Drainage Study
for:
Ashley Place
Phase II
Vanderburgh Co. Indiana

January 19, 2000
revised February 20, 2000

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DRAINAGE CALCULATIONS FOR ASHLEY PLACE PHASE II
OUTER EICHOFF ROAD
VANDERBURGH COUNTY, INDIANA

SITE LOCATION:

The proposed site is located north of the existing Ashley Place (Phase I) and east of Eichoff Road.

GENERAL NOTES:

This property has several unique features which include being bound by a railroad track to the north, an abandoned oil well on site, an oil pipe line which is located along the west line, an old unmarked cemetery and existing grades that approach 18%. Extensive earthwork will be required to provide buildable lots as required by the proposed primary play.

EXISTING CONDITIONS:

Previous Use: Agricultural and wooded.

Approximately 2/3 of the proposed site is wooded with the remaining third available for agriculture.

Gross Area = 20.3 Acres

EXISTING DRAINAGE PATTERN:

By inspection of County Planametric maps, this area is part of an 82.39 acre watershed. 38.83 acres of this watershed is located north of the adjacent railroad tracks and enters onto the site via a 3' x 3' box. The remainding 43.56 enters the property by overland flow into a ditch that exits the property through an homemade 8' diameter culvert.

Existing Watershed Geometry:

Area: 82.39 Acres (gross)

Undeveloped Runoff Coefficient, C_U = 0.24 for a fallow field with brush with a slope between 2 and 5% as per Vanderburgh County Drainage Ordinance. It should be noted that a runoff coefficient of 0.40 is utilized to examine storm water runoff for the 25 year and 100 year events.

L = 4569 feet
H = 528 - 441 = 87 feet
t_c = 50 minutes as per attached nomograph (25 minutes x 2 for overland flow)

From the Rainfall Intensity as per Vanderburgh County Drainage Ordinance
i = 2.288"/hour for a 10 year storm.

Proposed Watershed Geometry:

Total area = 883,718.6 sf = 20.3 Acres

New Structures = 62 lots x 2000 sf/ea = 124,000.00 sf
Private driveways = 62 lots x 12' x 35.5' = 26,412.00 sf
Patios and walks = 62 lots x 100sf/ea = 6,200 sf
Roadways = 3964.76 lf x 29' = 114,978.21 sf
Sidewalks = 23,378 sf
Yard Area = 588,750.4

Developed runoff coefficient =

{(124,000 * 0.98) + (26,412 * 0.95) + (6,200 * 0.95) + (114,978.21 * 0.95) + (23,378 * 0.95) + (588,750 * 0.25)} / 883,718.6 = 0.49

Project: ASHLEY PLACE -PHASE II
Designer: Easley Engineering
Detention Facility Design Return Period: 25 yrs.
Release Rate Return Period: 10 yrs.
Watershed Area: 82.39 acres
Time of Concentration: 25 minutes
Rainfall Intensity: (i_u) = 2.288"/hr
Undeveloped Runoff Coefficient (C_U) = 0.24
Undeveloped Runoff Rate ($O=(C_U)(i_u)(A_u)$ = 0.24 * 2.288 * 82.39 = 45.24 CFS
Developed Runoff Coefficient (C_D)= 0.49
Area to be Developed (A_d) = 20.3

Storm Duration	Rainfall Intensity	Inflow Rate	Outflow Rate	Storage Rate	Required Storage
t_d (hrs)	i_d (in./hr)	$C_d i_d A_D$ (cfs)	$C_u i_u A_u$ (cfs)	$I(t_d)$-O (cfs)	$[I((t_d)$-0 $t_d]/12$ (acre-ft)
0.170	5.925	58.93	45.24	13.69	0.19
0.33	4.571	45.46	45.24	0.22	0.01
0.50	3.646	36.26	45.24	-	-
0.67	3.123	31.06	45.24	-	-
0.83	2.601	25.86	45.24	-	-
1.0	2.078	20.67	69.10	-	-
1.5	1.739	17.30	69.10	-	-
2.0	1.40	13.93	69.10	-	-

Peak storage requirement = 0.19 acre-feet = 8,451.78 cf cubic feet of storage.

