CEQA DRAINAGE STYDY

Dated 4/25/05
(Revised 8/01/06, 01/22/07, 12/29/09, 8/22/11, 9/22/11, 11/21/11)

FOR

CONCEPTUAL GRADING PLAN

LOCATION:
A.P.N: 127-460-14

OWNERS:

DAI DANG MEDIATION CENTER
6326 CAMINO DEL REY
BONSAL, CA 92003
Ph: (760) 945-5588

BY: SPEAR & ASSOCIATES, INC.
CIVIL ENGINEERING AND LAND SURVEYING
475 Production Street
San Marcos, CA 9207
PHONE: (760) 736-2040

Date: 11/21/11

Danny Abada, PE

S&A, INC: J. N. 03-190

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I. INTRODUCTION

This hydrology report is prepared for the Dai Dang Meditation Center located at 6326 Camino Del Rey, Bonsall CA. The site encompasses approximately 8.96 acres and is zoned residential. APN: 127-460-14

The project will disturb approximately 6.7 acres and consists of developing a Buddhist Meditation Center for Thirty (30) monks. Construction will include 3 new buildings, a new driveway, parking lot, utilities, landscaping and onsite bioretention facilities for stormwater treatment.

The development utilizes low impact development strategies that mimic the site's pre-development hydrology by using design techniques that infiltrate, store, evaporate and detain runoff close to its source. Pervious surfaces were minimized with extensive use of pervious pavement, landscaping, self-treating areas and bioretention facilities. Flow rates were also maintained close to pre-development rates with the use of bioretentions, underground detention and by using flatter slopes and maximizing onsite times of concentration.

The topography slopes gently in a south to southwesterly direction with elevations approximately ranging from 405' to 205'. The southern portion of the site is developed with 3 buildings a parking lot and a paved driveway. The undeveloped portion of the site was previously graded and is covered with native grasses, trees and also includes large patches of mostly barren soils, with slopes exceeding 20%. This results in lower infiltration rates and higher than normal pre-development runoff discharging from the site. The barren steep areas can be seen in the attached aerial map. However this design was very conservative in the assumption that these pre-development areas have the same runoff coefficient as undisturbed vegetated and moderately sloped areas. This had a direct effect on the post development balance of flow rates, by requiring this design to use higher onsite detention storage in order to not exceed the pre-development flow rates.

We have used the County of San Diego Hydrology Manual for this report to calculate the 100-year flow generated from the site. Based on the soil hydrologic group map in Appendix A of the County Hydrology Manual, the project soil consists of type C on the northern 2/3 of the site and type B on the southern 1/3 southern portion.

The drainage areas include northeastern offsite tributaries and the site surface drains southwesterly to Camino Del Rey, then west along the northerly right-of-way for Camino Del Rey 1600± feet to a 6' x 12' box culvert that passes under Camino Del Rey. The flow continues west to Moosa Canyon Creek, the San Luis Rey River and the Pacific Ocean. The proposed development will maintain the existing drainage characteristics. Post development peak flows, flow volumes and velocities will be maintained below pre-development rates by maximizing pervious surfaces, onsite times of concentration and energy dissipaters at the outlet points.

This project will maintain existing drainage patterns along the site and will not alter the course of a stream or river and therefore will not contribute to substantial erosion or siltation onsite or offsite. Additionally all outlets will have adequate energy dissipaters as shown in the grading plan.

Post development peak flow rates and flow velocities will be maintained at or below pre-development rates, and therefore no increased flooding on- or offsite is anticipated as a result of this development. For this same reason no increase in capacity of existing or planned storm water drainage systems is anticipated

The project will not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps

II. DISCUSSION/CONCLUSION

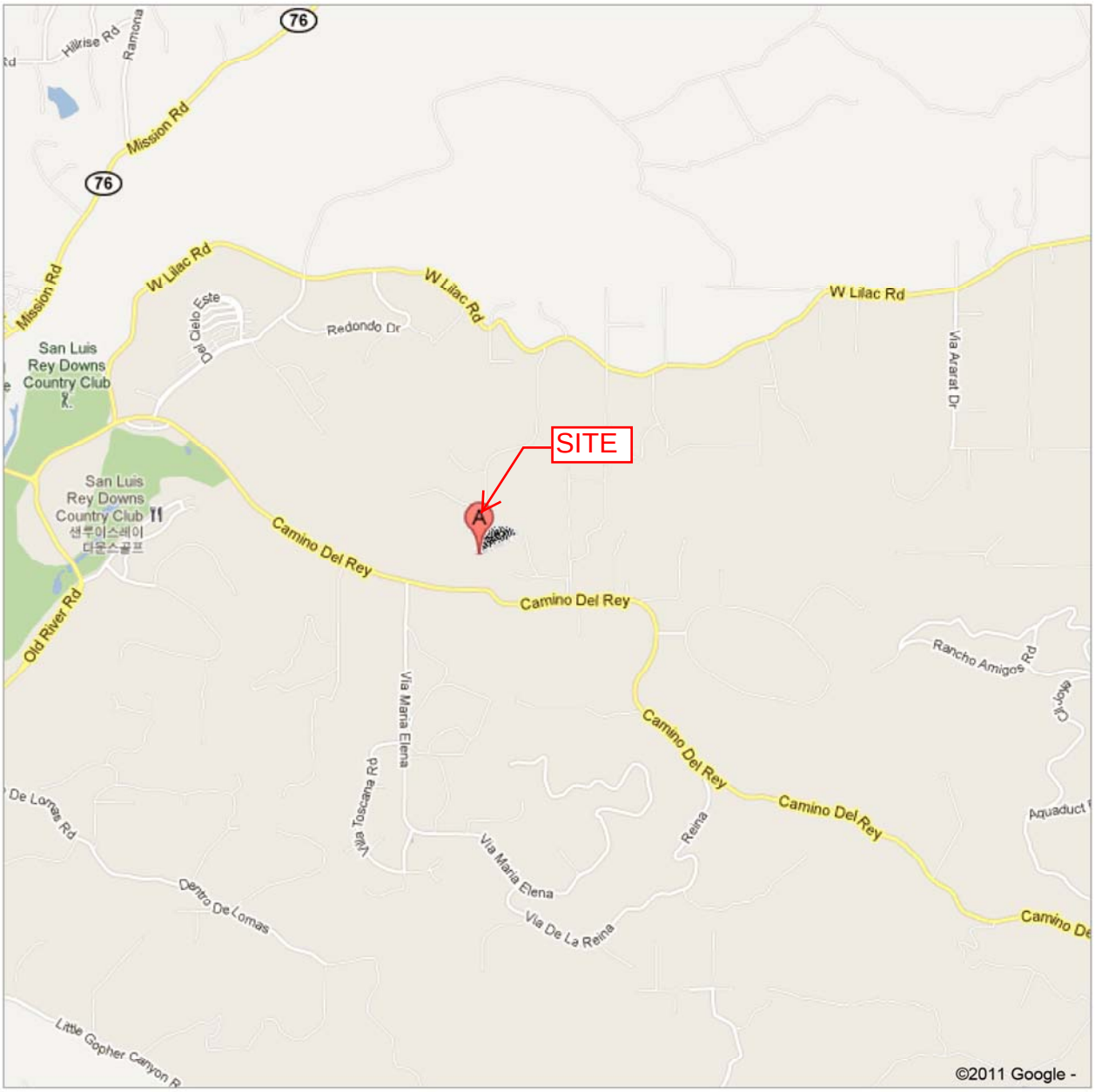
Post development peak flows, flow volumes and velocities will be maintained at or below pre-development rates with a conservative design and the use of low impact strategies, an underground detention pond and Hydromodification strategies as shown on the project's Stormwater Management Plan.

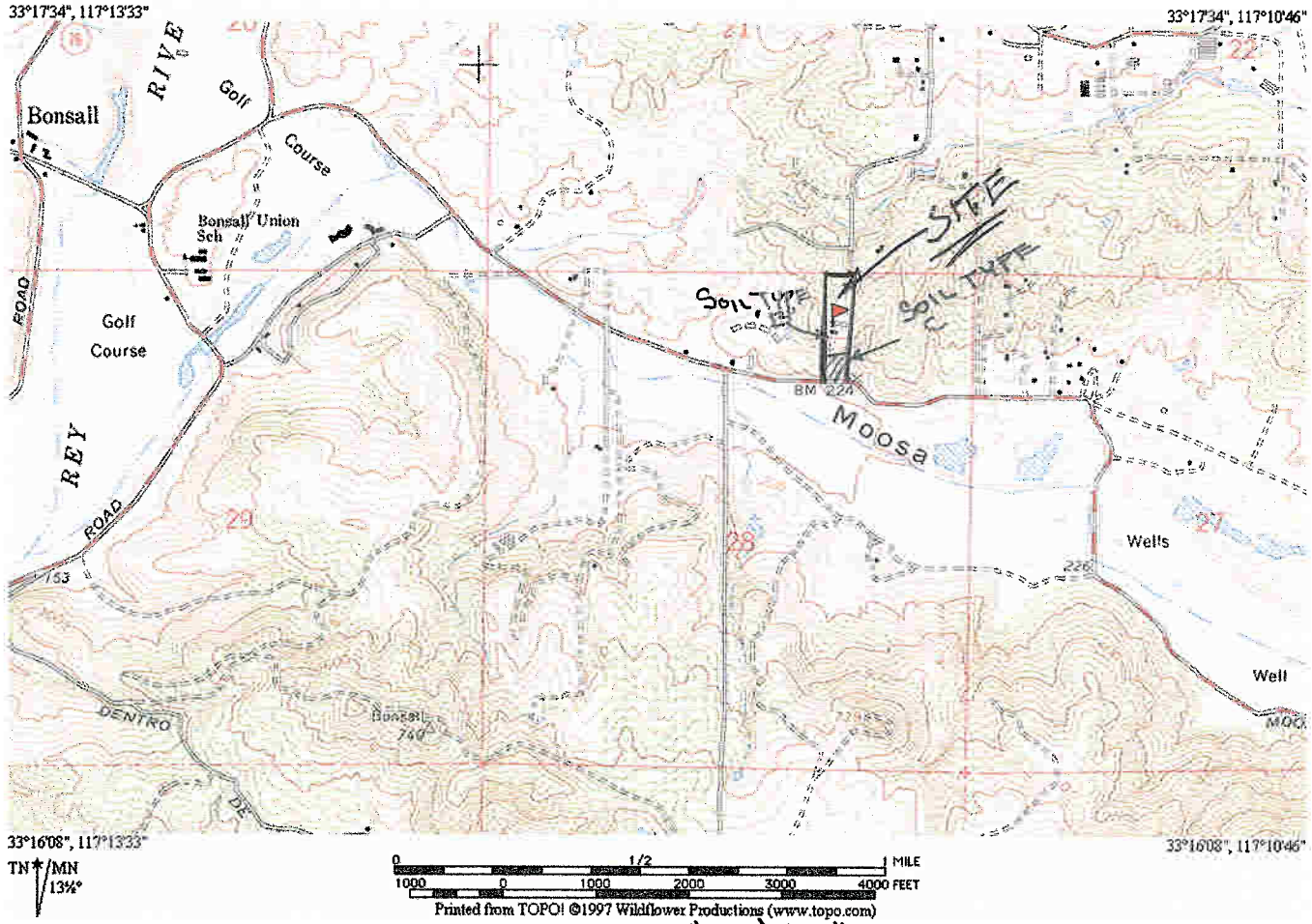
Summary flow rates (see areas delineated in the Drainage Map)

Storm Event 100-year	***Pre-Dev./ Post Dev. Q (cfs)***	***Pre-Dev./ Post Dev. Q (cfs) w/Detention***	***Pre-Dev./ Post Dev. V (ft/s)***
Total @ SW watershed N	33.6/33.5	33.6/ 33.5	6.1/6.1
Total @ NW watershed P1	4.5/9.3	4.5/3.9	9.3/9.0
Total @ NW watershed P2	2.4/1.9	2.4/1.9	5.4/5.3

ATTACHMENT A

Address **6326 Camino Del Rey**
Bonsall, CA 92003





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LAT: 33° 16' 57"
LONG: 117° 11' 47"

SITE
6326 Camino Del Rey, Bonsall, CA 92003
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ATTACHMENT B

Developed Conditions 100-yr Event ***Rational Method**

REACH	Development/ Soil Type	TC	C	A	CA	∑CA	P_6	I	**Q cfs**	Lower Secn	Slope %	V ft/s	L ft	T	∑TC	**Det. Pond Q cfs**
Offsite O1	Open Space/C	12.3	0.30	15.6	4.68		3.20	4.72	22.1							
Offsite O3	O S/C	7.1	0.30	0.19	0.06		3.20	6.72	0.4							
Confluence @ P3		12.3				4.74	3.20	4.72	22.3							
Travel Time from P3 to M										M	5.5	8.6	250	0.50	12.8	(D=3' Rough/Rock lined)
Area A	O S/B &C		0.28	2.25	0.63		3.20									
Offsite O2	O S/B &C		0.28	0.89	0.25		3.20									
Confluence @ Point M		12.8				5.62	3.20	4.60	25.8	M		5.5				
Area E 2	dev/c	10.2	0.72	0.48	0.35		3.20	5.32	1.8							
Area E 1			0.40	0.59	0.24		3.20									
Confluence @ Lower E2		10.2				0.58	3.20	5.32	3.1							
Travel time from lower E2 to N (Q=3.1 + (2.5 x 3.44)/2) = 7.4 cfs											17	5.1	770	2.50	12.7	
(Q @ E2 + average of 2.5 cfs/acre x area)																
Area E 3			0.61	0.71	0.43		3.20									
Area E 4			0.40	0.91	0.36		3.20									
Area F			0.40	0.75	0.30		3.20									
E & F Confluence @ N		12.7				1.68	3.20	4.62	7.8	N						
Confluence M & N		12.8				7.29	3.20	4.60	**33.5**	N		6.1				
Offsite O4	O S/C	6.5	0.30	0.4	0.12		3.20	7.12	0.9							
Travel Time from lower O4 to P2 (Q= 0.9 + (2.5 x .17)/2) = 1 cfs										P2	20	2.8	300	1.80	8.3	
Area D2	dev/c		0.90	0.17	0.15		3.20									
Lower D2		6.5				0.27	3.20	7.12	1.9							
Area G1	undev/c		0.30	0.14	0.04											
Confluence @ Point P2		8.3				0.32	3.20	6.08	**1.9**	P2		5.3				

Developed Conditions 100-yr Event ***Rational Method**

REACH	Development/ Soil Type	TC	C	A	CA	∑CA	P_6	I	**Q cfs**	Lower Secn	Slope %	V ft/s	L ft	T	∑TC	**Det. Pond Q cfs**
Offsite O5	O S/C	6.1	0.30	0.33	0.10		3.20	7.42	0.7							
Travel Time from lower O5 to Lower D4 (Q= 0.7 + (2.5 x .51)/2) = 1.3 cfs										D4	20	2.7	200	1.20	7.3	
Area D4	dev/c		0.52	0.51	0.27		3.20									
Confluence @ Lower D4		7.3				0.36	3.20	6.61	2.4	D4						
Area D3	dev/c		0.90	0.13	0.12		3.20									
Confluence @ Lower D3		7.3				0.48	3.20	6.61	3.2							
Travel Time from lower D3 to Type F inlet (Q= 3.2 + (2.5 x 1.91)/2) = 5.6 cfs										Type F	4	2.5	265	1.80	9.1	
D5 & D1	dev/c		0.52	2.05	1.07		3.20									
Area G2	O S/C		0.30	0.27	0.08		3.20									
Confluence @ Point P1		9.1				1.63	3.20	5.73	**9.3**	P1		9.0				**3.9**

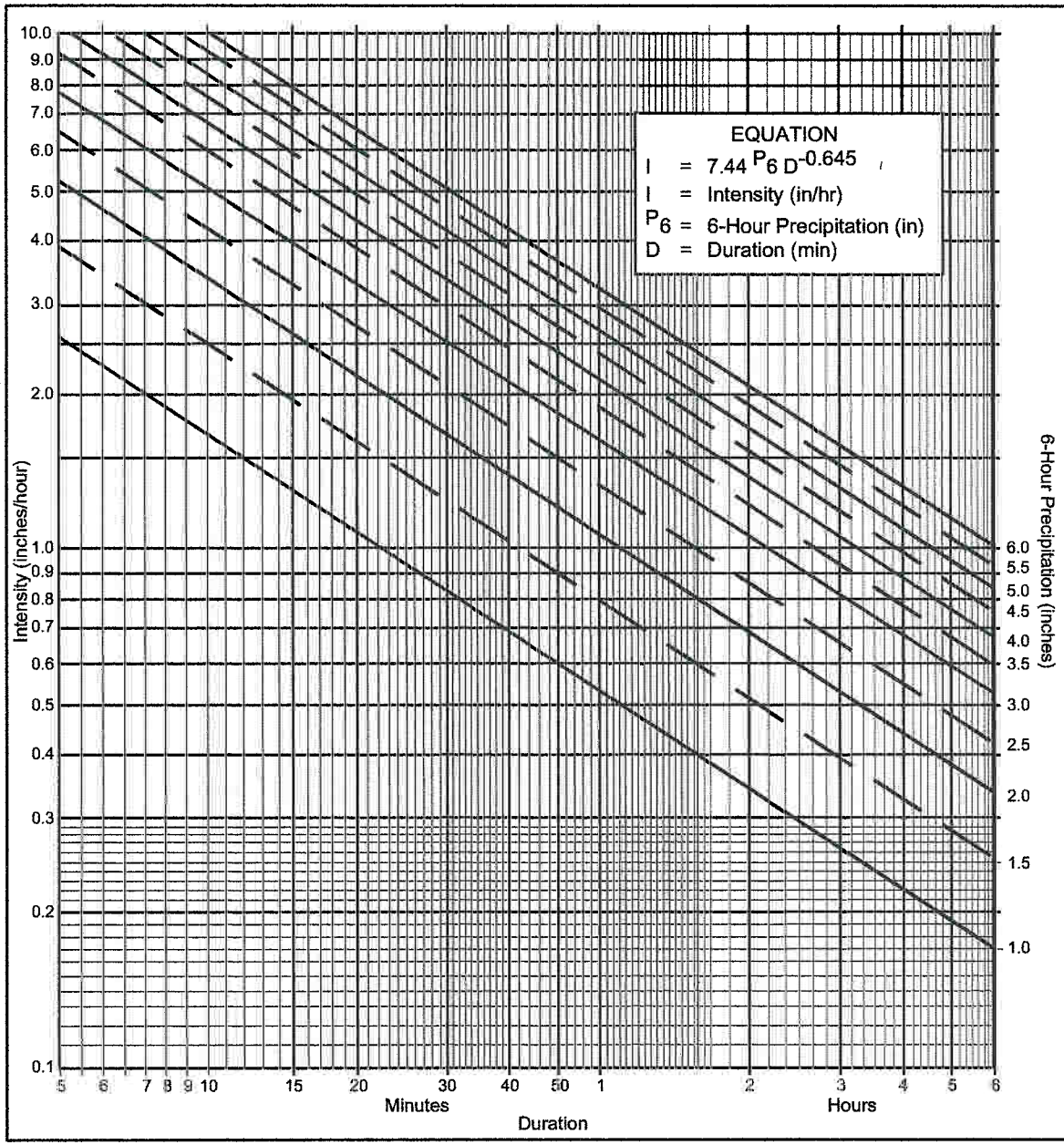
Summary of 100-yr Flows (cfs)

Location	N	P1	P2
Post Dev.	33.5	3.9	1.9
Pre Dev.	33.6	4.5	2.4

There was no increase in flow rates and flow velocities from pre development.
This was accomplished by maximizing the use of pervious surfaces and by maximizing post development onsite times of concentation and Detention Pond. Significant flows are addressed with Hydromodification calculations shown on the project's Water Quality Technical Report.

