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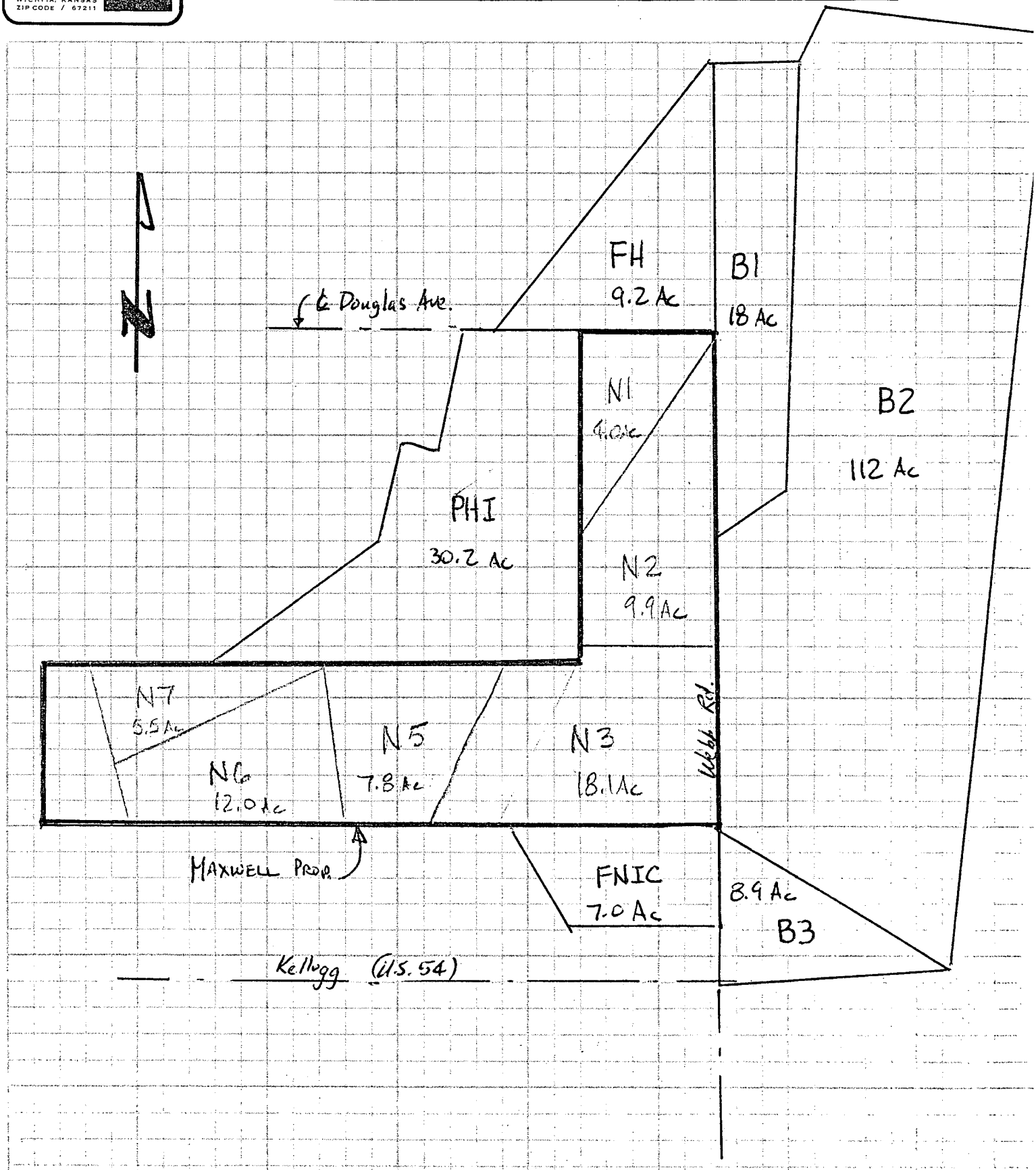
Date 6/21/82 MHB Page ____ of ____

Project MAXWELL

Item EXISTING CONDITION DRAINAGE AREA MAP



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Date 4/16/82 MAB Page 2 of _____ 2A/16

Project MAXWELL

Item EXISTING O's

Equations Used

$$S = \frac{1000}{CN} - 10$$

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

$$Lag = \frac{L^{0.8}(S+1)^{0.7}}{1900\sqrt{Y}}$$

$$tc = \frac{(60)(Time)(Time)(Lag)}{0.6}$$

$$q_p = q_u A Q$$

S = Max. poss. retention (in)

Q = runoff in inches

Lag = lag time, hr

tc = time of conc, min

q_p = peak discharge per cfs/acre/in

q_u = peak runoff rate

P = 24 hr. rainfall (5 yr = 4.6", 100 yr = 7.8")

Y = watershed slope, %

L = hydraulic length, ft

Minimum t_c for calculation is 0.2 hr = 12 min.

Tt is calculated from subarea outlet to point of design, and rounded off to the nearest 0.25 hr.

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Date 4/15/82 Page 3 of

Project MAXWELL 78414-2

Item EXISTING COND Q's

3A/16

AREA B1

D.A. = 18.0 Ac.

D Soil

Est. 40% Imp. CN=95
60% Turf CN=80

$CN = (0.4)(95) + (0.6)(80) = 87$ ✓

24 hr $P_{100} = 7.8"$
$P_5 = 4.6"$

$S = 1.49"$ ✓

$Q_{100} = 6.26"$ ✓ $Q_5 = 3.19"$ ✓

$\ell = 1800'$

$Y = \frac{1382 - 1357}{1800} = 1.4\%$

H.L.M. = 1300' % HLM = 13/18 = 72%

$F_{HLM} = 0.65$ $F_{IMP} = 0.82$

Lag = 0.34 hr ✓

T_c = 17 min = 0.29 hr ⇒ 0.3 hr ✓

$T_t = 0$

$q_a = 658$ cfs/mi²/in

$q_{p_{100}} = \frac{658}{640} \times 18 \times 6.26 = 122$ cfs ✓ (115 %)

$q_{p_5} = \frac{658}{640} \times 18 \times 3.19 = 62$ cfs ✓ (59 %)

AREA B2

D.A. = 112.0 Ac.

D Soil

10% Imp CN=98
90% Turf CN=80

$CN = 98 \times 0.1 + 80 \times 0.90 = 81.8$ ⇒ USE B2

$S = 2.20"$ ✓

$Q_{100} = 5.67"$ ✓

$Q_5 = 2.72"$ ✓

$\ell = 3500'$

$Y = \frac{1382 - 1352}{3500} = 0.85\%$ ✓

H.L.M. = 0% (Open ditches)

$F_{HLM} = 1.0$ $F_{IMP} = 0.95$

Lag = 0.69 hr ✓

t_c = 34 min = 1.39 hr ⇒ use 1.5 hr ✓

$T_t = 0$

$q_a = 236$ cfs/mi²/in ✓

$q_{p_{100}} = \frac{236}{640} \times 112 \times 5.67 = 234$ cfs ✓

$q_{p_5} = \frac{236}{640} \times 112 \times 2.72 = 112$ cfs ✓

Check 1.25 hr

$q_{p_{100}} = \frac{271}{640} \times 112 \times 5.67 = 269$ cfs (115% more)

USE $q_{p_{100}} = 250$ cfs $q_{p_5} = 120$ cfs.

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Date 4-28-82 MWB Page 1 of 1

Project Maxwell Prop

Item Revised B3 Existing

4A/16

From field inspection 4/28/82

revise B3 to ~~to~~ 90% impervious.

DA = 9 Acres

D Soil

10% Turf CN = 80
90% Imp CN = 98

$CN = 0.1 \times 80 + 0.9 \times 98 = 96.$

$S = 0.42"$

$P_{100} = 7.8"$ $P_5 = 4.6"$ $P_2 = 3.5"$

$Q_{100} = 7.32"$ $Q_5 = 4.14"$ $Q_2 = 3.04"$

$l = 1200'$

$Y = \frac{1375 - 1358}{1200} = 1.4\%$

% HLM = 100%

$F_{imp} =$ ~~0.78~~ 0.80

$F_{HLM} =$ ~~0.5~~ 0.78

Lag = 0.16 hr

$T_c = 10.2$ min $\Rightarrow$ use 0.2 hr

$q_p = 1.24$ cfs/ac/in

$q_{p100} = 1.24 \times 7.32 \times 9 = 82$ cfs

$q_{p5} = 1.24 \times 4.14 \times 9 = 46$ cfs

$q_{p2} = 1.24 \times 3.04 \times 9 = 34$

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Date 4/28/82 MJB Page 1 of 1

Project Maxwell Prop.