Detention will be provided in the relocated ditch at the northwesterly corner of the propoerty. This detention facility will provide 9019 cubic feet of storage with a top water elevation of 447.50.

The 10 year undeveloped storm shall be released by a RCP culvert based on the following computer

generated anayisis

Allowable release = 45.24 cfs

$Q = CLH^{3/2}$
Q = 45.24
H = 447.50 - 444.00 = 3.50 feet
C = Coefficient = 3.32 as per the Handbook of Hydraulics by King and Braxter

L = 2.10 feet

The elevation of the 25 year event (emergency overflow elevation) was determined to be 474.84 based on the attached HEC II analysis for the 25 year event with a clear outflow structure.

Q = CiA
i_{25} = 2.60 as per the Vanderburgh County Drainage Ordinance
C = 0.40
A = 82.39 Acres
Q = 0.40 * 2.60 * 82.39 = 86.00 CFS

Release of this flow shall be over a concrete capped berm at the release structure. Details are provided on the plans.

Release for the 100 year event is provided over the same concrete capped berm.

A 100 year overflow weir will be provided to discharge the 100 year event based upon the following:

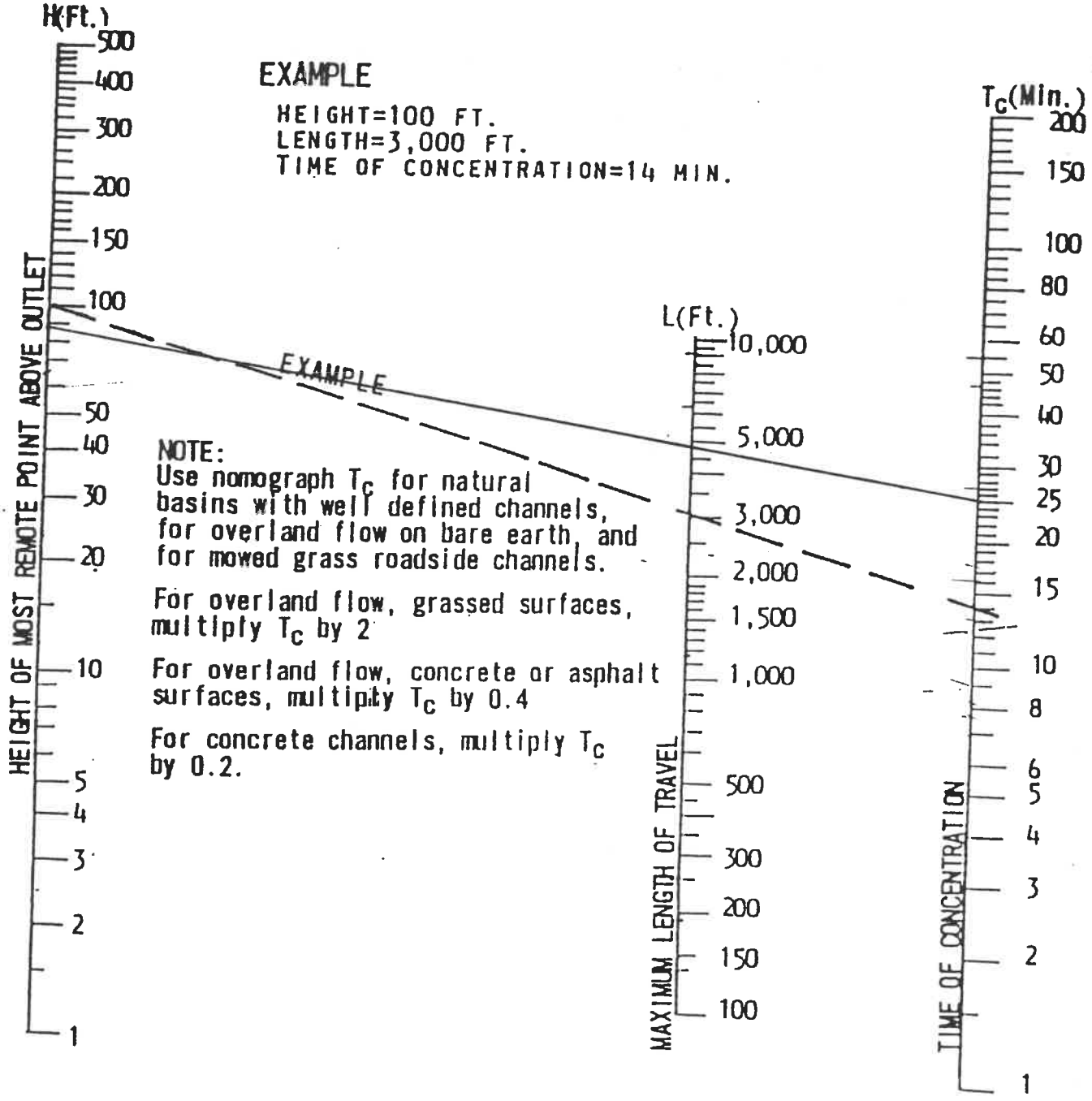
Assuming that the watershed located above the proposed site is developed to such an extent that the runoff coefficient increases from 0.24 to 0.40

