HYDROLOGY STUDY

FITNESS MANIA

2895 S. Main Street
Corona, CA 92880

PP2022-0004

REVISION DATE: 03/06/2023

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Section 1- Project Description

Project Description
The project involves the development of new Fitness Center located at northeast corner of the Main St. & Chase Dr. (APN 113-340-018). The site, excluding the dedicated area, is 175,755 s.f.=4.03 ac. The drainage would be in easterly direction where flow will be collected in proposed catch basin.
The flow from catch basin will be directed into detention basin with overflow discharging into the channel.
The separate encroachment permit will be obtained from Riverside County Flood Control District prior to the construction.

As part of the construction, both street will be widen. The median will be constructed along Main St. The flow will be directed into proposed curb & gutter and directed northerly. The flow along the Chase Dr. will be directed into proposed curb and gutter and directed easterly.

Purpose of the Study
The purpose of this report is to provide a hydrologic and hydraulic study for this development. This study will calculate the 10-year and 100-year storm discharges together with the BMP sizing calculations.

Land Use
The Existing use is residential with agriculture and Planned land use is commercial.

Pre Development Conditions

The existing site has a single building and driveway.
The remaining portion is a natural cover.
The site has mild slope easterly to the back of the property.

Post Development Conditions

The proposed development will include construction of new fitness center.

The site would be fully paved with pockets of landscape areas.

Total Area=175,755 s.f.=4.03 ac
Impervious Area (If=1)= 139,935 s.f.
Pervious Area (If=0.15)=35,820 s.f.

If1=(139,935x1+35,820x0.15)/175,755=0.83

The drainage pattern would be toward northerly side of the property.

The flow along Main St will be directed into proposed curb & gutter and directed northerly. The flow along the Chase Dr. will be directed into proposed curb and gutter and directed easterly.

Section 2- Hydrology Section

This section describes the design criteria and methodology applied during hydrologic analysis of the project site. The design criteria and methodology used follow the Riverside County Flood Control and Water Conservation District Hydrology Manual

3.1 Rational Method Hydrology

Runoff calculations for this study were accomplished using the Rational Method. The Rational Method is a physically-based numerical method where runoff is assumed to be directly proportional to rainfall and area, less losses for infiltration and depression storage. Flows were computed based on the Rational formula:

$$Q = CIA$$

Where ...
- Q = peak discharge (cfs);
- C = runoff coefficient, based on land use and soil type;
- I= rainfall intensity (in/hr);
- A = watershed area (acre)

The proposed project consists of 1 lot of approximately of 4.03 ac (excluding street easement) and located at the northeast corner of Main St. & Chase Dr .The proposed site improvements will include construction of 1 commercial building.

The general drainage pattern of new development will be taken by curb & gutter easterly toward proposed catch basin at northeasterly side of the project. The flow from catch basin will be directed into detention basin with overflow discharging into the channel.

The runoff coefficient is dependent on the land use coverage and soil type.

DMA 1

EXISTING CONDITION

Total Area=175,755 s.f.= 4.03 ac.

Impervious Area (If=1)= 9,950 s.f.

Pervious Area (If=0.15)= 165,805 s.f.

Length of initial area, L=900'
The difference in elevation between ends of initial area, H=27'

FROM FIGURE D-3, RCFC&WCD , TIME OF CONCENTRATION Tc=26.0

FROM FIGURE D-4.1, RCFC&WCD:

INTENSITY I(t)10 =1.40 in/hr.
INTENSITY I(t)100=2.17 in/hr.

Effective Impervious Fraction If for natural (B soil)=0.15, then

If1=(9,950x1+165,805x0.15)/171,457=0.20

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04

Cex=0.858*0.20^3-0.78*0.20^2+0.774*0.20+0.04=0.17

Q=CIA,

Q-runoff in cubic feet per second (cfs)
C-a runoff coefficient representing the ratio of runoff to rainfall
I-the time-averaged rainfall intensity in in/hr corresponding to the time of concentration
A-drainage area (ac).

Qex-total(10yr.)=0.17x1.40x4.03=**0.96 cfs**
Qex-total(100yr.)=0.17x2.17x4.03=**1.49 cfs**

DMA 1
Subarea 1-1

PROPOSED CONDITION

Use If from above, If1=0.83

First, let's determine the initial time of concentration, "T", using Plate D-3 (see attached).
The length of initial area L=370'.
The difference in elevation between ends of initial area H=1.78.
Then from Plate D-3, T=9.2 min.

Using this time of concentration let's determine the intensity of rainfall "I" in inches per hour from Plate D-4.1 (see attached).
I=2.32 in/hr. for 10 year frequency and
I=3.57 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.83^3-0.78*0.83^2+0.774*0.83+0.04=0.64

The Area 1-1 =64,408 s.f.=1.44 ac.

Then, **$Q1\text{-}1_{10}$**=CIA=0.64x2.32x1.44= **2.14**cfs.
$Q1\text{-}1_{100}$=CIA=0.64x3.57x1.44= **3.29** cfs.

Subearea 1-2

PROPOSED CONDITION

Use If from above, If2=0.83
The length of initial area L=220'.
The difference in elevation between ends of initial area H=8.0.
Then from Plate D-3, T=5.2 min.

Using this time of concentration let's determine the intensity of rainfall "I" in inches per hour from Plate D-4.1 (see attached).
I=3.05 in/hr. for 10 year frequency and
I=4.70 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.83^3-0.78*0.83^2+0.774*0.83+0.04=0.64

The Area 1-2 =16,100 s.f.=0.37 ac.

Then, **$Q1\text{-}2_{10}$**=CIA=0.64x3.05x0.37= **2.32** cfs.
$Q1\text{-}2_{100}$=CIA=0.64x4.70x0.37= **3.57** cfs.

Subarea 1-3

PROPOSED CONDITION

Use If from above, If1=0.83
The length of initial area L=305'.
The difference in elevation between ends of initial area H=2.03'.
Then from Plate D-3, T=8.1 min.

Using this time of concentration let's determine the intensity of rainfall "I" in inches per hour from Plate D-4.1 (see attached).
I=2.46 in/hr. for 10 year frequency and
I=3.79 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.83^3-0.78*0.83^2+0.774*0.83+0.04=0.64

The Area 1-3=49,034=1.13 ac.

Then, **$Q1\text{-}3_{10}$**=CIA=0.64x2.46x1.13= **1.78** cfs.
$Q1\text{-}3_{100}$=CIA=0.64x3.79x1.13= **2.74** cfs.

Subarea 1-4

PROPOSED CONDITION

Use If from above, If1=0.83
The length of initial area L=520'.
The difference in elevation between ends of initial area H=12.6'.
Then from Plate D-3, T=7.8 min.

Using this time of concentration let's determine the intensity of rainfall "I" in inches per hour from Plate D-4.1 (see attached).
I=2.50 in/hr. for 10 year frequency and
I=3.85 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.83^3-0.78*0.83^2+0.774*0.83+0.04=0.64

The Area 1-4=46,213=1.06 ac.

Then, **$Q1\text{-}4_{10}$**=CIA=0.64x2.50x1.06= **1.70** cfs.
$Q1\text{-}4_{100}$=CIA=0.64x3.85x1.06= **2.61** cfs.

Total Q for post construction of the site:

Q10=2.14+2.32+1.78+1.70=7.94 cfs

Q100=3.29+3.57+2.74+2.61=12.21 cfs

DMA 2 Main St.

EXISTING CONDITION

Total Area=13,646 s.f.=0.31 ac.
Impervious Area (If=1)= 0 s.f. (0 ac.)
Pervious Area (If=0.15)=13,646 s.f. (0.31 ac.)
If1=(0x1+13,646x0.15)/13,646=0.15

The length of initial area L=427'.
The difference in elevation between ends of initial area H=19.9'.

From Plate D-3, T=20.3 min.

From Plate D-4.1 (see attached).
I=1.59 in/hr. for 10 year frequency and I=2.46 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.15^3-0.78*0.15^2+0.774*0.15+0.04=0.14

The Area 2 of the project approximately 0.31 ac.

Then, **$Q2_{10}$**=CIA=0.14x1.59x0.31= **0.07** cfs.
$Q2_{100}$=CIA=0.14x2.46x0.31= **0.11** cfs.

PROPOSED CONDITION

Total Area=13,646 s.f.=0.31 ac.
Impervious Area (If=1)= 11,211 s.f. (0.25 ac.)
Pervious Area (If=0.15)=2,435 s.f. (0.06 ac.)
If1=(11,211x1+2,435x0.15)/13,646=0.85

The length of initial area L=427'.
The difference in elevation between ends of initial area H=19.9'.

From Plate D-3, T=6.5 min.

From Plate D-4.1 (see attached).
I=2.74 in/hr. for 10 year frequency and I=4.22 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.85^3-0.78*0.85^2+0.774*0.85+0.04=0.66

The Area 2 of the project approximately 0.31 ac.

Then, **$Q2_{10}$**=CIA=0.66x2.74x0.31= **0.56** cfs.
$Q2_{100}$=CIA=0.66x4.22x0.31=**0.86** cfs.

DMA 3 Chase Dr.

EXISTING CONDITION

Total Area=10,350 s.f.=0.24 ac.
Impervious Area (If=1)= 0 s.f. (0 ac.)
Pervious Area (If=0.15)=10,350 s.f. (0.24 ac.)
If1=(0x1+10,350x0.15)/10,350=0.15

The length of initial area L=320'.
The difference in elevation between ends of initial area H=1.70.

From Plate D-3, T=15.1 min.

From Plate D-4.1 (see attached).
I=1.83 in/hr. for 10 year frequency and I=2.82 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.15^3-0.78*0.15^2+0.774*0.15+0.04=0.14

The Area 3 of the project approximately 0.24 ac.

Then, $\mathbf{Q3_{10}}$=CIA=0.14x1.83x0.24= **0.06** cfs.
$\mathbf{Q3_{100}}$=CIA=0.14x2.82x0.24= **0.09** cfs.

PROPOSED CONDITION

Total Area=10,350 s.f.=0.24 ac.
Impervious Area (If=1)= 4,785 s.f.
Pervious Area (If=0.15)=5,565 s.f. If1=(4,785x1+5,565x0.15)/10,350=0.54

The length of initial area L=320'.
The difference in elevation between ends of initial area H=1.70.

From Plate D-3, T=8.6 min.

From Plate D-4.1 (see attached).
I=2.40 in/hr. for 10 year frequency and I=3.70 in/hr. for 100 year frequency.

runoff factor C=0.858If^3-0.78If^2+0.774If+0.04
Cnew=0.858*0.54^3-0.78*0.54^2+0.774*0.54+0.04=0.37

The Area 3 of the project approximately 0.24 ac.

Then, $\mathbf{Q3_{10}}$=CIA=0.37x2.40x0.24= **0.21** cfs.
$\mathbf{Q3_{100}}$=CIA=0.37x3.70x0.24=**0.33** cfs.

Conclusion

The general drainage pattern of new development will be taken by curb & gutter easterly toward proposed catch basin at northeasterly side of the project. The flow from catch basin will be directed into detention basin with overflow discharging into the channel.
The sizing calculations for treatment and detention are included in Appendix 4.

The additional flow generate in public right of way along the Main St & Chase Dr due to widening the street is negligent.
The increase in 100yr Q from the project to Chase Dr. 0.33-0.09=0.24 cfs.

The evaluation of capacity of existing storm drain system is based on the City of Corona Drainage Plan dated April 29, 2003.

The project's drainage along Main St. contribute to inlet northerly of node 071503 as shown on map no. 47 of Master Plan. The increase in 100yr Q from the project to Main St.=0.86-0.11= 0.75 cfs. The capacity of existing storm drain system is 152.9 cfs. The increase in Q to existing system is 0.75/152.9=0.49%
The Master Plan shows that the main storm drain does not have a deficiency.

The Biopod System would be installed at the end of improvements at the curb. The 85th percentile of the storm event would be treated in Biopod and overflow continue northerly along Main St.

The project's drainage along Chase Dr. contribute to inlet at node 071500 as shown on map no. 47 of Master Plan.
The increase in 100yr Q from the project to Chase Dr. 0.33-0.09=0.24 cfs.
The flow directly discharge to RCFCD channel and there is no deficiency in the City system.

The Biopod System would be installed at the end of improvements at the curb. The 85th percentile of the storm event would be treated in Biopod installed at the easterly terminus of Parcel 2 and overflow pipe would be connected to existing transition structure.

Section 3- Hydraulics Section

Flow- and Volume-Based on-site BMP Design Calculations

A. Flow-Based BMP Design

Calculate the target BMP flow rate, Q, by using the following formula (see Table D-2 below for limitations on the use of this formula):

$$Q = C_{BMP} \cdot I_{BMP} \cdot A$$

where: **Q** = flow in ft^3/s
IBMP = BMP design rainfall intensity, in inches/hour
CBMP = composite runoff coefficient
I bmp=0.2 in/hr.

Calculate the composite runoff coefficient CBMP for the Drainage Area above using the following equation:

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

where: **CBMP** = composite runoff coefficient; and,
i = watershed imperviousness ratio, **Cbmp=0.64**

Then for Area 1 (4.03 ac.), Qbmp-new=0.64x0.2x4.03= 0.52 cfs
For existing condition (C=0.17), Qbmp-ex=0.17x0.2x4.03=0.14 cfs

B. DRAINAGE PIPE SIZING

FROM KING'S HYDROLOGY BOOK
Q= k∗(D^(8/3))*(S^0.5)/n

k-coefficient representing depth of water (for pipe flowing full k=0.463)
n-roughness coefficient (assume n=0.013 for new pipe), S-slope of pipe.

For **12" pipe** with s=0.075

Qpipe= k∗(D^(8/3))*(S^0.5)/n=0.463/0.0138x1.0^2.67x0.075^0.5=9.75 cfs
Qpipe=9.75 cfs > Q100=9.6 cfs OK!

For **8" pipe** with s=0.020

Qpipe= k∗(D^(8/3))*(S^0.5)/n=0.463/0.0138x0.670^2.67x0.020^0.5=9.75 cfs
Qpipe=1.73 cfs

For **18" pipe** with s=0.196
Qpipe= k∗(D^(8/3))*(S^0.5)/n=0.463/0.0138x1.5^2.67x0.196^0.5=9.75 cfs
Qpipe=46.6 cfs > Q100=9.6 cfs OK!

