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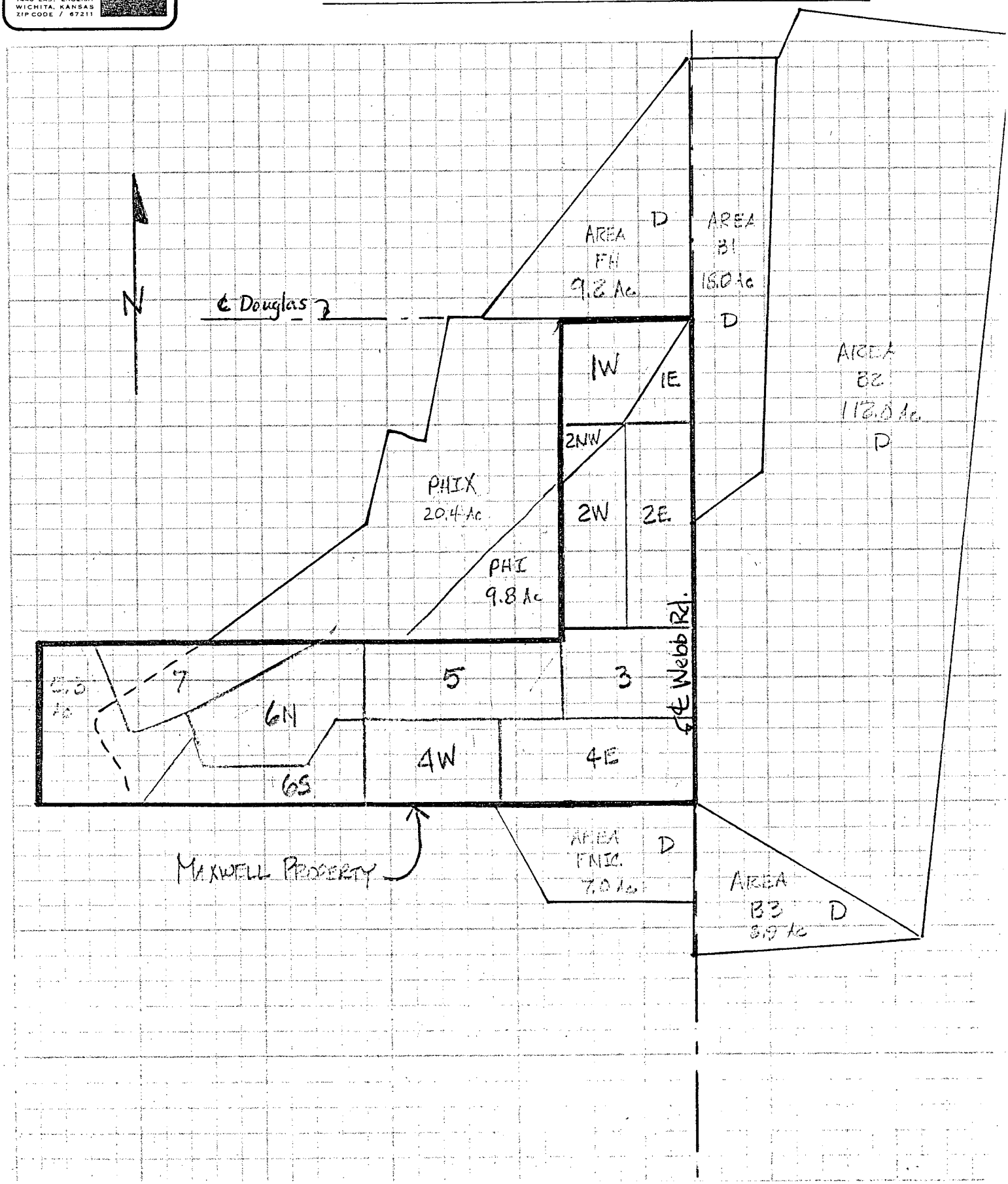
ZIP CODE / 67211

Date 4/15/82 MMB Page 1 of _____

Project MAXWELL 36-78419-2-1014

Item PROPOSED CONDITION QUO'S

18/16



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Project Maxwell Property 36-78414-2-1014

Item Drainage Calc's Revised Areas

USE SCS TR 55 METHOD.