Item Revised FNIC Existing.

5A/16

~~D.A.~~ =

Based on field ~~survey~~ inspection 4/28/82, add 125' x 550' to area

$$DA = 7 + \frac{125 \times 550}{43560} = 8.6 \text{ ac}$$

Est. imp area = 75%

D Soil

$CN = 0.75 \times 98 + 0.25 \times 80 = 94$

$S = 0.64$ in

$P_{100} = 7.8"$ $P_5 = 4.6"$ $P_2 = 3.5"$

$Q_{100} = 7.08"$ $Q_5 = 3.91"$ $Q_2 = 3.04"$

$\ell = 750'$

~~Imp~~ HLM = ~~0%~~ 100%

$F_{HLM} = 0.72$ $F_{imp} = 0.77$

Estimate 2% = Y

Lag = 0.10 hr

T_c = 6 min

Use T_c = 12 minute = 0.2 hr

Let $T_t = 0$ $q_p = 1.24$ cfs/ac/in

$q_{p100} = 1.24 \times 7.08 \times 8.6 = 76$ cfs

$q_{p5} = 1.24 \times 3.91 \times 8.6 = 42$ cfs

$q_{p2} = 1.24 \times 3.04 \times 8.6 = 32$ cfs

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Date 4/15/82 MWB Page 5 of _____

Project MAXWELL 78414-2

Item EXISTING COND. Q's

6A/16

AREA FH

Area = 9.2 Ac

D Soil

¼ Ac-lot = CN: 87

S = 1.49"

Q_{100} = 6.25" Q_5 = 3.19"

ℓ = 1400'

$Y = \frac{1382 - 1359}{1400} = 1.6\%$

Assume % HLM = 50% F_{HLM} = 0.78

% Imp = 38% F_{imp} = 0.82

Lag = 0.26 hr

T_c = 17 min ⇒ USE 0.3 hr

If T_t = 0

q_a = 658 cfs/mi²/in ~~(by interpolation)~~

$q_{p100} = \frac{658}{640} \times 9.2 \times 6.25 = 59$ cfs

$q_{p5} = \frac{658}{640} \times 9.2 \times 3.19 = 30$ cfs

AREA PHI

Area = 30.2 Ac

D Soil

40% Imp CN = 98
60% Turf CN = 80

CN = 0.4 x 98 + 0.6 x 80 = 87

S = 1.49"

Q_{100} = 6.25" Q_5 = 3.19"

$Y = \frac{11'}{425'} = 2.5\%$ (Avg. land slope)

Assume HLM = 50% F_{HLM} = 0.78

% Imp = 40% F_{imp} = 0.82

ℓ = 1500'

Lag = 0.09 hr

T_c = 5.8 min ⇒ USE 0.1 hr

BUT min. t_c = 15 min ⇒ USE 0.25 hr

$q_a = \frac{796 + 658}{2} = 727$ cfs/mi²/in OK

$q_{p100} = 6.25 \times 30.2 \times \frac{727}{640} = 214$ cfs

$q_{p5} = 3.19 \times 30.2 \times \frac{727}{640} = 109$ cfs

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Date 4/15/82 MWB Page 6 of _____

Project MAXWELL PROP

Item EXISTING COND Q.

7A/16

AREA N1

Area = 4.0 Ac.

D Soil

CN = 80

S = 2.50"

P_{100} = 7.8" P_5 = 4.6"

Q_{100} = 5.44" Q_5 = 2.54"

ℓ = 700'

Y = 1.65%

Lag = 0.19 hr

T_c = 18.6 min USE 0.3 hr

Based on T_t = 0

$q_{P_{100}} = \frac{658}{640} \times 4 \times 5.44 = 22$ cfs

$q_{P_5} = \frac{658}{640} \times 4 \times 2.54 = 10$ cfs

AREA N2

$\text{Area} = \frac{\left(\frac{550+970}{2}\right)(570)}{43560} = 9.9$ ac.

D Soil

CN = 80

S = 2.50"

Q_{100} = 5.44" Q_5 = 2.54"

ℓ = 1200'

Y = 1.6%

Lag = 0.29 hr

T_c = 29 min ⇒ 0.5 hr

Based on T_t = 0

$q_{P_{100}} = \frac{496}{640} \times 9.9 \times 5.44 = 42$ cfs

$q_{P_5} =$ " x " x 2.54 = 19.5 cfs

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Date 4/15/82 MJB Page 7 of _____

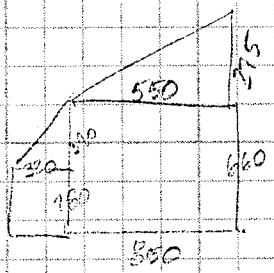
Project MAXWELL PROP

Item EXISTING COND. Q

8A 1/6

AREA N3

Area = 18.1 Ac



D Soil

CN = 80

S = 2.50"

Q_{100} = 5.44" Q_5 = 2.54"

l = 800'

Y = 2.4%

Lag = 0.17 hr

T_c = 17 min ⇒ 0.3 hr

Based on T_t = 0

$$q_{P100} = \frac{658}{640} \times 18.1 \times 5.44 = 101 \text{ cfs}$$

$$q_{P5} = \frac{658}{640} \times 18.1 \times 2.54 = 47 \text{ cfs}$$

AREA N5

Area = 7.8 Ac

D Soil

CN = 80

S = 2.50"

Q_{100} = 5.44" Q_5 = 2.54"

l = 825'

Y = 3 %

Lag = 0.16 hr

T_c = 16 min ⇒ 0.25 hr

Based on T_t = 0

$$q_{P100} = \frac{658}{640} \times 7.8 \times 5.44 = 44 \text{ cfs}$$

$$q_{P5} = \text{"} \times \text{"} \times 2.54\text{"} = 20 \text{ cfs}$$

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Date 4/20/82 MWB Page 8 of _____

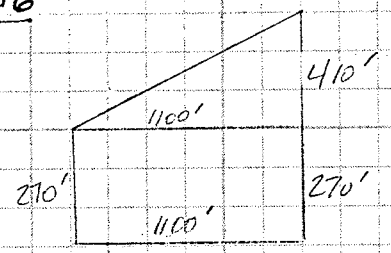
Project Maxwell Prop.

Item Existing Concl. Q

9A/16

AREA N6

DA = 12.0 ac



D Soil

CN = 80

S = 2.50"

P_{100} = 7.8" P_5 = 4.6"

Q_{100} = 5.44" Q_5 = 2.54"

Y = 2.75%

L = 750'

Lag = 0.15 hr

T_c = 15 min ⇒ 0.25 hr

BASED ON T_t = 0

$q_a = \frac{658}{640}$ cfs/ac/in = 1.03 cfs/ac/in

q_{P100} = 1.03 x 12 x 5.44 = 67 cfs

q_{P5} = " x " x 2.54 = 31 cfs

AREA N7

$DA = \frac{\frac{1}{2} \times 1050' \times 460'}{43560}$ = 5.5 ac.

D Soil

CN = 80

S = 2.50"

P_{100} = 7.8" P_5 = 4.6"

Q_{100} = 5.44" Q_5 = 2.54"

Y = 1.33%

L = 375'

Lag = 0.13 hr

T_c = 13 min = 0.21 hr

Based on T_t = 0

$q_a = \frac{727}{640}$ cfs/ac/in = 1.14 cfs/ac/in

q_{P100} = 1.14 x 5.5 x 5.44 = 34 cfs

q_{P5} = " x " x 2.54 = 16 cfs

MAXWELL ADDITION

EXISTING CONDITION

Table VI-2 TR 55 Form 1 - Hydrograph Computations- Basic Data SHT 1 OF 2

Subarea	Drainage Area, mi^2	Y[1]	CN[2]	PIA,[3] %	HLM,[4] %	l, ft
B1	18.0 Ac = 0.03	1.4%	87	40%	72%	1800'
B2	112.0 Ac = 0.18	0.85%	82	10%	0%	3500'
B3	8.9 Ac = 0.01	1.4%	96	90%	100%	1200'
FH	9.2 Ac = 0.01	1.6%	87	38%	50%	1400'
PHI	30.2 Ac = 0.05	2.5%	87	40%	50%	1500'
FNIC	8.6 Ac = 0.01	2%	89	75%	100%	750'
N1	4.0 Ac = 0.01	1.65%	80	0%	0%	700'
N2	9.9 Ac = 0.015	1.6%	↓	↓	↓	1200'
N3	18.1 Ac = 0.03	2.4%				800'
N5	7.8 Ac = 0.01	3%				825'

[1] Y = average watershed land slope, %
[2] CN = runoff curve number
[3] PIA = percent impervious area, %
[4] HLM = percent of hydraulic length modified, %
[5] l = hydraulic length of watershed, ft., distance from the point of design up the channel until it disappears when normal to the contours up to the divide.