Undeveloped Conditions 100-yr Event

REACH	Development/ Soil Type	TC	C	A	CA	∑CA	P_6	I	**Q cfs**	Lower Secn	Slope %	V ft/s	L ft	T	∑TC	
Offsite O1	Open Space/C	12.3	0.30	15.6	4.68	4.68	3.20	4.72	22.1							
Offsite O3	O S/C	7.1	0.30	0.19	0.06		3.20	6.72	0.4							
Confluence @ P3		12.3				4.74	3.20	4.72	22.3							
Travel Time from P3 to M										M	5.5	15.5	250	0.27	12.6	(exist. concrete lined)
Offsite O2	O S/B &C		0.28	0.89	0.25		3.20									
Area A	O S & Dev/B &C		0.28	2.25	0.63		3.20									
Confluence @ Point M		12.6				5.62	3.20	4.64	26.1	M		5.6				
Area E2		10.2	0.72	0.48	0.35		3.20	5.32	1.8							
Travel time from lower E2 to Cam. Del Rey (Q=1.8 + (2.5 x 3.44)/2) = 6.1 cfs											19	5	710	2.36	12.6	
(Q @ E2 + average of 2.5 cfs/acre x area)																
Area E1			0.30	0.59	0.18											
Area E3			0.61	0.71	0.43											
Area E4 & F			0.40	1.66	0.66											
Confluence M & N		12.6				7.24	3.20	4.64	**33.6**	N		6.1				
Offsite O4	O S/C	6.5	0.30	0.4	0.12		3.20	7.12	0.9							
Travel Time from lower O4 to L (Q= 0.9 + (2.5 x 0.9)/2) = 2 cfs											20	3.1	300	1.60	8.1	
Onsite S4	Barren-steep/C	8.1	0.30	0.9	0.27		3.20									
Confluence @ Point L		8.1				0.39	3.20	6.18	**2.4**	L (P2)		5.4				
Offsite O5	O S/C	6.1	0.30	0.33	0.10		3.20	7.42	0.7							
Travel Time from lower O5 to K (Q= 0.7 + (2.5 x 2.37)/2) = 3.7 cfs											20	3.7	370	1.70	7.8	
Onsite S3	Barren-steep/C	7.8	0.30	2.37	0.71		3.20			K						
Confluence @ Point K		7.8				0.71	3.20	6.33	**4.5**	K (P1)		9.3				



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.2 in., P_{24} = 5.5 = 58.2%(2)

(c) Adjusted $P_6^{(2)}$ = 3.2 in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

FIGURE

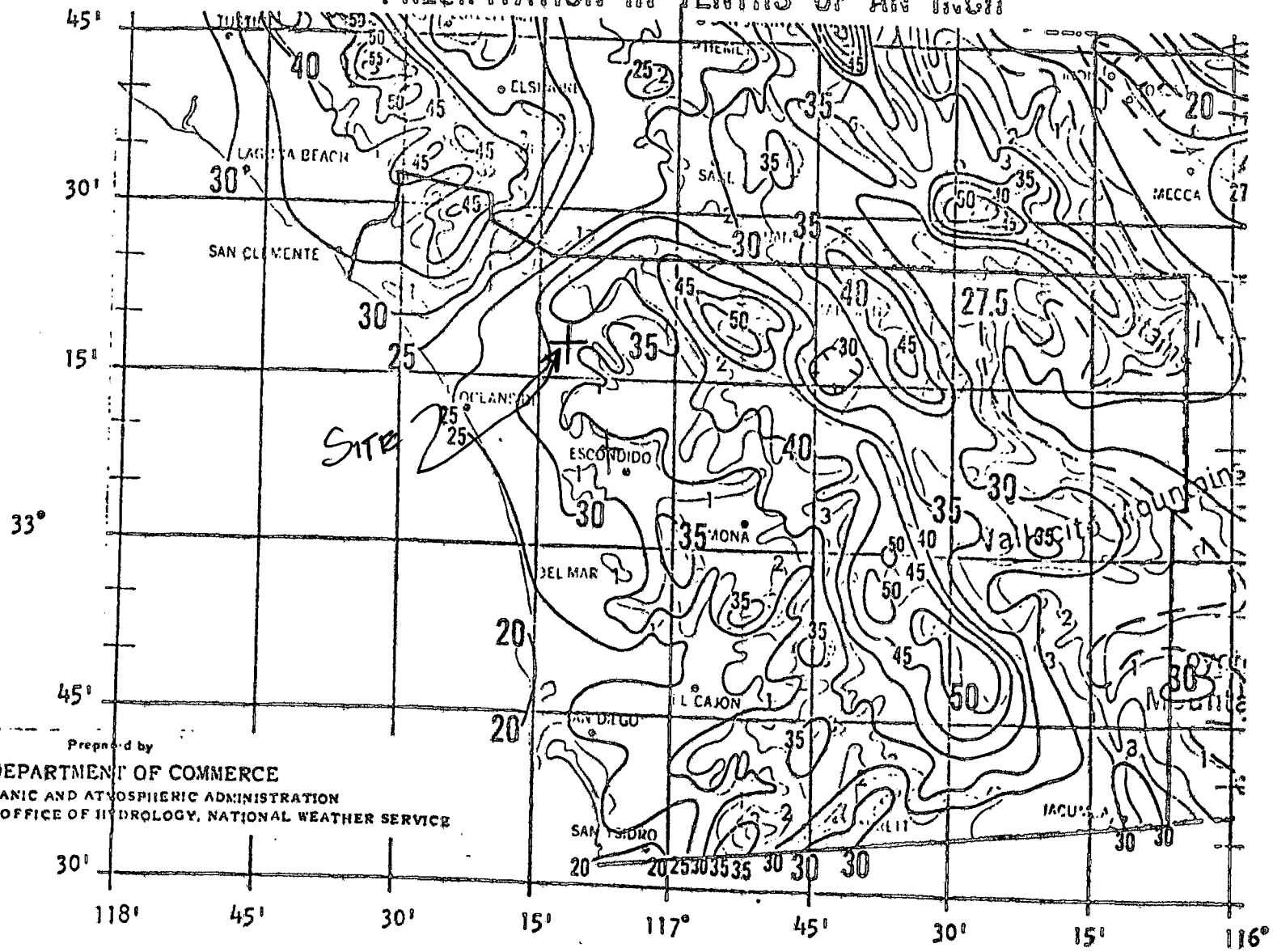
3-1

Intensity-Duration Design Chart - Template

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 6-HOUR PRECIPITATION

20 ISOPLUVIALS OF 100-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH



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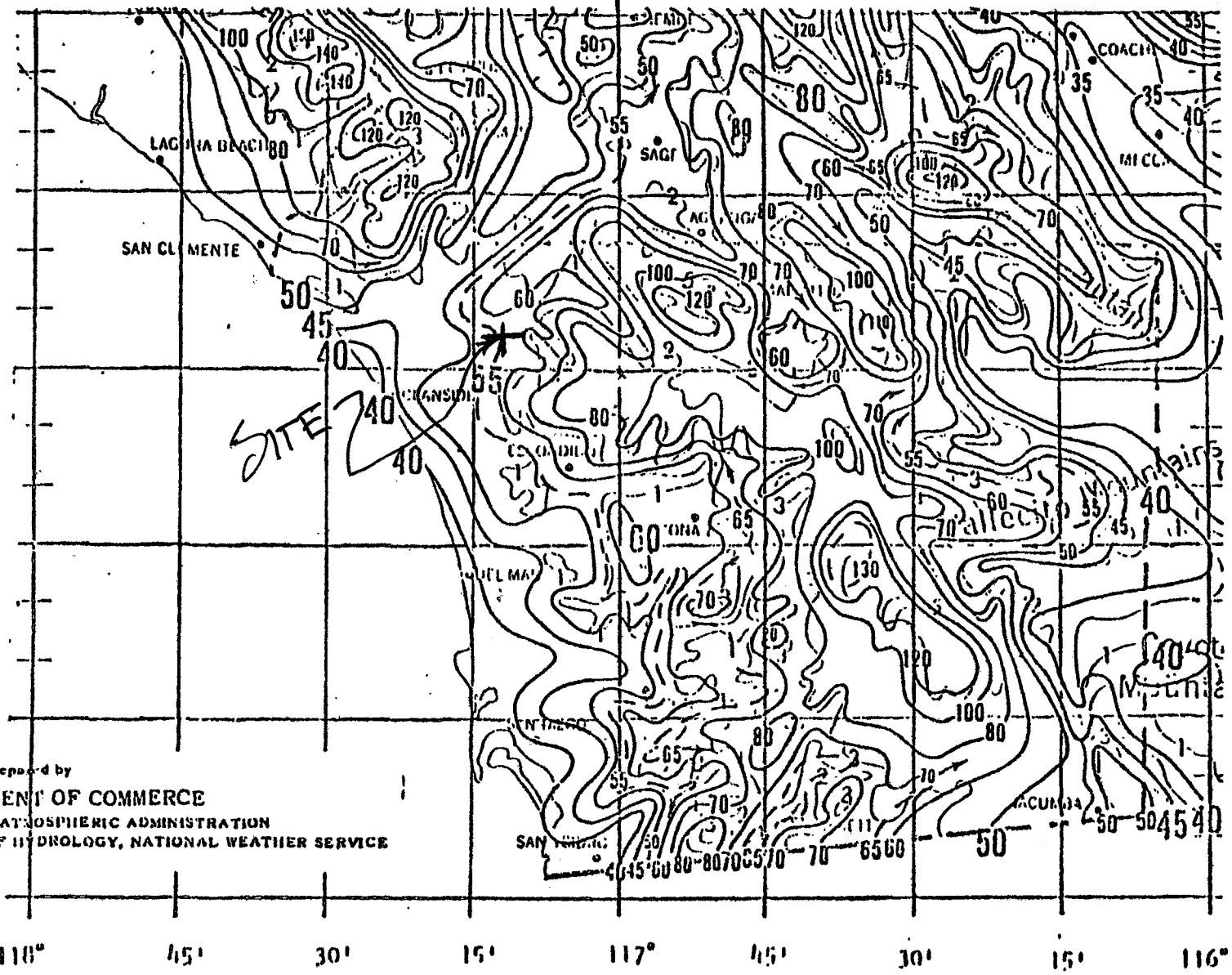
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, NATIONAL WEATHER SERVICE

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 24-HOUR PRECIPITATION

(20) ISOPLUVIALS OF 100-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH



Prepared by
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, NATIONAL WEATHER SERVICE

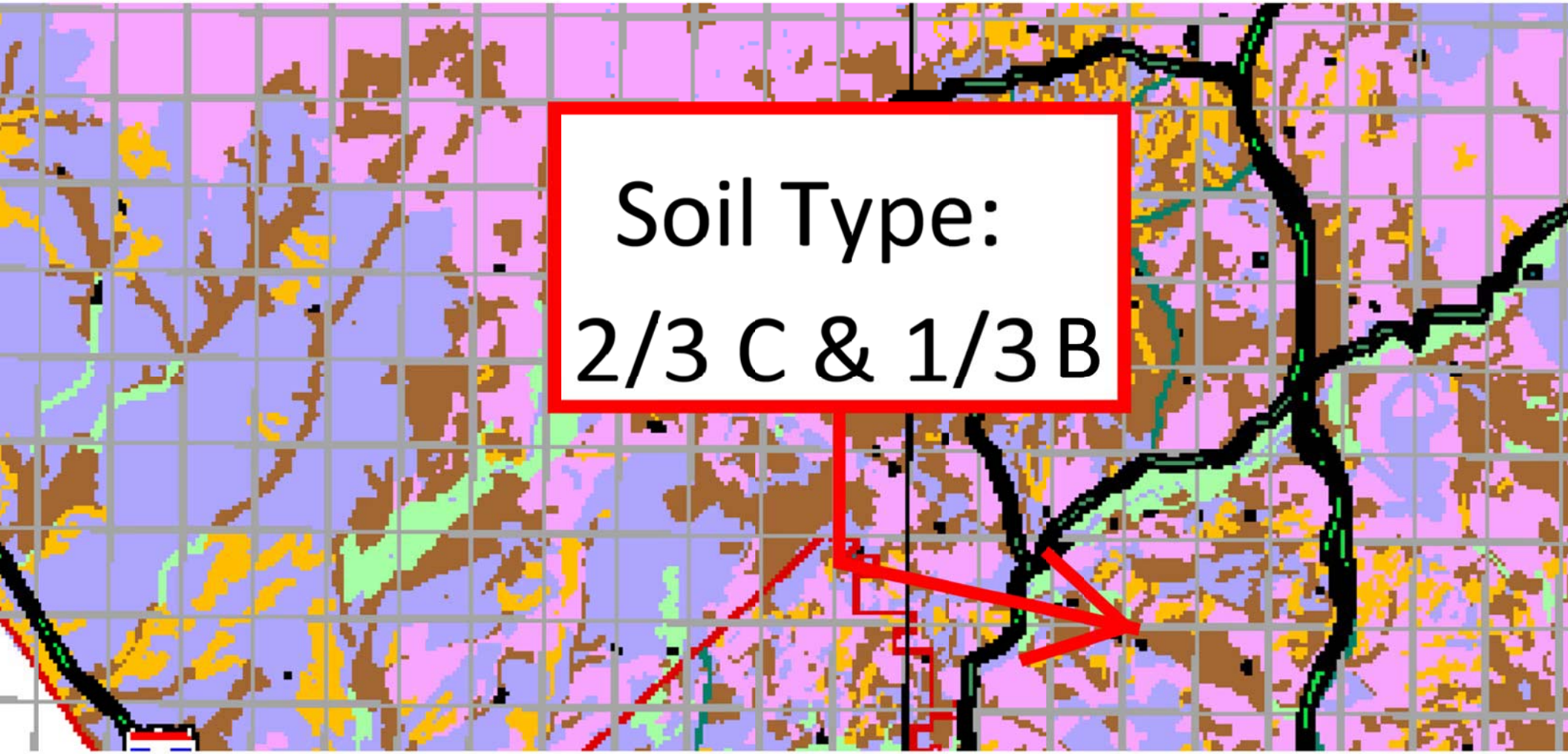

Soil Type:
2/3 C & 1/3 B

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use			Runoff Coefficient "C"			
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Runoff Coefficient Adjustment

Post Development Area

Area D2 (0.17 acres)
Total impervious area = 0.17 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 1
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.90

Area D3 (0.13 acres)
Total impervious area = 0.13 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 1
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.90

Areas D1, D4 & D5 (2.56 acres)
Total impervious area = 40,911 sqft = 0.94 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.37
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.52

Areas E1 (0.59 acres)
Total impervious area = 4,739 sqft = 0.1 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.17
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.40

Areas E2 (0.48 acres)
Total impervious area = 14,725 sqft = 0.338 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.7
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.72

Areas E3 (0.71 acres)
Total impervious area = 16,159 sqft = 0.37 acres

C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.52
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.61

Post Development Area

Areas E4 & F (1.66 acres)
Total impervious area = 14,600 sqft = 0.335 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.2
Cp = 0.28 (Table 3.1, soil types B & C, 0% impervious, County Hydrology Manual)
C = 0.40

Area A
(This area will remain natural w/ no impervious surfaces)
Soil Types B & C
C = 0.28

Areas G1 & G2
(This area will remain natural w/ no impervious surfaces)
Soil Type C
C = 0.30

Runoff Coefficient Adjustment

Pre Development Area

Areas S3 & S4
Undeveloped, Soil Type C
C = 0.30
(Note that this value is very conservative as this area is currently barren with over 20% slopes)

Area A
Undeveloped, Soil Types B & C
C = 0.28

Area A
(This area will remain natural w/ no impervious surfaces)
Soil Types B & C
C = 0.28

Areas E1 (0.59 acres)
Undeveloped, Soil Type C
C = 0.30

Areas E2 (0.48 acres)
Total impervious area = 0.338 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.7
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.72

Areas E3 (0.71 acres)
Total impervious area = 0.37 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.52
Cp = 0.3 (Table 3.1, soil type C, 0% impervious, County Hydrology Manual)
C = 0.61

Areas E4 & F (1.66 acres)
Total impervious area = 0.335 acres
C = 0.90 × (% Impervious) + Cp × (1 - % Impervious)
% impervious = 0.2
Cp = 0.28 (Table 3.1, soil types B & C, 0% impervious, County Hydrology Manual)
C = 0.40

Barren Area w/
over 20% slopes
Barren area w/
over 15% slopes
6326 Camino Del Rey, Bonsall, CA
Camino Del Rey
Cottontail
Cottontail Ln
Bobbitt Ln
628 ft
© 2011 Google
©2010 Google

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

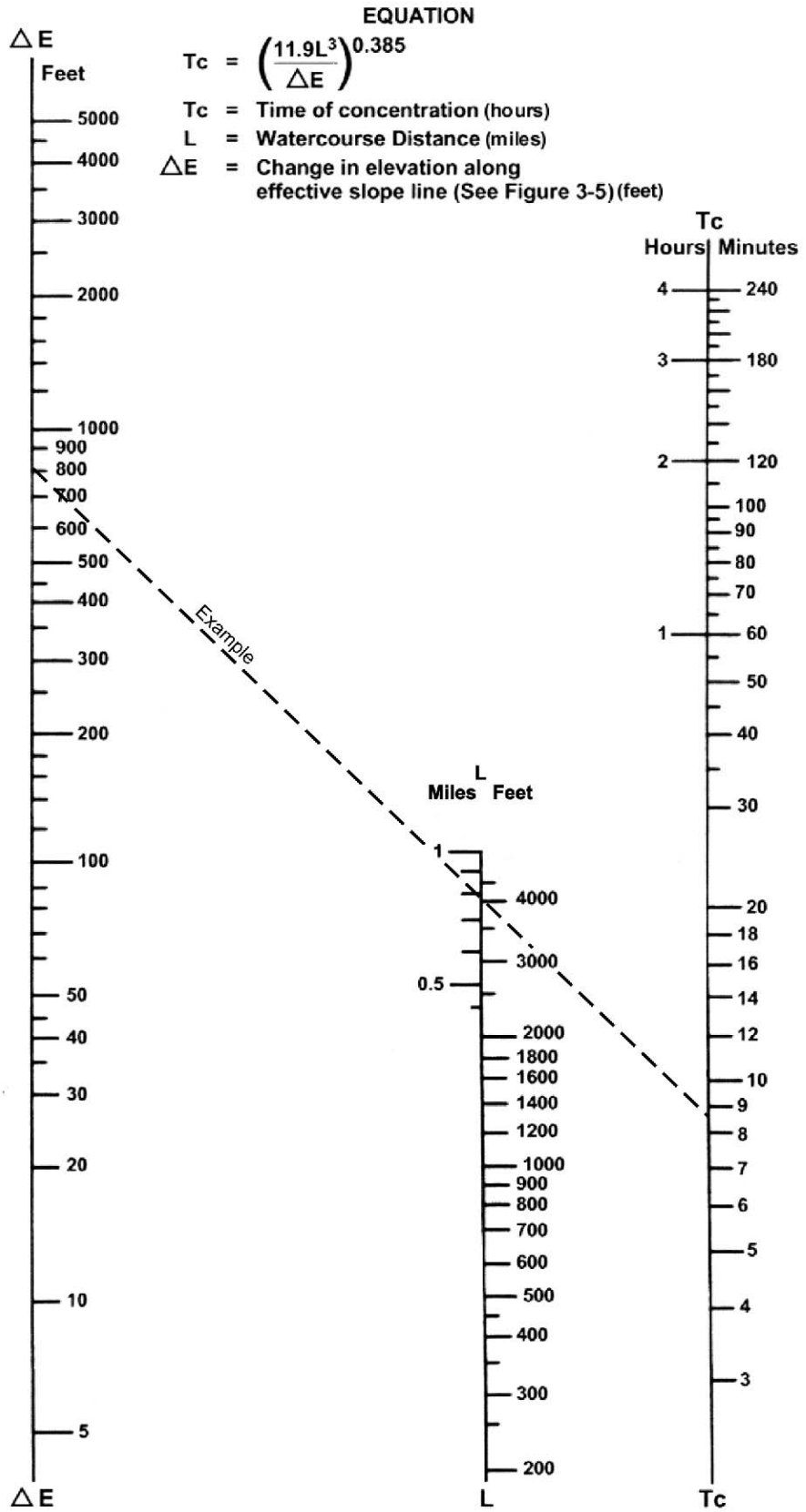
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M) & INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