For 6**” pipe** with s=0.010

Qpipe= k∗(D^(8/3))*(S^0.5)/n=0.463/0.0138x0.50^2.67x0.010^0.5=9.75 cfs
Qpipe=0.56 cfs > Qbmp-street

For **10” HDPE pipe** with s=0.010

Qpipe= k∗(D^(8/3))*(S^0.5)/n=0.463/0.0138x0.83^2.67x0.010^0.5=2.0 cfs
Qpipe=2.0 cfs > Qbmp-DMA2=0.048 cfs

C. ORIFICE (CURB OUTLET for DMA3)

Q=c*A*(2GH)^1/2
Q(85th)=0.041 cfs (DMA3)

Qorf.=CxAx(2gH)^0.5, where C=0.6, g=32.2, H=0.5', then
A=0.041/(0.6x(2x32.2x0.5)^0.5)=0.012 s.f.
Then r=(A/3.14)^0.5=0.06=3/4", we will use 3" dia pipe.

D. CAPACITY of ON-SITE DRIVEWAY

Per Chezy-Manning formula, the capacity of curb outlet
Qdwy.=1.486/n(A^1.67/P^0.67)S^0.5

Where A-wetted area, P-wetted perimeter, S- slope of outlet, then
For 6" curb with 2' gutter , 5% max cross slope and

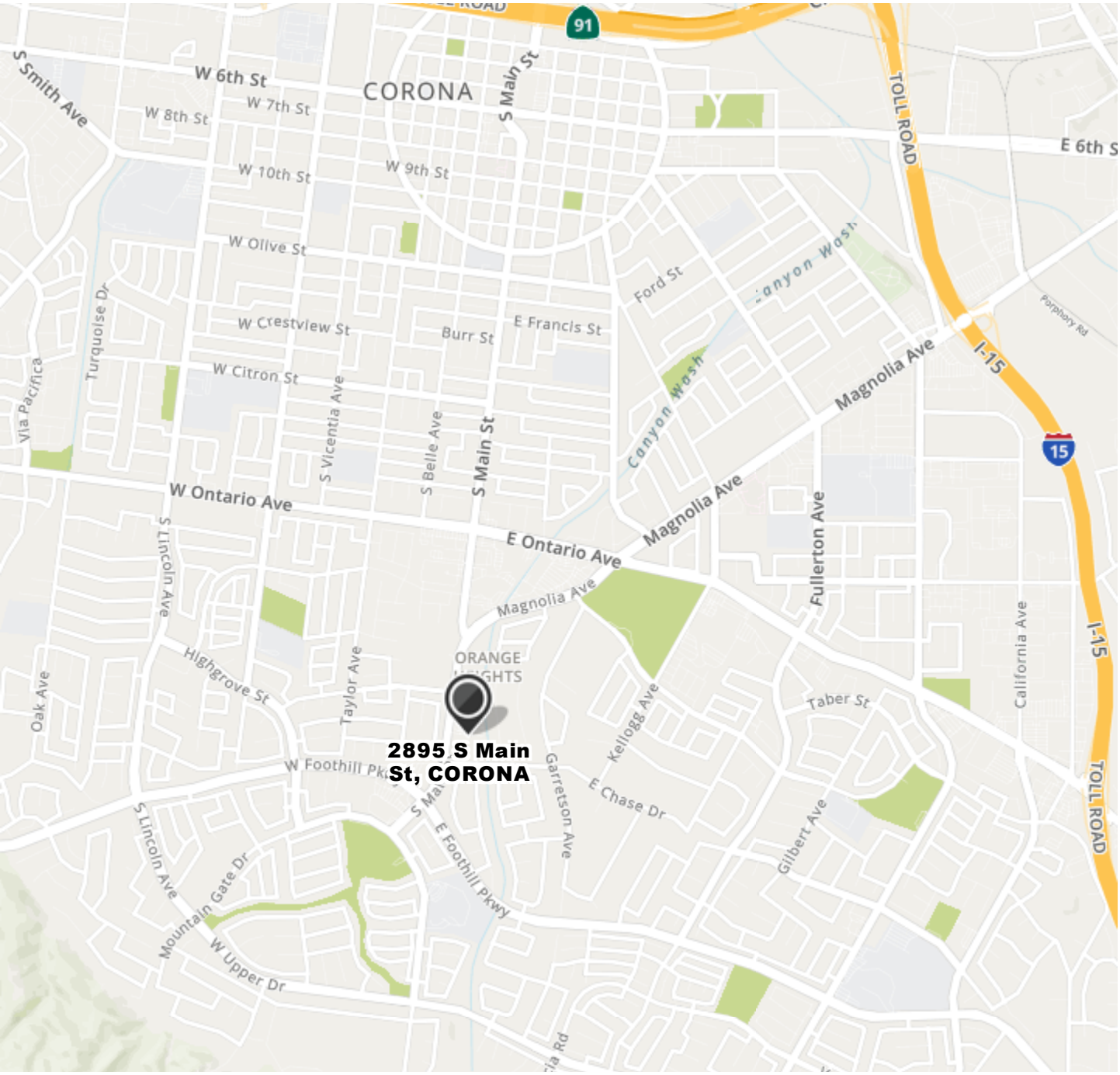
water level at top of 6" curb (A=2.32 s.f, P=10.1'), Q6"= 16.5cfs >Q1total=10.12 cfs
water level at 5" of 6" curb (A=1.62 s.f, P=8.43'), Q5"= 10.26cfs >Q1total=10.12 cfs