Q = CiA

A = 82.39 Acres
i_{100} = 3.311"/hr
c = 0.40

Q_{100} = 0.40 * 3.311 * 82.39 = 109.12 cfs

C:\Projects\WPDOCS\6512.drg.wpd



TIME OF CONCENTRATION OF SMALL DRAINAGE BASINS

FOR EXAMPLE : SEE 3) PAGE 41

FIG. 7-425.04 A

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEY PLACE PHASE II 100 S ` DATE: JAN, 18,2000 SHEET: 1 OF

ENGINEER: ANDY EASLEY ENGINEERING DESIGN STORM: 25YR MANNINGS N: 0.013

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2	102	101	29	0.39	2.5	0.98	0.975	18.7	19	4.69	4.59	15	1.06	6.65	5.42	0.09	446.43	446.43	443.97	443.66	0.96	1.27
1	101	100	46.02	0.62	0.87	0.54	1.514	15.9	19	4.69	7.1	18	1.06	10.81	6.12	0.13	446.43	446.18	443.66	443.18	1.27	1.25

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEY PLACE PHASE II 200 S ` DATE: JAN 18,2000 SHEET: OF

ENGINEER: ANDY EASLEY ENGINEERING DESIGN STORM: 25YR MANNINGS N: 0.013

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
3	203	202	29	0.5	1.907	0.95	0.954	16.4	16	4.91	4.68	12	2.2	5.28	6.73	0.07	458.26	458.26	455.26	454.62	1.75	2.39
2	202	201	73.8	0.49	1.25	0.61	1.566	16	16	4.9	7.67	15	2.12	9.41	7.66	0.16	458.26	458.34	454.62	453.05	2.14	3.79
1	201	200	144	0.59	0.73	0.43	1.997	19.7	20	4.59	9.16	18	2.12	15.3	8.65	0.27	458.34	453	453.05	450	3.54	1.25

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEY PLACE PHASE II - SERIES 300 DATE: JAN 18,2000 SHEET: OF

ENGINEER: ANDY EASLEY ENGINEERING DESIGN STORM: 25YR MANNINGS N: 0.013

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
3	303	302	84.02	0.5	2.17	1.09	1.085	15	15	5.033	5.47	15	1.75	8.55	6.96	0.2	462.28	462.41	459.52	458.05	1.26	2.86
2	302	301	30.22	0.7	0.38	0.27	1.351	15	15	5.03	6.79	15	1.75	8.55	6.96	0.07	462.41	462.45	458.05	457.52	2.86	3.43
1	301	300	144	0.59	0.32	0.19	1.54	16	15	5.03	7.75	18	1.75	13.9	7.86	0.3	462.45	456	457.52	455	3.18	1.25