*See Table 3-1 for more detailed description

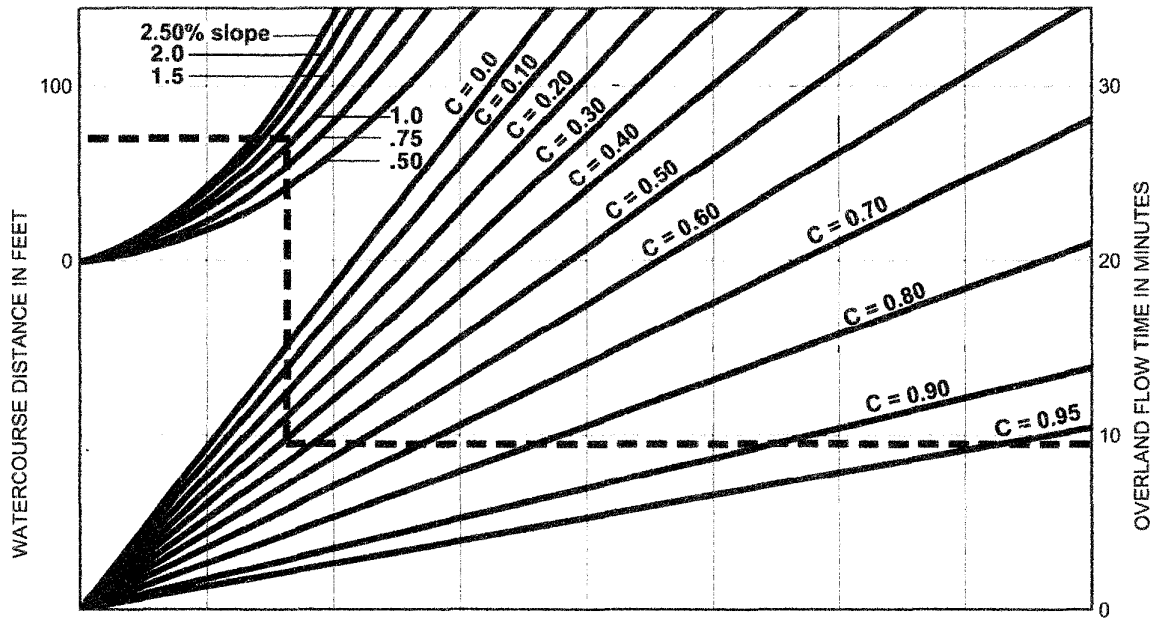


SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds

3-4



EXAMPLE:

Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

Rational Formula - Overland Time of Flow Nomograph

FIGURE

3-3

Time of Concentration

Location	Average slope %	Initial L (ft)	**Initial TC** Initial T (min)	Add'l L (ft)	area (ac)	Q (cfs)	Mannings V (ft/s)	**Additional TC (travel time)** Inc. T (min)	**total T (min)**
						* Est.			
						Average Q			
Offsite O1	10	100	6.9	1535				5.40	12.3
Offsite O4	16	100	5.7	175				0.84	6.5
Offsite O5	16	100	5.7	70				0.42	6.1
Offsite O3	16	100	5.7	340				1.40	7.1
Area E2	0.5	50	6.1	180	0.48	0.6	0.74	4.10	10.2
Area A	18	100	5.6	460				1.70	7.3

Kirpish Formula Tc min= $(11.9L^3/\Delta E)^{0.385}$

	Offsite O1	**Offsite O4**	**Offsite O5**	**Offsite O3**	**A**
ΔE ft =	154	28	11	55	82
L Feet =	1535	175	70	340	460
L miles =	0.2907	0.0331	0.0133	0.0644	0.0871
T hours =	0.0896	0.0141	0.0070	0.0233	0.0284
T min =	**5.37**	**0.84**	**0.42**	**1.40**	**1.70**

* Estimated sheet flow Q average = 1/2 (2.5 cfs/acre)

Overland Flow T min= $\frac{1.8(1.1-C)D^{1/2}}{S^{1/3}}$ (from Figure 3-3 of the County Hydrology Manual)

Initial TC	**Offsite O4, O5 & O3**	**A**	**E2**
C =	0.3	0.28	0.72
D ft =	100	100	50
S % =	16	18	0.5
T =	**5.7**	**5.6**	**6.1**

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Tuesday, Sep 20 2011

TC - Travel Time Vel Calc for E2

Triangular

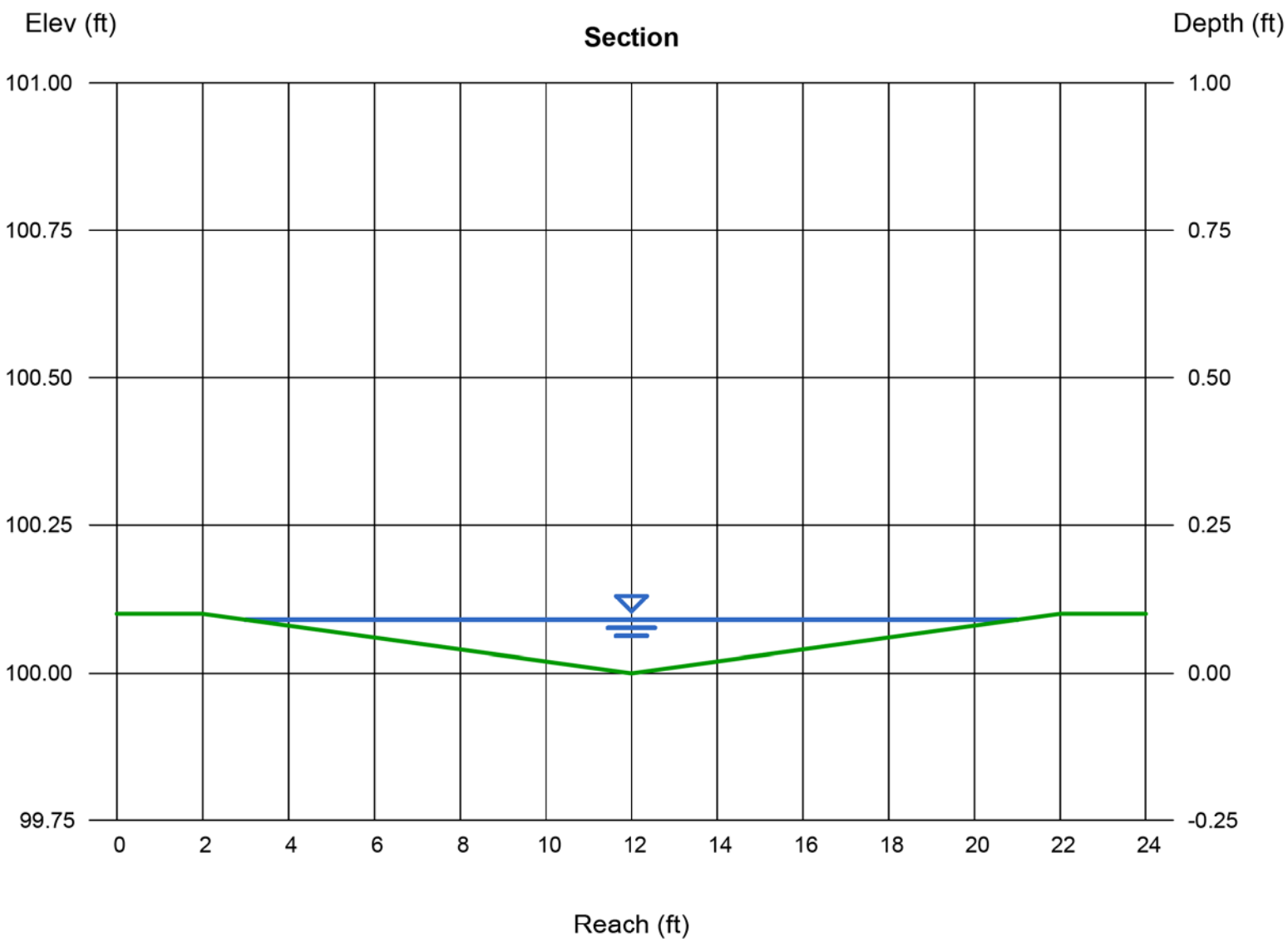
Side Slopes (z:1)	= 100.00, 100.00
Total Depth (ft)	= 0.10
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.016

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.60

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 0.600
Area (sqft)	= 0.81
Velocity (ft/s)	= 0.74
Wetted Perim (ft)	= 18.00
Crit Depth, Yc (ft)	= 0.08
Top Width (ft)	= 18.00
EGL (ft)	= 0.10



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time Vel - Post Dev Lower D3 to Type F inlet

Triangular

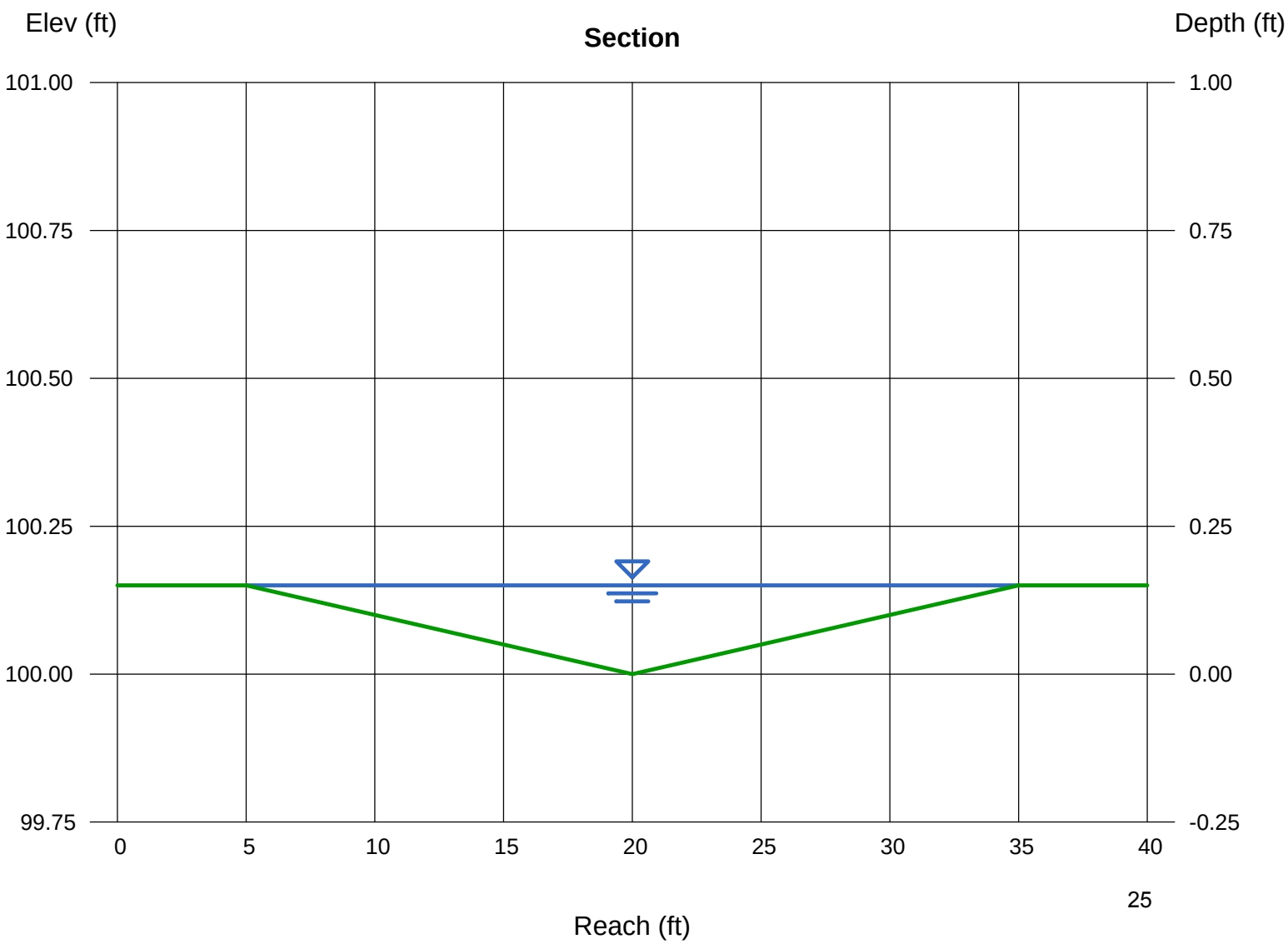
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.15
Invert Elev (ft)	=	100.00
Slope (%)	=	4.00
N-Value	=	0.018

Calculations

Compute by:		Known Q
Known Q (cfs)	=	5.60

Highlighted

Depth (ft)	=	0.15
Q (cfs)	=	5.600
Area (sqft)	=	2.25
Velocity (ft/s)	=	2.49
Wetted Perim (ft)	=	30.00
Crit Depth, Yc (ft)	=	0.15
Top Width (ft)	=	30.00
EGL (ft)	=	0.25



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time - Post- Dev Lower E2 to N (along new driveway)

Triangular

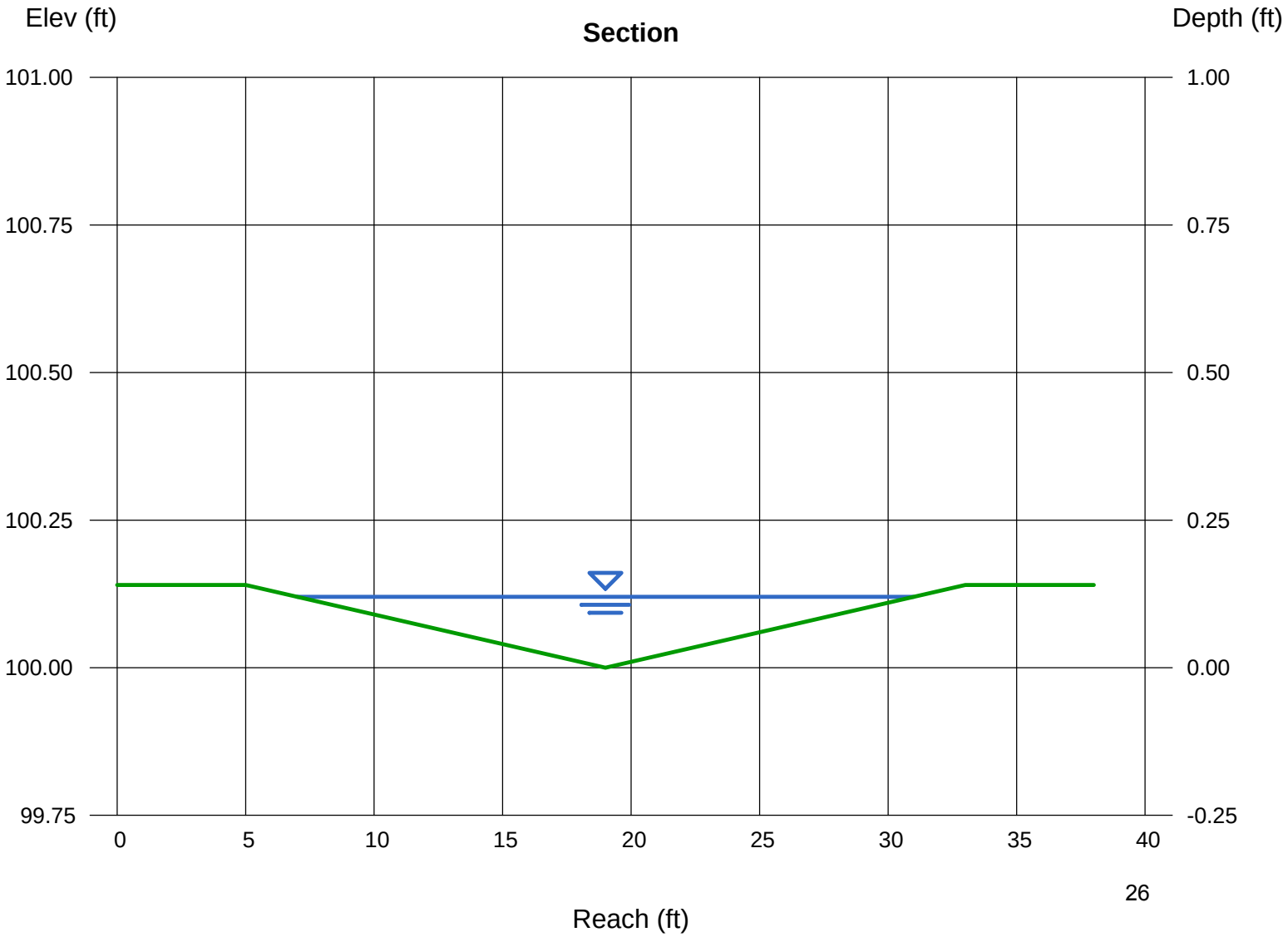
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.14
Invert Elev (ft)	=	100.00
Slope (%)	=	17.00
N-Value	=	0.016

Calculations

Compute by:		Known Q
Known Q (cfs)	=	7.40

Highlighted

Depth (ft)	=	0.12
Q (cfs)	=	7.400
Area (sqft)	=	1.44
Velocity (ft/s)	=	5.14
Wetted Perim (ft)	=	24.00
Crit Depth, Yc (ft)	=	0.14
Top Width (ft)	=	24.00
EGL (ft)	=	0.53



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Tuesday, Sep 20 2011

TC - Travel Time Vel - Post Dev Lower O4 to P2

Triangular

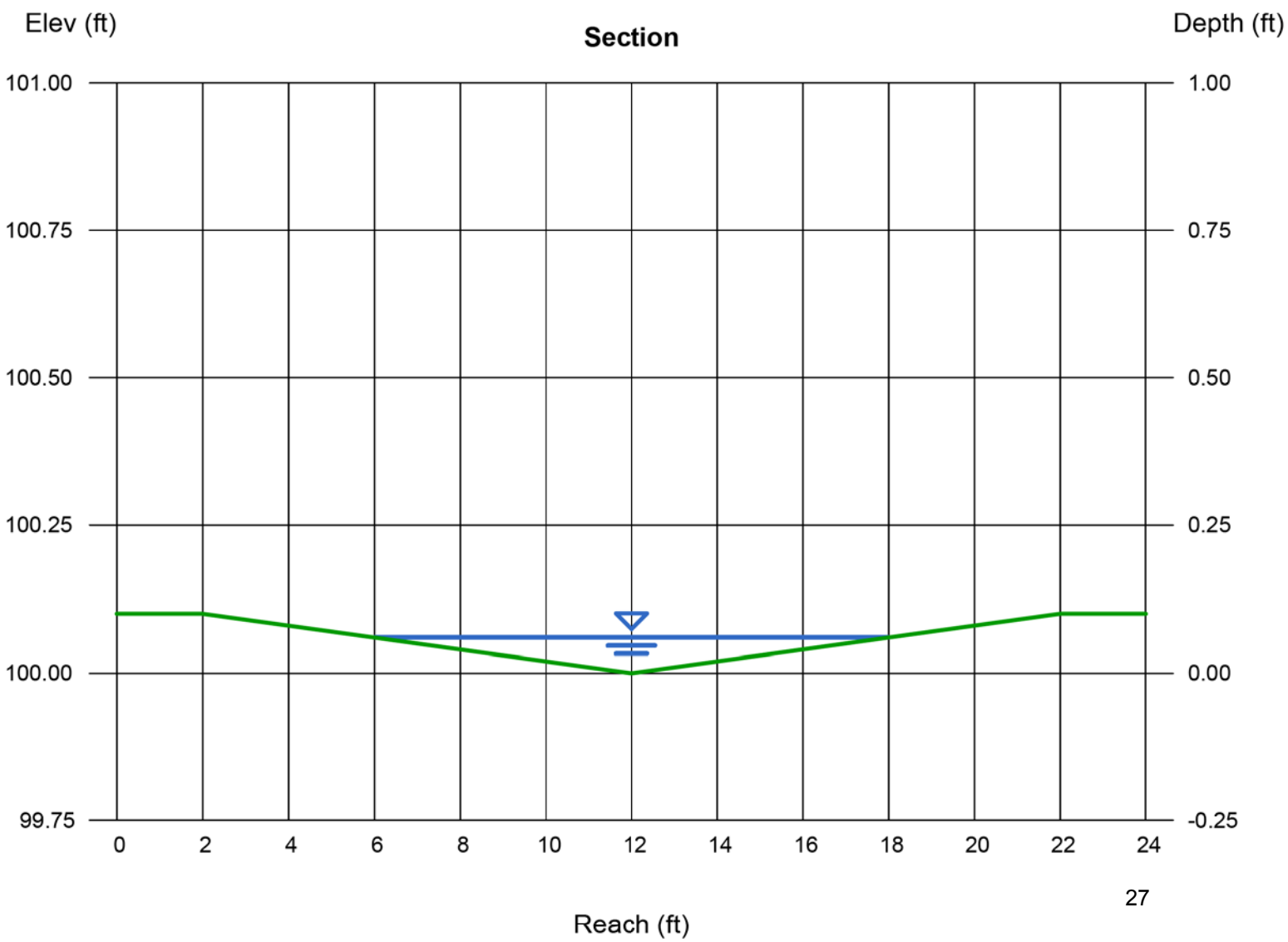
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.10
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.016

