.00	Ac.	0.95	0.02
Lawn (0-2%)			0	S.F. =		S.F. =	0.00	Ac.	0.15	0.40
Lawn (2-5%)			8.276	S.F. =		S.F. =	0.19	Ac.	0.25	0.40
Lawn (5-10%)			0	S.F. =		S.F. =	0.00	Ac.	0.40	0.40
Lawn (>10%)			0	S.F. =		S.F. =	0.00	Ac.	0.55	0.40
Water			0	S.F. =		S.F. =	0.00	Ac.	1.00	0.00
Misc.			0	S.F. =		S.F. =	0.00	Ac.		

Weighted c :	0.704
Weighted N :	0.154
L =	270 Ft.
H =	10.0 Ft.
S =	0.0370 Ft./Ft.
tc =	10.17 Minutes
I(25) =	5.895 In./Hr.
Q(25) =	2.24 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins										
Sub-basin No. : 8		Total Area = 4.356 S.F. = 0.10 Ac.								
Surface										
Structures	0	Total	0	S.F. =	0	S.F. =	0.00	Ac.	0.92	0.02
Pavement	1	Total	4.356	S.F. =	4.356	S.F. =	0.10	Ac.	0.95	0.02
Drives	0	L.F.	0.0	Width =	0	S.F. =	0.00	Ac.	0.95	0.02
Patios	0	Total	0	S.F. =	0	S.F. =	0.00	Ac.	0.92	0.02
Sidewalks	0	L.F.	0	Width =	0	S.F. =	0.00	Ac.	0.95	0.02
Lawn (0-2%)			0	S.F. =		S.F. =	0.00	Ac.	0.15	0.40
Lawn (2-5%)			0	S.F. =		S.F. =	0.00	Ac.	0.25	0.40
Lawn (5-10%)			0	S.F. =		S.F. =	0.00	Ac.	0.40	0.40
Lawn (>10%)			0	S.F. =		S.F. =	0.00	Ac.	0.55	0.40
Water			0	S.F. =		S.F. =	0.00	Ac.	1.00	0.00
Misc.			0	S.F. =		S.F. =	0.00	Ac.		

Weighted c :	0.950
Weighted N :	0.020
L =	110 Ft.
H =	1.7 Ft.
S =	0.0155 Ft./Ft.
tc =	3.16 Minutes
I(25) =	7.208 In./Hr.
Q(25) =	0.68 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No. : 9	Total Area =	24.394 S.F. =	0.56 Ac.
Surface			C N
Structures	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Pavement	1 Total	17,860 S.F. =	17,860 S.F. = 0.41 Ac. 0.95 0.02
Drives	0 L.F.	0.0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Patios	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Lawn (0-2%)		0 S.F. =	0.00 Ac. 0.15 0.40
Lawn (2-5%)	6,534	S.F. =	0.15 Ac. 0.25 0.40
Lawn (5-10%)	0	S.F. =	0.00 Ac. 0.40 0.40
Lawn (>10%)	0	S.F. =	0.00 Ac. 0.55 0.40
Water	0	S.F. =	0.00 Ac. 1.00 0.00
Misc.	0	S.F. =	0.00 Ac.

Weighted c =	0.763
Weighted N =	0.122
L =	190 Ft.
H =	10.0 Ft.
S =	0.0526 Ft./Ft.
tc =	7.13 Minutes
I(25) =	6.661 In./Hr.
Q(25) =	2.84 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No. : 10	Total Area =	6.098 S.F. =	0.14 Ac.
Surface			C N
Structures	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.92 0.02
Pavement	1 Total	436 S.F. =	436 S.F. = 0.01 Ac. 0.95 0.02
Drives	0 L.F.	0.0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Patios	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.92 0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Lawn (0-2%)	5,663	S.F. =	0.13 Ac. 0.15 0.40
Lawn (2-5%)	0	S.F. =	0.00 Ac. 0.25 0.40
Lawn (5-10%)	0	S.F. =	0.00 Ac. 0.40 0.40
Lawn (>10%)	0	S.F. =	0.00 Ac. 0.55 0.40
Water	0	S.F. =	0.00 Ac. 1.00 0.00
Misc.	0	S.F. =	0.00 Ac.