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEYN PLACE - PHASE II SERIES 400 DATE: JAN 18,2000 SHEET: OF

ENGINEER: AEASLEY ENGINEERING, INC. DESIGN STORM: 25YR MANNINGS N: 0.013

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
6	406	405	78.5	0.66	0.51	0.34	0.337	15	15	5.033	1.7	12	0.44	2.36	3.01	0.43	476.98	477.2	473.98	473.64	1.75	2.3
5	405	404	115.3	0.56	0.24	0.13	0.471	15	15	5.03	2.37	12	0.5	2.52	3.21	0.6	477.2	479	473.64	476.06	2.3	1.69
4	404	402	414.6	0	0	0	0.471	15	15	0	2.37	12	2.33	5.44	6.92	1	479	466.64	476.06	463.4	1.69	1.99
						0	0															
7	407	403	34.3	0.47	1.58	0.74	0.74	16.4	16	4.91	3.63	15	0.76	5.63	4.59	0.12	468.46	468.45	465.21	464.95	1.75	1.74
3	403	402	60.7	0.74	0.31	0.23	0.97	15	16	4.91	4.76	15	3.8	12.59	10.26	0.1	468.45	466.64	464.95	462.64	2	2.5
8	408	402	34	0.33	*******	0.32	0.32	15	15	5.03	1.63	12	1	3.56	3.73	0.15	466.5	466.64	463	462.64	2.25	2.75
2	402	401	45.1	0.71	0.04	0.02	2.1	15	16	4.91	10.3	15	2.57	10.36	8.44	0.09	466.64	465.48	462.64	461.48	2.25	2.5
1	401	400	143.7	0.57	0.64	0.36	2.46	15.5	16	4.91	12.1	18	2.42	16.34	8.580.2	0.26	465.48	461	461.48	458	2.25	1.25

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEY PLACE PHASE II -500 SERIES DATE: JAN 18,2000 SHEET: OF

ENGINEER: EASLEY ENGINEERING, INC. DESIGN STORM: MANNINGS N:

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2	502	501	36	0.63	1.03	0.65	0.649	18.8	19	4.68	3.02	15	0.33	3.68	3	0.21	441.8	442.75	438.55	438.43	1.75	2.82
1	501	500	19	0.95	0.08	0.08	0.725	15	19	4.68	3.39	15	4.4	13.55	11.04	0.03	442.75	439.5	438.43	437.59	2.82	0.41

STORM SEWER DESIGN SHEET - RATIONAL METHOD

PROJECT: ASHLEY PLACE - PHASE II 600 SERIES DATE: JAN 18,2000 SHEET: OF

ENGINEER: AEASLEY ENGINEERING, INC. DESIGN STORM: 25YR MANNINGS N: 0.013

Line Number	Upstream Manhole	Downstream Manhole	Length (Ft)	C_i	A_i (Acres)	CA	ΣCA	t (min)	t_{cum} (min)	I (in/hr)	Q (CFS)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (CFS)	Velocity (Ft/Sec)	Travel Time (min)	Rim Elevation Upstream	Rim Elevation Downstream	Invert Elevation Upstream	Invert Elevation Downstream	Pipe Cover Upstream	Pipe Cover Downstream
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	601	600	17.85	0.95	0.11	0.1	0.105	15	15	5.033	0.53	12	12.8	12.73	16.21	0.01	442.63	439.84	439.63	437.59	1.75	1

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 101

AREA: 37918.55

		c=	n=
HOMES	4500.00	0.95	0.02
CONC. DRIVES & PATIO	2556.00	0.95	0.02
LAWN OR GREEN SPACE	16529.86	0.20	0.40
ROADS	12140.40	0.95	0.02
SIDEWALKS	2192.29	0.95	0.02