APPENDIX 1

VICINITY MAP

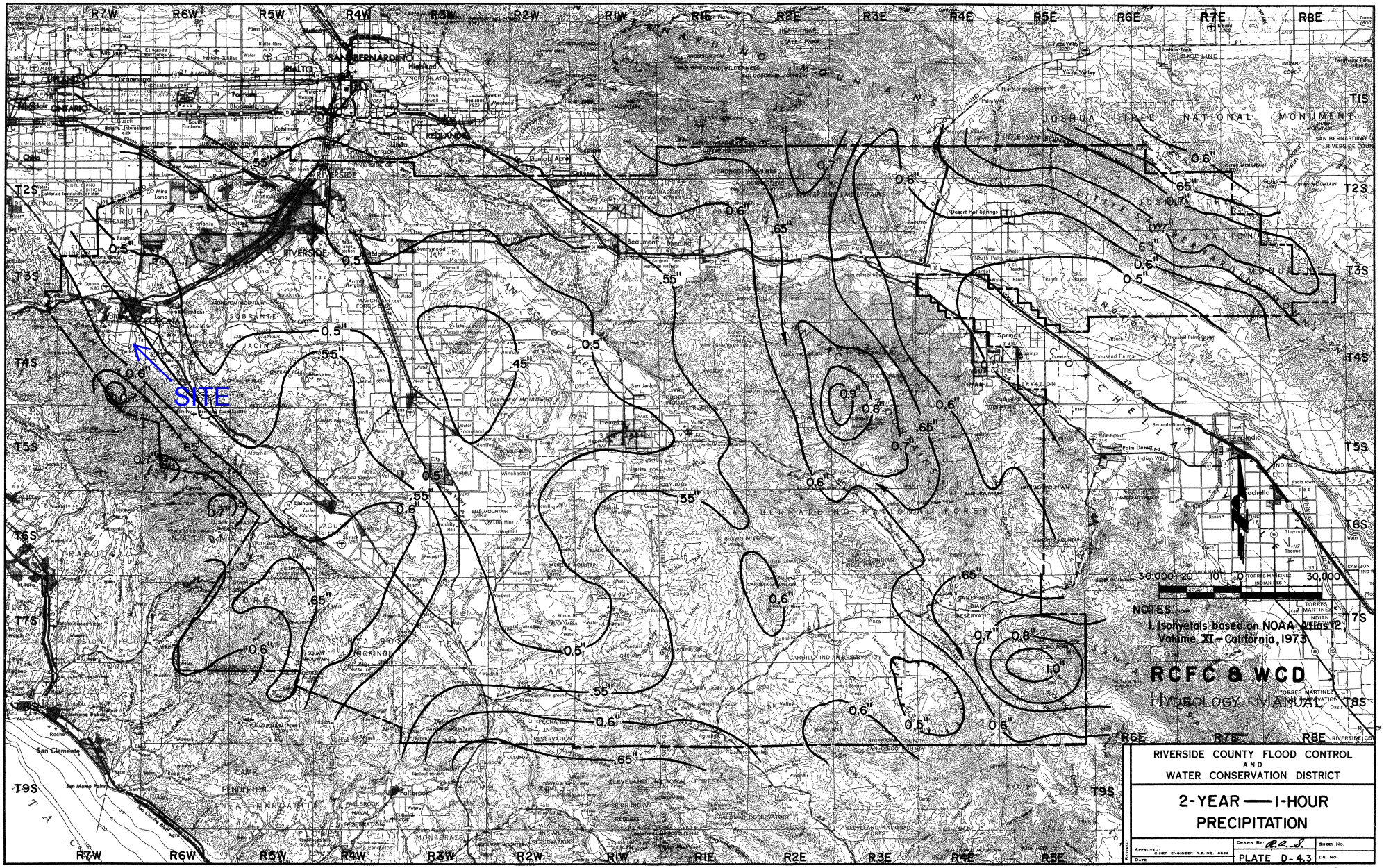
2895 S Main St, CORONA

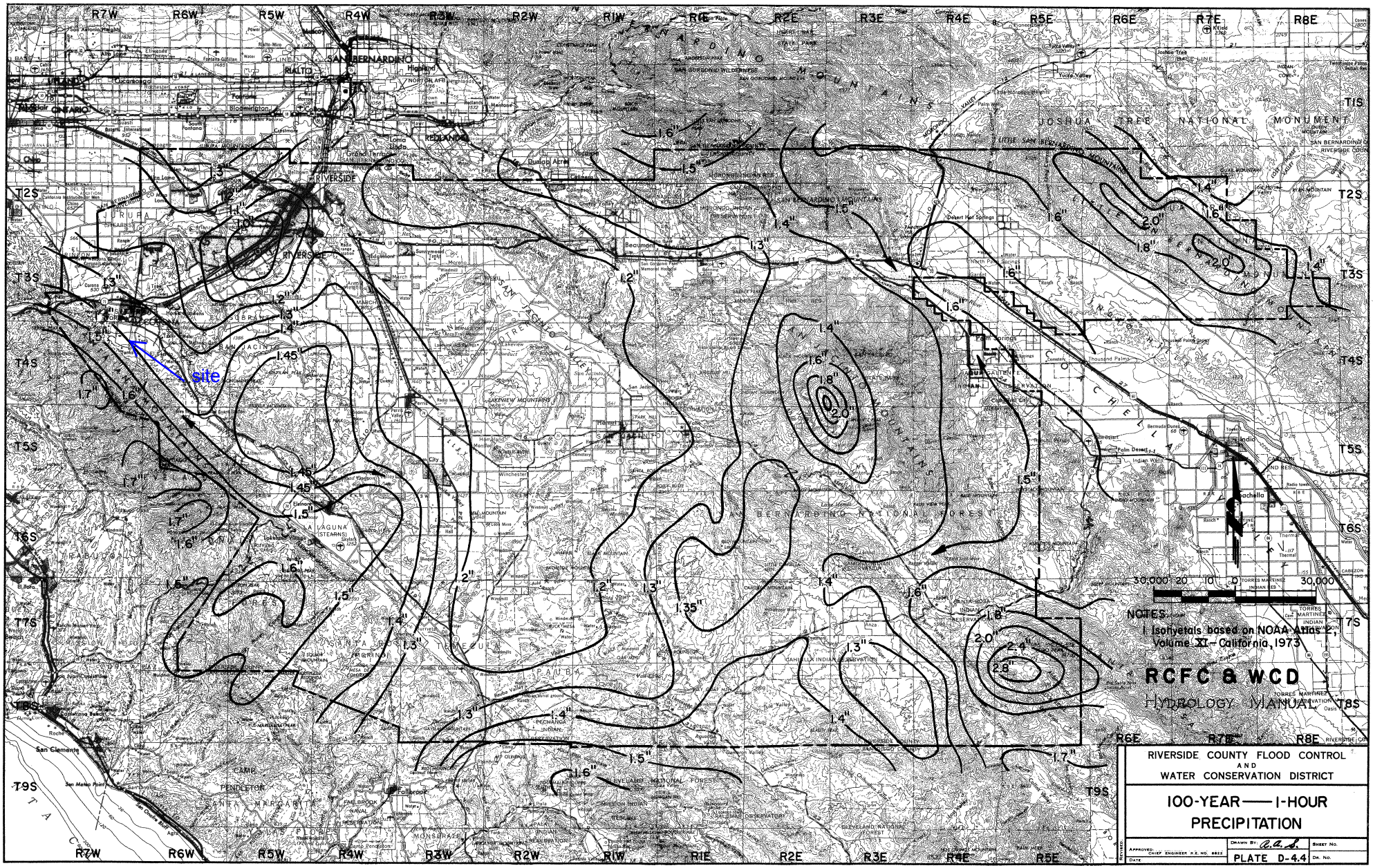
Corona | CA 92882-5942



APPENDIX 2

HYDROLOGY MANUAL PLATES

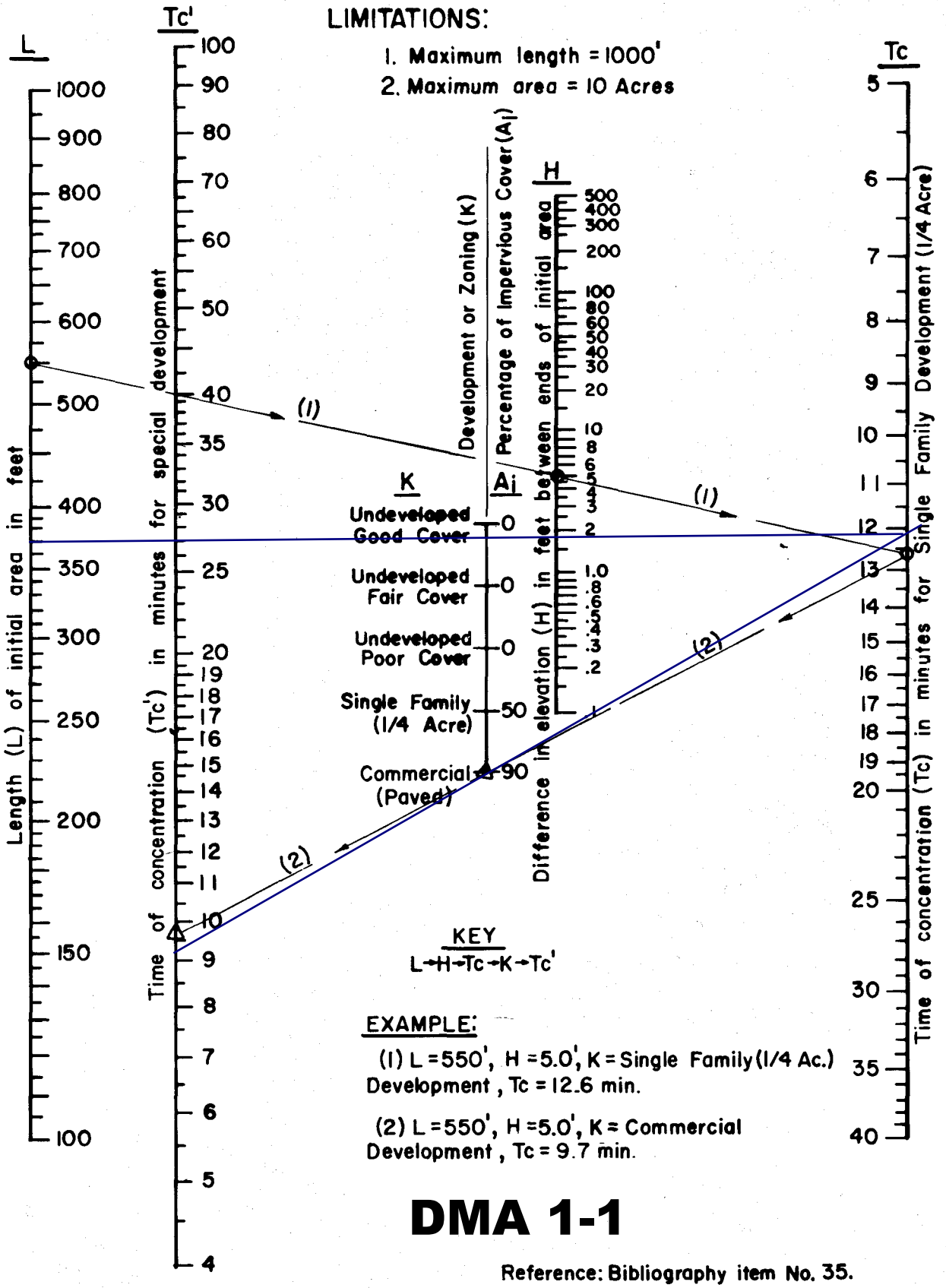

SITE
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3


site
1.0"
1.1"
1.2"
1.3"
1.4"
1.45"
1.5"
1.6"
1.7"
1.8"
2.0"
2.4"
2.8"
1.35"
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.4
SAN BERNARDINO MOUNTAINS
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
SANTA ROSA AND SAN JACINTO MOUNTAINS NATIONAL MONUMENT
SAN JACINTO MOUNTAINS
SAN GORGONIO WILDERNESS
SAN GABRIEL MOUNTAINS
SAN JACINTO WILDERNESS
SAN GORGONIO MOUNTAIN
SAN JACINTO PEAK
SAN BERNARDINO
RIVERSIDE
RIALTO
REDLANDS
CORONA
PERRIS
HEMET
MORENO VALLEY
MARCH AIR FORCE BASE
LAKE MATHEWS
LAKE PERRIS
LAKE ELSINORE
LAGUNA MOUNTAINS
LAKEVIEW MOUNTAINS
PALM SPRINGS
INDIO
COACHELLA
DESERT HOT SPRINGS
THOUSAND PALMS
BANNING
BEAUMONT
CABAZON
TORRES MARTINEZ INDIAN RES
SAN JACINTO
HEMET
SAN CLEMENTE
FALLBROOK
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S

RAINFALL INTENSITY—INCHES PER HOUR

CATHEDRAL CITY			CHERRY VALLEY			CORONA			DESERT HOT SPRINGS			ELSINORE - WILDOMAR		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	4.14	6.76	5	3.65	5.49	5	3.10	4.78	5	4.39	6.76	5	3.23	4.94
6	3.73	6.08	6	3.30	4.97	6	2.84	4.38	6	3.95	6.08	6	2.96	4.53
7	3.41	5.56	7	3.03	4.56	7	2.64	4.07	7	3.62	5.56	7	2.75	4.21
8	3.15	5.15	8	2.82	4.24	8	2.47	3.81	8	3.35	5.15	8	2.58	3.95
9	2.95	4.81	9	2.64	3.97	9	2.34	3.60	9	3.13	4.81	9	2.44	3.73
10	2.77	4.52	10	2.49	3.75	10	2.22	3.43	10	2.94	4.52	10	2.32	3.54
11	2.62	4.28	11	2.36	3.56	11	2.12	3.27	11	2.78	4.28	11	2.21	3.39
12	2.49	4.07	12	2.25	3.39	12	2.04	3.14	12	2.65	4.07	12	2.12	3.25
13	2.38	3.88	13	2.16	3.25	13	1.96	3.02	13	2.53	3.88	13	2.04	3.13
14	2.28	3.72	14	2.07	3.12	14	1.89	2.92	14	2.42	3.72	14	1.97	3.02
15	2.19	3.58	15	1.99	3.00	15	1.83	2.82	15	2.32	3.58	15	1.91	2.92
16	2.11	3.44	16	1.92	2.90	16	1.77	2.73	16	2.24	3.44	16	1.85	2.83
17	2.04	3.32	17	1.86	2.80	17	1.72	2.66	17	2.16	3.32	17	1.80	2.75
18	1.97	3.22	18	1.80	2.71	18	1.68	2.58	18	2.09	3.22	18	1.75	2.67
19	1.91	3.12	19	1.75	2.64	19	1.63	2.52	19	2.03	3.12	19	1.70	2.60
20	1.85	3.03	20	1.70	2.56	20	1.59	2.46	20	1.97	3.03	20	1.66	2.54
22	1.75	2.86	22	1.61	2.43	22	1.52	2.35	22	1.86	2.86	22	1.59	2.43
24	1.67	2.72	24	1.54	2.32	24	1.46	2.25	24	1.77	2.72	24	1.52	2.33
26	1.59	2.60	26	1.47	2.22	26	1.40	2.17	26	1.69	2.60	26	1.46	2.24
28	1.52	2.49	28	1.41	2.13	28	1.36	2.09	28	1.62	2.49	28	1.41	2.16
30	1.46	2.39	30	1.36	2.05	30	1.31	2.02	30	1.55	2.39	30	1.37	2.09
32	1.41	2.30	32	1.31	1.98	32	1.27	1.96	32	1.50	2.30	32	1.33	2.03
34	1.36	2.22	34	1.27	1.91	34	1.23	1.90	34	1.45	2.22	34	1.29	1.97
36	1.32	2.15	36	1.23	1.85	36	1.20	1.85	36	1.40	2.15	36	1.25	1.92
38	1.28	2.09	38	1.20	1.80	38	1.17	1.81	38	1.36	2.09	38	1.22	1.87
40	1.24	2.02	40	1.16	1.75	40	1.14	1.76	40	1.32	2.02	40	1.19	1.82
45	1.16	1.89	45	1.09	1.64	45	1.08	1.66	45	1.23	1.89	45	1.13	1.72
50	1.09	1.78	50	1.03	1.55	50	1.03	1.58	50	1.16	1.78	50	1.07	1.64
55	1.03	1.68	55	.98	1.47	55	.98	1.51	55	1.09	1.68	55	1.02	1.56
60	.98	1.60	60	.93	1.40	60	.94	1.45	60	1.04	1.60	60	.98	1.50
65	.94	1.53	65	.89	1.34	65	.90	1.40	65	.99	1.53	65	.94	1.44
70	.90	1.46	70	.85	1.29	70	.87	1.35	70	.95	1.46	70	.91	1.39
75	.86	1.41	75	.82	1.24	75	.84	1.30	75	.91	1.41	75	.88	1.35
80	.83	1.35	80	.79	1.20	80	.82	1.26	80	.88	1.35	80	.85	1.31
85	.80	1.31	85	.77	1.16	85	.80	1.23	85	.85	1.31	85	.83	1.27
SLOPE = .580			SLOPE = .550			SLOPE = .480			SLOPE = .580			SLOPE = .480		