From previous calc's, all drainage areas have short t_c (5-10 min. range). Thus, will use a minimum $t_c = 0.2$ hr (12 minutes),

$P_{100} = 7.8"$ (24 hr) $P_2 = 3.5"$

$P_5 = 4.6"$ (24 hr)

Soils are type D. For comm/ind area, use CN = 95 (85% Impervious) $F_{imp} = 0.78$

$$S = \frac{1000}{CN} - 10 = 0.53 \text{ in}$$

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

$Q_{100} = 7.2"$ $Q_5 = 4.0"$ $Q_2 = 2.9"$

All drainage areas will use a travel time $T_t = 0$. Thus, $q_a = 796$ cfs/mi²/in from Table 5- in TR-55.

The peak runoff rate is found by

$$q_p = q_a Q A$$

$$q_{P100} = \frac{796 \text{ cfs/mi}^2\text{/in}}{640 \text{ ac/mi}^2} \times 7.2 \times A = 8.96A$$

$$q_{P5} = \frac{796}{640} \frac{\text{cfs/mi}^2\text{/in}}{\text{ac/mi}^2} \times 4.0 \times A = 4.98A$$

$$q_{P2} = \frac{796}{640} \times 2.9 \times A = 3.65A$$

FYI.

RATIONAL FORMULA EQUIV. $t_c = 12$ min

$i_{100} = 9.80$ in/hr $i_5 = 5.69$ in/hr

$4.98A = C i_5 A$

$$C = \frac{4.98}{5.69} = 0.87$$ ← EQUIV. RATIONAL C FOR Q_5

$8.96A = C i_{100} A$

$$C = \frac{8.96}{9.80} = 0.91$$ ← EQUIV. RATIONAL C FOR Q_{100}

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

$T_c = 1.67 \text{ Lag } F_{imp} F_{min} 60$

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Project Maxwell Property 36-78414-2-1014

Item Drainage Calculations

28/16

AREA 1W

DA = 2.9 Ac

q_{p100} = 2.9 x 8.96 = 26 cfs

q_{p5} = 2.9 x 4.98 = 14 cfs

L = 500' Y = 1.6%

Improved length = 25% ⇒ F_{HLM} = 0.93

Lag = 0.08 hr

T_c = 5.9 min ⇒ USE 0.2 hr

AREA 1E

DA = 1.6 ac

q_{p100} = 1.6 x 8.96 = 14 cfs

q_{p5} = 1.6 x 4.98 = 8 cfs

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Project Maxwell Property 36-78414-2-1014

Item Drainage Calculations

48/16

AREA 2E

DA = 5.0ac

$q_{P100} = 5.0 \times 8.96 = 45$ cfs

$q_{P5} = 5.0 \times 4.98 = 25$ cfs

$l = 850'$
Improved hydraulic length $\cong 425' \approx 50\%$
$F_{HLM} = 0.87$

$Y = \frac{171-158}{850} = 1.5\%$

Lag = 0.13 hr
T_c = 8.6 min $\Rightarrow$ USE 0.2 hr

AREA 2W

DA = 4.2ac

$q_{P100} = 4.2 \times 8.96 = 38$ cfs

$q_{P5} = 4.2 \times 4.98 = 21$ cfs

$l = 850'$
Improved hydraulic length $\approx 50\%$
$F_{HLM} = 0.87$

$Y = 1.5\%$

Lag = 0.13 hr
T_c = 8.6 min $\Rightarrow$ USE 0.2 hr

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Project Maxwell Property 36-78414-2-1014

Item Drainage Calculations

53/16

AREA 2NW

DA = 0.8 ac

q_{P100} = 8.96 x 0.8 = 7 cfs

q_{P5} = 4.98 x 0.8 = 4 cfs

AREA 3

DA = 4.0 ac

q_{P100} = 8.96 x 4.0 = 36 cfs

q_{P5} = 4.98 x 4.0 = 20 cfs

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Project Maxwell Property 36-78414-2-1014