C= 0.62

N= 0.19

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 15.87

H= 12.00

L= 470.00

S= 0.0255

I25= 4.95

Q=CIA= 2.68468488

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 102

AREA: 109084.93

HOMES	10000.00	c=	0.95	n=	0.02	
CONC. DRIVES & PATIO	2630.00	c=	0.95	n=	0.02	
LAWN OR GREEN SPACE	81270.04	c=	0.20	n=	0.40	
ROADS	13024.70	c=	0.95	n=	0.02	
SIDEWALKS	2160.19	c=	0.95	n=	0.02	

C= 0.39

N= 0.30

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 18.71

H= 27.00

L= 575.00

S= 0.0470

i25= 4.69

Q=CIA= 4.59505372

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 201

AREA: 32205.61

		c=	n=
HOMES	5250.00	0.95	0.02
CONC. DRIVES & PATIO	2982.00	0.95	0.02
LAWN OR GREEN SPACE	15471.55	0.20	0.40
ROADS	6662.06	0.95	0.02
SIDEWALKS	1840.00	0.95	0.02

C= 0.59

N= 0.20

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 19.77

H= 7.00

L= 520.00

S= 0.0135

i25= 4.59

Q=CIA= 2.00118805

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN	202	AREA	54862.95		
HOMES	10000.00	C=	0.95	n=	0.02
CONC. DRIVES & PATIO	2630.00	C=	0.95	n=	0.02
LAWN OR GREEN SPACE	33706.39	C=	0.20	n=	0.40
ROADS	6756.35	C=	0.95	n=	0.02
SIDEWALKS	1770.21	C=	0.95	n=	0.02
C=	0.49				
N=	0.25				
$t_c = 0.827 \times (N \times L)/(S)^{1/2}$					16.45
H=	10.71				
L=	397.00				
S=	0.0270				
I25=	4.90				
Q=CIA=	3.01919304				

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 203

AREA: 83104.93

		c=	n=
HOMES	14000.00	0.95	0.02
CONC. DRIVES & PATIO	3682.00	0.95	0.02
LAWN OR GREEN SPACE	49890.34	0.20	0.40
ROADS	12438.05	0.95	0.02
SIDEWALKS	3094.54	0.95	0.02

C= 0.50

N= 0.25

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 16.37

H= 20.00

L= 485.00

S= 0.0412

I25= 4.91

Q=CIA= 4.68140011

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 301

AREA: 13799.53

		c=	n=
HOMES	2250.00	0.95	0.02
CONC. DRIVES & PATIO	1278.00	0.95	0.02
LAWN OR GREEN SPACE	6624.30	0.20	0.40
ROADS	2858.49	0.95	0.02
SIDEWALKS	788.74	0.95	0.02

C= 0.59

N= 0.20

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 13.4 - 15 minimum

H= 4.00

L= 248.00

S= 0.0161

I25= 5.03

Q=CIA= 0.9406632

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 302

AREA: 16677.72

		c=	n=
HOMES	2000.00	0.95	0.02
CONC. DRIVES & PATIO	852.00	0.95	0.02
LAWN OR GREEN SPACE	5554.51	0.20	0.40
ROADS	7267.89	0.95	0.02
SIDEWALKS	1003.32	0.95	0.02