Calculations

Compute by:		Known Q
Known Q (cfs)	=	1.00

Highlighted

Depth (ft)	=	0.06
Q (cfs)	=	1.000
Area (sqft)	=	0.36
Velocity (ft/s)	=	2.78
Wetted Perim (ft)	=	12.00
Crit Depth, Yc (ft)	=	0.10
Top Width (ft)	=	12.00
EGL (ft)	=	0.18



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time Vel - Post Dev Lower O5 to Lower D4

Triangular

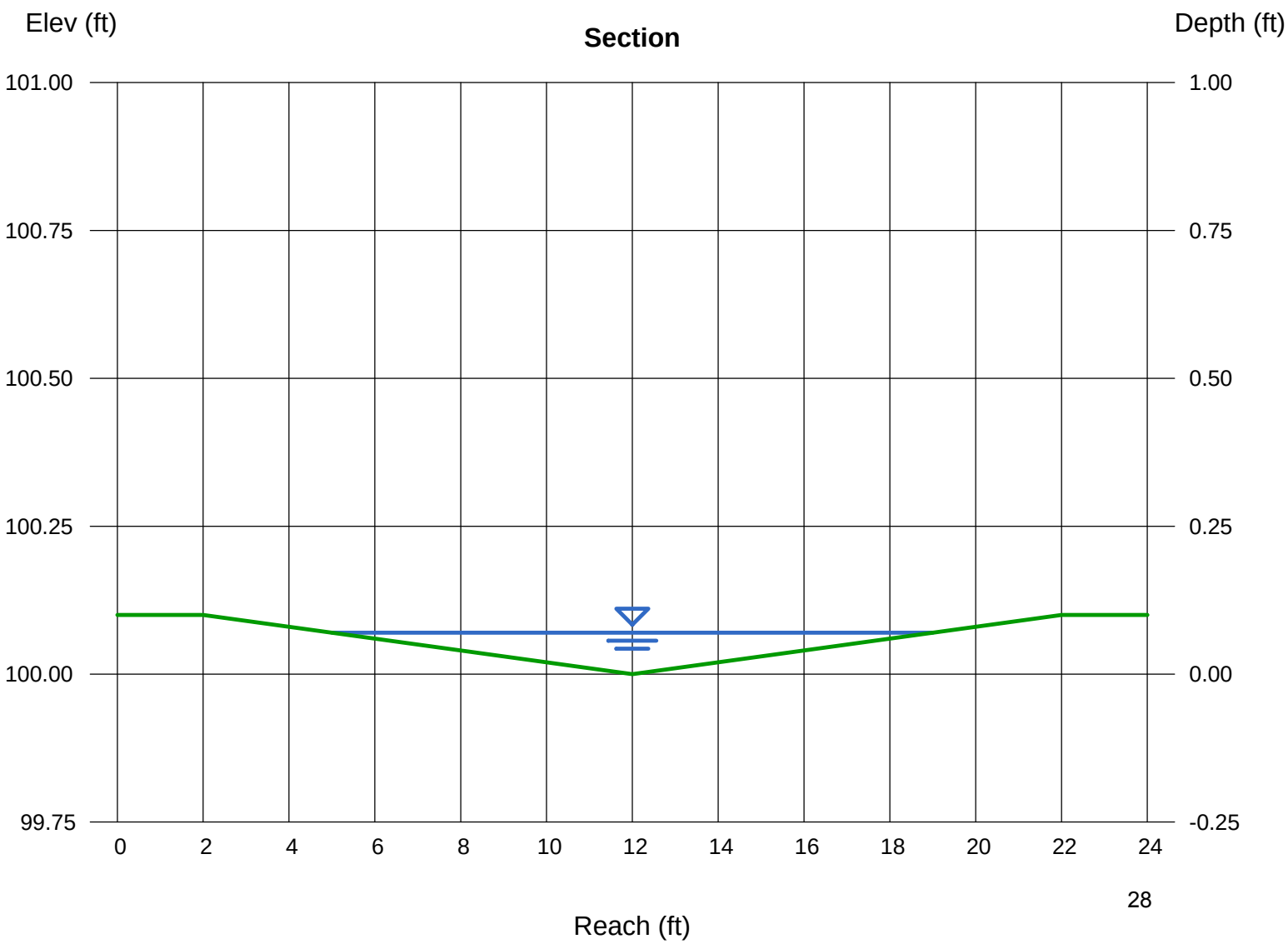
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.10
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	1.30

Highlighted

Depth (ft)	=	0.07
Q (cfs)	=	1.300
Area (sqft)	=	0.49
Velocity (ft/s)	=	2.65
Wetted Perim (ft)	=	14.00
Crit Depth, Yc (ft)	=	0.10
Top Width (ft)	=	14.00
EGL (ft)	=	0.18



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Tuesday, Sep 20 2011

TC - Travel Time Vel - Post Dev O1 & O3 from P3 to M (Rough/Rock Lined)

Circular

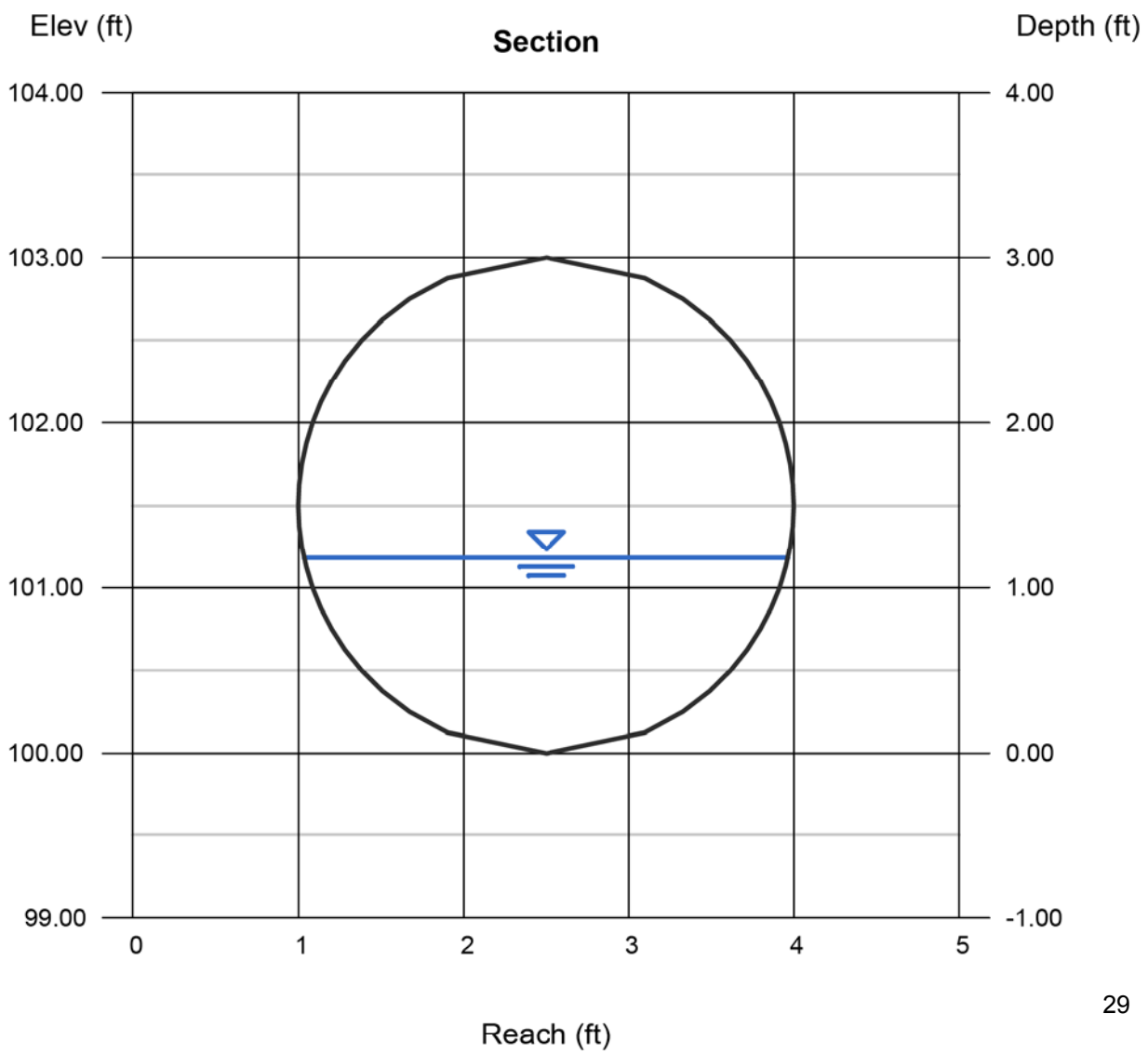
Diameter (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 5.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.30

Highlighted

Depth (ft)	= 1.18
Q (cfs)	= 22.30
Area (sqft)	= 2.60
Velocity (ft/s)	= 8.58
Wetted Perim (ft)	= 4.08
Crit Depth, Yc (ft)	= 1.52
Top Width (ft)	= 2.93
EGL (ft)	= 2.32



Channel Report

TC - Travel Time - Pre Dev O1 & O3 from P3 to M (Concrete Lined)

Circular

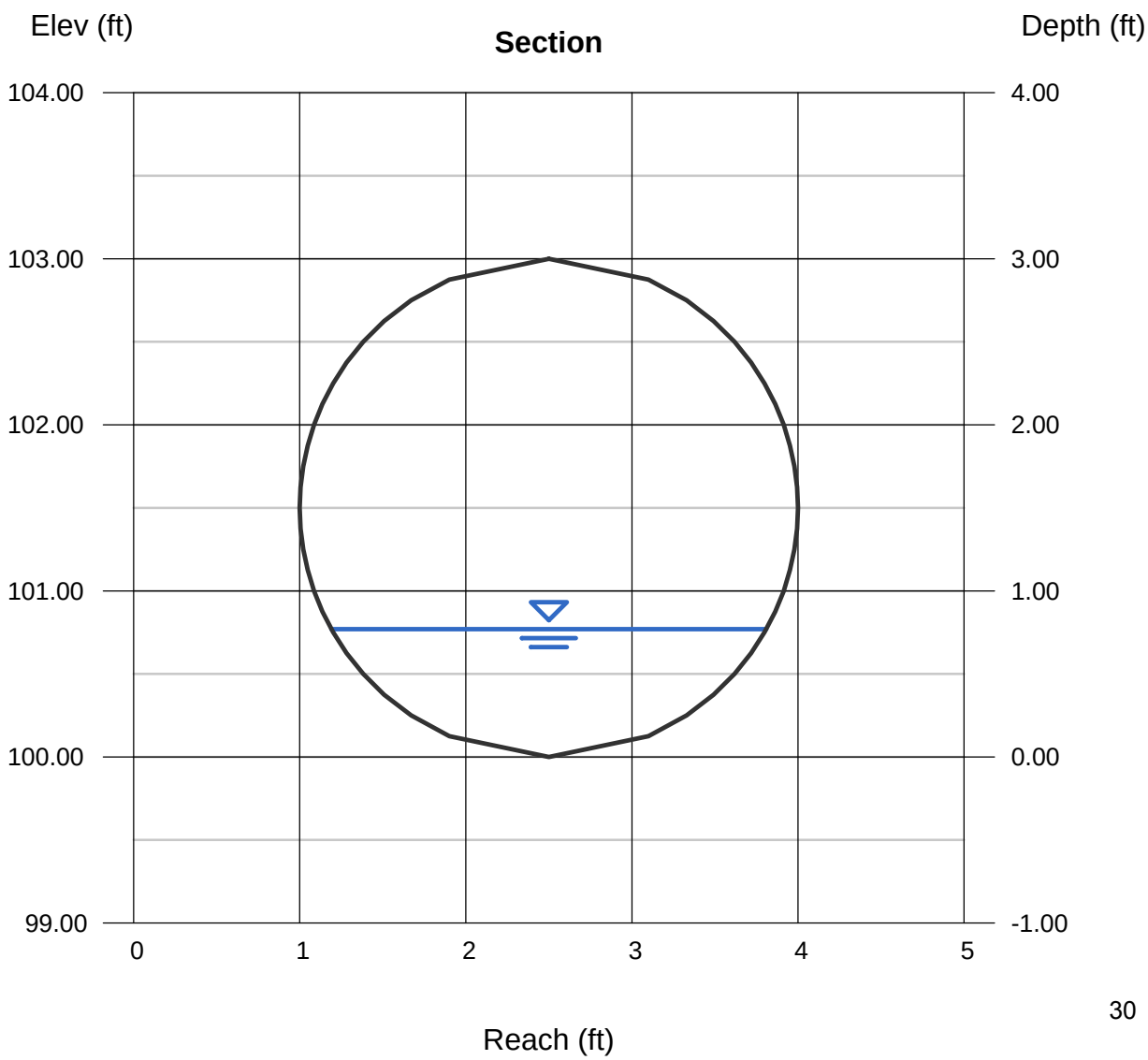
Diameter (ft)	=	3.00
Invert Elev (ft)	=	100.00
Slope (%)	=	5.50
N-Value	=	0.013

Calculations

Compute by:		Known Q
Known Q (cfs)	=	22.30

Highlighted

Depth (ft)	=	0.77
Q (cfs)	=	22.30
Area (sqft)	=	1.44
Velocity (ft/s)	=	15.46
Wetted Perim (ft)	=	3.19
Crit Depth, Yc (ft)	=	1.52
Top Width (ft)	=	2.62
EGL (ft)	=	4.49



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time - Pre- Dev Lower E2 to Camino Del Rey (along exist. driveway)

Triangular

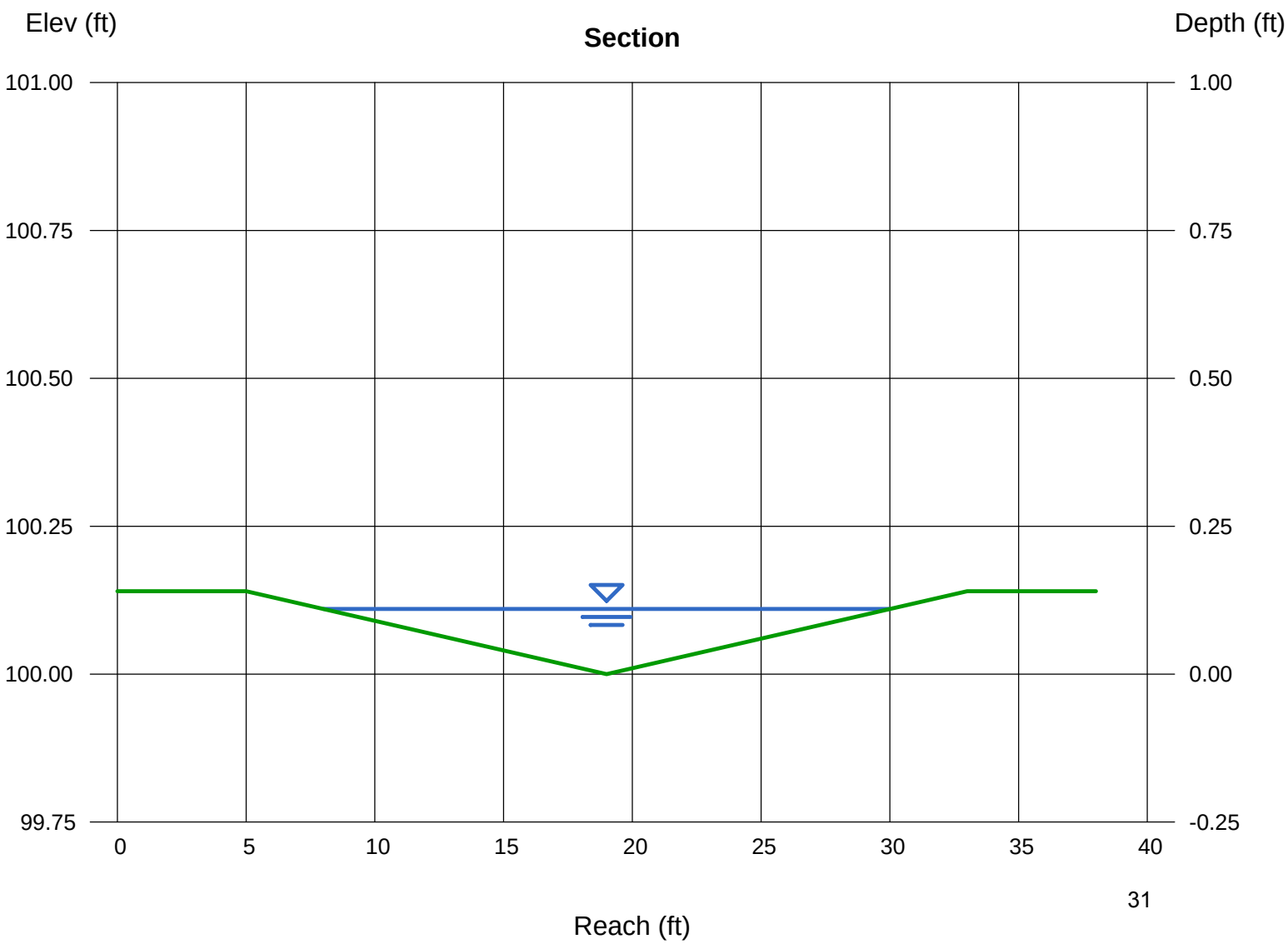
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.14
Invert Elev (ft)	=	100.00
Slope (%)	=	19.00
N-Value	=	0.016

Calculations

Compute by:		Known Q
Known Q (cfs)	=	6.10

Highlighted

Depth (ft)	=	0.11
Q (cfs)	=	6.100
Area (sqft)	=	1.21
Velocity (ft/s)	=	5.04
Wetted Perim (ft)	=	22.00
Crit Depth, Yc (ft)	=	0.14
Top Width (ft)	=	22.00
EGL (ft)	=	0.51



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time - Pre- Dev Lower O4 to L