MAXWELL 1KOP.

7/24/82

VI-25

10A

Maxwell Addition

EXISTING CONDITION

Table VI-2 TR 55 Form 1 - Hydrograph Computations- Basic Data SHT 2 OF 2

Subarea	Drainage Area, mi^2	Y[1]	CN[2]	PIA,[3] %	HLM,[4] %	l, ft
N6	12.0ac = 0.019	2.75%	80	0%	0%	750'
N7	5.5ac = 0.01	1.33%	80	0%	0%	375'

[1]Y = average watershed land slope, %
[2]CN = runoff curve number
[3]PIA = percent impervious area, %
[4]HLM = percent of hydraulic length modified, %
[5]l = hydraulic length of watershed, ft., distance from the point of design up the channel until it disappears when normal to the contours up to the divide.

MAXWELL REDP. 4/20/82

11A

MAXWELL ADDITION
EXISTING COND.

SHT 1 OF 2

ible VI-3 TR 55 Form 2 - Hydrograph Computations - Time of Concentration, Travel Time and Runoff

Sarea	L Basin Lag, hrs	F_{HLM} [1]	F_{IMP} [2]	T_c [3] hr	Length of Channel, ft	Average velocity ft/sec	T_t min	100-Yr Design Precip., in	100-Yr Q^4, in.	$^5C=DA\cdot Q$, mi^2-in
B1	0.34	0.65	0.82	0.3	2650	5	8.8 0.15hr	7.8	6.26	0.18
B2	0.69	1.0	0.95	1.5	2200	5	7.3 = 0.12hr		5.67	0.99
B3	0.16	0.78	0.8	0.2	2650	5	8.8 = 0.15min		7.32	0.10
FH	0.26	0.78	0.82	0.3	2600	5	0.15		6.25	0.09
PHI	0.09	0.78	0.82	0.1	860	5	3 = 0.04 hr		6.25	0.29
FNIC	0.10	0.72	0.77	0.2	2300'	5	7.67 = 0.13hr		7.08	0.10
N1	0.19	1.0	1.0	0.3	2100'	5	7 = 0.12hr		5.44	0.034
N2	0.29			0.5	1800'	5	6 = 0.10hr			0.084
N3	0.17			0.3	1800'	5	6 = 0.10hr			0.154
N5	0.16			0.25	1150'	5	3.8 = 0.06hr			0.066

*Minimum t_c = 15 min.

[1] Correction Factor for hydraulic length modified from Fig.3-4, p.3-8, TR 55
[2] Correction Factor for imperviousness from Fig. 3-5, p. 3-9, TR 55
[3] $T_c = 1.67 \cdot L \cdot F_{HLM} \cdot F_{IMP}$.
[4] Q is runoff obtained from Fig. 3-12, p. 3-35, FHWA Manual or Table 2-1, p. 2-3, TR 55 for the design storm precipitation
[5] This coefficient will be used in TR 55 Form 3.

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MAXWELL ADDITION

EXISTING CONDITIONS

SHT 2 OF 2

ble VI-3 TR 55 Form 2 - Hydrograph Computations - Time of Concentration, Travel Time and Runoff

barea	L Basin Lag,hrs	F_{HLM} [1]	F_{IMP} [2]	T_c [3]	Length of Channel, ft	Average velocity	T_t min	100-yr Design Precip.,in	100-yr Q [4], in.	[5] $C=DA \cdot Q$, mi^2-in
N6	0.15	1.0	1.0	0.25	300'	5	1.0 = 0.02hr	7.8	5.44	0.102
N7	0.13	1.0	1.0	0.21	0	—	0	7.8	5.44	0.046

Correction Factor for hydraulic length modified from Fig.3-4, p.3-8, TR 55
Correction Factor for imperviousness from Fig. 3-5, p. 3-9, TR 55
$T_c = 1.67 \cdot L \cdot F_{HLM} \cdot F_{IMP}$
Q is runoff obtained from Fig. 3-12, p. 3-35, FHWA Manual or Table 2-1, p. 2-3, TR 55 for the design storm precipitation
This coefficient will be used in TR 55 Form 3.

MAXWELL ADDITION

EXISTING COND 100-YR

SHT 1 OF 2

Table VI-4

TR 55 Form 3 - Hydrograph Computations

Subarea	T_c hr	T_t hr	C^1 mi²-in	Subarea hydrographs, cfs														
				11.0 hrs.	11.5 hrs.	12.0 hrs.	12.4 hrs.	12.6 hrs.	12.8 hrs.	13.0 hrs.	13.2 hrs.	13.5 hrs.	14.0 hrs.	14.5 hrs.	15.0 hrs.	16.0 hrs.	18.0 hrs.	20.0 hrs.
B1	0.3	0.25	0.18	3	6	50	77	42	26	17	14	11	8	7	6	5	3	3
B2	1.5	0	0.99	10	18	81	190	225	234	223	199	151	98	68	50	32	20	16
B3	0.2	0.25	0.10	2	3	40	32	16	11	8	7	5	4	3	3	2	2	1
FH	0.3	0.25	0.09	2	3	25	39	21	13	9	7	5	4	3	3	2	2	1
PHI	0.1	0	0.29	7	15	138	35	25	20	19	15	14	11	10	8	7	5	4
FNIC	0.3	0	0.10	2	4	66	18	12	9	7	6	5	4	3	3	2	2	1
N1	0.3	0	0.034	1	1	22	6	4	3	2	2	2	1	1	1	1	1	1
N2	0.5	0	0.084	2	3	36	26	16	11	8	6	5	4	3	3	2	2	1
N3	0.3	0	0.154	3	7	101	28	19	13	11	9	8	6	5	5	4	3	2
N5 ~~Total~~	0.25	0	0.066	2	3	42	9	7	5	4	4	3	3	2	2	2	1	1