Item Drainage Calculations

AREA 4E

DA = 6.6 ac

q_{P100} = 6.6 x 8.96 = 59 cfs

q_{P5} = 6.6 x 4.98 = 33 cfs

q_{P2} = 6.6 x 3.65 = 24 cfs

AREA 4W

DA = 4.3 ac

q_{P100} = 4.3 x 8.96 = 39 cfs

q_{P5} = 4.3 x 4.98 = 21 cfs

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Project Maxwell Property

Item Drainage Calculations

7916

AREA 5

DA = 5.1 ac

$q_{P100} = 5.1 \times 8.96 = 46$ cfs

$q_{P5} = 5.1 \times 4.98 = 25$ cfs

AREA 6N

DA = 6.6 ac

$q_{P100} = 6.6 \times 8.96 = 59$ cfs

$q_{P5} = 6.6 \times 4.98 = 33$ cfs

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Project Maxwell Property

Item Drainage Calculations

80/16

AREA 6S

DA = 4.8 ac

$q_{P100} = 4.8 \times 8.96 = 43$ cfs

$q_{P5} = 4.8 \times 4.98 = 24$ cfs

AREA 7

DA = 5.6 ac

$q_{P100} = 5.6 \times 8.96 = 50$ cfs

$q_{P5} = 4.98 \times 5.6 = 28$ cfs

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Project MAXWELL 36-78414-2-1014

Item ____

AREA PHI

Assume area S.E'ly of floodway will develop as comm/ind.

DA = 9.8 ac.

$q_{P100} = 9.8 \times 8.96 = 88$ cfs

$q_{P5} = 9.8 \times 4.93 = 49$ cfs

AREA PHIX

Balance of PHI Addition in which will remain existing condition.

DA = 20.4 ac.

$q_{P100} = \frac{20.4}{30.2} \times 214 = 145$ cfs

$q_{P5} = \frac{20.4}{30.2} \times 109 = 74$ cfs

$T_c \rightarrow 15$ min } Previous calc's

$T_t \rightarrow 0$ min }

MAXWELL ADDITION 7841M-2
DEVELOPED CONDITIONS

SHT 1 OF 2

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

Subarea	Drainage Area, mi^2	Y[1]	CN[2]	PIA,[3] %	HLM,[4] %	l, ft
31	0.03	1.4	87	40	72	1800
B2	0.18	0.85	82	10	0	3500
B3	0.01	0.01	96	90	100	1200
FH	0.01	0.01	87	38	50	1400
FNIC	0.01	0.01	89	75	100	800
1W	2.9 Ac	*	95	*	*	*
1E	1.6 Ac	↓	↓	↓	↓	↓
2E	5.0 Ac					
2W	4.2 Ac					
2NW	0.8 ac					

[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.

VI-25

9/10/01

MAXWELL ADDITION
36-T3-4W-2-DM
DEVELOPED CONDITIONS

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

Subarea	Drainage Area, ~~mi²~~	Y[1]	CN[2]	PIA,[3] %	HLM,[4] %	l, ft
3	4.0 Ac	*	95	*	*	*
4E	6.6 Ac	↓	↓	↓	↓	↓
4W	4.3 Ac					
5	5.1 Ac					
6N	6.6 Ac					
6S	4.8 Ac					
7	5.6 Ac	↓	↓	↓	↓	↓
PHI	9.8 Ac	*	95	*	*	*
PHIX	20.4 Ac	2.5	87	38%	50%	1400'

[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.

11816

MAXWELL ADDITION
36-78414-2-1014
100-YR DEVELOPED CONDITIONS

le VI-3 TR 55 Form 2 - Hydrograph Computations - Time of Concentration, Travel Time and Runoff SHT 1 OF 2

rea	L Basin Lag, hrs	F_{HLM} [1]	F_{IMP} [2]	T_c [3]	Length of Channel, ft	Average velocity	T_t	100-YR Design Precip., in	Q [4], in.	$C=DA \cdot Q$ [5], mi^2-in
31	0.34	0.65	0.82	0.3	2650	5	0.25	7.8	6.26	0.18
32	0.69	1.0	0.95	1.5	2200	5	0		5.67	0.99
33	0.16	0.78	0.8	0.2	2650	5	0.25		7.32	0.10
FH	0.26	0.78	0.82	0.3	2600	5	0.25		6.25	0.09
VIC	0.10	0.72	0.77	0.2*	2300	5	0		7.08	0.07
W	*	*	*	0.2*	*	*	0		7.2	0.03
E										0.02
2E										0.06
2W										0.05
NW										0.01

VI-27

rrection Factor for hydraulic length modified from Fig.3-4, p.3-8, TR 55
rrection Factor for imperviousness from Fig. 3-5, p. 3-9, TR 55
$= 1.67 \cdot L \cdot F_{HLM} \cdot F_{IMP}$
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.
is coefficient will be used in TR 55 Form 3.