Triangular

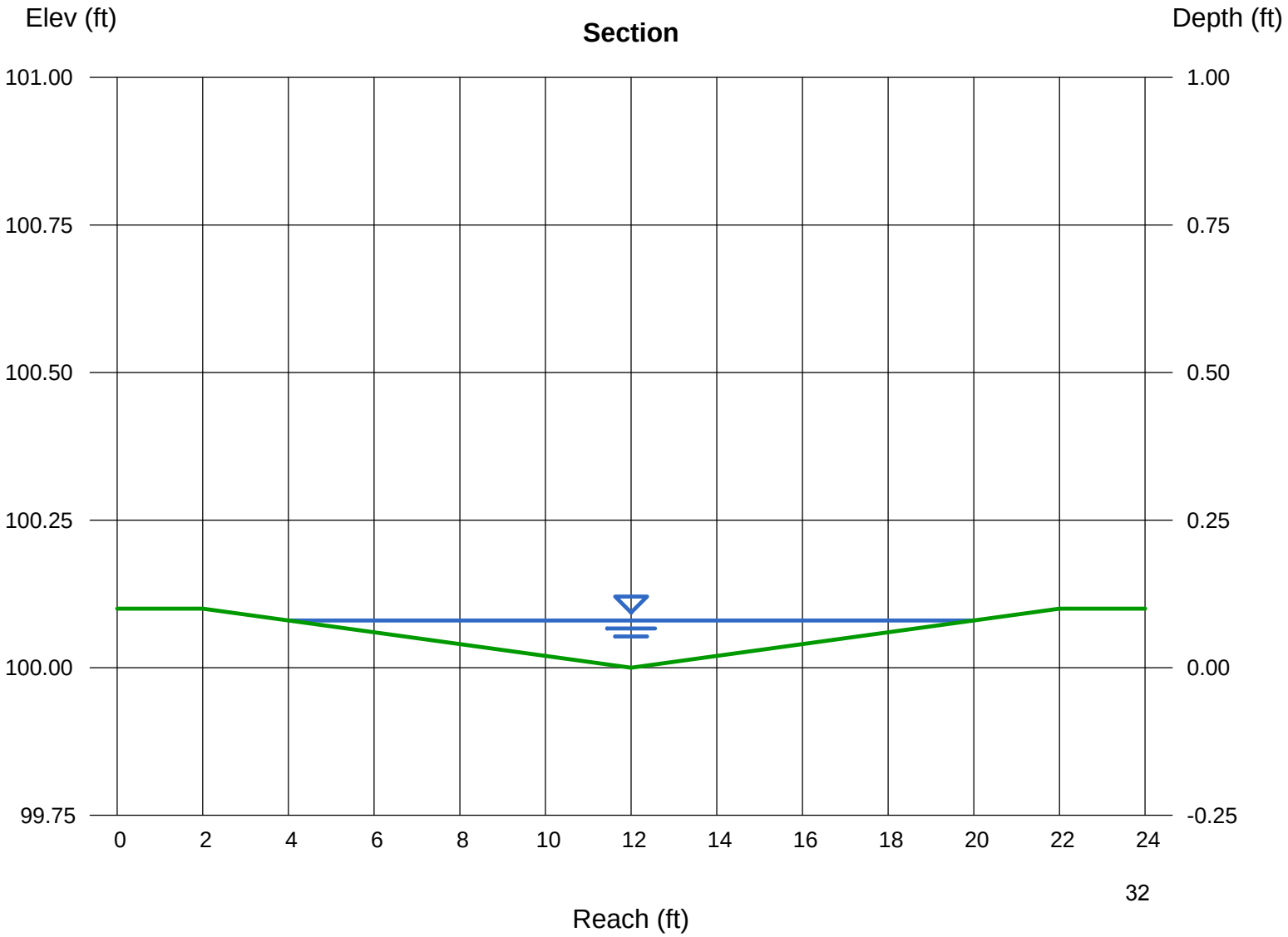
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.10
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	2.00

Highlighted

Depth (ft)	=	0.08
Q (cfs)	=	2.000
Area (sqft)	=	0.64
Velocity (ft/s)	=	3.13
Wetted Perim (ft)	=	16.00
Crit Depth, Yc (ft)	=	0.10
Top Width (ft)	=	16.00
EGL (ft)	=	0.23



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

TC - Travel Time - Pre- Dev Lower O5 to K

Triangular

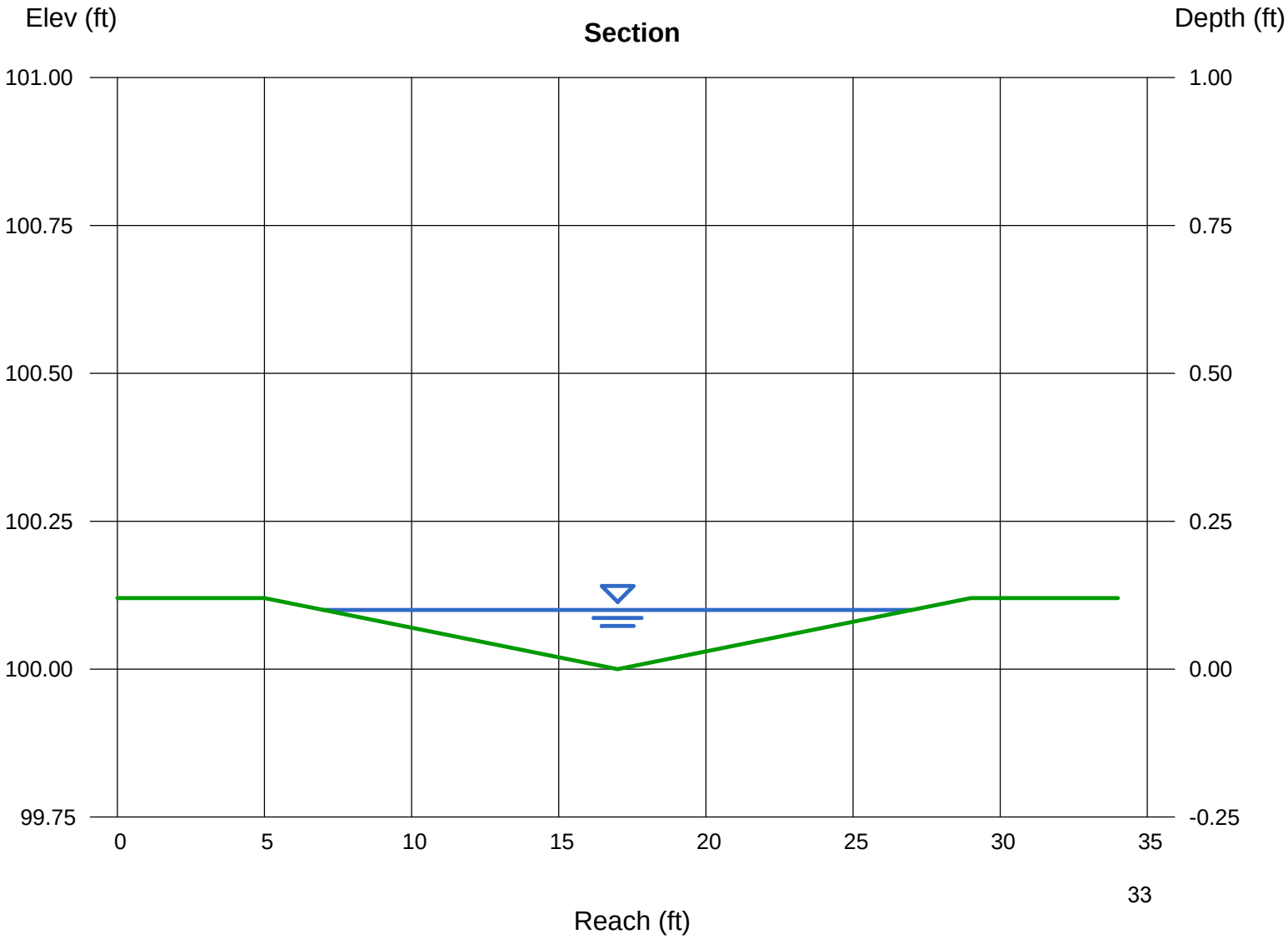
Side Slopes (z:1)	=	100.00, 100.00
Total Depth (ft)	=	0.12
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	3.70

Highlighted

Depth (ft)	=	0.10
Q (cfs)	=	3.700
Area (sqft)	=	1.00
Velocity (ft/s)	=	3.70
Wetted Perim (ft)	=	20.00
Crit Depth, Yc (ft)	=	0.12
Top Width (ft)	=	20.00
EGL (ft)	=	0.31



Channel Report

Velocity to Energy Dissipator @ M Rough/Rock Lined

Circular

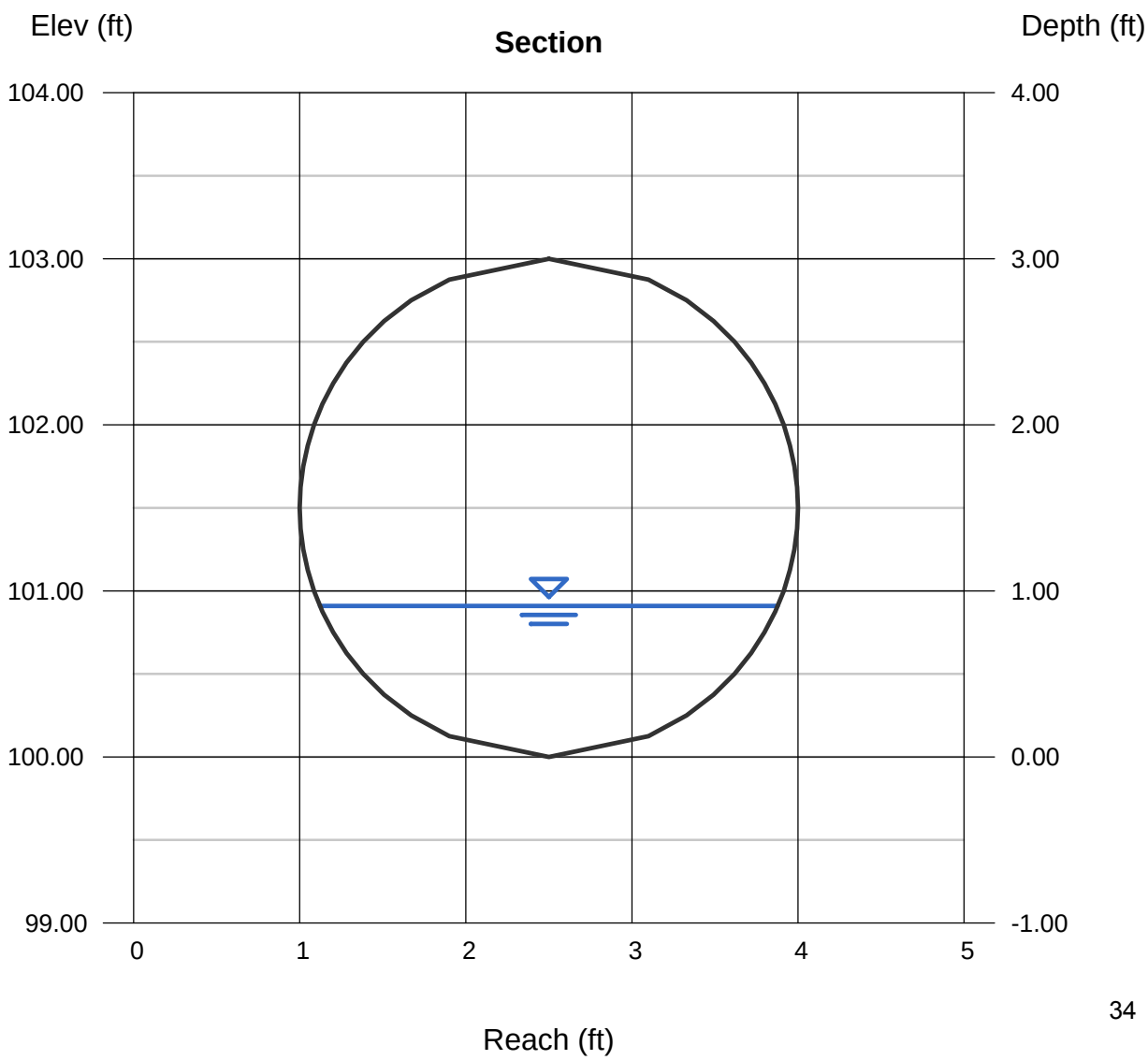
Diameter (ft)	=	3.00
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.030

Calculations

Compute by:		Known Q
Known Q (cfs)	=	26.00

Highlighted

Depth (ft)	=	0.91
Q (cfs)	=	26.00
Area (sqft)	=	1.82
Velocity (ft/s)	=	14.25
Wetted Perim (ft)	=	3.51
Crit Depth, Yc (ft)	=	1.65
Top Width (ft)	=	2.76
EGL (ft)	=	4.07



Channel Report

Velocity to Energy Dissipator @ N Rough/Rock Lined

Circular

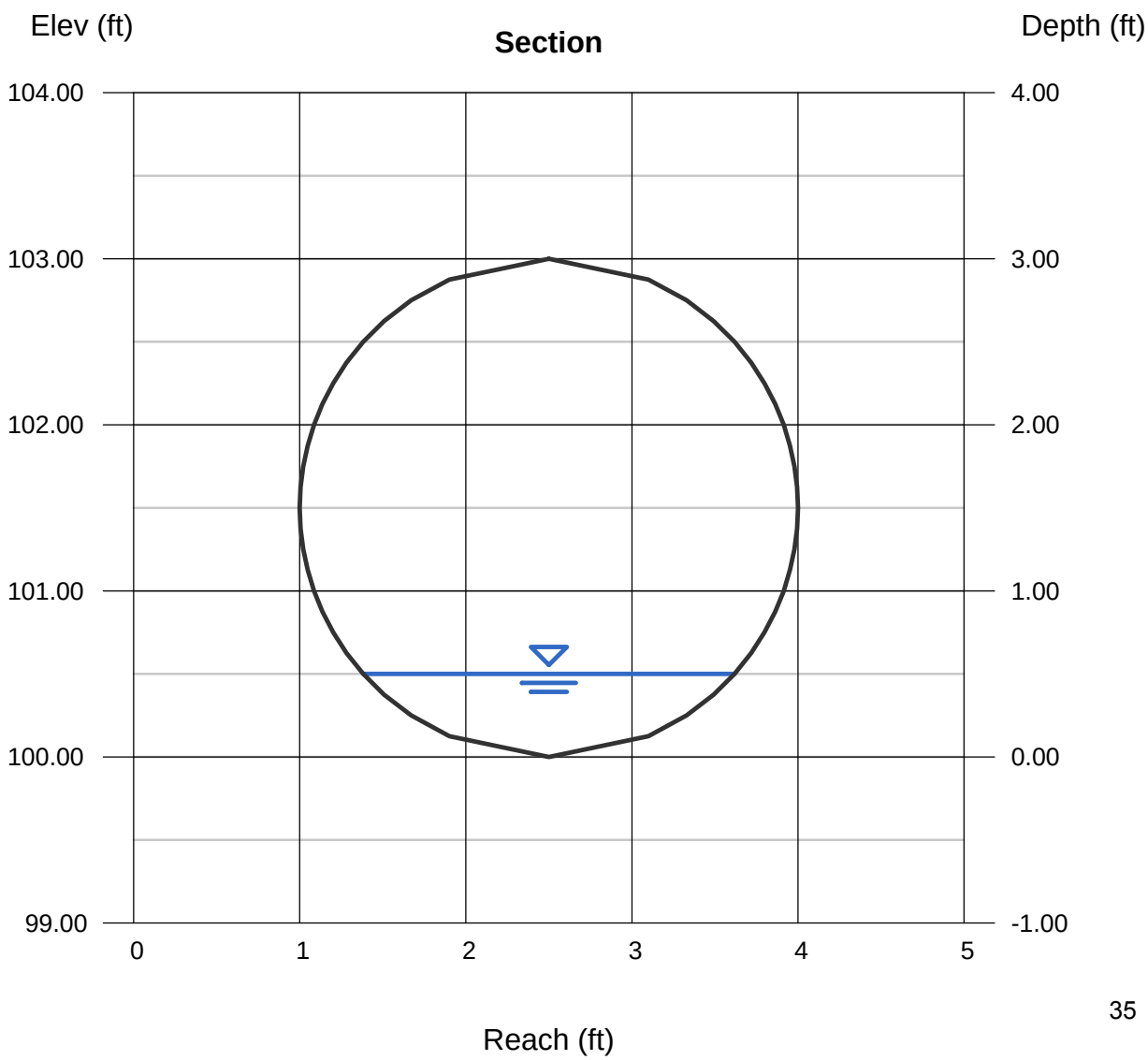
Diameter (ft)	=	3.00
Invert Elev (ft)	=	100.00
Slope (%)	=	20.00
N-Value	=	0.030

Calculations

Compute by:		Known Q
Known Q (cfs)	=	7.80

Highlighted

Depth (ft)	=	0.50
Q (cfs)	=	7.800
Area (sqft)	=	0.78
Velocity (ft/s)	=	9.95
Wetted Perim (ft)	=	2.53
Crit Depth, Yc (ft)	=	0.88
Top Width (ft)	=	2.24
EGL (ft)	=	2.04



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Post Dev Vel Calc - Camino Del Rey @ M

Triangular

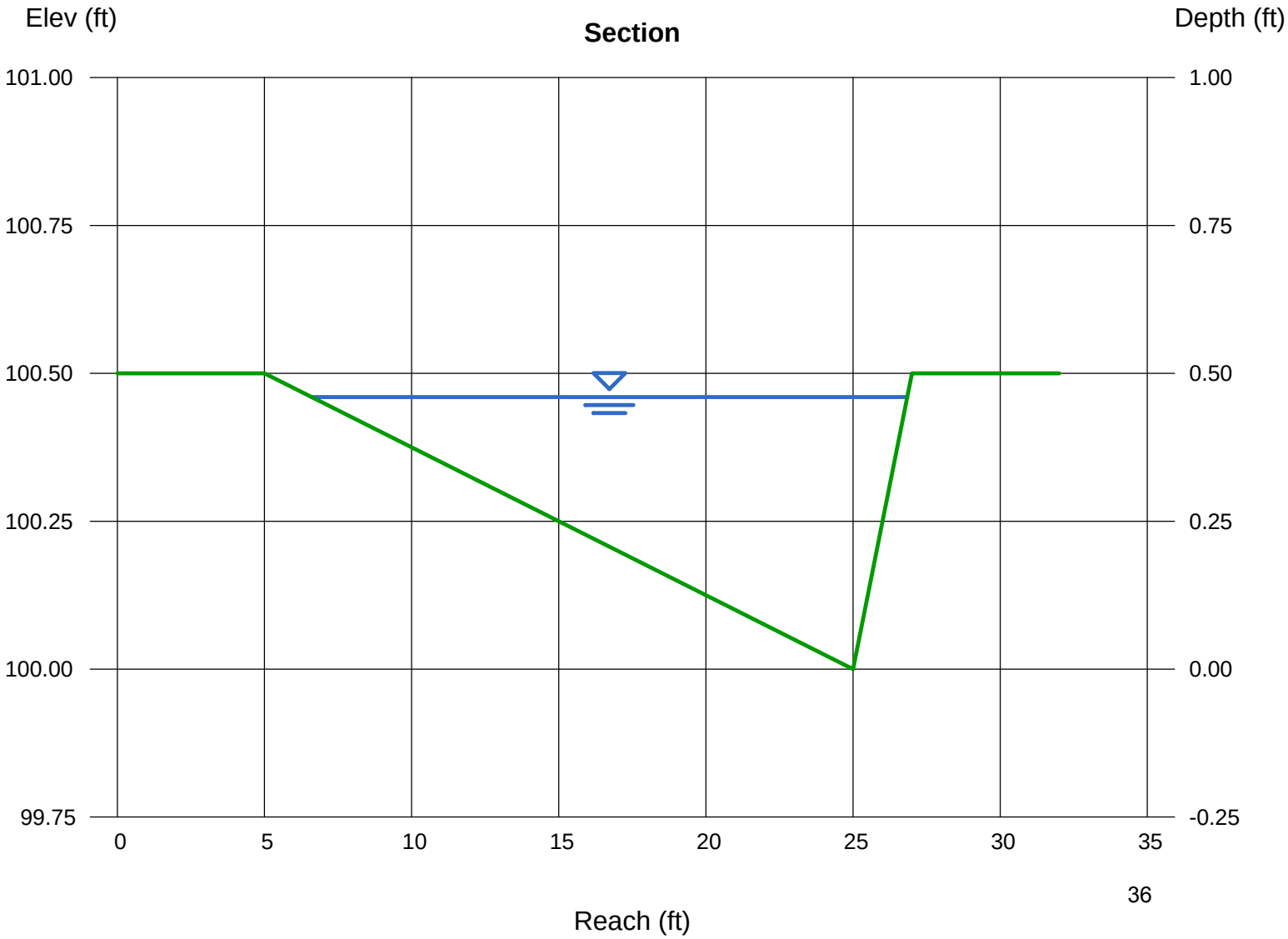
Side Slopes (z:1)	=	40.00, 4.00
Total Depth (ft)	=	0.50
Invert Elev (ft)	=	100.00
Slope (%)	=	3.50
N-Value	=	0.018