1 DA x Q, mi2 - in, from Form 2

14A

MAXWELL ADDITION

EXISTING COND 100-YR

SHT 2-OF 2

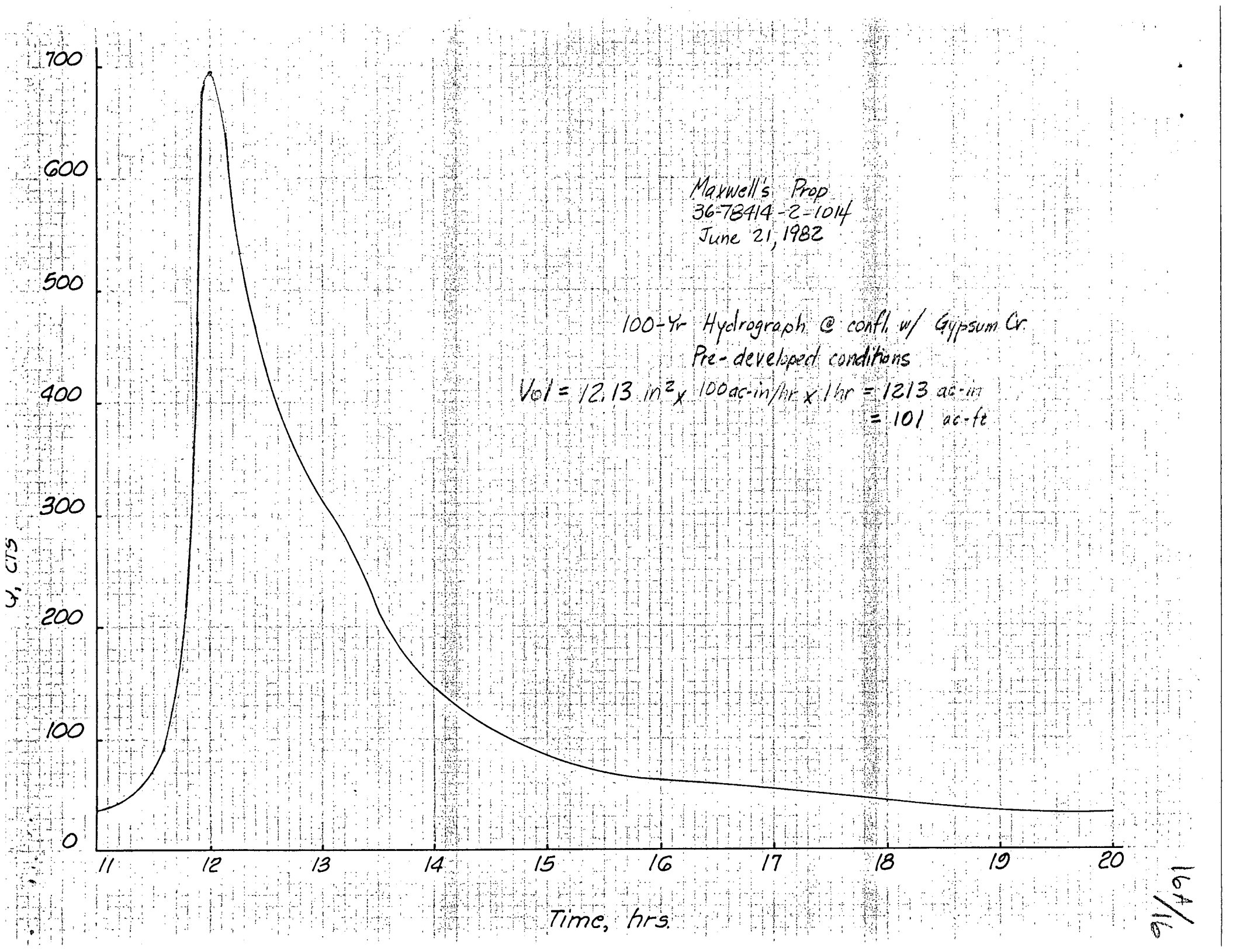
Table VI-4

TR 55 Form 3 - Hydrograph Computations

Subarea	T_c hr	T_t hr	C^1 mi²-in	Subarea hydrographs, cfs														
				11.0 hrs.	11.5 hrs.	12.0 hrs.	12.4 hrs.	12.6 hrs.	12.8 hrs.	13.0 hrs.	13.2 hrs.	13.5 hrs.	14.0 hrs.	14.5 hrs.	15.0 hrs.	16.0 hrs.	18.0 hrs.	20.0 hrs.
N6	0.25	0	0.102	2	5	65	12	11	8	7	6	5	4	3	3	2	2	1
N7	0.2	0	0.046	1	2	29	6	5	3	3	3	2	2	2	1	1	1	1
~~TOTAL~~			REVISED	~~35~~	~~69~~	~~669~~	~~468~~	~~398~~	351 ~~347~~	315 ~~312~~	~~275~~	~~314~~	~~147~~	~~109~~	~~87~~	~~62~~	~~42~~	~~33~~
TOTAL				37	70	695	478	403	356	318	278	216	149	110	88	62	44	33
Total																		

1c DA x Q, mi2 - in, from Form 2

15A


Maxwell's Prop
36-78414-2-1014
June 21, 1982
100-Yr Hydrograph @ confl. w/ Gypsum Cr.
Pre-developed conditions
Vol = 12.13 in² x 100 ac-in/hr x 1 hr = 1213 ac-in
= 101 ac-ft
Q, cfs
700
600
500
400
300
200
100
0
11
12
13
14
15
16
17
18
19
20
Time, hrs.
16A/16

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Date 6-22-82 MB Page ____ of ____ 10/11

Project MAXWELL ADDITION

Item HYDRAULIC DESIGN

ASSUMPTIONS

1. PIPE FLOW IN PRESSURE FLOW, i.e., H.G.L ELEV IS HIGHER THAN TOP OF PIPE.

2. INLET CAPACITY IS SUFFICIENT TO INTERCEPT FLOW AND CONVEY IT TO PIPE

3.

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Project MAXWELL ADDITION

Item HYDRAULIC DESIGN

29/11

NODES 120-100

Intercepts flow beneath Douglas Avenue.

$Q_{100} = 31$ cfs from Area FH

Area 2NW & 1W will sheet flow overland and outfall into PHL Addition Floodway Reserve.

Computer printout for hydraulics follows. Conduits are designed for 100-year flow.

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Project MAXWELL ADDITION

Item HYDRAULIC DESIGN

NODES 240-200

NODE 240 INTERCEPTS FLOW FROM AREA B1 & 1E.

NODE 230 INTERCEPTS FLOW FROM AREA B2 & 2E, & A PORTION FROM AREA B3.

HYDROLOGY SUMMARY

SUBAREA	AREA, AC.	Q_{100}, CFS	T_c, min.
B1	18.0	122	17
B2	112.0	234	84
1E	1.6	14	15
2E	5.0	45	15
B3*	9.0	75	15

* B3 drains both across Webb into SWS 106 & north in E. ditch of Webb Road. Existing 18" pipe across Webb has capacity = 7 cfs. for B3, Q_{100} = 82 cfs. Therefore, 82-7 = 75 cfs is the flow amount noted in the table.

On the following pages are a hydrograph combination table for peak flows and a computer printout for hydraulics calculation.

The hydrograph indicates Q_p = 79 for node 240. We'll use the higher value for area B1 of Q_{100} = 122 cfs.

The conduits are designed to carry 100-yr flow.

Table VI-4

TR 55 Form 3 - Hydrograph Computations

Subarea	T_c hr	T_t	C^1	Subarea hydrographs, cfs													
				11.0 hrs.	11.5 hrs.	12.0 hrs.	12.4 hrs.	12.6 hrs.	12.8 hrs.	13.0 hrs.	13.2 hrs.	13.5 hrs.	14.0 hrs.	14.5 hrs.	15.0 hrs.	16.0 hrs.	18.0 hrs.	20.0 hrs.
B1	0.3	0.25	0.18	3	6	50	77	42	26	17	14	11	8	7	6	5	3	3
1E	0.2	0	0.02	0	1	12	2	2	1	1	1	1	1	1	1	0	0	0
NODE 240				3	7	62	79	46	27	18	15	12	9	8	7	5	3	3
B2	1.5	0	0.99	10	18	81	190	225	234	223	199	151	98	68	50	32	20	16
2E	0.2	0	0.06	1	3	36	8	6	4	4	3	3	2	2	2	1	1	1
B3	0.2	0.25	0.10	2	3	40	32	16	11	8	7	5	4	3	3	2	2	1
NODE 230				13	24	157	230	247	249	235	209	159	104	73	55	35	23	18
~~Total~~																		

[1] DA x Q, mi2 - in, from Form 2

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Project HEXWELL ADDITION 36-78414-2-1014

Item HYDRAULIC DESIGN

TC/11

NODES 330-210

Node 320 intercepts flow from SWS 106. SWS 106 is a 36" RCP on 0.32% slope. We will continue to use 36" RCP at much steeper grade (≈1.25%), which will increase the capacity. Additional flow in excess of capacity will sheet flow through drives, etc., to floodway.

NODES 330/320 collect flow from Area 4E. INLET(S) 330 drains 82% of the area, and inlet(s) 320 drain 18% of the area.

SUMMARY

	Q5 cfs	Q2 cfs
FNIC	42+7*	32 cfs+7*
4E	33	24

* Add 7 cfs for X-road flow from B3.

HYDRAULICS OUTPUT FOLLOWS

THE SYSTEM HAS SLIGHTLY INSUFFICIENT CAPACITY FOR 5-YR. SYSTEM WILL OPERATE BETWEEN 2-YR & 5-YR DESIGN STORMS. EXCESS WILL BE HANDLED OVERLAND BETWEEN BUILDINGS (IN DRIVES, FLUMES, ETC.

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Project MAXWELL ADDITION

Item HYDRAULIC DESIGN

10C/11

NODES 420-400

DESIGN FOR 5-YR FLOW

AREA 4-W ONLY

Q_5 = 21 cfs

NODE 420 drains 80% of area
NODE 410 drains 20% of area

HYDRAULICS OUTPUT ON NEXT PAGE.