Weighted c =	0.207
Weighted N =	0.373
L =	85 Ft.
H =	1.5 Ft.
S =	0.0176 Ft./Ft.
tc =	10.66 Minutes
I(25) =	5.807 In./Hr.
Q(25) =	0.17 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No. : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No. : 11 Total Area = 7.405 S.F. = 0.17 Ac.

						C	N
Surface							
Structures	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Pavement	1 Total	3,049 S.F.	=	3,049 S.F.	=	0.07 Ac.	0.95 0.02
Drives	0 L.F.	0.0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Lawn (0-2%)		0 S.F.	=		=	0.00 Ac.	0.15 0.40
Lawn (2-5%)		0 S.F.	=		=	0.00 Ac.	0.25 0.40
Lawn (5-10%)		4.356 S.F.	=		=	0.10 Ac.	0.40 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	0.55 0.40
Water		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Misc.		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.626
Weighted N =	0.244
L =	170 Ft.
H =	9.0 Ft.
S =	0.0529 Ft./Ft.
t_c =	9.35 Minutes
I(25) =	6.093 In./Hr.
Q(25) =	0.65 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No. : 12 Total Area = 21.780 S.F. = 0.50 Ac.

						C	N
Surface							
Structures	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Pavement	1 Total	5,227 S.F.	=	5,227 S.F.	=	0.12 Ac.	0.95 0.02
Drives	0 L.F.	0.0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Patios	0 Total	0 S.F.	=	0 S.F.	=	0.00 Ac.	0.92 0.02
Sidewalks	0 L.F.	0 Width	=	0 S.F.	=	0.00 Ac.	0.95 0.02
Lawn (0-2%)		0 S.F.	=		=	0.00 Ac.	0.15 0.40
Lawn (2-5%)		16.553 S.F.	=		=	0.38 Ac.	0.25 0.40
Lawn (5-10%)		0 S.F.	=		=	0.00 Ac.	0.40 0.40
Lawn (>10%)		0 S.F.	=		=	0.00 Ac.	0.55 0.40
Water		0 S.F.	=		=	0.00 Ac.	1.00 0.00
Misc		0 S.F.	=		=	0.00 Ac.	

Weighted c =	0.418
Weighted N =	0.309
L =	410 Ft.
H =	20.0 Ft.
S =	0.0488 Ft./Ft.
t_c =	16.06 Minutes
I(25) =	4.935 In./Hr.
Q(25) =	1.03 CFS

(Min. 5 minutes)

Project : First Church of God
 Project No : 96-3363-1

Developed Drainage Sub-Basins

Sub-basin No : 13	Total Area =		9.148 S.F. =	0.21 Ac.		
Surface					C	N
Structures	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02
Pavement	1 Total	1,742 S.F. =	1,742 S.F. =	0.04 Ac.	0.95	0.02
Drives	0 L.F.	0.0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02
Patios	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02
Lawn (0-2%)		0 S.F. =		0.00 Ac.	0.15	0.40
Lawn (2-5%)		7,405 S.F. =		0.17 Ac.	0.25	0.40
Lawn (5-10%)		0 S.F. =		0.00 Ac.	0.40	0.40
Lawn (>10%)		0 S.F. =		0.00 Ac.	0.55	0.40
Water		0 S.F. =		0.00 Ac.	1.00	0.00
Misc.		0 S.F. =		0.00 Ac.		