STANDARD INTENSITY—DURATION CURVES DATA

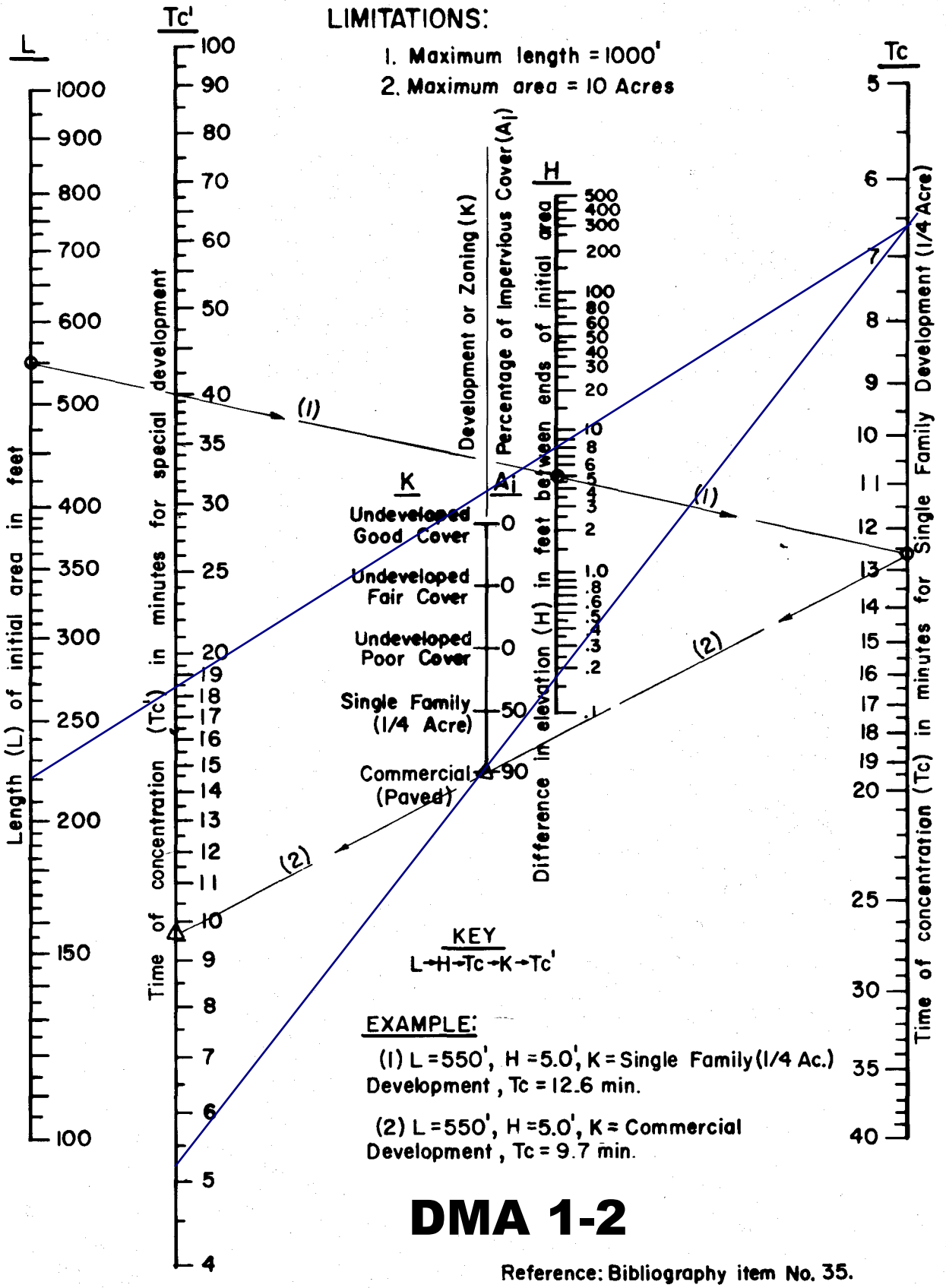


DMA 1-1

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

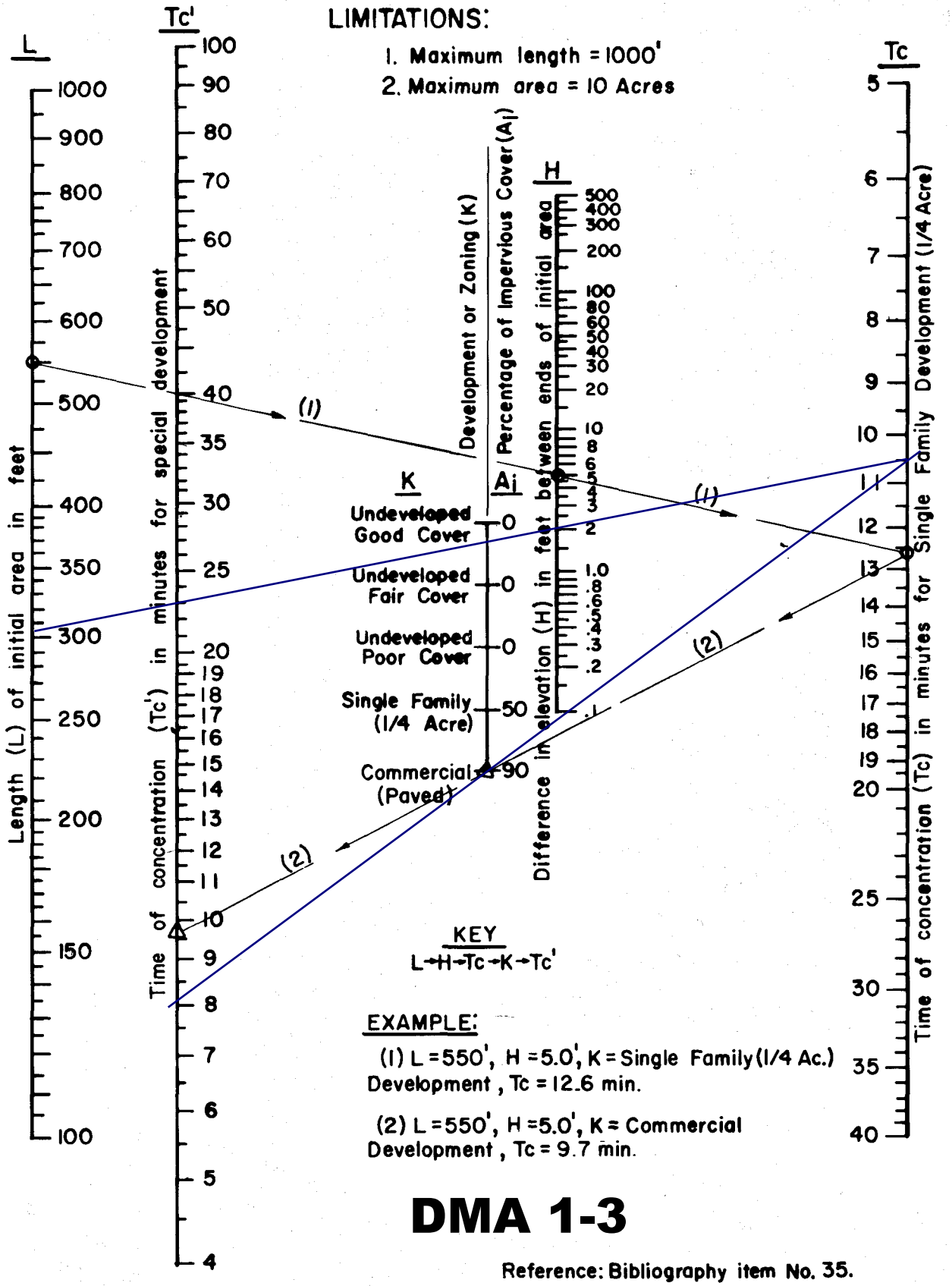


DMA 1-2

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

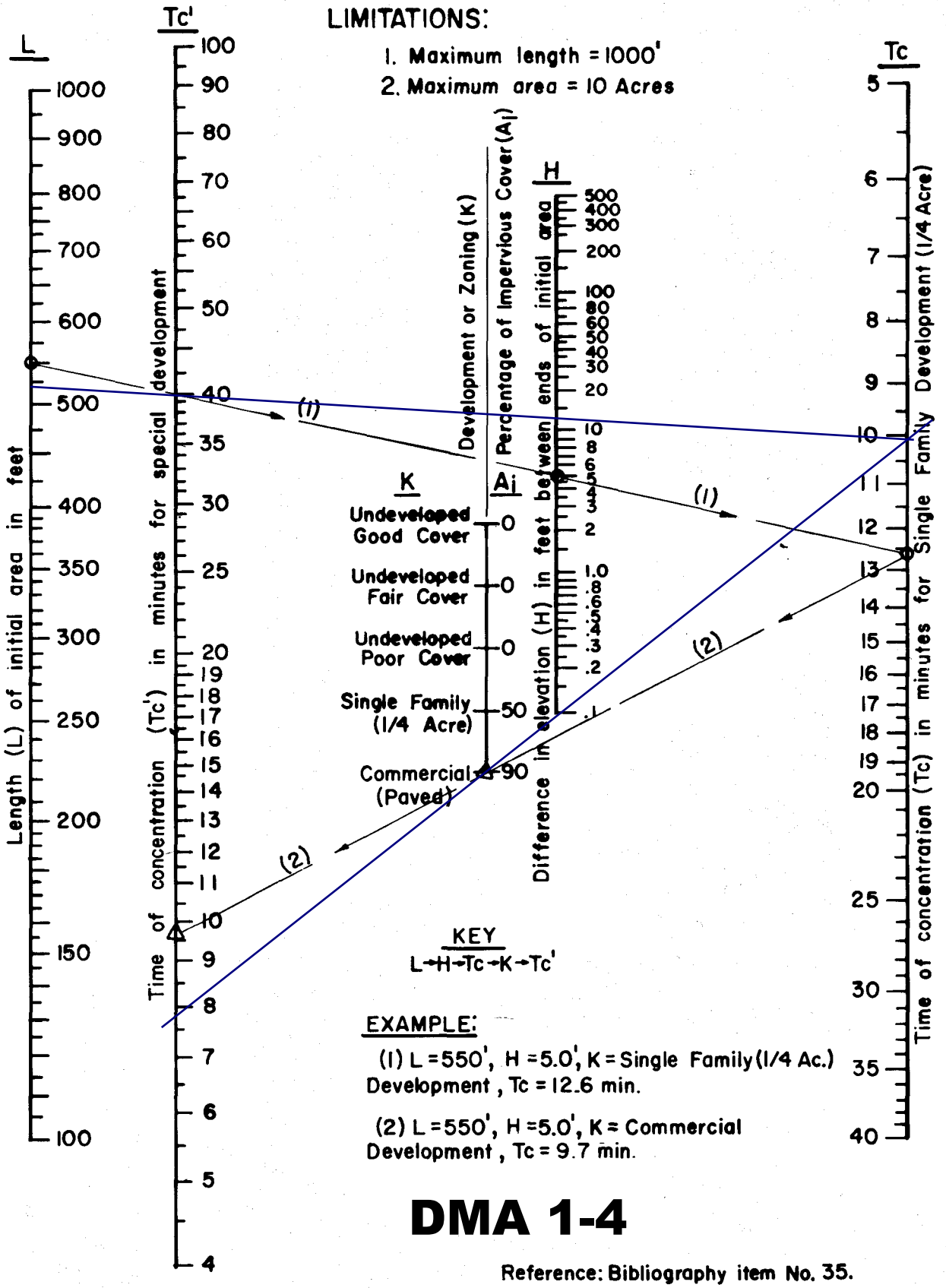


DMA 1-3

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

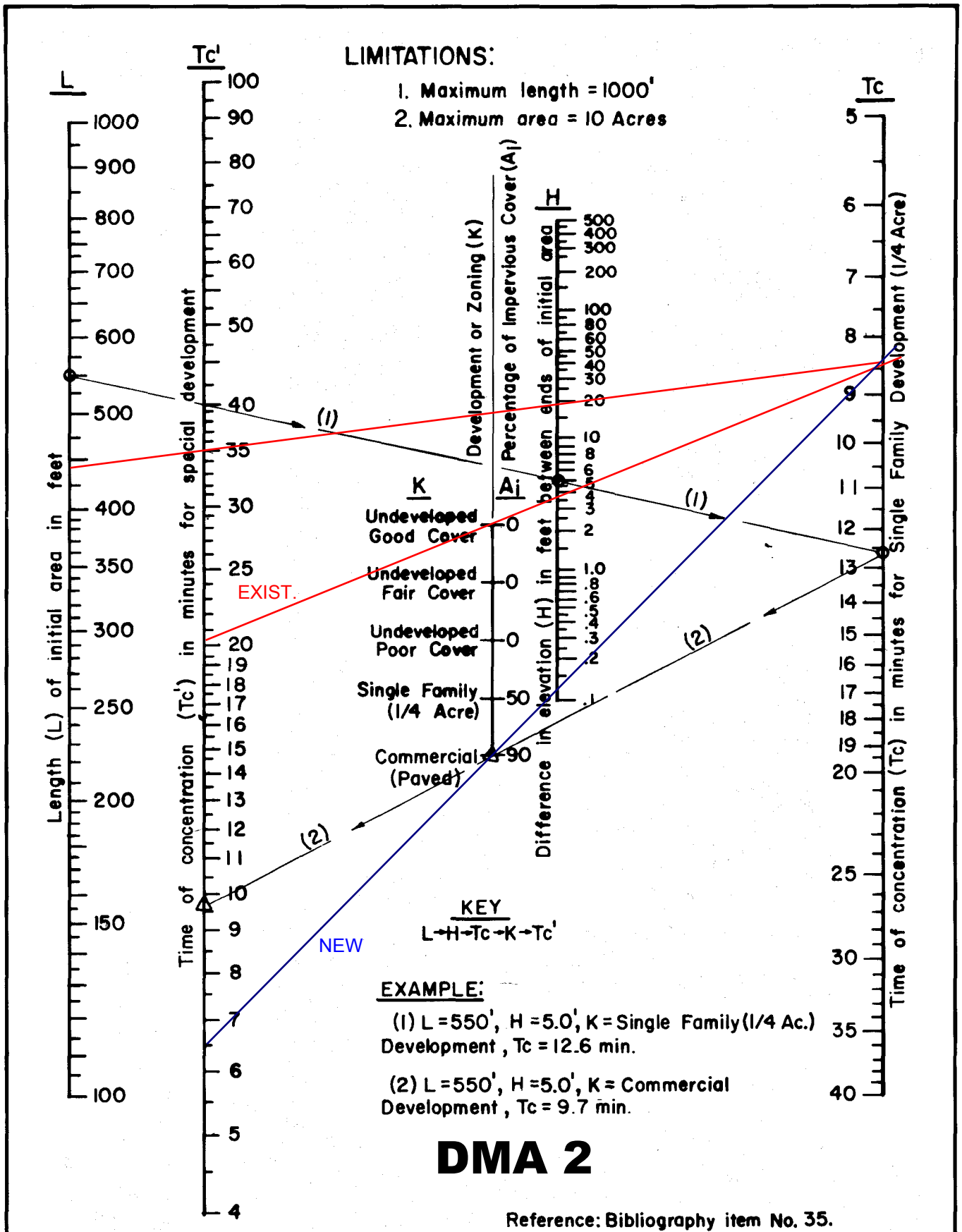


DMA 1-4

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

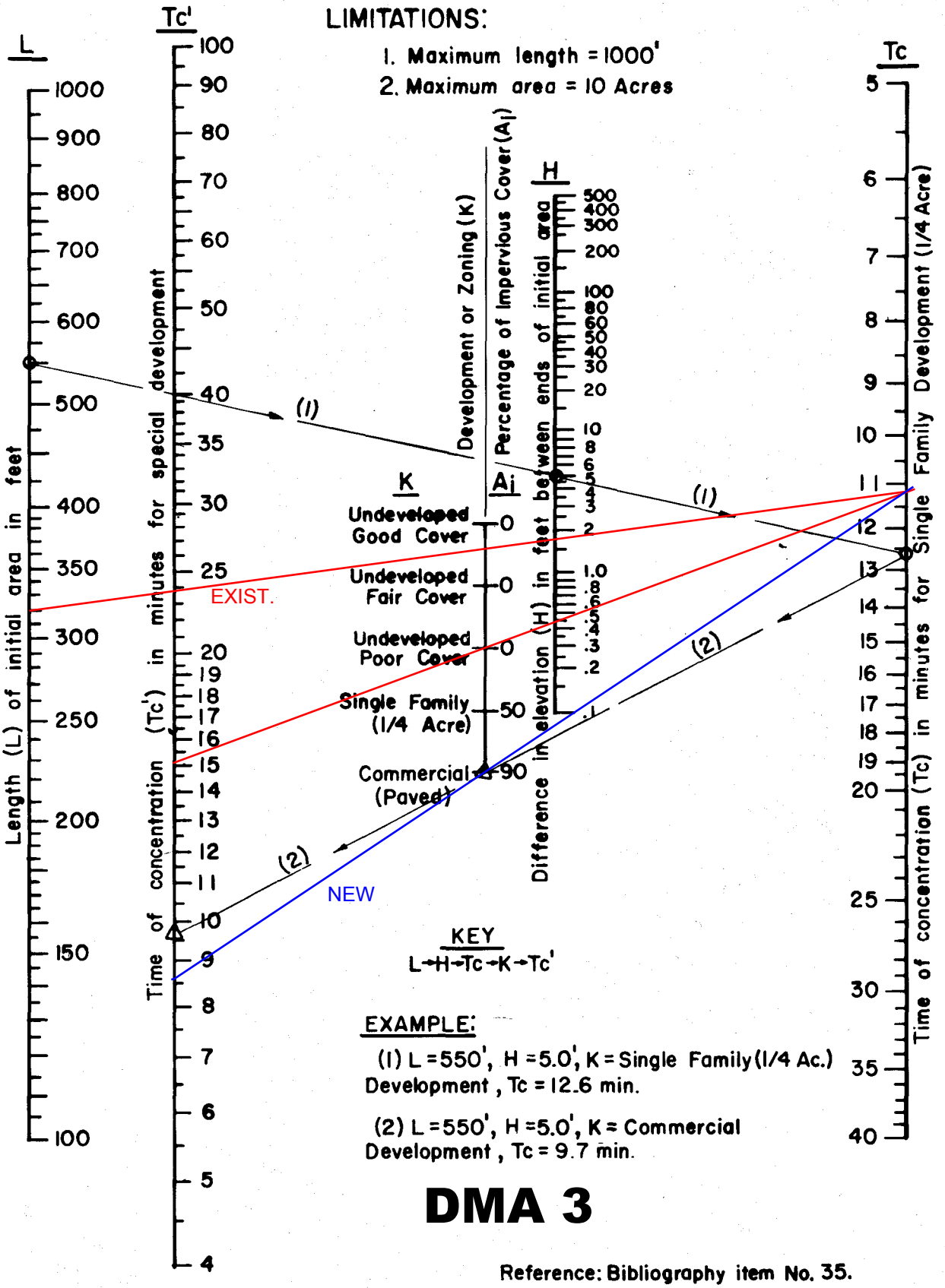


DMA 2

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

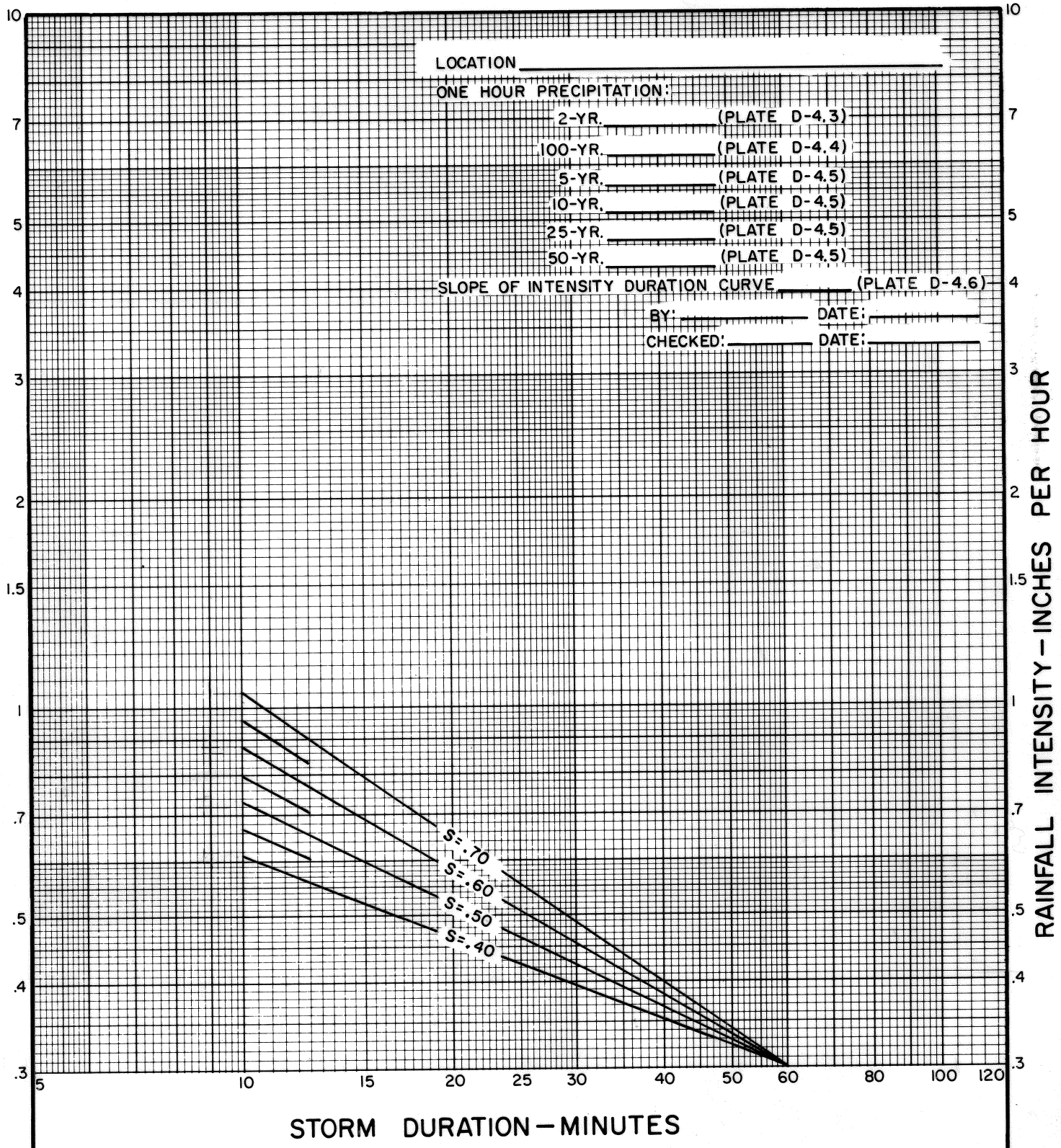


DMA 3

Reference: Bibliography item No. 35.

RCFC & WCD
HYDROLOGY MANUAL

TIME OF CONCENTRATION
FOR INITIAL SUBAREA

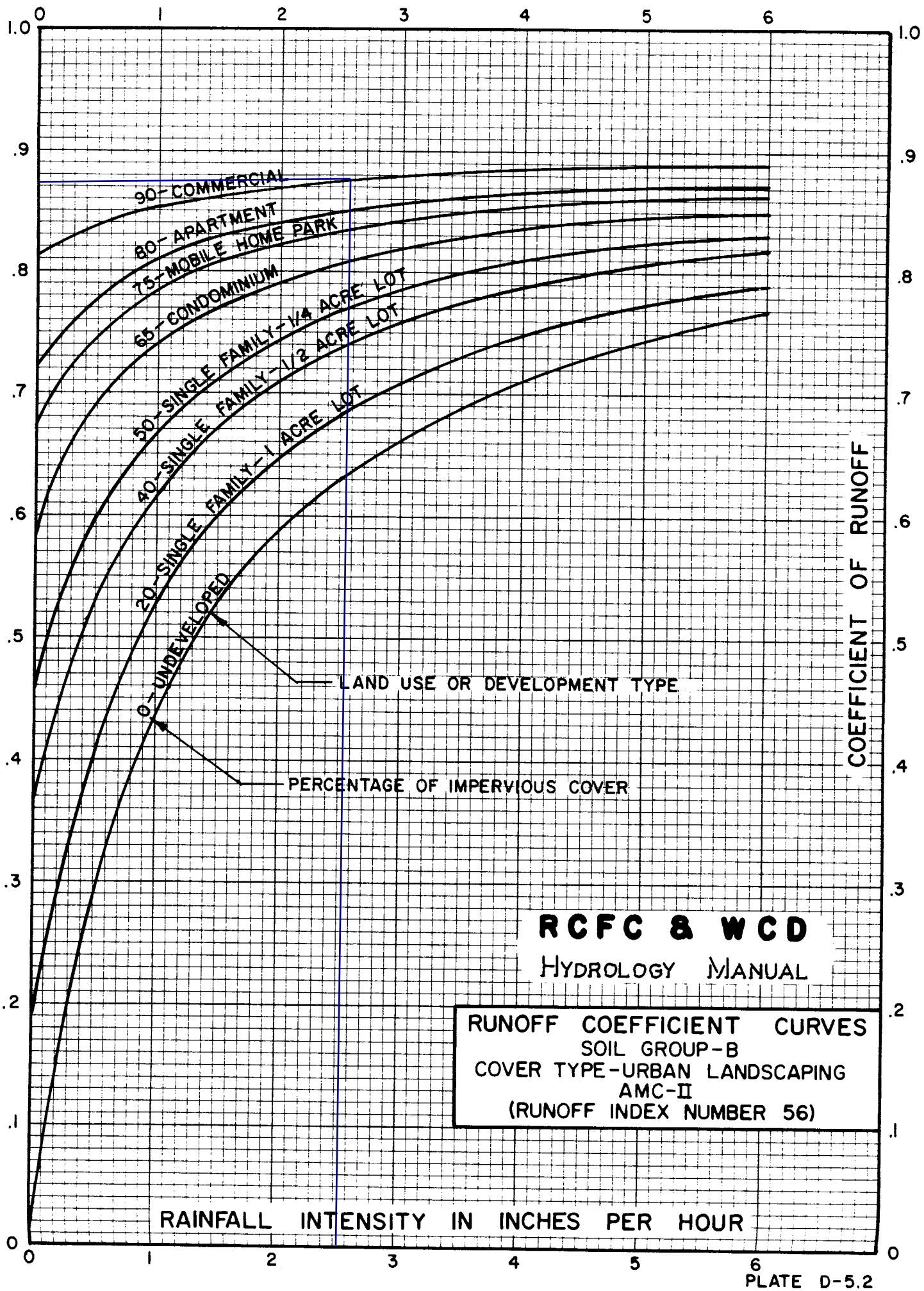


RCFC & WCD

HYDROLOGY MANUAL

INTENSITY — DURATION CURVES CALCULATION SHEET

PLATE D-4.7

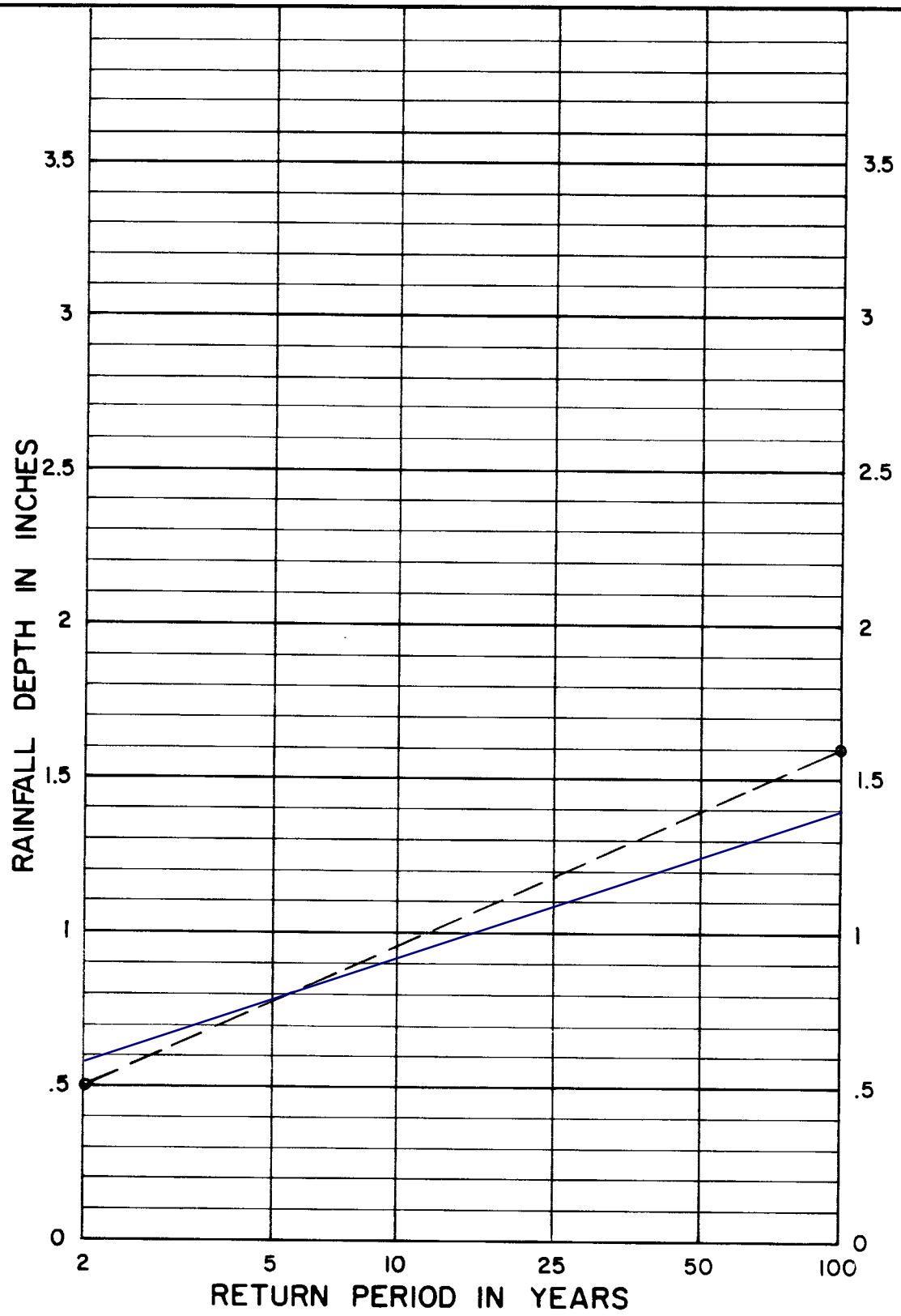


RCFC & WCD

HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVES
SOIL GROUP-B
COVER TYPE-URBAN LANDSCAPING
AMC-II
(RUNOFF INDEX NUMBER 56)

PLATE D-5.2



NOTE:

1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

Reference: NOAA Atlas 2, Volume XI-California, 1973.

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

PLATE D-4.5

LOCATION _____

ONE HOUR PRECIPITATION:

2-YR. 0.57 (PLATE D-4.3)

100-YR. 1.4 (PLATE D-4.4)

5-YR. _____ (PLATE D-4.5)

10-YR. _____ (PLATE D-4.5)

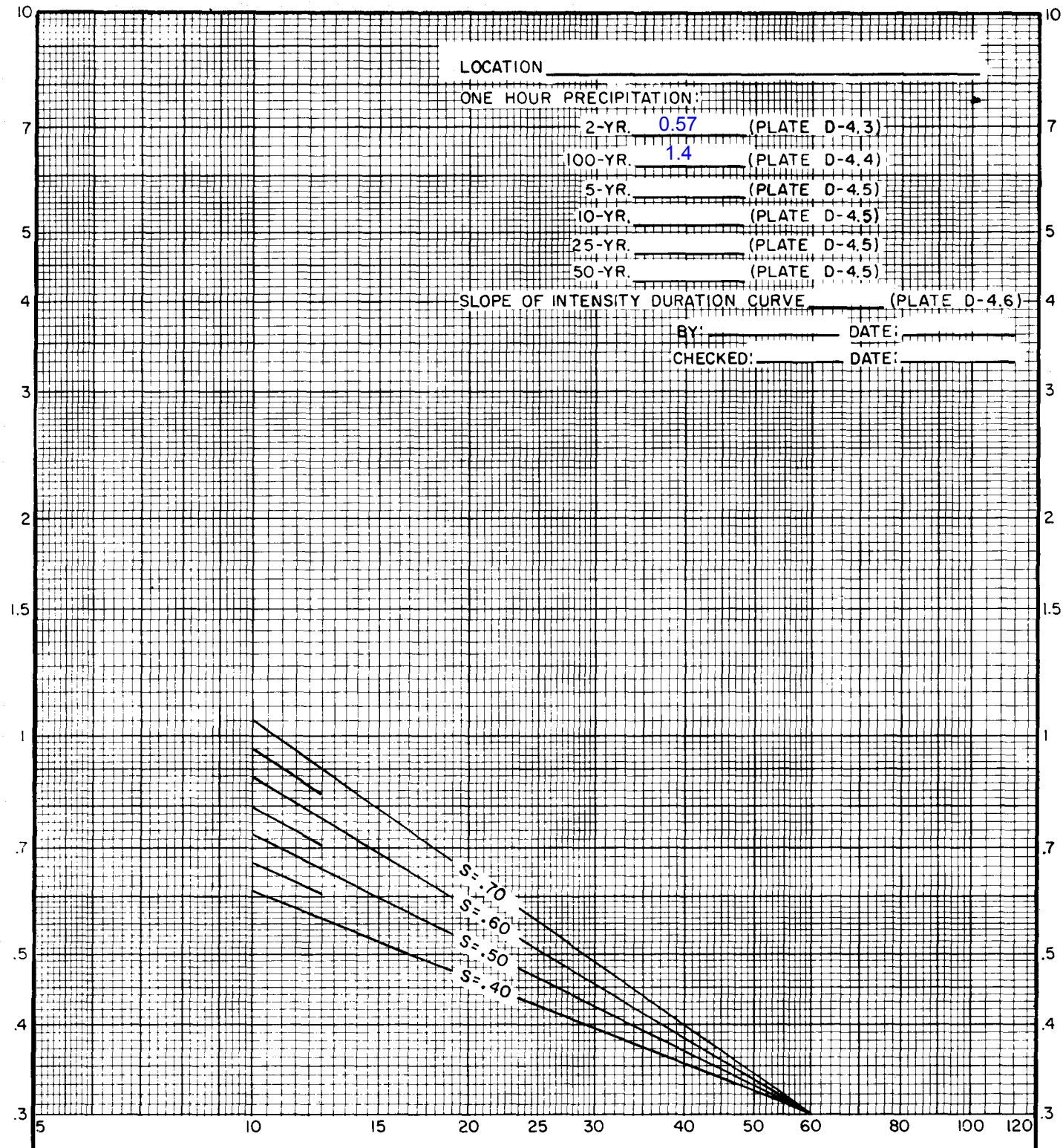
25-YR. _____ (PLATE D-4.5)

50-YR. _____ (PLATE D-4.5)

SLOPE OF INTENSITY DURATION CURVE _____ (PLATE D-4.6)

BY: _____ DATE: _____

CHECKED: _____ DATE: _____



RCFC & WCD

HYDROLOGY MANUAL

INTENSITY-DURATION CURVES CALCULATION SHEET

PLATE D-4.7

APPENDIX 3

HYDROLOGY MAPS

HYDROLOGY MAP
PRE CONSTRUCTION

100yr. storm
Q2ex.=0.11cfs

100yr. storm
Q1ex.=1.49 cfs

DMA 2
A2-imp=0 s.f.
A2-Indsc.=13,646 s.f.