NODES 350-210 5-YR MWB 6/22/82

* * * H Y D R A U L I C S * * *

NODE	HYD-SLOPE (FT/FT)	FRICTION (FT)	BEND (FT)	TRANSITION (FT)	MANHOLE (FT)	DEFLECTION (FT)	JUNCTION (FT)	TOTAL (FT)	HYD-GL ELEVATION	DESIRED ELEVATION	DIFF. (FT)
350	.00540	1.1334	0.0000	0.0000	0.0000	0.0000	0.0000	1.1334	168.0650	171.0000	2.94
340	.00540	1.4572	0.0000	0.0000	.0373	.3731	.0270	1.8946	166.9316	170.0000	3.07
330	.00559	.2236	0.0000	.0203	0.0000	0.0000	.9543	1.1982	165.0369	165.0000	-.04
320	.00649	1.0383	0.0000	.0152	0.0000	.4747	.3358	1.8640	163.8387	165.0000	1.16
310	.00649	2.3361	0.0000	0.0000	.0551	.5509	.0325	2.9747	161.9747	166.0000	4.03
210	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	159.0000	162.0000	3.00

PROJECT 36-78414-2-1014 MAXWELL ADDITION DRAINAGE PLAN
NODES 350-210 5-YR MWB 6/22/82

STORM FREQUENCY = 5-YEAR

* * * H Y D R O L O G Y * * *

TRIBUTARY AREA									HYDROLOGY SUMMATION				CONDUIT DATA				
NODE	TO NODE	C	AREA (AC)	SLOPE (%)	LENGTH (FT)	TC(Ø) (MIN)	I(Ø) (IN/HR)	Q(Ø) (CFS)	TC (MIN)	I (IN/HR)	Q (CFS)	SUM Q (CFS)	SIZE	VELOCITY (FT/SEC)	LENGTH (FT)	TT (MIN)	TT+TC (MIN)
350	340	.90	8.60	0.00	0.0	15.00	5.22	49.00	15.00	5.22	49.00	49.00	36"	6.93	210.00	.50	15.50
340	330	0.00	0.00	0.00	0.0	0.00	0.00	0.00	15.50	5.15	0.00	49.00	36"	6.93	270.00	.65	16.15
330	320	.90	5.40	0.00	0.0	15.00	5.22	27.00	16.15	5.07	26.23	75.23	42"	7.82	40.00	.09	16.24
320	310	.90	1.20	0.00	0.0	15.00	5.22	6.00	16.24	5.06	5.82	81.05	42"	8.42	160.00	.32	16.56
310	210	0.00	0.00	0.00	0.0	0.00	0.00	0.00	16.56	5.02	0.00	81.05	42"	8.42	360.00	.71	17.27

PROJECT 36-78414-2-1014 MAXWELL ADDITION DRAINAGE PLAN
NODES 210-240 100-YR MWB 6/22/82

641

STORM FREQUENCY = 100-YEAR

* * * H Y D R O L O G Y * * *

TRIBUTARY AREA									HYDROLOGY SUMMATION				CONDUIT DATA			
NODE	TO NODE	C	AREA (AC)	SLOPE (%)	LENGTH (FT)	TC(Ø) (MIN)	I(Ø) (IN/HR)	Q(Ø) (CFS)	TC (MIN)	I (IN/HR)	Q (CFS)	SUM Q (CFS)	SIZE	VELOCITY (FT/SEC)	LENGTH (FT)	TT (MIN)	TT+TC (MIN)
240	235	.75	18.00	0.00	0.0	17.00	8.55	122.00	17.00	8.55	122.00	122.00	60"	6.21	825.00	2.21	19.21
235	230	0.00	0.00	0.00	0.0	0.00	0.00	0.00	19.21	8.15	0.00	122.00	60"	6.21	50.00	.13	19.35
230	210	.50	121.00	0.00	0.0	84.00	3.02	249.00	84.00	3.02	249.00	294.33	72"	10.41	500.00	.80	84.80
210	200	0.00	0.00	0.00	0.0	0.00	0.00	0.00	84.80	3.00	0.00	294.33	72"	10.41	30.00	.05	84.85

NODES 210-240 100-YR MWB 6/22/82

* * * H Y D R A U L I C S * * *

NODE	HYD-SLOPE (FT/FT)	FRICTION (FT)	BEND (FT)	TRANSITION (FT)	MANHOLE (FT)	DEFLECTION (FT)	JUNCTION (FT)	TOTAL (FT)	HYD-GL ELEVATION	DESIRED ELEVATION	DIFF. (FT)
240	.00219	1.8103	0.0000	0.0000	0.0000	0.0000	0.0000	1.8103	169.3767	170.8000	1.42
235	.00219	.1097	0.0000	0.0000	.0300	.1305	.0110	.2811	167.5664	169.0000	1.43
230	.00483	2.4149	0.0000	.1083	0.0000	.1305	3.0122	5.6659	167.2853	168.8000	1.51
210	.00483	.1449	0.0000	0.0000	.0841	.3662	.0242	.6194	161.6194	162.0000	.38
200	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	161.0000	162.0000	1.00

* * * HYDROLOGY * * *

TRIBUTARY AREA									HYDROLOGY SUMMATION					CONDUIT DATA				
POINT	TO POINT	C	AREA (AC)	SLOPE (%)	LEN (FT)	TC(O) (MIN)	I(O) (IN/HR)	Q(O) (CFS)	TC (MIN)	I (IN/HR)	Q (CFS)	SUM Q (CFS)	SUM A (AC)	SIZE	VELOCITY (FT/SEC)	LENGTH (FT)	TT (MIN)	TT + TC (MIN)
120	110	.50	9.20	0.	0	17.0	8.55	59.0	17.0	8.55	59.0	59.0	9.2	42"	6.13	220	.6	17.6
110	100	0.	0.	0.	0	0.	0.	0.	17.6	8.43	0.	59.0	9.2	42"	6.13	380	1.0	18.6

PROJECT 36-78414-2-1014 MAXWELL ADDITION
NODES 120-100 100-YR MWB 6-9-82

* * * HYDRAULICS * * *

POINT	HYD-SLOPE (FT/FT)	FRICTION (FT)	BEND (FT)	TRANSITION (FT)	MANHOLE (FT)	DEFLECTION (FT)	JUNCTION (FT)	TOTAL (FT)	HYD-GL ELEVATION	DESIRED ELEVATION	DIFF. (FT)
120	.00344	.7566	0.	0.	0.	0.	0.	.7566	172.40	173.40	1.00
110	.00344	1.3068	0.	0.	.0292	.2920	.0172	1.6452	171.65	174.00	2.35
100	0.	0.	0.	0.	0.	0.	0.	0.	170.00	170.00	0.

```
File = STORM/INP        LRL = 70        REC = ASCII

  100  J   155.00    400
  110  T  PROJECT 36-78414-2-1014    MAXWELL ADDITION DRAINAGE PLAN
  120  T  NODES 400-420          5-YR          MWB          6/11/82
  130  I  420   .90    3.40    0.00    0.00   17.00   15.00  161.00
  140  I  410   .90     .90    0.00    0.00    4.00   15.00  161.00
  150  M  400   156.00
  160  P  420  410   30.00  18   .013    0.00    0.00
  170  P  410  400  280.00  24   .013    0.00    0.00
  180  E
EOF
```

PROJECT 36-78414-2-1014 MAXWELL ADDITION DRAINAGE PLAN
NODES 400-420 5-YR MWB 6/11/82

STORM FREQUENCY = 5-YEAR

* * * H Y D R O L O G Y * * *

TRIBUTARY AREA									HYDROLOGY SUMMATION				CONDUIT DATA				
NODE	TO NODE	C	AREA (AC)	SLOPE (%)	LENGTH (FT)	TC(0) (MIN)	I(0) (IN/HR)	Q(0) (CFS)	TC (MIN)	I (IN/HR)	Q (CFS)	SUM Q (CFS)	SIZE	VELOCITY (FT/SEC)	LENGTH (FT)	TT (MIN)	TT+TC (MIN)
420	410	.90	3.40	0.00	0.0	15.00	5.22	17.00	15.00	5.22	17.00	17.00	18"	9.62	30.00	.05	15.05
410	400	.90	.90	0.00	0.0	15.00	5.22	4.00	15.05	5.21	3.99	20.99	24"	6.68	280.00	.70	15.75

NODES 400-420 5-YR MWB 6/11/82

* * * H Y D R A U L I C S * * *

NODE	HYD-SLOPE (FT/FT)	FRICTION (FT)	BEND (FT)	TRANSITION (FT)	MANHOLE (FT)	DEFLECTION (FT)	JUNCTION (FT)	TOTAL (FT)	HYD-GL ELEVATION	DESIRED ELEVATION	DIFF. (FT)
420	.02619	.7857	0.0000	0.0000	0.0000	0.0000	0.0000	.7857	158.1386	161.0000	2.86
410	.00861	2.4116	0.0000	.1487	0.0000	0.0000	-.2074	2.3529	157.3529	161.0000	3.65
400	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	155.0000	156.0000	1.00

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Project MAXWELL ADDITION 36-78414-2-1014

Item DETENTION POND.