Weighted c =	0.383
Weighted N =	0.328
L =	175 Ft.
H =	4.0 Ft.
S =	0.0229 Ft./Ft.
tc =	13.24 Minutes
I(25) =	5.347 In./Hr.
Q(25) =	0.43 CFS

(Min. 5 minutes)

Developed Drainage Sub-Basins

Sub-basin No : 14	Total Area =		10.018 S.F. =	0.23 Ac.		
Surface					C	N
Structures	1 Total	10,018 S.F. =	10,018 S.F. =	0.23 Ac.	0.92	0.02
Pavement	1 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.95	0.02
Drives	0 L.F.	0.0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02
Patios	0 Total	0 S.F. =	0 S.F. =	0.00 Ac.	0.92	0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. =	0.00 Ac.	0.95	0.02
Lawn (0-2%)		0 S.F. =		0.00 Ac.	0.15	0.40
Lawn (2-5%)		0 S.F. =		0.00 Ac.	0.25	0.40
Lawn (5-10%)		0 S.F. =		0.00 Ac.	0.40	0.40
Lawn (>10%)		0 S.F. =		0.00 Ac.	0.55	0.40
Water		0 S.F. =		0.00 Ac.	1.00	0.00
Misc.		0 S.F. =		0.00 Ac.		

Weighted c =	0.920
Weighted N =	0.020
L =	410 Ft.
H =	20.0 Ft.
S =	0.0488 Ft./Ft.
tc =	4.47 Minutes
I(25) =	7.208 In./Hr.
Q(25) =	1.53 CFS

(Min. 5 minutes)

Project : First Church of God
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Developed Drainage Sub-Basins

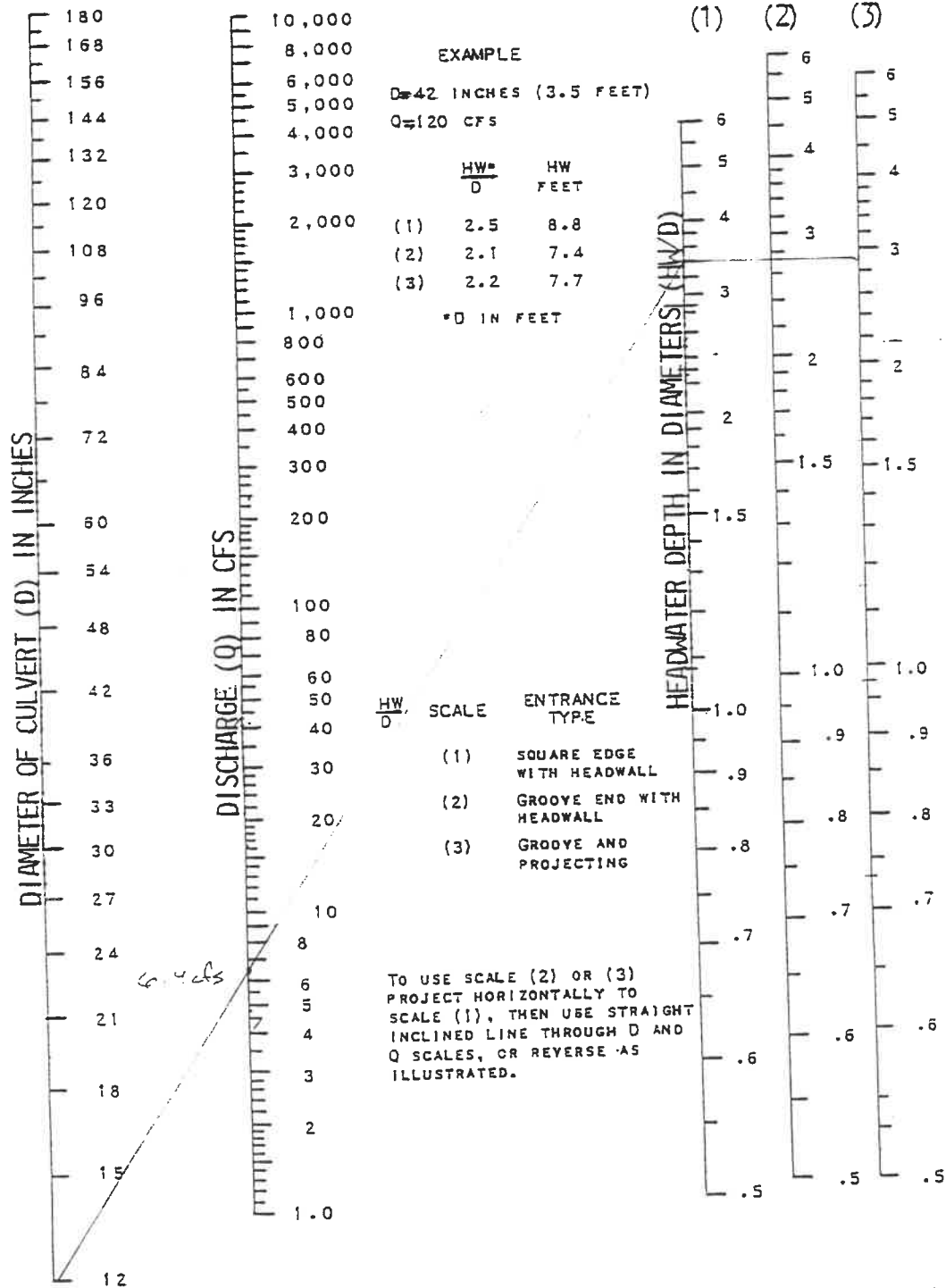
Sub-basin No.: 15	Total Area =	4.792 S.F. =	0.11 Ac.
Surface			C N
Structures	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Pavement	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Drives	0 L.F.	0 0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Patios	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Lawn (0-2%)	4.792	S.F. =	0.11 Ac. 0.15 0.40
Lawn (2-5%)	0	S.F. =	0.00 Ac. 0.25 0.40
Lawn (5-10%)	0	S.F. =	0.00 Ac. 0.40 0.40
Lawn (>10%)	0	S.F. =	0.00 Ac. 0.55 0.40
Water	0	S.F. =	0.00 Ac. 1.00 0.00
Misc.	0	S.F. =	0.00 Ac.