C= 0.70

N= 0.15

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 11.4 - 15 minimum

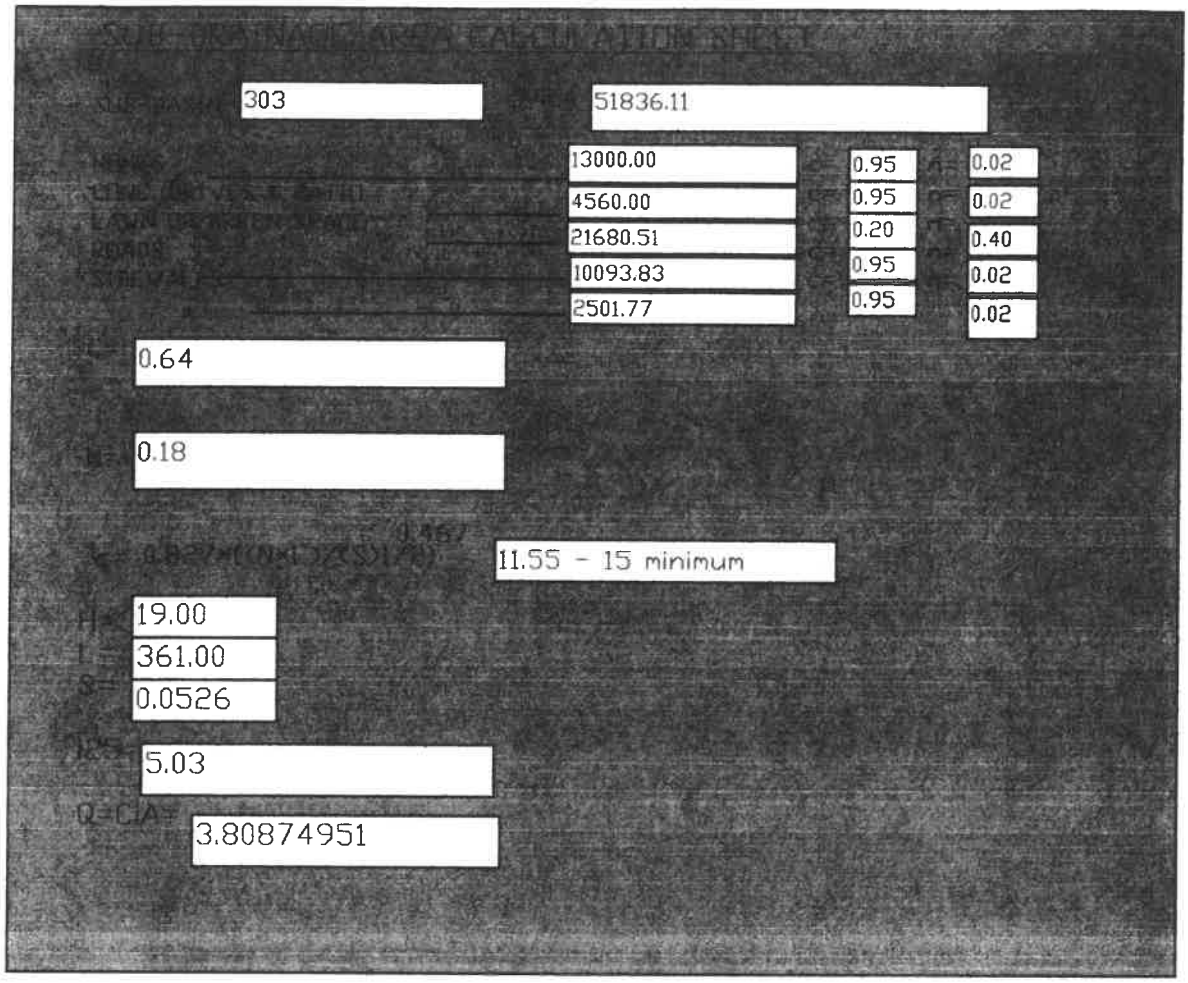
H= 15.80

L= 380.00

S= 0.0416

i25= 5.03

Q=CiA= 1.34937186


303
51836.11
13000.00
4560.00
21680.51
10093.83
2501.77
0.95
0.95
0.20
0.95
0.95
0.02
0.02
0.40
0.02
0.02
0.64
0.18
11.55 - 15 minimum
19.00
361.00
0.0526
5.03
3.80874951

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 401

AREA: 28039.33

HOMES	4500.00	c=	0.95	n=	0.02
CONC. DRIVES & PATIO	2556.00	c=	0.95	n=	0.02
LAWN OR GREEN SPACE	14061.59	c=	0.20	n=	0.40
ROADS	5415.17	c=	0.95	n=	0.02
SIDEWALKS	1506.57	c=	0.95	n=	0.02