Calculations

Compute by:		Known Q
Known Q (cfs)	=	25.80

Highlighted

Depth (ft)	=	0.46
Q (cfs)	=	25.80
Area (sqft)	=	4.66
Velocity (ft/s)	=	5.54
Wetted Perim (ft)	=	20.30
Crit Depth, Yc (ft)	=	0.50
Top Width (ft)	=	20.24
EGL (ft)	=	0.94



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Pre Dev Vel Calc - Camino Del Rey @ M

Triangular

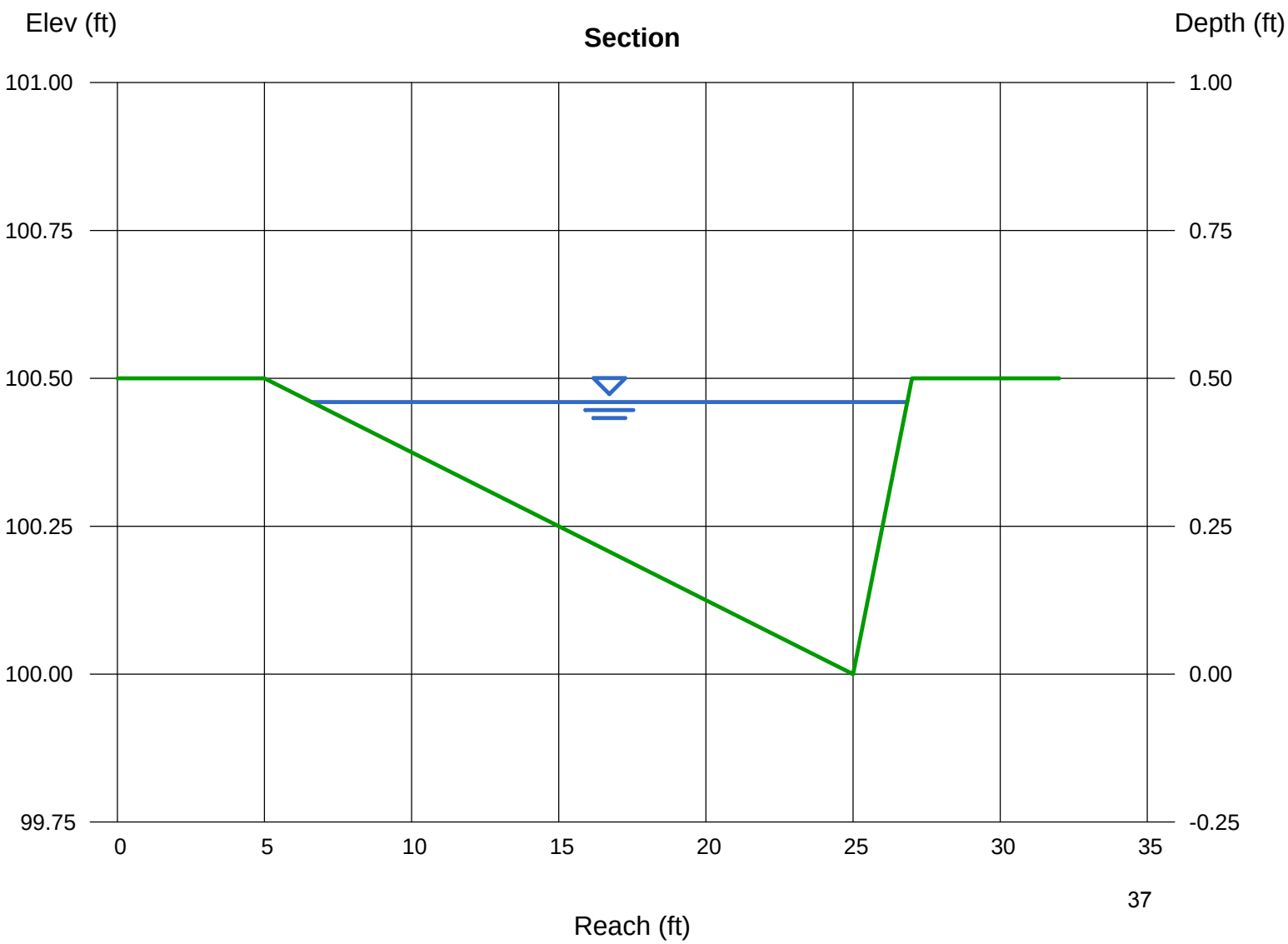
Side Slopes (z:1)	=	40.00, 4.00
Total Depth (ft)	=	0.50
Invert Elev (ft)	=	100.00
Slope (%)	=	3.50
N-Value	=	0.018

Calculations

Compute by:		Known Q
Known Q (cfs)	=	26.10

Highlighted

Depth (ft)	=	0.46
Q (cfs)	=	26.10
Area (sqft)	=	4.66
Velocity (ft/s)	=	5.61
Wetted Perim (ft)	=	20.30
Crit Depth, Yc (ft)	=	0.50
Top Width (ft)	=	20.24
EGL (ft)	=	0.95



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Post Dev Vel Calc - Camino Del Rey @ N

Triangular

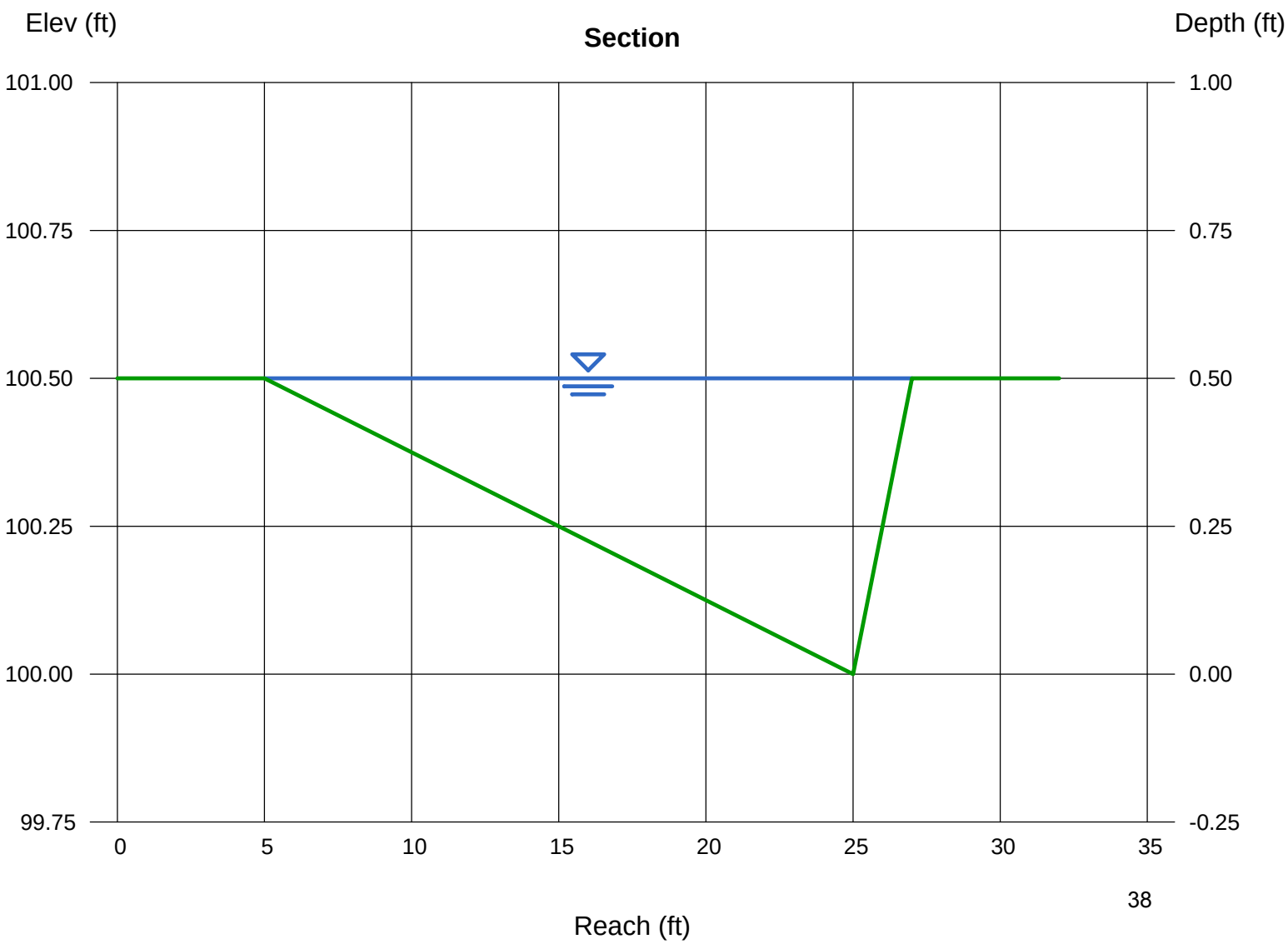
Side Slopes (z:1)	=	40.00, 4.00
Total Depth (ft)	=	0.50
Invert Elev (ft)	=	100.00
Slope (%)	=	3.50
N-Value	=	0.018

Calculations

Compute by:		Known Q
Known Q (cfs)	=	33.50

Highlighted

Depth (ft)	=	0.50
Q (cfs)	=	33.50
Area (sqft)	=	5.50
Velocity (ft/s)	=	6.09
Wetted Perim (ft)	=	22.07
Crit Depth, Yc (ft)	=	0.50
Top Width (ft)	=	22.00
EGL (ft)	=	1.08



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Pre Dev Vel Calc - Camino Del Rey @ N

Triangular

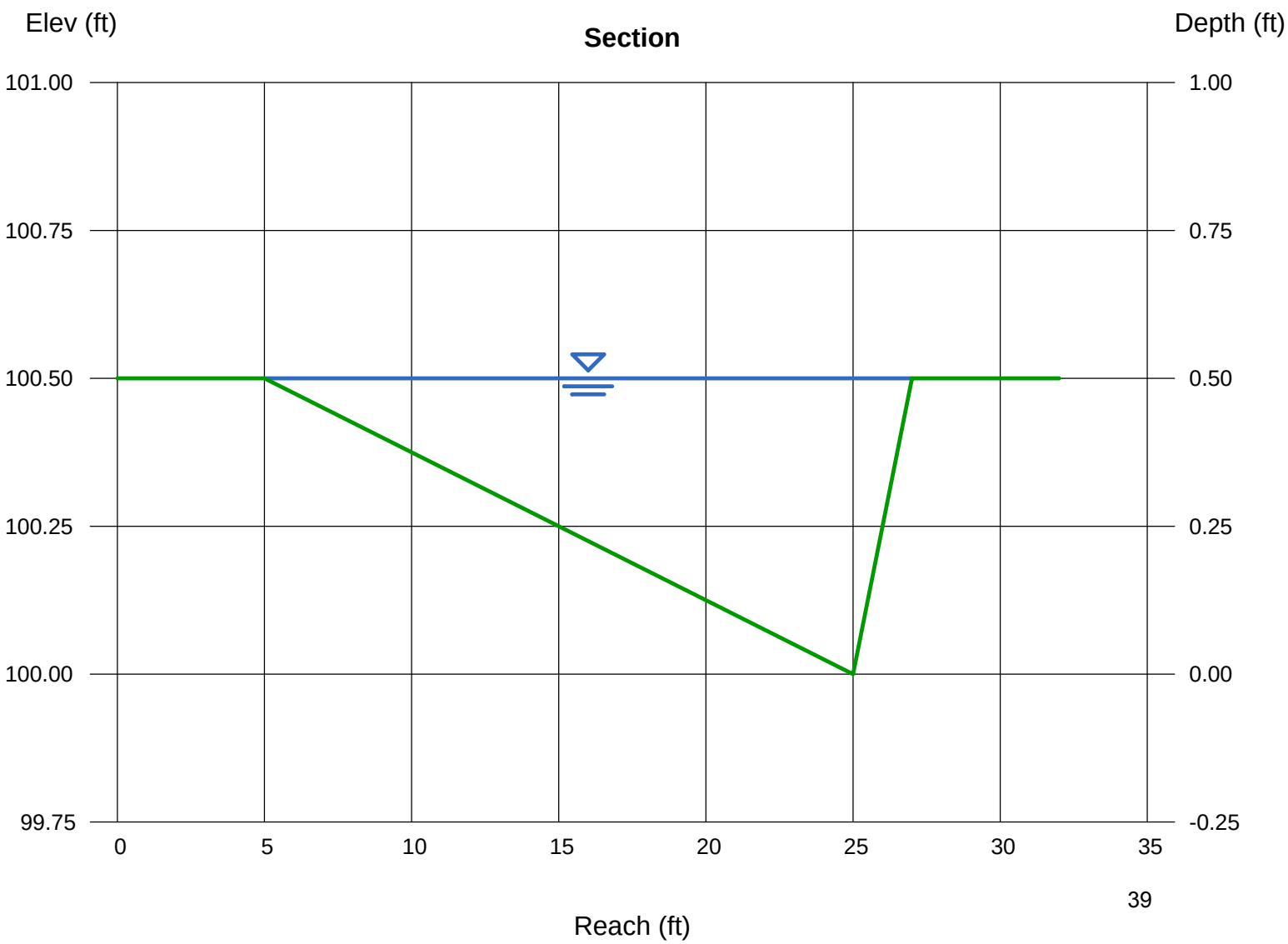
Side Slopes (z:1)	=	40.00, 4.00
Total Depth (ft)	=	0.50
Invert Elev (ft)	=	100.00
Slope (%)	=	3.50
N-Value	=	0.018

Calculations

Compute by:		Known Q
Known Q (cfs)	=	33.60

Highlighted

Depth (ft)	=	0.50
Q (cfs)	=	33.60
Area (sqft)	=	5.50
Velocity (ft/s)	=	6.11
Wetted Perim (ft)	=	22.07
Crit Depth, Yc (ft)	=	0.50
Top Width (ft)	=	22.00
EGL (ft)	=	1.08



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Post-Dev Vel Calc @ Outlet P1

Triangular

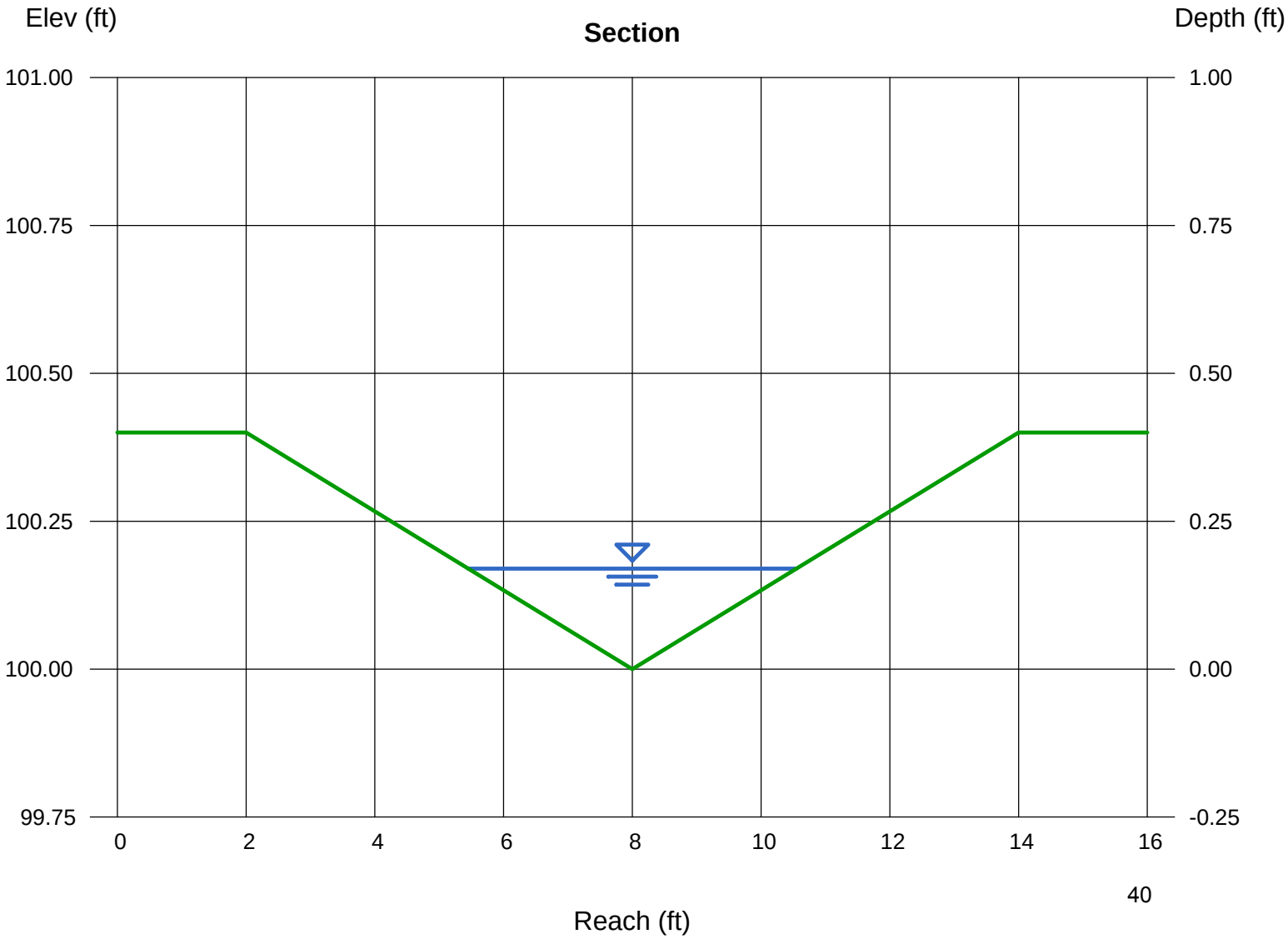
Side Slopes (z:1)	=	15.00, 15.00
Total Depth (ft)	=	0.40
Invert Elev (ft)	=	100.00
Slope (%)	=	40.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	3.90

Highlighted

Depth (ft)	=	0.17
Q (cfs)	=	3.900
Area (sqft)	=	0.43
Velocity (ft/s)	=	9.00
Wetted Perim (ft)	=	5.11
Crit Depth, Yc (ft)	=	0.34
Top Width (ft)	=	5.10
EGL (ft)	=	1.43



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Pre-Dev Vel Calc @ Outlet P1