9/18/91

MAXWELL ADDITION
36-7344-2-1014
100-YR DEVELOPED CONDITIONS

le VI-3 TR 55 Form 2 - Hydrograph Computations - Time of Concentration, Travel Time and Runoff SHT # 2 OF 2

rea	L· Basin Lag,hrs	F_{HLM} [1]	F_{IMP} [2]	T_c [3]	Length of Channel, ft	Average velocity	T_t	Design Precip.,in	Q [4], in.	$C=DA\cdot Q$ [5], mi^2-in
3	*	*	*	0.2*	*	*	0	7.8	7.2	0.05
HE										0.07
fW										0.05
5										0.06
oN										0.07
oS										0.05
7										0.06
HI	*	*	*	0.2	*	*	*	7.8	7.2	0.11
HIX	0.09	0.78	0.82	0.1	800	5	3= 0.04 hr	7.8	6.25	0.20

VI-27

rrection Factor for hydraulic length modified from Fig.3-4, p.3-8, TR 55
rrection Factor for imperviousness from Fig. 3-5, p. 3-9, TR 55
$= 1.67 \cdot L \cdot F_{HLM} \cdot F_{IMP}$
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
is coefficient will be used in TR 55 Form 3.

6/8/16

MAXWELL ADDITION
30-7541-2-1014
100-YR DEVELOPED CONDITIONS

Table VI-4 TR 55 Form 3 - Hydrograph Computations SHT 1 OF 2

Subarea	T_c	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
B2	1.5	0	0.99	10	18	80	190	225	234	223	199	151	98	67	49	31	19	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
FNIC	0.3	0	0.10	2	4	66	18	12	9	7	6	5	4	3	3	2	2	1
1W	0.2	0	0.03	1	2	21	5	3	2	2	2	2	1	1	1	1	1	0
1E			0.02	0	1	12	2	2	1	1	1	1	1	1	1	0	0	0
2E			0.06	1	3	36	8	6	4	4	3	3	2	2	2	1	1	1
2W			0.05	1	2	30	7	5	4	3	3	2	2	2	1	1	1	1
2NW			0.01	0	0	6	1	1	1	1	1	0	0	0	0	0	0	0
~~Total~~																		