Weighted c =	0.150
Weighted N =	0.400
L =	60 Ft.
H =	1.0 Ft.
S =	0.0167 Ft./Ft.
tc =	9.49 Minutes (Min. 5 minutes)
I(25) =	6.056 In./Hr.
Q(25) =	0.10 CFS

Developed Drainage Sub-Basins

Sub-basin No.: 16	Total Area =	11.326 S.F. =	0.26 Ac.
Surface			C N
Structures	1 Total	11.326 S.F. =	11.326 S.F. = 0.26 Ac. 0.92 0.02
Pavement	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.95 0.02
Drives	0 L.F.	0 0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Patios	0 Total	0 S.F. =	0 S.F. = 0.00 Ac. 0.92 0.02
Sidewalks	0 L.F.	0 Width =	0 S.F. = 0.00 Ac. 0.95 0.02
Lawn (0-2%)	0	S.F. =	0.00 Ac. 0.15 0.40
Lawn (2-5%)	0	S.F. =	0.00 Ac. 0.25 0.40
Lawn (5-10%)	0	S.F. =	0.00 Ac. 0.40 0.40
Lawn (>10%)	0	S.F. =	0.00 Ac. 0.55 0.40
Water	0	S.F. =	0.00 Ac. 1.00 0.00
Misc.	0	S.F. =	0.00 Ac.

Weighted c =	0.920
Weighted N =	0.920
L =	410 Ft.
H =	20.0 Ft.
S =	0.0488 Ft./Ft.
tc =	4.47 Minutes (Min. 5 minutes)
I(25) =	7.208 In./Hr.
Q(25) =	1.72 CFS



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

FIG. 7-430.01 F