REQUIREMENTS

STORAGE VOL ABOVE STATIC POOL = 7 AC-FT

MAX. DISCHARGE RATE AT H.W. ELEV = 695 CFS

SET STATIC POOL = EXISTING EL = 140.0 ±

SET BOTTOM OF POND AT 135.0 W/ 2:1 SIDE SLOPES

TRY TO MAINTAIN EXISTING 145.0 CONTOUR, & SLOPE AT 4:1 TO EDGE WATER.

SET DESIGN HIGH WATER AT 145.0 ±. (CAN GO UP TO 146 ±)

(NOTE: GYPSUM CREEK H.W. ELEV = 148.7)

SURF. AREA AT 140.0 (STATIC POOL) = 1.14 Ac

SURF. AREA " 145.0 = 1.93 Ac

VOLUME = $\frac{1.14+1.93}{2}$ (5) = 7.68 AC-FT

IF HEAD REQUIREMENT CAN BE KEPT IN 5 FT ± RANGE, SHOULD WORK WELL

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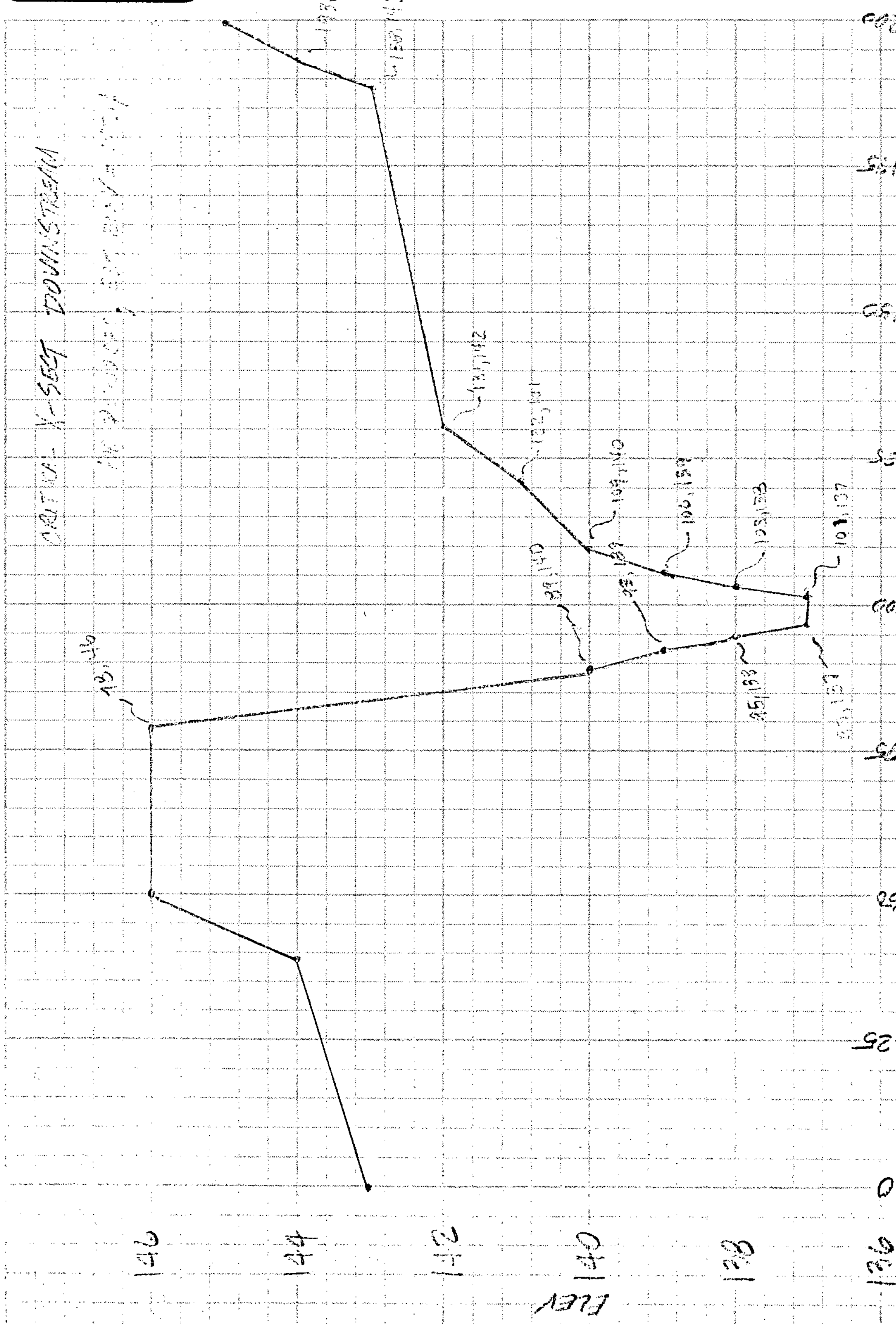
Project MAXWELL ADDITION 36-7844-2-1014

Item DETENTION POND



Elev.	Q	
138	18	2.
139	69	4.
140	164	5.
141	314	5.
142	615	6.
143	928	6.
144	1131	[illegible]

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Project MAYFIELD ADDITION 36-78HWL-2-1014

Item DETENTION POND

DETERMINE PIPE SIZE:

Assumptions:

H.W. Elev = 146
H.W. Elev = 145 Q=695
T.W. Elev = 142.4

H = 2.6 FT = HW-TW

DIA.	INLET CONTROL Q/PIPE	INLET CONTROL NO. REQ'D.	OUTLET CONTROL Q/PIPE	OUTLET CONTROL NO. REQ'D
48	105	7	125	6
42	88	8	95	8
36	70	10	65	11

7-48" RCP

DETERMINE RCB SIZE:

Assume 4' DEPTH

Inlet control: $\frac{Q}{B} = 30$ cfs

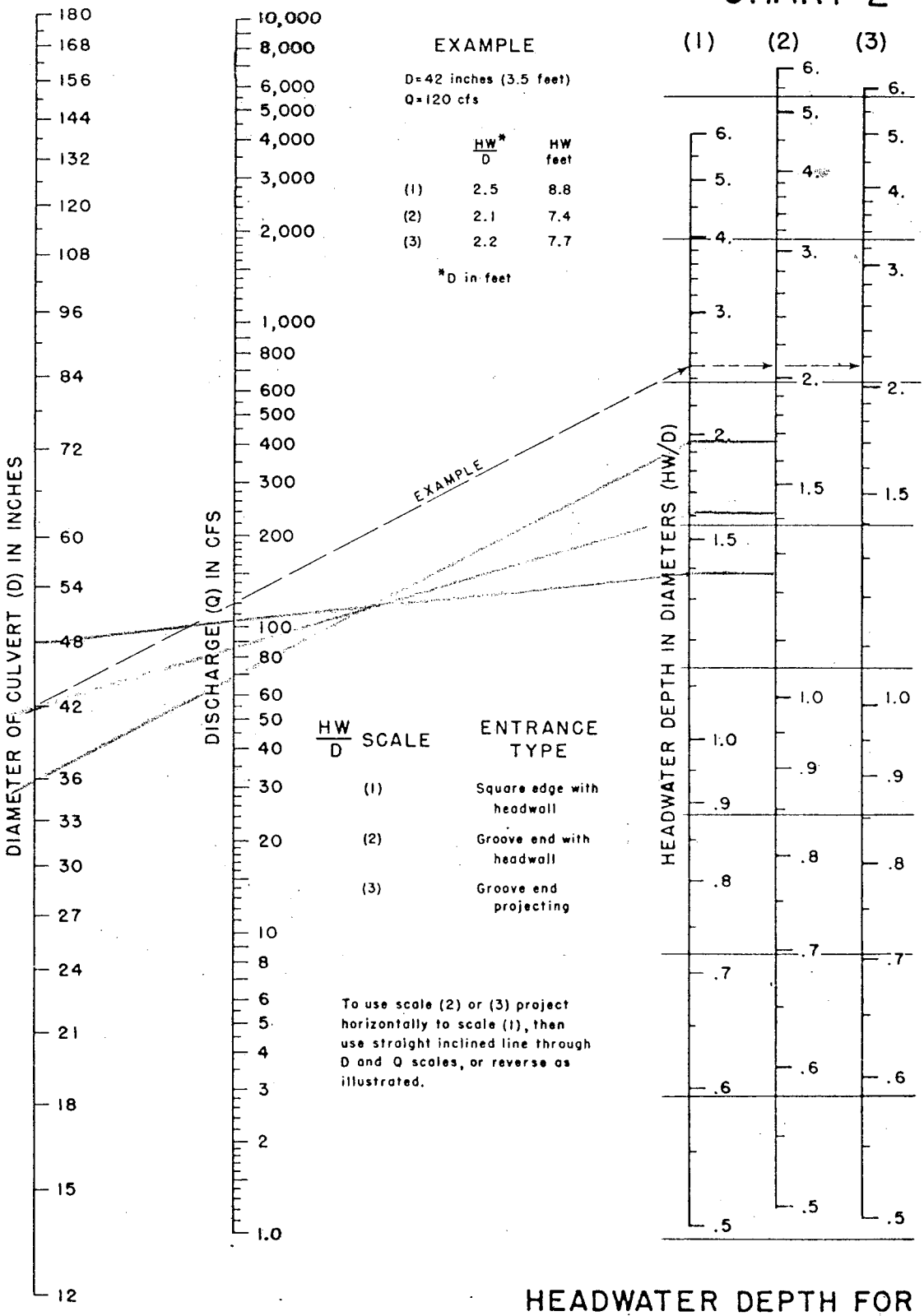
B = 23' 6-4x4 RCB OR 4-6x4 RCB OR 3-8x4 RCB