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

6/18/11

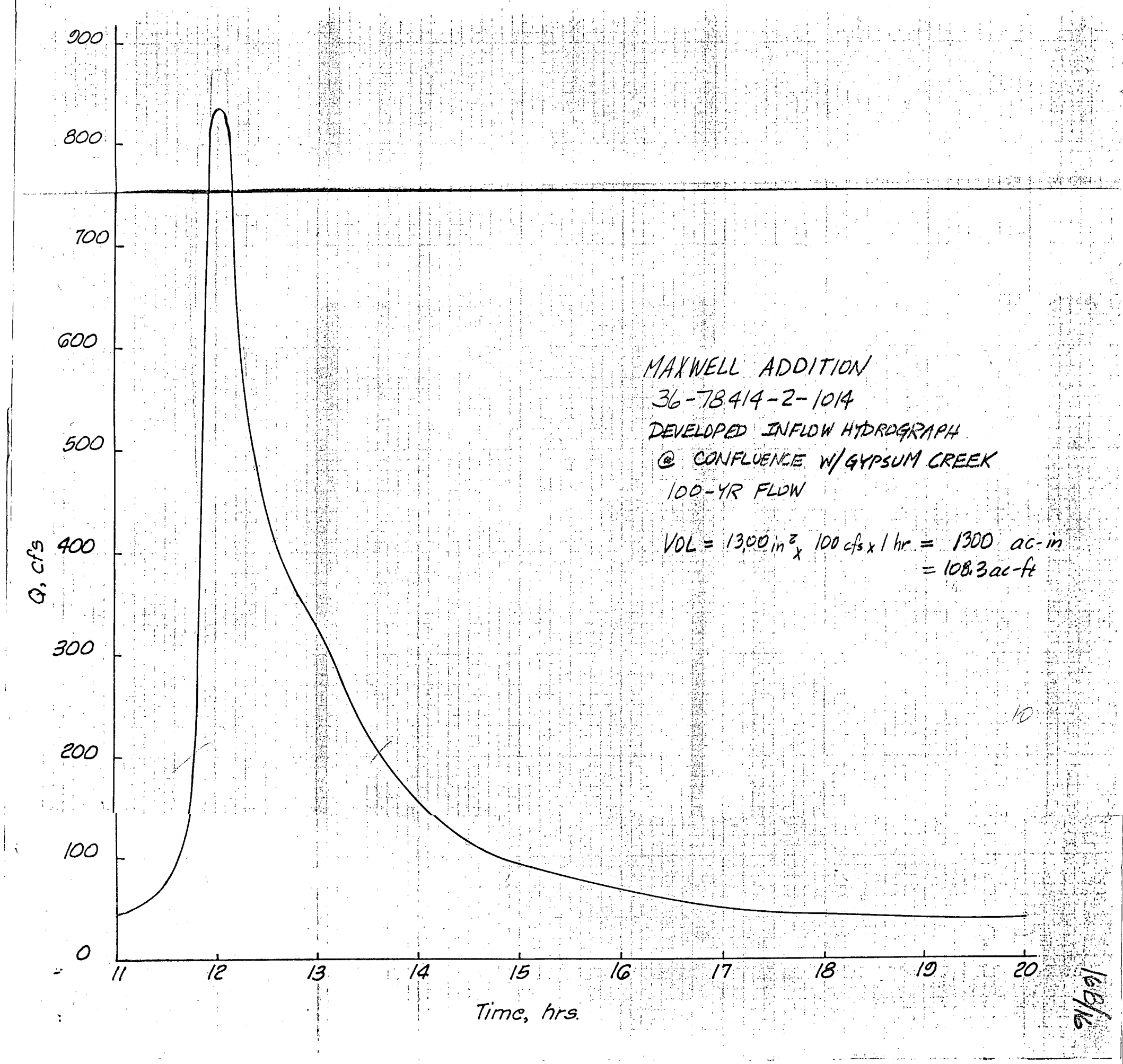
MAXWELL ADDITION
86-78414-2-1014
100-YR DEVELOPED CONDITIONS

Table VI-4 TR 55 Form 3 - Hydrograph Computations SHT 2 OF 2

Subarea	T_c	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.
3	0.2	0	0.05	1	2	29	7	5	4	3	3	2	2	2	1	1	1	1
4E			0.07	2	3	48	10	8	6	5	4	4	3	3	2	2	1	1
4W			0.05	1	2	31	7	5	4	3	3	2	2	2	1	1	1	1
5			0.06	1	3	37	8	6	4	4	3	3	2	2	2	1	1	1
6N			0.07	2	3	48	10	8	6	5	4	4	3	3	2	2	1	1
6S			0.05	1	3	35	7	6	4	4	3	3	2	2	2	1	1	1
7			0.06	1	3	40	9	7	5	4	4	3	3	2	2	2	1	1
PHI	0.2	0	0.11	3	5	71	15	11	8	7	6	5	4	4	3	3	2	2
PHIX	0.2	0	0.20	5	9	128	27	21	15	14	11	10	8	7	6	5	4	3
Total				39	75	833	479	410	361	324	284	221	153	116	70	63	34	36

1 — DA x Q, mi2 - in, from Form 2

8/19/91


900
800
700
600
500
400
300
200
100
0
Q, cfs
11
12
13
14
15
16
17
18
19
20
Time, hrs.
MAXWELL ADDITION
36-78414-2-1014
DEVELOPED INFLOW HYDROGRAPH
@ CONFLUENCE W/GYPSUM CREEK
100-YR FLOW
VOL = 13,00 in² x 100 cfs x 1 hr = 1300 ac-in
= 108.3 ac-ft
10
10/16