DMA 1
A1-imp=9,950 s.f.
A1-Indsc.=165,805 s.f.

DMA 3
A3-imp=0 s.f.
A3-Indsc.=10,350 s.f.

100yr. storm
Q3ex.=0.09cfs

MAIN STREET

CHASE DRIVE

EXIST. FLOOD CONTROL CHANNEL

NOT A PART
APN 113-340-014

SCALE 1"=60'

N

HYDROLOGY MAP
POST CONSTRUCTION

DMA 2
A2-imp=11,211 s.f.
A2-Indsc.=2,435 s.f.

Q2-10yr.=0.56cfs
Q2-100yr.=0.86cfs

Q1-3(10yr.)=1.78cfs
Q1-3(100yr.)=2.74cfs

Q1-4(10yr.)=1.70 cfs
Q1-4(100yr)=2.61 cfs

Q1total-10yr.=7.94 cfs
Q1total-100yr=12.21 cfs

Q1-2(10yr.)=2.32cfs
Q1-2(100yr.)=3.57cfs

Q1-1(10yr.)=2.14cfs
Q1-1(100yr.)=3.29cfs

Q3-10yr.=0.21cfs
Q3-100yr.=0.33 cfs

BIOPOD (4'x4') SYSTEM (DMA 2) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP C) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP D) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP B) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP A) PER DETAIL HEREON

BIOPOD (4'x4') SYSTEM (DMA 3) PER DETAIL HEREON

N141 EL. 37.10

N142 EL.24.50

N132 EL.37.45

N131 EL.39.48

N121 EL.37.60

N122 EL.29.60

N112 EL.37.50

DMA 1-4
46,213 s.f.=1.06ac.

DMA 1-2
16,100 s.f.=0.37ac.

DMA 1-3
49,034 s.f.=1.13 ac.

DMA 1-1
64,408 s.f.=1.44ac.

DMA 3-1
10,350 s.f.=0.24 ac.

DMA 2
13,646 s.f.=0.31 ac.

DMA1-1a
DMA1-1b
DMA1-2b
DMA1-3a
DMA1-3b
DMA1-4a
DMA1-4b

L1-4=520'
h1-4=12.6'

L1-2=305'
h1-2=8.00'

L1-3=305'
h1-3=2.03'

L1-1=370'
h1-1=1.78'

L2=427'
h2=19.9'

L3=320'
h3=1.70'

6" OVERFLOW PIPE

10" HDPE OVERFLOW PIPE

CURB OUTLET WITH 3" PIPE CONNECTION TO PROPOSED BIOPOD

6" OVERFLOW PIPE CONNECTED TO EXIST. TRANSITION STRUCTURE

NOT A PART
APN 113-340-014

EXIST. FLOOD CONTROL CHANNEL

MAIN ST.

CHASE DR.

SA1-3 –SUB AREA
N101 –NODE

SCALE 1"=60'

N

APPENDIX 4

BMP DESIGN FLOW CALCULATIONS

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk Case No:

Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA1-1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.90 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1-1a	*52548*	*Concrete or Asphalt*	*1*	*0.89*	*46872.8*			
DMA1-1b	*11860*	*Natural (C Soil)*	*0.3*	*0.225166*	*2670.5*			
	64408		***Total***		**49543.3**	**0.90**	***3715.7***	***3716***

Notes:

Bioretention Facility - Design Procedure	BMP ID 1-1	Legend:	Required Entries / Calculated Cells

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk County/City Case No.:

Design Volume

Enter the area tributary to this feature A_T= 1.48 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 3,716 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 21.0 ft

Total Effective Depth, d_E

$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$ d_E = 1.80 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 2,065 ft^2

Proposed Surface Area A= 2,262 ft^2

Minimum Required Length of Bioretention Facility, L L = 98.3 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = :1

Diameter of Underdrain inches

Longitudinal Slope of Site (3% maximum) %

6" Check Dam Spacing feet

Describe Vegetation:

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk Case No:

Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA1-2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.90 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1-2a	*13095*	*Concrete or Asphalt*	*1*	*0.89*	*11680.7*			
DMA1-2b	*3005*	*Natural (C Soil)*	*0.3*	*0.225166*	*676.6*			
	16100		***Total***		**12357.3**	**0.90**	***926.8***	***927***

Notes:

Bioretention Facility - Design Procedure	BMP ID 1-2	Legend:	Required Entries / Calculated Cells

Company Name: ITF & Associates, Inc. Date: 2/23/2023

Designed by: Jeff Tsalyuk County/City Case No.:

Design Volume

Enter the area tributary to this feature A_T= 0.37 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 927 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 4.0 ft

Total Effective Depth, d_E

$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$ d_E = 1.80 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 515 ft^2

Proposed Surface Area A= 872 ft^2

Minimum Required Length of Bioretention Facility, L L = 128.8 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = :1

Diameter of Underdrain inches

Longitudinal Slope of Site (3% maximum) %

6" Check Dam Spacing feet

Describe Vegetation:

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. Date: 2/23/2023

Designed by: Jeff Tsalyuk Case No:

Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA1-3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.90 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1-3a	*40524*	*Concrete or Asphalt*	*1*	*0.89*	*36147.4*			
DMA1-3b	*8510*	*Natural (C Soil)*	*0.3*	*0.225166*	*1916.2*			
	49034	***Total***			**38063.6**	**0.90**	***2854.8***	***2856***

Notes:

Bioretention Facility - Design Procedure	BMP ID 1-3	Legend:	Required Entries / Calculated Cells

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk County/City Case No.:

Design Volume

Enter the area tributary to this feature A_T= 1.34 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 2,856 ft^3

Type of Bioretention Facility Design

(●) Side slopes required (parallel to parking spaces or adjacent to walkways)

( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 10.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ d_E = 1.73 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,651 ft^2

Proposed Surface Area A= 1,730 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = :1

Diameter of Underdrain inches

Longitudinal Slope of Site (3% maximum) %

6" Check Dam Spacing feet

Describe Vegetation:

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk Case No:

Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA1-4

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.90 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1-4a	*40393*	*Concrete or Asphalt*	*1*	*0.89*	*36030.6*			
DMA1-4b	*5820*	*Natural (C Soil)*	*0.3*	*0.225166*	*1310.5*			
	46213		***Total***		**37341.1**	**0.90**	***2800.6***	***2802***

Notes:

Bioretention Facility - Design Procedure	BMP ID 1-4	Legend:	Required Entries / Calculated Cells

Company Name: ITF & Associates, Inc. Date: 2/28/2023

Designed by: Jeff Tsalyuk County/City Case No.:

Design Volume

Enter the area tributary to this feature A_T= 1.06 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 2,802 ft^3

Type of Bioretention Facility Design

○ Side slopes required (parallel to parking spaces or adjacent to walkways)

◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 3.0 ft

Total Effective Depth, d_E

$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$ d_E = 1.80 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 1,557 ft^2

Proposed Surface Area A= 1,617 ft^2

Minimum Required Length of Bioretention Facility, L L = 519.0 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = :1

Diameter of Underdrain inches

Longitudinal Slope of Site (3% maximum) %

6" Check Dam Spacing feet

Describe Vegetation:

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. Date: 2/20/2023

Designed by: Jeff Tsalyuk Case No:

Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity I = 0.20 in/hr

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMAs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
DMA2a	11211	Concrete or Asphalt	1	0.89	10000.2			
DMA2b	2435	Natural (C Soil)	0.3	0.225166	548.3			
	13646	Total			10548.5	0.20	0	0.2

Notes:

Qmin=10548.5x02/43,560= 0.048 cfs

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: ITF & Associates, Inc. — Date: 2/28/2023
Designed by: Jeff Tsalyuk — Case No:
Company Project Number/Name: 8842

BMP Identification

BMP NAME / ID: DMA3

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

Design Rainfall Intensity: I = 0.20 in/hr

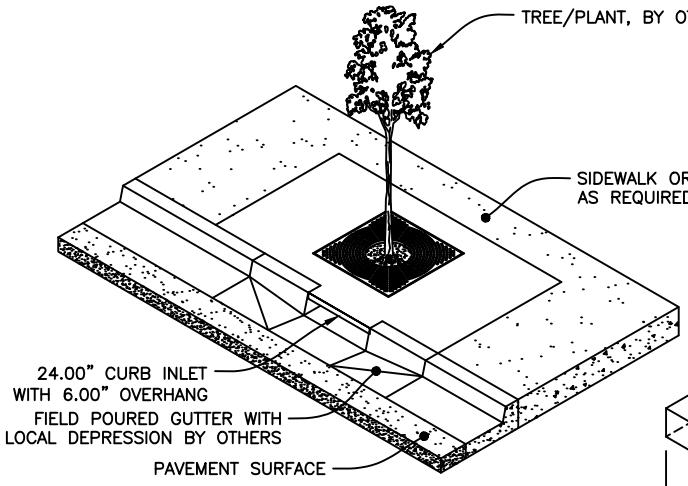
Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
DMAs	*DMA3a*	*9302*	*Concrete or Asphalt*	*1*	*0.89*	*8297.4*			
	DMA3b	*12730*	*Natural (B Soil)*	*0.15*	*0.141446*	*1800.6*			
		22032		***Total***		**10098**	**0.20**	***0***	***0.046***

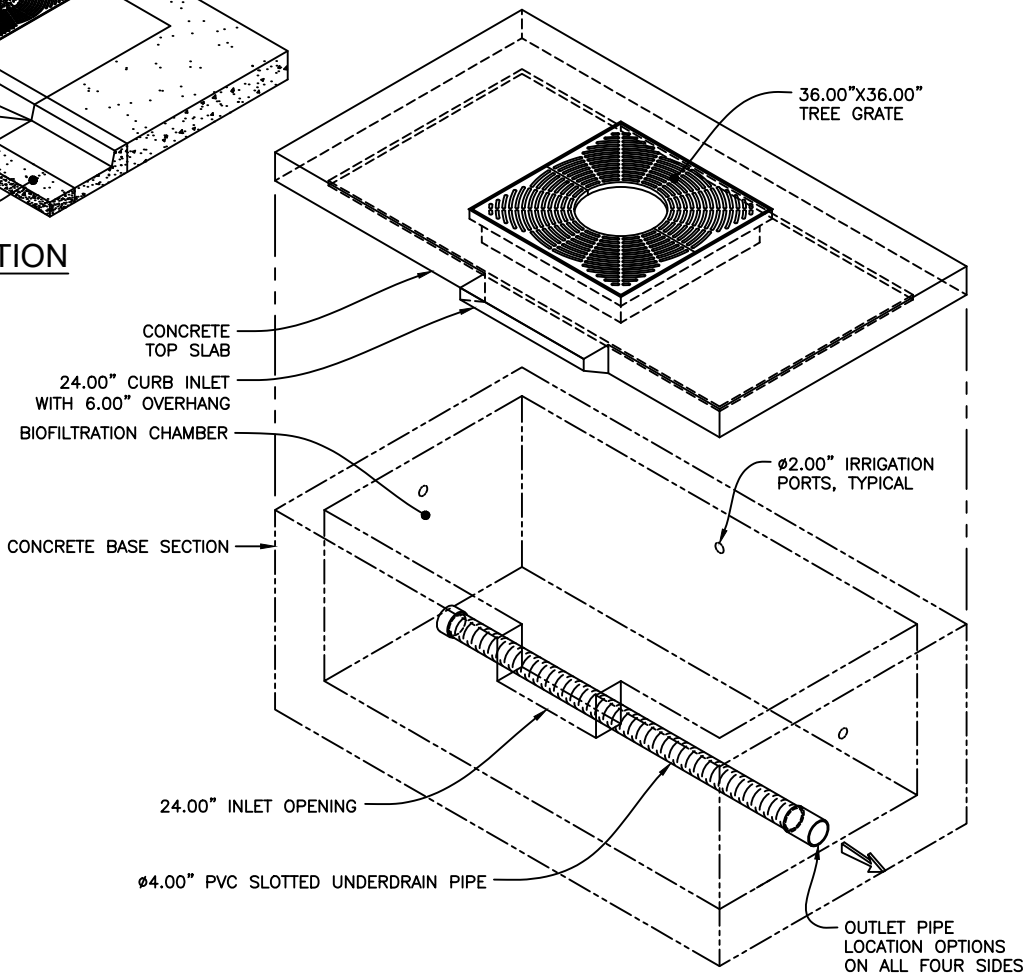
Notes:

Qmin=10098x0.2/43560=0.046 cfs



TYPICAL INSTALLATION

SCALE: 1/2



ISOMETRIC VIEW

FILTER MEDIA & DRAIN ROCK NOT SHOWN FOR CLARITY.