Triangular

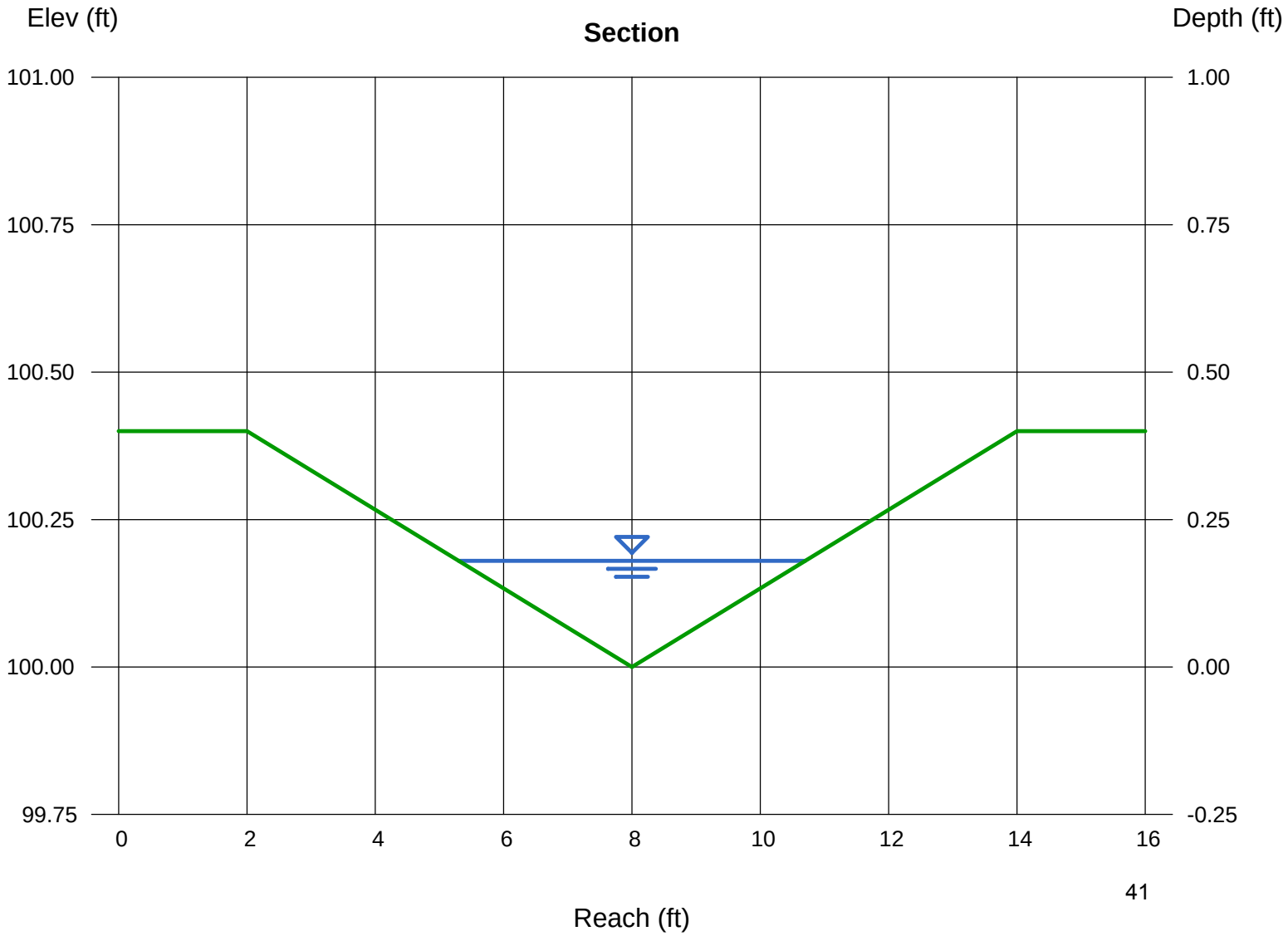
Side Slopes (z:1)	=	15.00, 15.00
Total Depth (ft)	=	0.40
Invert Elev (ft)	=	100.00
Slope (%)	=	40.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	4.50

Highlighted

Depth (ft)	=	0.18
Q (cfs)	=	4.500
Area (sqft)	=	0.49
Velocity (ft/s)	=	9.26
Wetted Perim (ft)	=	5.41
Crit Depth, Yc (ft)	=	0.36
Top Width (ft)	=	5.40
EGL (ft)	=	1.51



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Post-Dev Vel Calc @ Outlet P2

Triangular

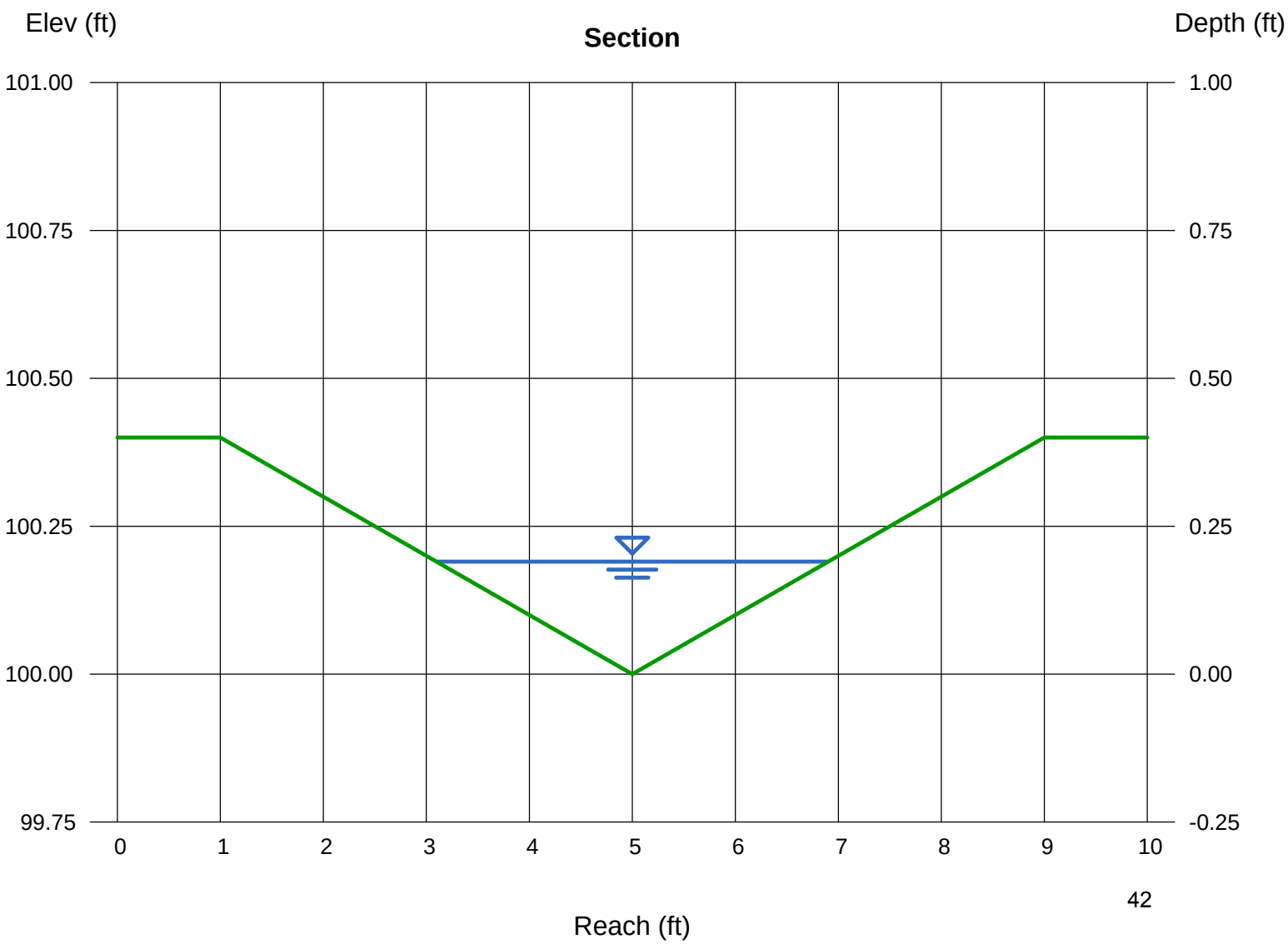
Side Slopes (z:1)	=	10.00, 10.00
Total Depth (ft)	=	0.40
Invert Elev (ft)	=	100.00
Slope (%)	=	13.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	1.90

Highlighted

Depth (ft)	=	0.19
Q (cfs)	=	1.900
Area (sqft)	=	0.36
Velocity (ft/s)	=	5.26
Wetted Perim (ft)	=	3.82
Crit Depth, Yc (ft)	=	0.30
Top Width (ft)	=	3.80
EGL (ft)	=	0.62



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Nov 17 2011

Pre-Dev Vel Calc @ Outlet P2

Triangular

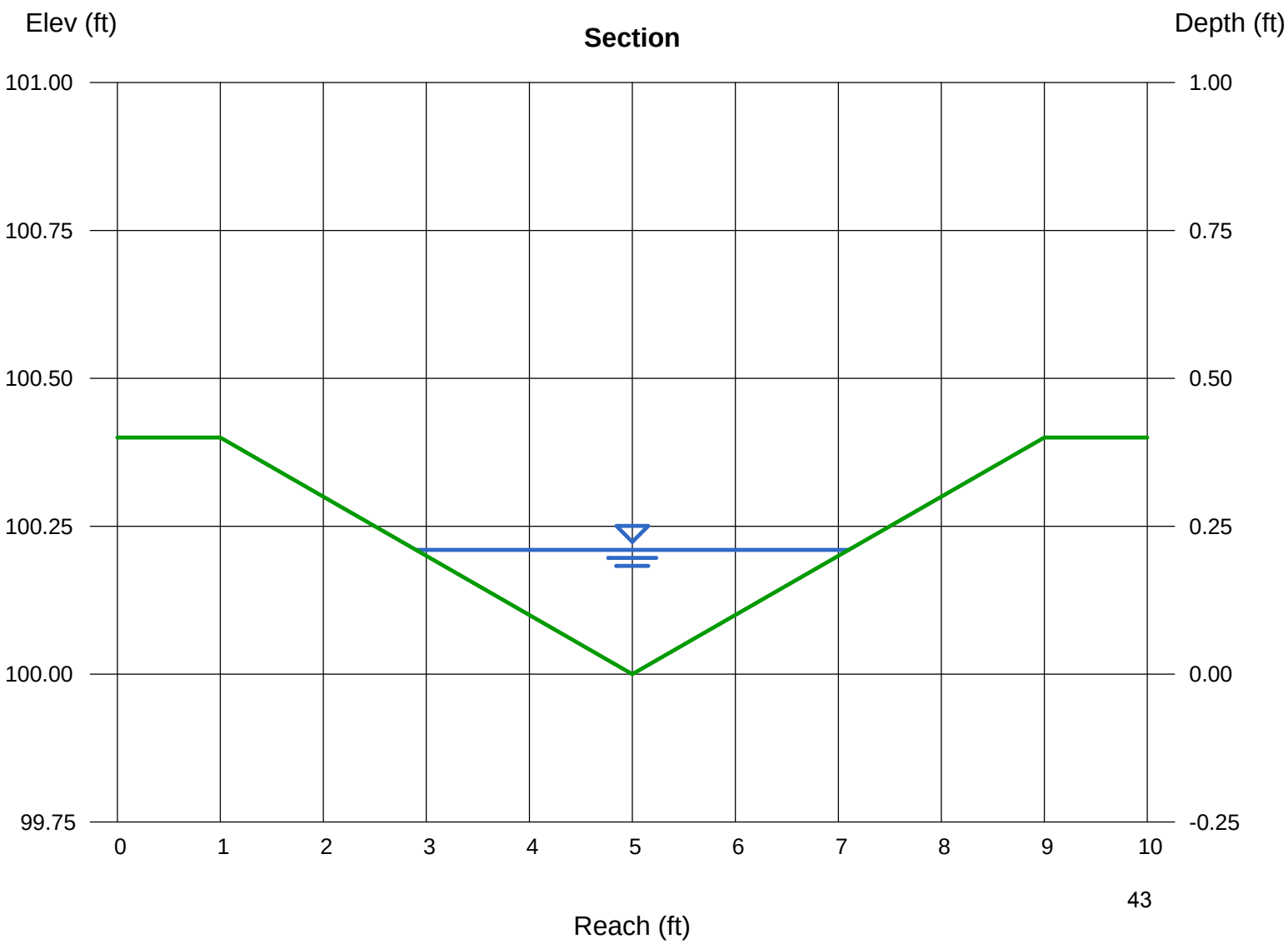
Side Slopes (z:1)	=	10.00, 10.00
Total Depth (ft)	=	0.40
Invert Elev (ft)	=	100.00
Slope (%)	=	13.00
N-Value	=	0.020

Calculations

Compute by:		Known Q
Known Q (cfs)	=	2.40

Highlighted

Depth (ft)	=	0.21
Q (cfs)	=	2.400
Area (sqft)	=	0.44
Velocity (ft/s)	=	5.44
Wetted Perim (ft)	=	4.22
Crit Depth, Yc (ft)	=	0.33
Top Width (ft)	=	4.20
EGL (ft)	=	0.67



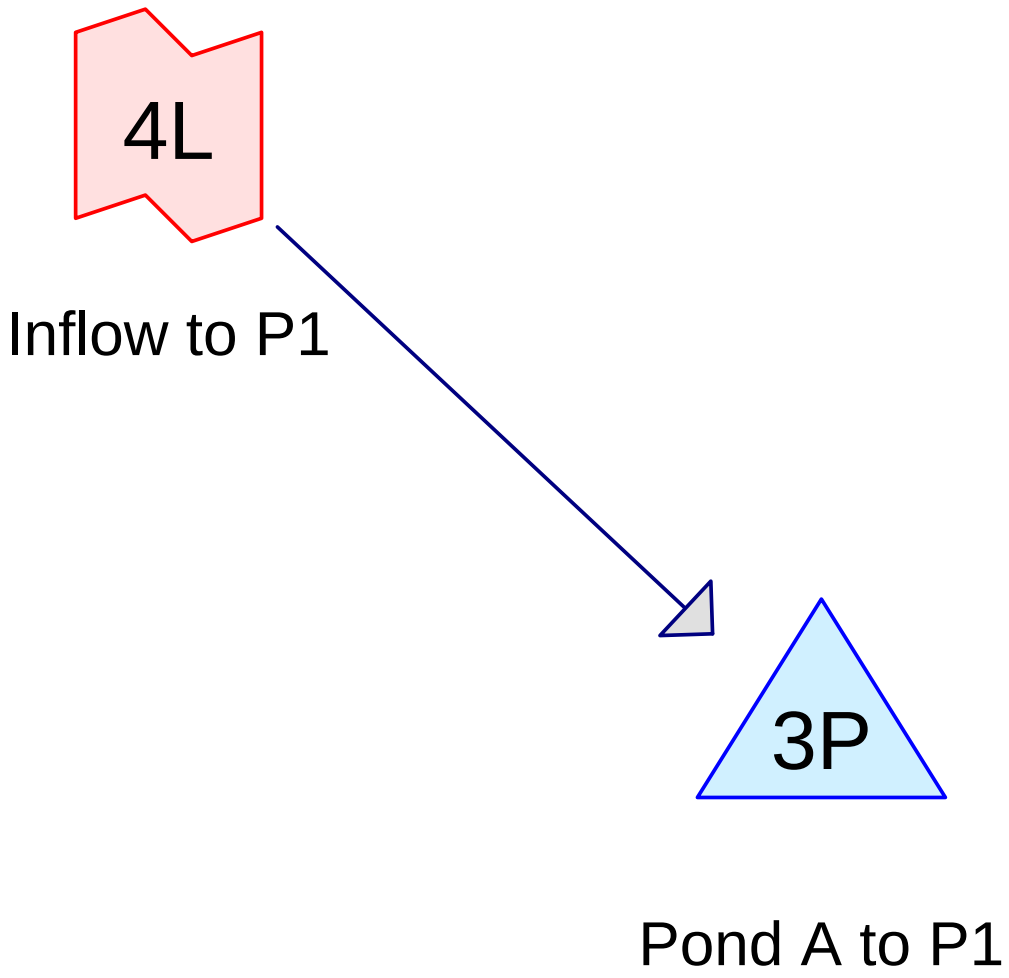
ATTACHMENT C

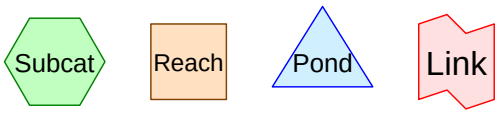
RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 11/17/2011
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 9 MIN.
6 HOUR RAINFALL 3.2 INCHES
BASIN AREA 3.29 ACRES
RUNOFF COEFFICIENT 0.5
PEAK DISCHARGE 9.3 CFS

Inflow to P1 Hydrograph Q100

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 9	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 0.3
TIME (MIN) = 27	DISCHARGE (CFS) = 0.3
TIME (MIN) = 36	DISCHARGE (CFS) = 0.3
TIME (MIN) = 45	DISCHARGE (CFS) = 0.3
TIME (MIN) = 54	DISCHARGE (CFS) = 0.4
TIME (MIN) = 63	DISCHARGE (CFS) = 0.4
TIME (MIN) = 72	DISCHARGE (CFS) = 0.4
TIME (MIN) = 81	DISCHARGE (CFS) = 0.4
TIME (MIN) = 90	DISCHARGE (CFS) = 0.4
TIME (MIN) = 99	DISCHARGE (CFS) = 0.4
TIME (MIN) = 108	DISCHARGE (CFS) = 0.4
TIME (MIN) = 117	DISCHARGE (CFS) = 0.5
TIME (MIN) = 126	DISCHARGE (CFS) = 0.5
TIME (MIN) = 135	DISCHARGE (CFS) = 0.5
TIME (MIN) = 144	DISCHARGE (CFS) = 0.5
TIME (MIN) = 153	DISCHARGE (CFS) = 0.6
TIME (MIN) = 162	DISCHARGE (CFS) = 0.6
TIME (MIN) = 171	DISCHARGE (CFS) = 0.6
TIME (MIN) = 180	DISCHARGE (CFS) = 0.7
TIME (MIN) = 189	DISCHARGE (CFS) = 0.7
TIME (MIN) = 198	DISCHARGE (CFS) = 0.8
TIME (MIN) = 207	DISCHARGE (CFS) = 0.9
TIME (MIN) = 216	DISCHARGE (CFS) = 1.1
TIME (MIN) = 225	DISCHARGE (CFS) = 1.3
TIME (MIN) = 234	DISCHARGE (CFS) = 1.9
TIME (MIN) = 243	DISCHARGE (CFS) = 2.8
TIME (MIN) = 252	DISCHARGE (CFS) = 9.3
TIME (MIN) = 261	DISCHARGE (CFS) = 1.5
TIME (MIN) = 270	DISCHARGE (CFS) = 1
TIME (MIN) = 279	DISCHARGE (CFS) = 0.8
TIME (MIN) = 288	DISCHARGE (CFS) = 0.7
TIME (MIN) = 297	DISCHARGE (CFS) = 0.6
TIME (MIN) = 306	DISCHARGE (CFS) = 0.5
TIME (MIN) = 315	DISCHARGE (CFS) = 0.5
TIME (MIN) = 324	DISCHARGE (CFS) = 0.4
TIME (MIN) = 333	DISCHARGE (CFS) = 0.4
TIME (MIN) = 342	DISCHARGE (CFS) = 0.4
TIME (MIN) = 351	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 369	DISCHARGE (CFS) = 0





Drainage Diagram for Outlet P1
Prepared by {enter your company name here}, Printed 11/17/2011
HydroCAD® 9.10 s/n 05586 © 2010 HydroCAD Software Solutions LLC

Summary for Pond 3P: Pond A to P1

Inflow	=	9.30 cfs @	4.76 hrs,	Volume=	0.488 af
Outflow	=	3.92 cfs @	4.88 hrs,	Volume=	0.488 af, Atten= 58%, Lag= 7.1 min
Primary	=	3.92 cfs @	4.88 hrs,	Volume=	0.488 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 331.93' @ 4.88 hrs Surf.Area= 641 sf Storage= 4,180 cf