Outlet control: A = 65 ft²

4-4x4 RCB OR 2-8x4 RCB

4/8

CHART 2



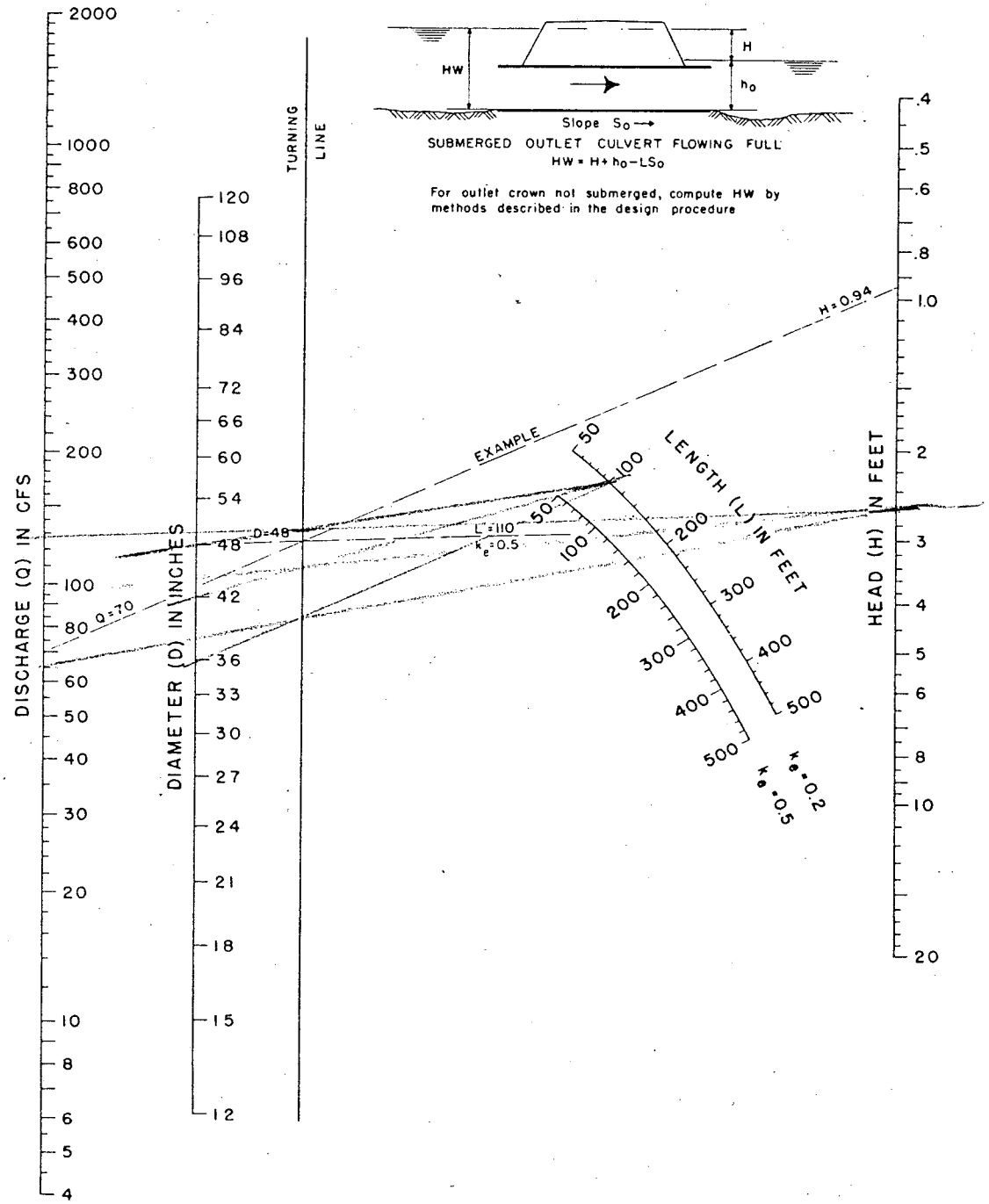
HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