NOTES:

1. RIGHT CONFIGURATION SHOWN, MIRROR LEFT CONFIGURATION ARE AVAILABLE TO ACCOMMODATE OTHER OUTLET PIPE LOCATIONS.
2. SEPARATE BYPASS STRUCTURE IS REQUIRED IF PEAK FLOW RATE EXCEEDS TREATMENT CAPACITY OF THE BioPod™.
3. CONTACT OLDCASTLE INFRASTRUCTURE™ FOR ENGINEERING ASSISTANCE AND DETAIL DRAWINGS.
4. CONCRETE COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C890 & C913.
5. VEGETATION BY OTHERS. CUSTOMER TO SPECIFY. INSTALLED AT TIME OF ACTIVATION. THE OWNER IS RESPONSIBLE FOR THE SURVIVAL OF THE VEGETATION AND MUST IRRIGATE AS NECESSARY.

US Patents Pending

Bioretention/ Biofiltration

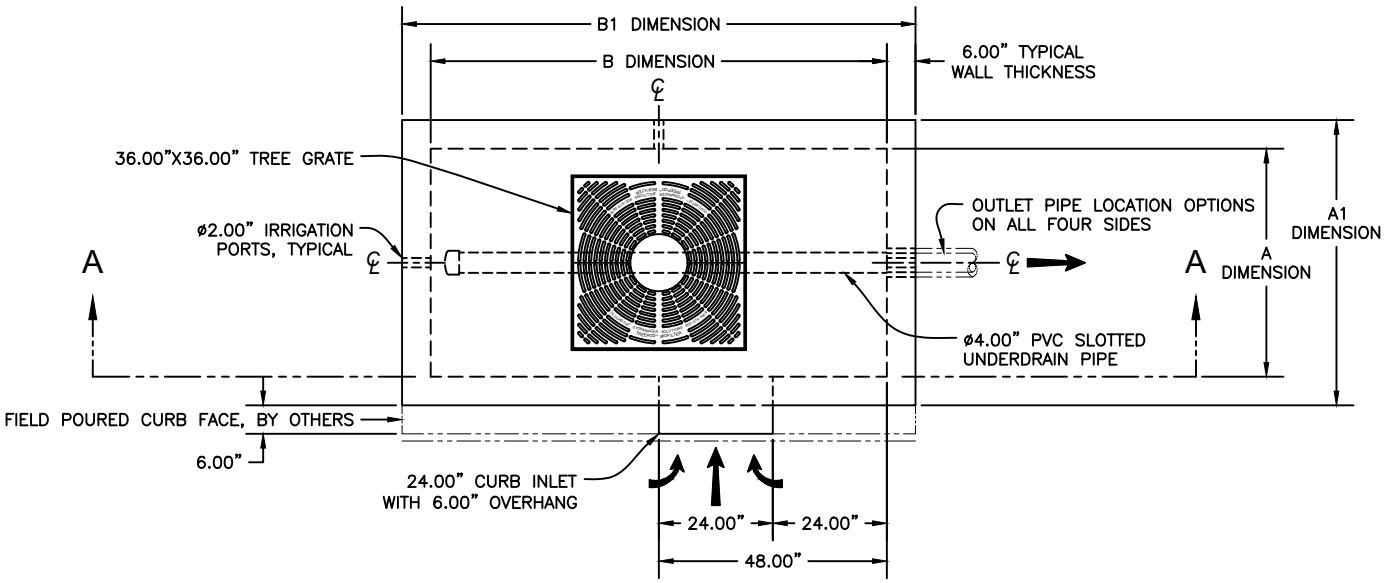
BioPod™ Biofilter

Tree - SoCal Sizing

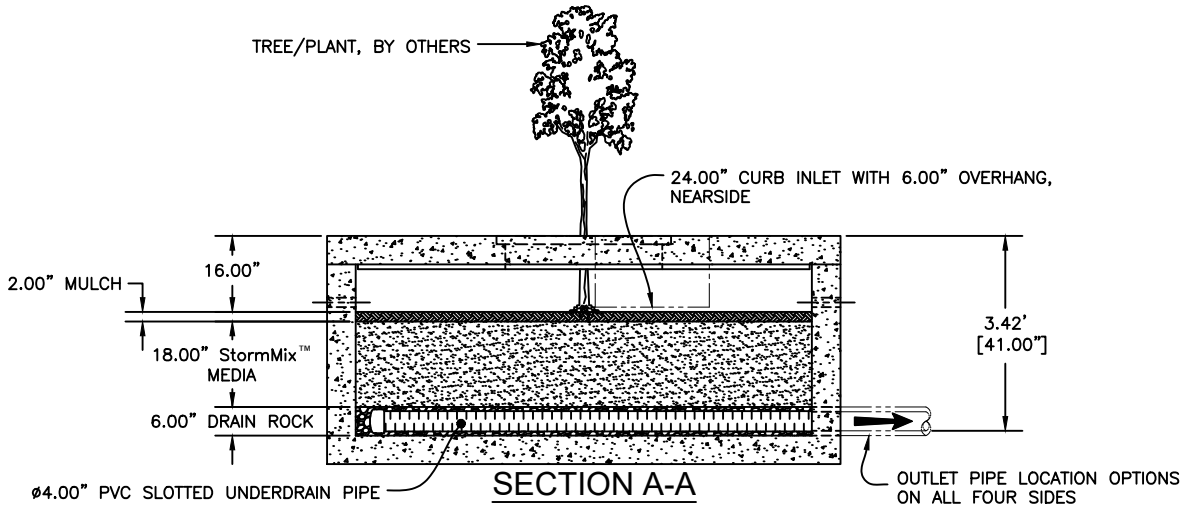
Side Inlet & External Bypass

Oldcastle Infrastructure™
A CRH COMPANY

DRAWING NO.	REV	ECO	DATE	
BPT-SI-SoCal	B	ECO-0161 ARG 6/4/19	PPS 6/4/19	SHEET 1 OF 2



PLAN VIEW



SECTION A-A

MODEL	VAULT SIZE [1] (ID)		VAULT FOOTPRINT [1] (OD)		TREATMENT FLOW CAPACITY (GPM/CFS)	
	A DIM	B DIM	A1 DIM	B1 DIM	1.6 GPM/SF (WA GULD[2])	1.8 GPM/SF (NJCAT[3])
BPT-44-SI	4'	4'	5'	5'	25.6 / 0.057	28.8 / 0.064
BPT-46.5-SI	4'	6.5'	5'	7.5'	41.6 / 0.093	46.8 / 0.104
BPT-48-SI	4'	8'	5'	9'	51.2 / 0.114	57.6 / 0.128
BPT-413-SI	4'	13'	5'	14'	83.2 / 0.185	93.6 / 0.209
BPT-66-SI	6'	6'	7'	7'	57.6 / 0.128	64.8 / 0.144
BPT-68-SI	6'	8'	7'	9'	76.8 / 0.171	86.4 / 0.193
BPT-612-SI	6'	12'	7'	13'	115.2 / 0.257	129.6 / 0.289
BPT-88-SI	8'	8'	9'	9'	102.4 / 0.228	115.2 / 0.257
BPT-812-SI	8'	12'	9'	13'	153.6 / 0.342	172.8 / 0.385
BPT-816-SI	8'	16'	9'	17'	204.8 / 0.456	230.4 / 0.513

SITE SPECIFIC DATA				
Structure ID				
Model Size				
Orientation (Left or Right)				
Treatment Flow Rate (cfs)				
Peak Flow Rate (2 cfs max.)				
Rim Elevation				
Pipe Data	Pipe Location (Front or Side)	Pipe Size (15" max.)	Pipe Type	Invert Elevation*
Outlet				
* Invert Elevation is 3.5' below Rim Elevation.				
Notes:				

[1] All Dimensions are nominal, ID=Inside Dimension, OD=Outside Dimension.
[2] Treatment flow capacity at 1.6 gpm/sf media surface area based on an WA Ecology GULD Approval for Basic, Enhanced & Phosphorus.
[3] Treatment flow capacity at 1.8 gpm/sf media surface area based on an NJCAT Verification & NJ DEP Certification.

US Patents Pending

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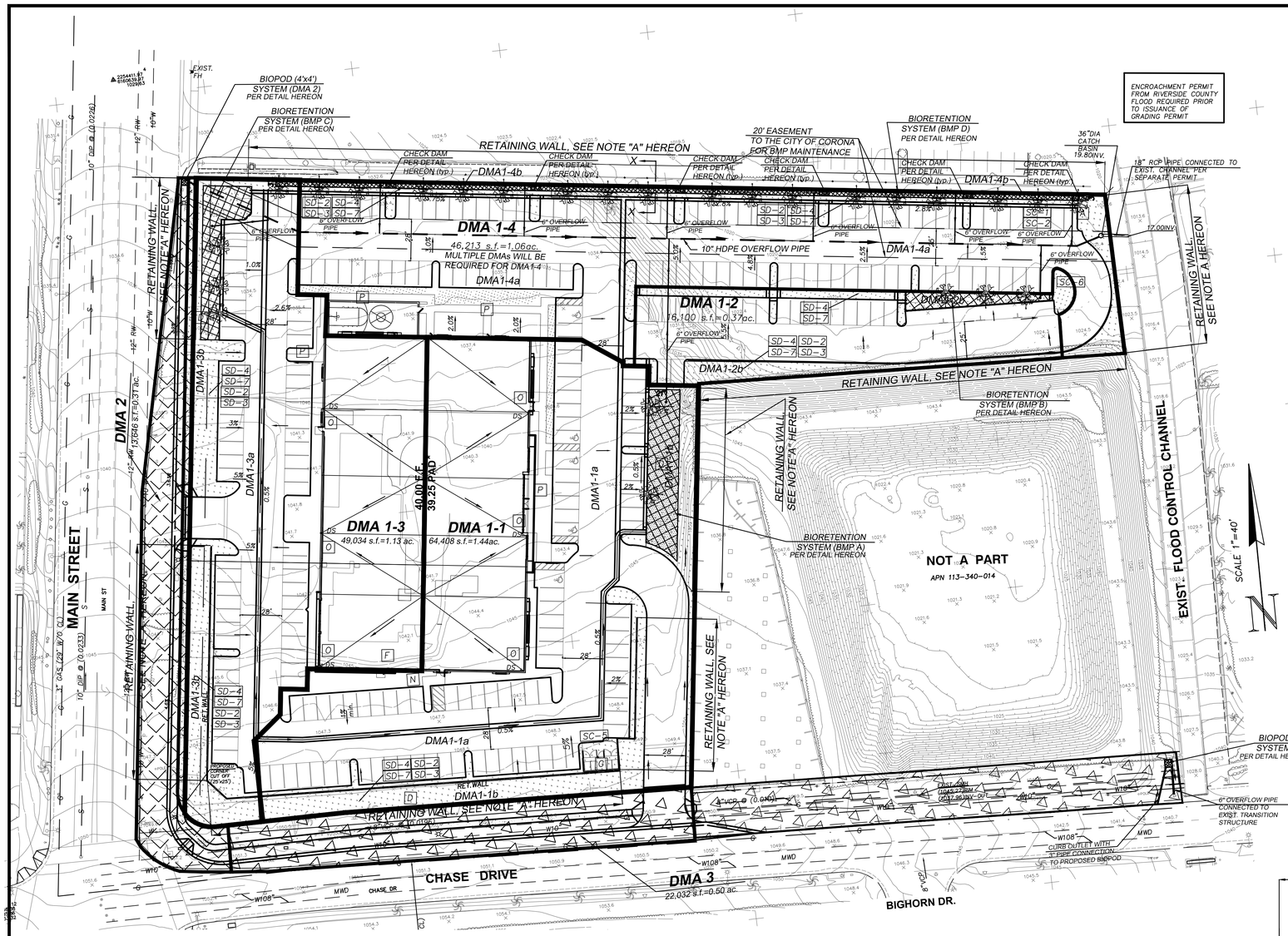
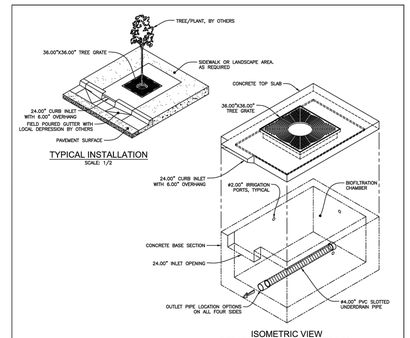
Oldcastle Infrastructure™ A CRH COMPANY

DRAWING NO.	REV	ECO	DATE	
BPT-SI-SoCal	B	ECO-0161 ARG 6/4/19	PPS 6/4/19	SHEET 2 OF 2

DPR2022-0010





NOTES:

1. RIGHT CONFIGURATION SHOWN, MIRROR LEFT CONFIGURATION ARE AVAILABLE TO ACCOMMODATE OTHER OUTLET PIPE LOCATIONS.
2. SEPARATE BYPASS STRUCTURE IS REQUIRED IF PEAK FLOW RATE EXCEEDS TREATMENT CAPACITY OF THE BioPod™.
3. CONTACT OLDCASTLE INFRASTRUCTURE™ FOR ENGINEERING ASSISTANCE AND DETAIL DRAWINGS.
4. CONCRETE COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C890 & C913.
5. VEGETATION BY OTHERS. CUSTOMER TO SPECIFY, INSTALLED AT TIME OF ACTIVATION. THE OWNER IS RESPONSIBLE FOR THE SURVIVAL OF THE VEGETATION AND MUST IRRIGATE AS NECESSARY.