C= 0.57

N= 0.21

$t_c = 0.827 \times (N \times L)^{0.467} / (S)^{1/2}$ = 15.54

H= 15.00

L= 460.00

S= 0.0326

I25= 4.98

Q=CIA= 1.83962435

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 402

AREA: 1887.16

		c=	n=
HOMES	0.00	0.95	0.02
CONC. DRIVES & PATIO	0.00	0.95	0.02
LAWN OR GREEN SPACE	607.68	0.20	0.40
ROADS	1099.09	0.95	0.02
SIDEWALKS	180.39	0.95	0.02

C= 0.71

N= 0.14

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 3.39 - 15 minimum

H= 2.00

L= 35.00

S= 0.0571

I25= 5.03

Q=CiA= 0.15449349

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 403 AREA: 13575.18

		C=	n=
HOMES	2250.00	0.95	0.02
CONC. DRIVES & PATIO	1278.00	0.95	0.02
LAWN OR GREEN SPACE	3861.68	0.20	0.40
ROADS	4965.93	0.95	0.02
SIDEWALKS	1219.57	0.95	0.02

C= 0.74

N= 0.13

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 10.14 - 15 minimum

H= 15.00
L= 344.00
S= 0.0436

I25= 5.03

Q=CIA= 1.15543677

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 405

AREA: 10825.19

HOMES	0.00	c=	0.95	n=	0.02
CONC. DRIVES & PATIO	0.00	c=	0.95	n=	0.02
LAWN OR GREEN SPACE	5630.42	c=	0.20	n=	0.40
ROADS	4250.76	c=	0.95	n=	0.02
SIDEWALKS	944.02	c=	0.95	n=	0.02

C= 0.56

N= 0.22

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 10.47 - 15 minimum

H= 5.00

L= 175.89

S= 0.0284

I25= 5.03

Q=CIA= 0.70

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 406

AREA: 22288.32

HOMES	4000.00	C=	0.95	n=	0.02
CONC. DRIVES & PATIO	852.00	C=	0.95	n=	0.02
LAWN OR GREEN SPACE	8637.99	C=	0.20	n=	0.40
ROADS	7264.47	C=	0.95	n=	0.02
SIDEWALKS	1533.86	C=	0.95	n=	0.02

C= 0.66

N= 0.17

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ 12.43 - 15 minimum

H= 11.00

L= 347.00

S= 0.0317

I25= 5.03

Q=CIA= 1.70

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 407

AREA: 68838.07

		c=	n=
HOMES	10000.00	0.95	0.02
CONC. DRIVES & PATIO	2630.00	0.95	0.02
LAWN OR GREEN SPACE	44211.44	0.20	0.40
ROADS	9646.92	0.95	0.02
SIDEWALKS	2349.71	0.95	0.02