5D/3

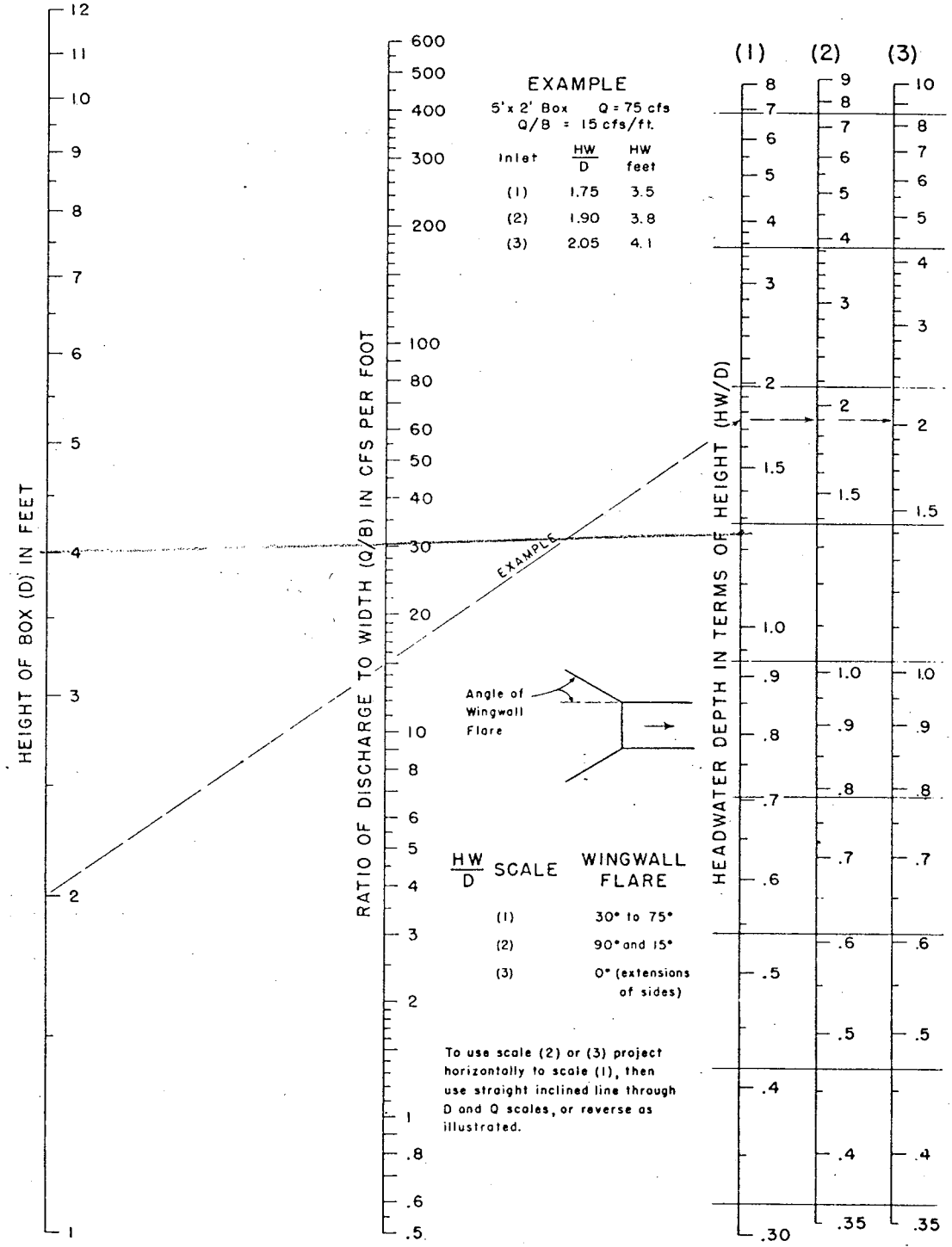
CHART 9



HEAD FOR CONCRETE PIPE CULVERTS FLOWING FULL n = 0.012

BUREAU OF PUBLIC ROADS JAN. 1963

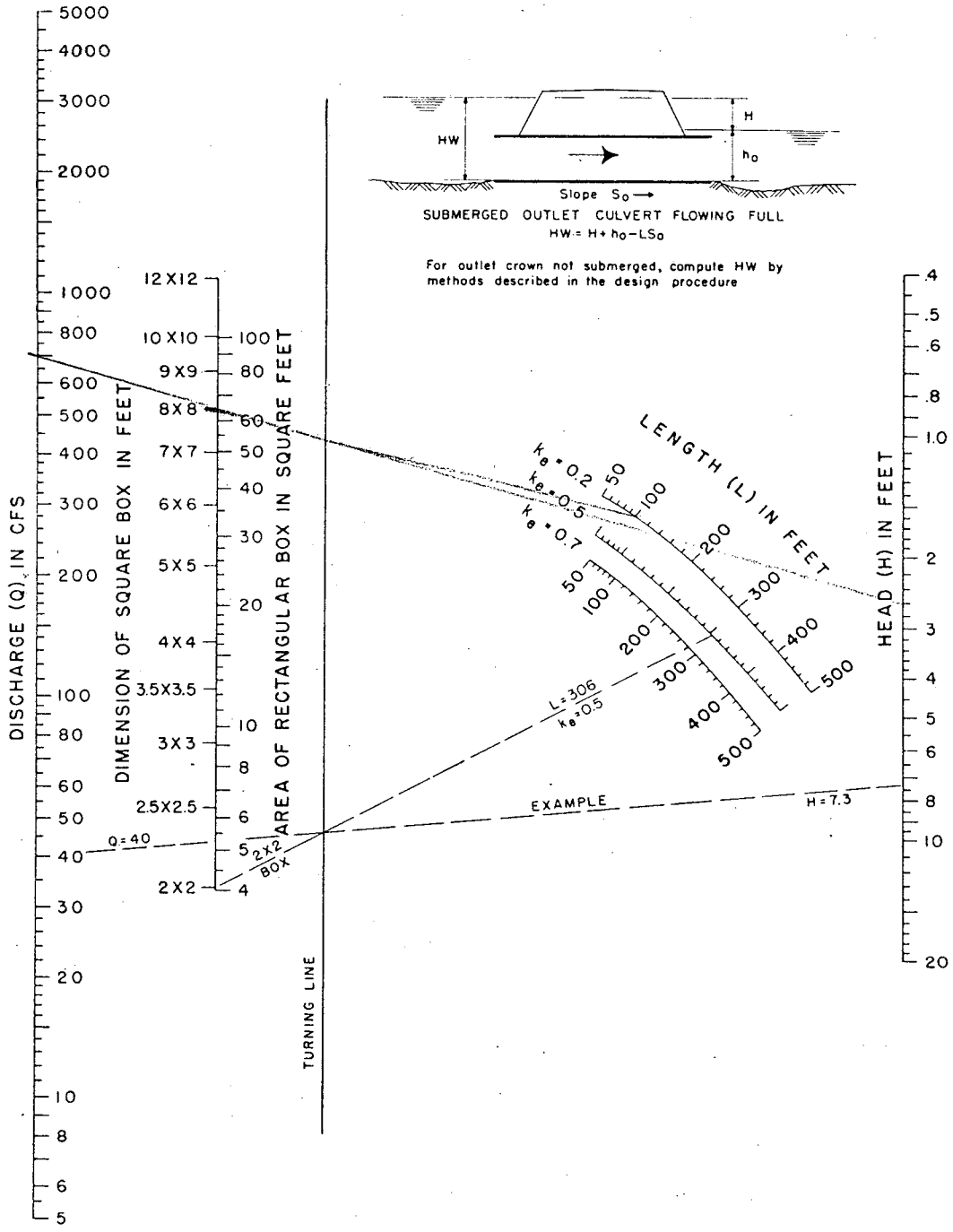
CHART 1



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

CHART 8



HEAD FOR CONCRETE BOX CULVERTS FLOWING FULL n = 0.012

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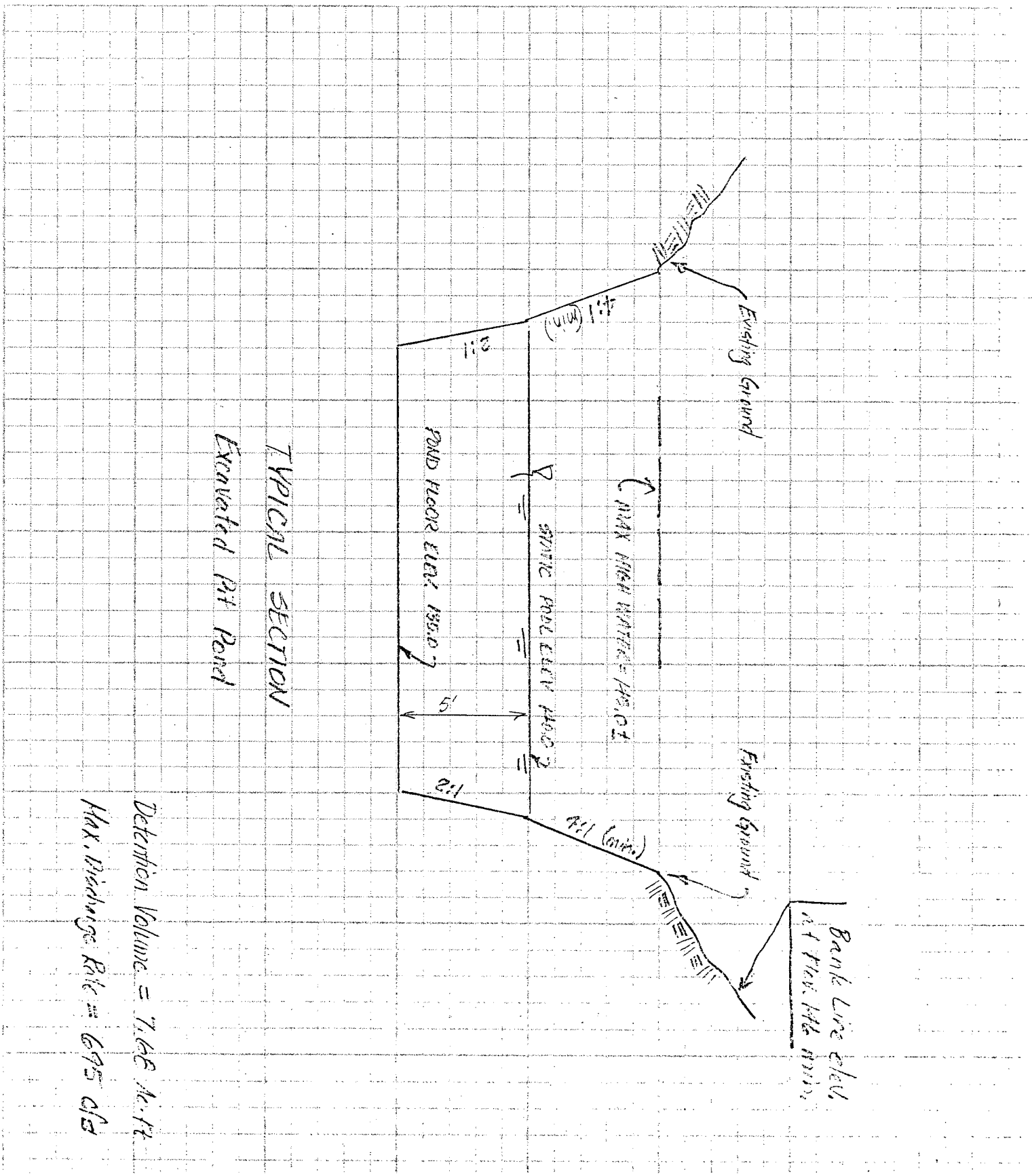
Project MARVELL ADDITION 36-78414-2-1014

Item DETENTION POND

8D/8



TYPICAL SECTION
Excavated Pit Pond

Detention Volume = 7.66 Ac. Ft.
Max. Discharge Rate = 695 cfs