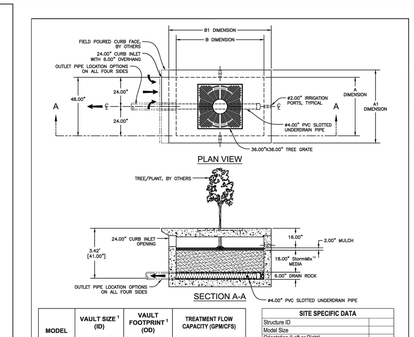
US Patents Pending

Bioretention Biofiltration

BioPod™ Biofilter
Tree - SoCal Sizing
End Inlet & External Bypass

Oldcastle Infrastructure
A CRH COMPANY

DRAWING NO.	BPT-EI-SoCal	B	ECO-2481 ARS 6/4/19	BY PPS 6/4/19	SHEET 1 OF 2



MODEL	VAULT SIZE [1] (OD)		VAULT FOOTPRINT [1] (OD)		TREATMENT FLOW CAPACITY (OPRC)[2][3]	
	A DIM	B DIM	A1 DIM	B1 DIM	1.6 GPM/SF (WA GULD)	1.0 GPM/SF (NJCAT)
BPT-4E-EI	4'	4'	5'	5'	25.6 / 0.057	29.8 / 0.064
BPT-4E5-EI	4'	4'-5"	5'	7.5'	41.6 / 0.093	48.8 / 0.104
BPT-4E-EI	4'	8'	5'	8'	51.2 / 0.114	57.6 / 0.128
BPT-4T5-EI	4'	13'	5'	14'	83.2 / 0.185	93.6 / 0.209
BPT-6E-EI	6'	6'	7'	7'	57.6 / 0.128	64.8 / 0.144
BPT-6E-EI	6'	8'	7'	9'	76.8 / 0.171	86.4 / 0.193
BPT-612-EI	6'	12'	7'	13'	115.2 / 0.257	129.6 / 0.289
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BPT-816-EI	8'	16'	9'	17'	204.8 / 0.456	230.4 / 0.513

[1] All Dimensions are nominal, ID=Inside Dimension, OD=Outside Dimension.
[2] Treatment flow capacity at 1.6 gpm/sf media surface area based on an WA Ecology GULD Approval for Basic, Enhanced & Phosphorus.
[3] Treatment flow capacity at 1.0 gpm/sf media surface area based on an NJCAT Verification & NJ DEP Certification.

SITE SPECIFIC DATA	
Structure ID	
Model Size	
Orientation (Left or Right)	
Treatment Flow Rate (cfs)	
Peak Flow Rate (2 cfs max.)	
Rim Elevation	
Pipe Data — Pipe Location (Invert or Side)	Pipe Size (10" max.)
Pipe Type	Invert Elevation*
Outlet	

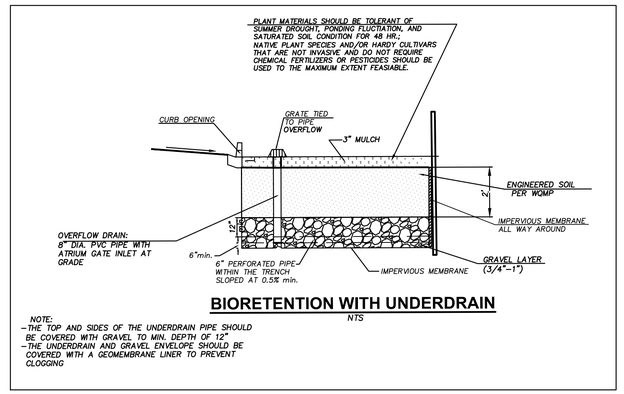
* Invert Elevation is 3.5" below Rim Elevation.
Notes:

US Patents Pending

Bioretention Biofiltration
BioPod™ Biofilter
Tree - SoCal Sizing
End Inlet & External Bypass
Oldcastle Infrastructure
A CRH COMPANY

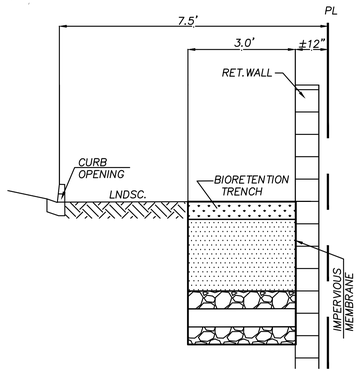
DRAWING NO.	BPT-EI-SoCal	B	BY ECO-2481 ARS 6/4/19	BY PPS 6/4/19	SHEET 2 OF 2

BIOPOD SYSTEM (DMA 2 & DMA3)

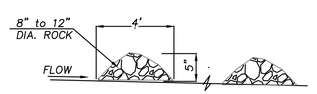


BIORETENTION WITH UNDERDRAIN
NTS

NOTE:
- THE TOP AND SIDES OF THE UNDERDRAIN PIPE SHOULD BE COVERED WITH GRAVEL TO MIN. DEPTH OF 12"
- THE UNDERDRAIN AND GRAVEL ENVELOPE SHOULD BE COVERED WITH A GEOMEMBRANE LINER TO PREVENT CLOGGING



SECTION X-X



CHECK DAM DETAIL

DMAs	IMPERVIOUS AREA (s.f.)	PERVIOUS AREA (s.f.)	TOTAL AREA (s.f.)	BMPs	PROPOSED VOLUME (c.f.)	AREA REQUIRED (s.f.)	AREA PROPOSED (s.f.)
DMA1-1	52,548	11,860	64,408	BMP A	3,716	2,065	2,262
DMA1-2	13,095	3,005	16,100	BMP B	927	515	872
DMA1-3	40,524	8,510	49,034	BMP C	2,856	1,651	1,730
DMA1-4	40,393	5,820	46,213	BMP D	2,802	1,557	1,617
TOTAL			175,755				
DMA2 (MAIN)	11,211	2,435	13,646	BIOPOD			
DMA3 (CHASE)	9,302	12,730	22,032	BIOPOD			

LEGEND

- DMA 2
- DMA 3
- LANDSCAPE AREA
- PROPOSED BMP
- FLOW DIRECTION
- o DS DOWNSPOUTS

SOURCE CONTROL BMPS	
BMP ID	BMP DESCRIPTION
SC-1	PREVENT ILLICIT DISCHARGE INTO MS4- ALL LANDSCAPE AREA (TYP.)
SC-2	STORM DRAIN STENCILING AND SIGNAGE- ALL CURB CUTS (TYP.)
SC-5	TRASH AND STORAGE AREAS
SC-6	ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OR RUNOFF POLLUTANTS
A	ON-SITE STORM DRAIN INLETS
D	LANDSCAPE/OUTDOOR PESTICIDE USE
F	FOOD SERVICE
G	REFUSE AREA
N	FIRE SPRINKLER TEST WATER
O	ROOFING, GUTTERS AND TRIM
P	PLAZA, SIDEWALKS AND PARKING LOTS

SITE DESIGN BMPS	
BMP ID	BMP DESCRIPTION
SD-2	CONSERVE NATURAL AREAS, SOILS AND VEGETATION
SD-3	MINIMIZE IMPERVIOUS AREAS
SD-4	MINIMIZE SOIL COMPACTION
SD-7	LANDSCAPE WITH NATIVE OR DROUGHT TOLERANT LANDSCAPING

PP2022-0004

REGISTERED PROFESSIONAL ENGINEER
YEFIM TSALYUK
NO. C052871
CIVIL
STATE OF CALIFORNIA

ITF & ASSOCIATES, INC.
11278 LOS ALAMITOS BLVD., #354
LOS ALAMITOS, CA 90720
(800) 797-9483

Designed by	Drawn by	Checked by
YT	YT	YT

PLANS PREPARED UNDER SUPERVISION OF YEFIM "JEFF" TSALYUK
Date _____ R.C.E. No. 52871

Reference Plans for these Improvements

Date	By	REVISIONS	App'd

BENCH MARK **C-137**
2-1/2" BRASS DISK STAMPED "C-137" SET IN TOP OF CURB LOCATED 12 N/O ECR OF NELY CURB RETURN OF INTERSECTION OF MAIN ST. & CHASE DR. ELEV. 1049.465

Scale 1"=20'

CITY OF CORONA

WQMP EXHIBIT
FITNESS MANIA
2895 SOUTH MAIN STREET, CORONA, CA

Drawing No. **22-**
Sh **1** of **1**

03/03/23

APPENDIX 5

DRAINAGE PLANS

DPR2022-0010

SCALE 1"=30'

APN 113-340-078

APN 113-340-034

APN 113-340-033

NOT A PART
APN 113-340-014

ENCROACHMENT PERMIT FROM RIVERSIDE COUNTY FLOOD REQUIRED PRIOR TO ISSUANCE OF GRADING PERMIT

BIOPOD (4'x4') SYSTEM (DMA 2) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP C) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP D) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP B) PER DETAIL HEREON

BIORETENTION SYSTEM (BMP A) PER DETAIL HEREON

BIOPOD (4'x4') SYSTEM (DMA 3) PER DETAIL HEREON

10" HDPE OVERFLOW PIPE

36"DIA CATCH BASIN 19.80INV.

18" RCP PIPE CONNECTED TO EXIST. CHANNEL PER SEPARATE PERMIT

6" OVERFLOW PIPE

PROPOSED RET. WALL

EXIST. WALL WITH CHAIN LINK FENCE ON TOP TO REMAIN

6" OVERFLOW PIPE CONNECTED TO EXIST TRANSITION STRUCTURE

CURB OUTLET WITH 3" PIPE CONNECTION TO PROPOSED BIOPOD

MAIN STREET

CHASE DRIVE

BIGHORN DR.

EXIST. FLOOD CONTROL CHANNEL

40.00 F.F.
39.25 PAD*

43+86.57-C.L.MAIN ST.
19+55.46-C.L.CHASE DR.

CONSTRUCTION NOTES

1. CONSTRUCT 6" P.C.C. CURB PER CITY STD. 135.
2. CONSTRUCT 6" P.C.C. CURB & GUTTER PER CITY STD. 137
3. CONSTRUCT 3' WIDE P.C.C. SWALE PER DETAIL "A" ON SHEET 3.
4. CONSTRUCT PAVEMENT SECTION PER SOILS ENGINEER RECOMMENDATION.
5. CONSTRUCT CURB OPENING PER DETAIL "C" ON SHEET 3.
6. CONSTRUCT BIOPOD.
7. CONSTRUCT RETAINING WALL PER SEPARATE PERMIT
8. CONSTRUCT TRASH ENCLOSURE PER ARCHITECTURAL PLAN
9. CONSTRUCT CURB RAMP PER SPPWC STD. PLAN 111-4 (CASE D, TYPE 1)

REGISTERED PROFESSIONAL ENGINEER
YEFIM TSALYUK
NO. C052871
CIVIL
STATE OF CALIFORNIA

*CONTRACTOR TO VERIFY SLAB THICKNESS WITH SOILS ENGINEER AND STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION

PP2022-0004

ITF & ASSOCIATES, INC.
11278 LOS ALAMITOS BLVD., #354
LOS ALAMITOS, CA 90720
(800) 797-9483

Designed by	Drawn by	Checked by
YT	YT	YT

PLANS PREPARED UNDER SUPERVISION OF YEFIM "JEFF" TSALYUK
Date _____ R.C.E. No. 52871

Reference Plans for these Improvements

Date	By	REVISIONS	App'd

BENCH MARK

Scale 1"=30'

Engineering _____
Planning _____
Fire _____

Approved _____
By _____
Savat Khampou
City Engineer
R.C.E. No. 62019

CITY OF CORONA

PRECISE GRADING PLAN
FITNESS MANIA
2895 SOUTH MAIN STREET, CORONA, CA

Drawing No. 22-
Sh 2 of 4

03/02/2023

APPENDIX 6

INFILTRATION DATA

GEO-ETKA, INC.

Established 1965

Soil Engineering and Geology
Material Testing and Inspections

1801 East Heim Avenue, Suite 202, Orange, California 92865 ● Phone (714) 771-6911● Email: geoetka@aol.com

PRELIMINARY SOIL INVESTIGATION REPORT

FOR

PROPOSED COMMERCIAL BUILDINGS
2895 SOUTH MAIN STREET
CORNER OF CHASE DRIVE
CORONA, CALIFORNIA 92881

FOR

BALBAS CONSTRUCTION, INC.
ATTN: MR. JOE BALBAS
3189 AIRWAY AVENUE, UNIT D
COSTA MESA, CALIFORNIA 92626

Date: February 28, 2022
Project No: FP-11936-22

3.6 PAVEMENT RECOMMENDATIONS

3.6.1 Subgrade Preparation

The pavement subgrade should be overexcavated/processed to provide at least 18-inches of compacted subgrade soil below the proposed pavement structural section. The subgrade for pavement support must be firm, unyielding, and uniform with no abrupt horizontal changes in degree of support. The subgrade soil should be uniform materials and density. Soft spots, if encountered, should be excavated and recompacted with the same type of soil as found in adjacent subgrade.

3.6.2 Aggregate Base

The aggregate base should conform to Caltrans Class 2 Aggregate Base or the Standard Specifications for Public Works for Crushed Miscellaneous Base, should be firm and unyielding, and without pumping conditions prior to placement of pavement. Aggregate base should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557.

3.6.3 Flexible Pavement Design

The following recommended pavement section is based on the following assumed Traffic Index and R-value. The minimum recommended asphalt concrete (AC) pavement thickness is as follows:

Pavement Use	Assumed Traffic Index (TI)	R-Value (Assumed)	Minimum Recommended Pavement Section	
			AC	AB
Light Duty	4	40	2.5”	4.0”
Heavy Duty	6	40	3.5”	5.5”

AC: Asphalt Concrete, AB: Aggregate Base.

Final pavement design recommendations should be based on laboratory test results of representative pavement subgrade soils upon the completion of rough grading.

3.7 STORMWATER INFILTRATION

Infiltration testing was conducted utilizing the double ring infiltration test method at a depth of approximately 12 inches below existing ground surface. The infiltration testing was performed in general accordance with the guidelines published in the Riverside County Design Handbook for Low Impact Development Best Management Practices, Infiltration Testing Guidelines. The following table summarizes the result of the infiltration feasibility study. Refer to Appendix F for field infiltration test data.

Test No.	Test Depth Below Ground Surface	Adjusted Infiltration Rate (in/hr)
P-1	12”	0.39
P-2	12”	0.78

The raw percolation rate is the rate of water infiltration in the horizontal and vertical direction. This percolation rate is adjusted using the “Porchet Method” to obtain the adjusted water infiltration rate in the vertical direction only.

Long-term infiltration rates may be reduced significantly by factors such as soil variability and inaccuracy in the infiltration rate measurement. Safety factors for operating the system, maintenance, siltation, biofouling, etc. should also be considered by the design civil engineer at his discretion.

Infiltration rate is too low. Infiltration BMP not feasible.
Bioretention BMP proposed