C= 0.47

N= 0.26

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 16.38

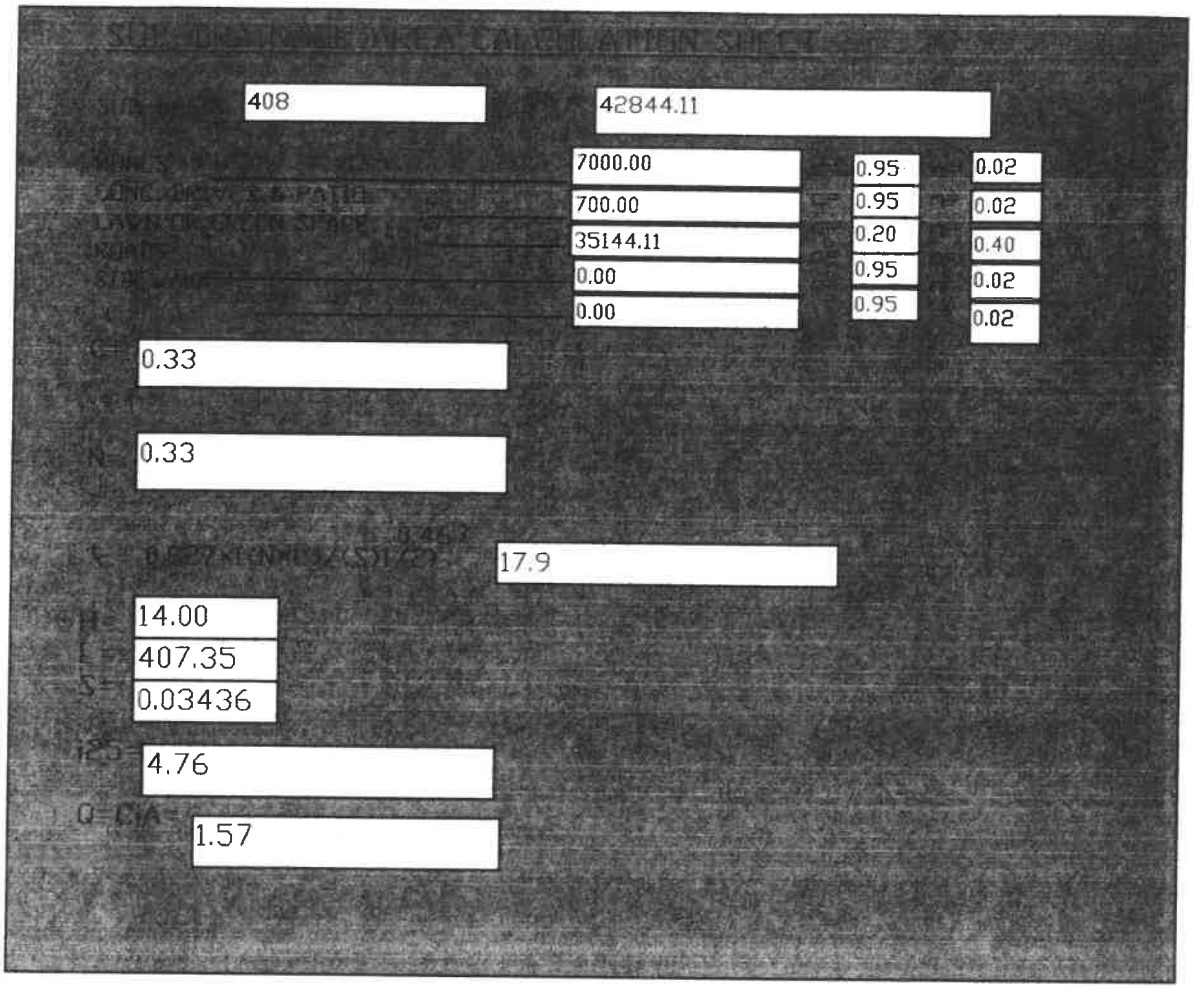
H= 16.00

L= 439.00

S= 0.0364

i25= 4.91

Q=CIA= 3.63


408
42844.11
7000.00
700.00
35144.11
0.00
0.00
0.95
0.95
0.20
0.95
0.95
0.02
0.02
0.40
0.02
0.02
0.33
0.33
17.9
14.00
407.35
0.03436
4.76
1.57

SUB-DRAINAGE AREA CALCULATION SHEET

SUB-BASIN: 502

AREA: 44813.93

		c=	n=
HOMES	8000.00	0.95	0.02
CONC. DRIVES & PATIO	2104.00	0.95	0.02
LAWN OR GREEN SPACE	19292.90	0.20	0.40
ROADS	13011.03	0.95	0.02
SIDEWALKS	2406.00	0.95	0.02

C= 0.63

N= 0.18

$t_c = 0.827 \times [(N \times L)/(S)^{1/2}]^{0.467}$ = 18.75

H= 13.20

L= 638.60

S= 0.0207

i25= 4.68

Q=CiA= 3.01939058

SEWER PIPES

Enter up to 10 pipes.
Enter <Return> only for flowrate and diameter to end.

FLOWRATE (CFS)	DIAMETER (IN)	FRICTION (FT^1/6)	SLOPE (%)	VELOCITY (FPS)
45.24	29.30	0.0130	1.38	9.66
48.18	30.00	0.0130	1.38	9.82

<Shift> <Prt Sc> print <Return> repeat <Space Bar> back to menu