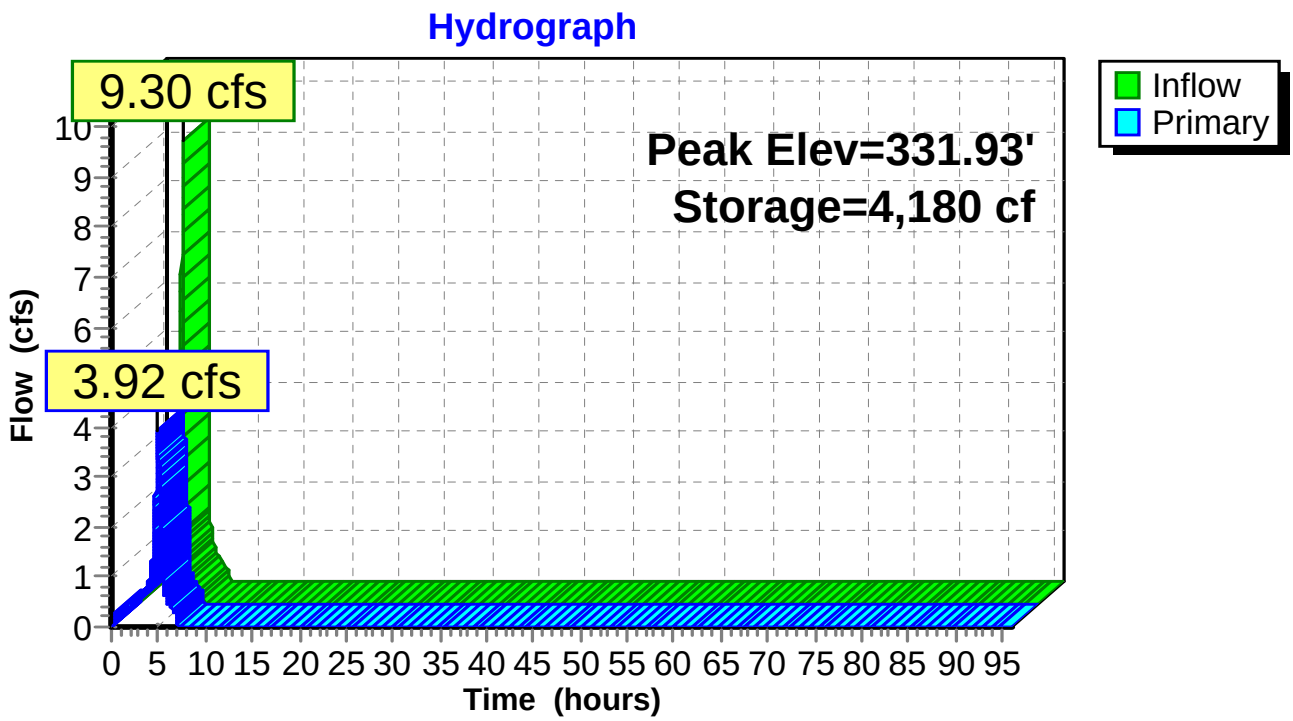
Plug-Flow detention time= 7.1 min calculated for 0.487 af (100% of inflow)
Center-of-Mass det. time= 7.1 min (255.6 - 248.4)

Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	4,524 cf	**72.0" D x 80.0'L Pipe Storage S= 0.0050 '/'** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	326.50'	**8.0" Vert. Orifice outlet** C= 0.620
#2	Primary	332.00'	**18.0" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads

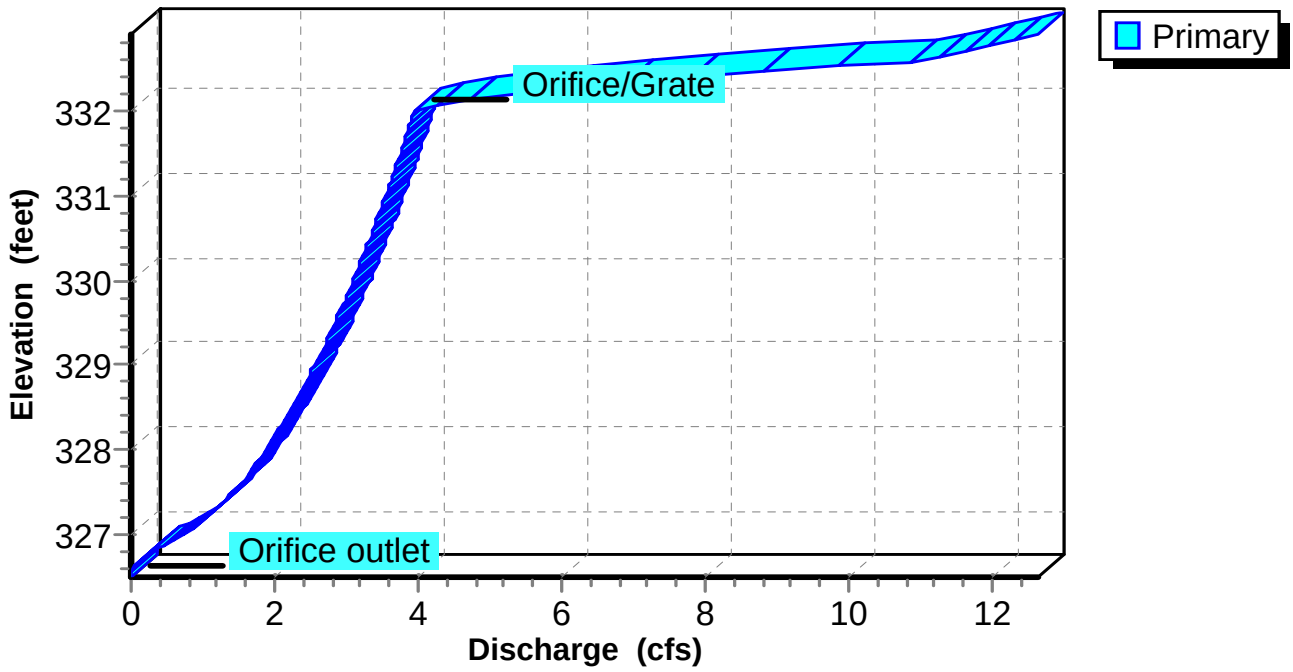
Primary OutFlow Max=3.92 cfs @ 4.88 hrs HW=331.92' (Free Discharge)
└─**1=Orifice outlet** (Orifice Controls 3.92 cfs @ 11.23 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Pond A to P1



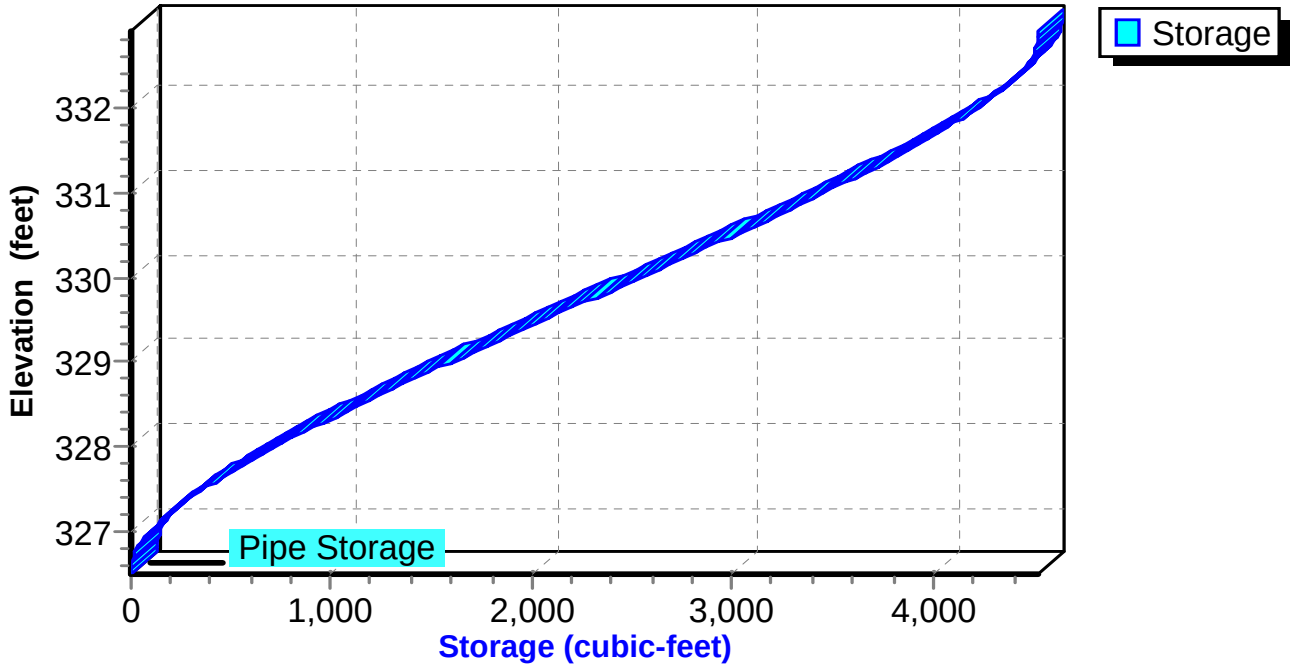
Pond 3P: Pond A to P1

Stage-Discharge

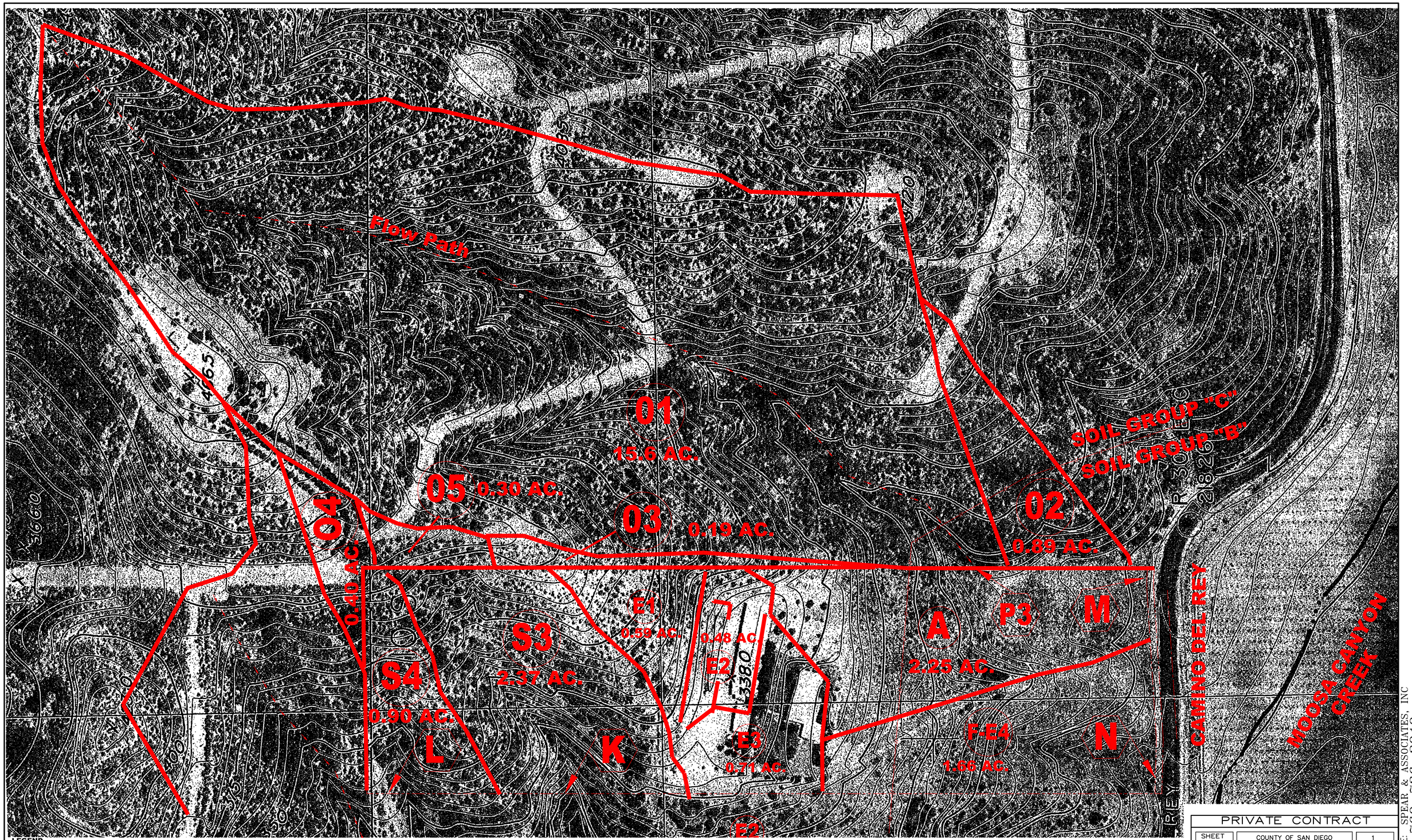


Pond 3P: Pond A to P1

Stage-Area-Storage



ATTACHMENT D



LEGEND

PROJECT BOUNDARY
SOIL TYPE DELINEATION
NATURAL DRAINAGE COURSE
DRAINAGE AREA BOUNDARY
DRAINAGE AREA DESIGNATION (S4)
DRAINAGE AREA OUTFALL (N)

SCALE 1"=60'

TOPOGRAPHY SOURCE
COUNTY OF SAN DIEGO FLOOD PLAIN MAP
EDITION OF 1973
TOPO SOURCE METHOD: PHOTO-GRAMMETRIC METHODS
TOPO SOURCE DATE: 07-22-1973

APPLICANT/OWNER
DAI DANG MEDITATION CENTER
6326 CAMINO DEL REY
BONSALL, CA 92003
(760) 945-5588
A.P.N. 127-460-14

PRIVATE CONTRACT

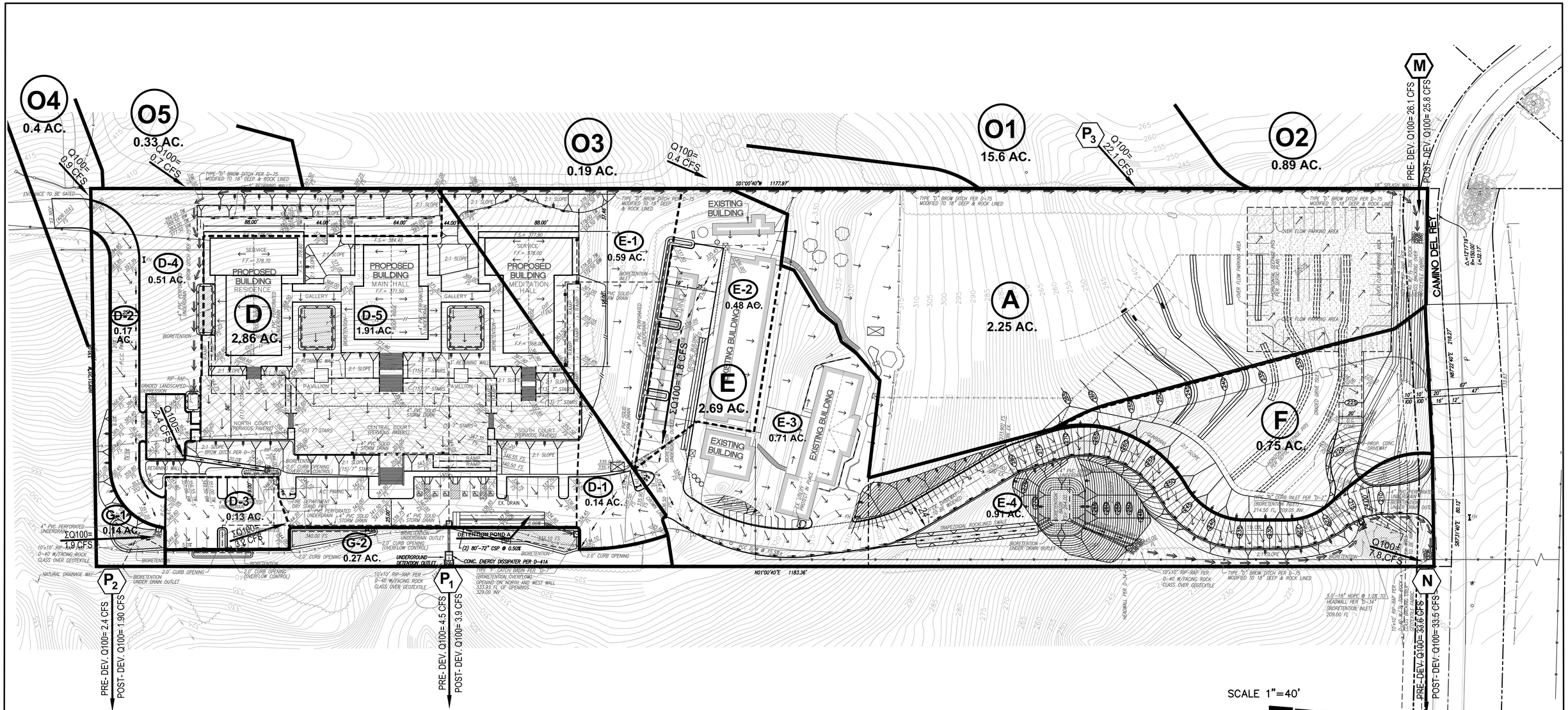
SHEET 1	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	1 SHEETS

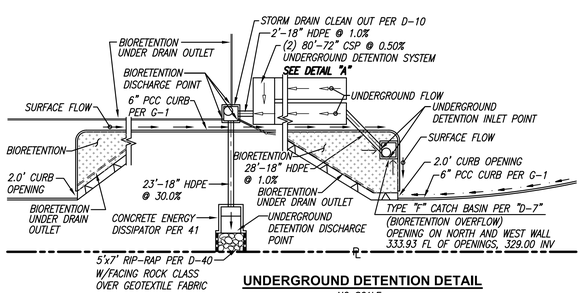
PRE-DEVELOPMENT DRAINAGE AREA MAP FOR:

DAI DANG MEDITATION CENTER

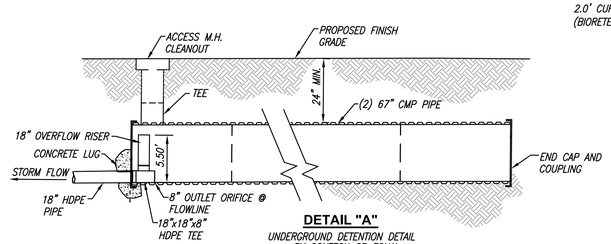
ENGINEER'S NAME: SPEAR & ASSOCIATES, INC
PHONE NO. 1-760-736-2040

PRE-DEVELOPMENT DRAINAGE AREA

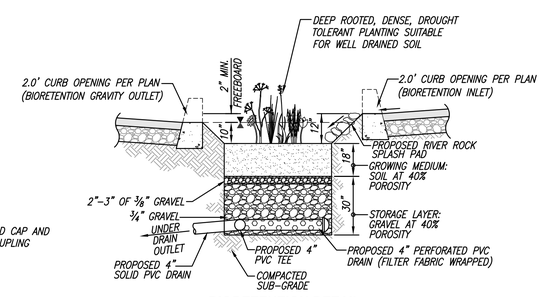




UNDERGROUND DETENTION DETAIL
NO SCALE



DETAIL "A"
UNDERGROUND DETENTION DETAIL
BY CONTECH OR EQUAL
NO SCALE



BIORETENTION DETAIL
DETAIL OF ONSITE POST CONSTRUCTION BMP
NO SCALE

LEGEND

PROJECT BOUNDARY	
PROP. CONCENTRATED FLOW	
PROP. SHEET FLOW	
DRAINAGE AREA BOUNDARY	
DRAINAGE AREA DESIGNATION	E
DRAINAGE AREA SUB-BOUNDARY	
DRAINAGE AREA SUB-BOUNDARY DESIGNATION	E-4
DRAINAGE AREA OUTFALL	N

TOPOGRAPHY SOURCE

TOWILL, INC., 5933 SEA LION PLACE, SUITE 100
CARLSBAD, CA 92010-6624.
TOPO SOURCE METHOD: AERIAL PHOTO
TOPO SOURCE DATE: 06-04-03

APPLICANT/OWNER
DAI DANG MEDITATION CENTER
6326 CAMINO DEL REY
BONSALL, CA 92003
(760) 945-5588

A.P.N. 127-460-14

PRIVATE CONTRACT

SHEET 1	COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS	1 SHEETS

DRAINAGE AREA MAP

DAI DANG MEDITATION CENTER

CALIFORNIA COORDINATE INDEX .

COUNTY ENGINEER

BY: DATE

ENGINEER OF WORK:

GRADING PERMIT NO.

ENGINEER'S NAME: SPEAR & ASSOCIATES, INC
PHONE NO. 1-760-736-2040

SPEAR & ASSOCIATES PROJECT NO. 03-190 DIF/JRZ

POST DEVELOPMENT DRAINAGE AREA MAP