Appendix G

Technical Appendix for Hydrology and Water Quality

Appendix G1

Preliminary Hydrology Calculations

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SOUTH BAY INDUSTRIAL CENTER
REDONDO BEACH BLVD. AND VERMONT AVE.
LOS ANGELES, CALIFORNIA

PREPARED FOR

PROLOGIS, INC.
3546 CONCOURS STREET, SUITE 100
ONTARIO, CALIFORNIA 91764
PHONE: (909) 673-8700
FAX: (909) 673-8702

OCTOBER 28, 2016
REVISED AUGUST 5, 2019

JOB NO. 3491

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
(714) 521-4811

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SOUTH BAY INDUSTRIAL CENTER

PREPARED BY ED TOLEDANES
UNDER THE SUPERVISION OF

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/20

INTRODUCTION

A: PROJECT LOCATION

The project site is located at the northeast corner of Redondo Beach Boulevard and Vermont Avenue in the City of Los Angeles. Please see next page for vicinity map.

B: STUDY PURPOSE

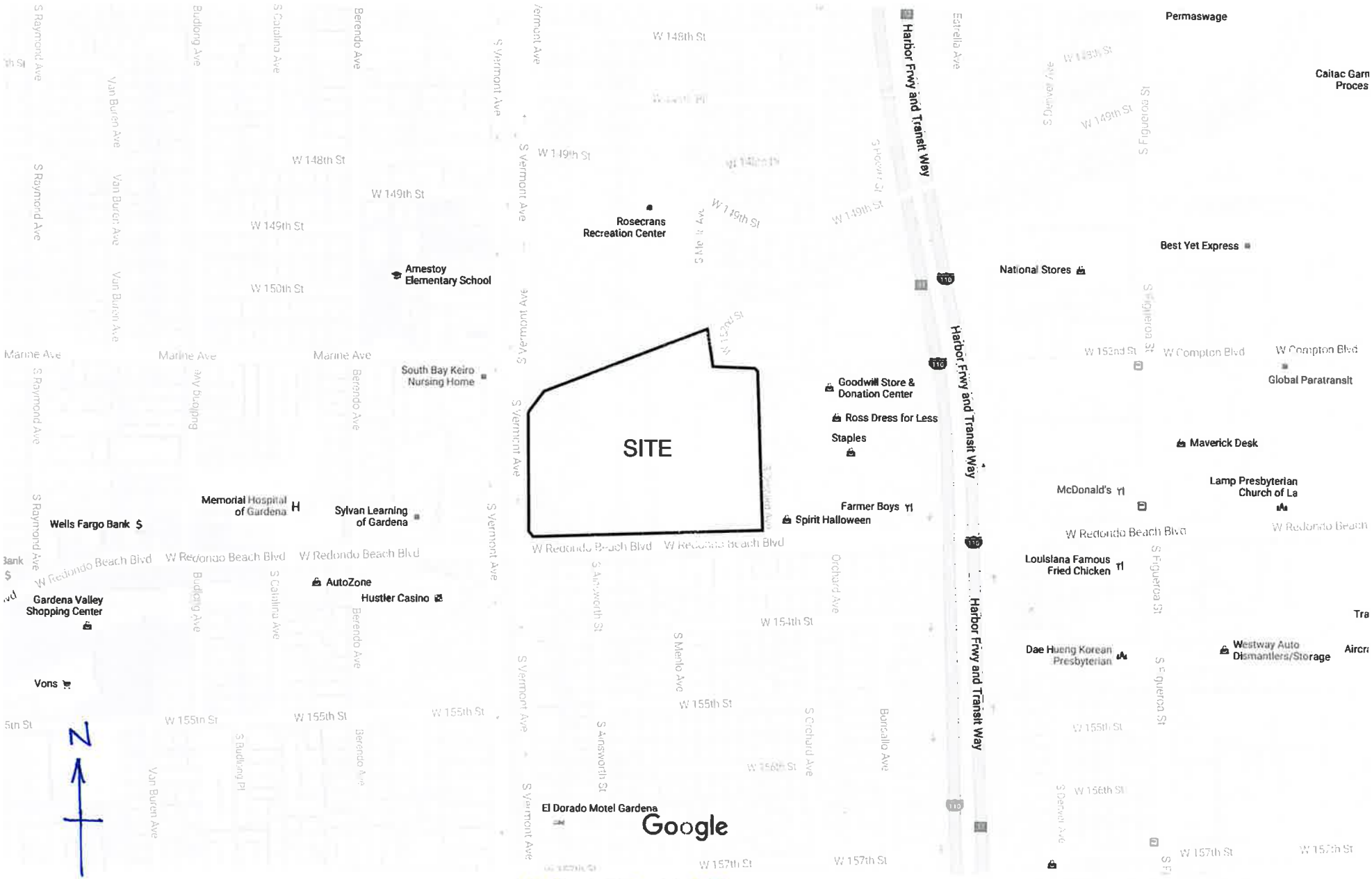
The purpose of this study is to determine the 50-year peak flow rate from the project site that ultimately drains to Project No. 74, a Los Angeles County maintained storm drain adjacent to the northeast corner of the site.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel, PE
Ricky Hwa
Eduardo Toledanes

Google Maps



VICINITY MAP

DISCUSSION

The project site encompasses approximately 15.05 acres. Proposed improvements to the project site consist of one commercial type building of 315,400 square feet. There will be a truck yard on the north side of the building, underground chambers for water quality purposes and vehicle parking lots on the east, south and west sides of the building. The remainder of the site will be reserved for landscaping.

County Hydrology

Per county hydrology data, the project site is located in Subareas 146, 147, 148 and 149, which are tabled to Project No. 74, a County maintained 93-inch storm drain adjacent to the northeast corner of the site. Allowable discharge from the project site to Project No. 74 is 1.15 cfs per acre. Please see Appendix "A" for County hydrology, as-built storm drain plans and other pertinent reference materials.

Existing Condition

The project site currently consists of paved parking lots and several demolished warehouse type buildings.

Proposed Condition

The north half of the proposed building, the northerly truck yard, the north-westerly drive aisle and the westerly parking lot (Subareas 1A-2A, 9.70 acres) drain to catch basins in the drive aisle and truck yard. Runoff is then conveyed northerly via a proposed storm drain system to Project No. 74. The 50-year peak flow rate from these areas is approximately 20.1 cfs.

The south half of the proposed building, the southerly and easterly parking lots (Subareas 3A-4A, 4.90 acres) drain to catch basin in the parking lots. Runoff is then conveyed northerly via the same proposed storm drain system to Project No. 74. The 50-year peak flow rate from these areas is approximately 11.4 cfs (10.0 cfs from Subarea 3A + 1.4 cfs from Subarea 4A).

The total proposed condition 50-year peak flow rate from the project site tributary to Project No. 74 via the proposed onsite storm drain system is approximately 31.5 cfs.

The north-easterly entry driveway fronting Orchard Avenue including the northwesterly portion of Orchard Avenue (Subarea 2B, 0.50 acres) will surface drain to a proposed catch basin north of the driveway and conveyed to the existing 93" R.C.P. public storm drain northeast of the project site. The 50-year peak flow rate at this location is

approximately 1.2 cfs. The westerly landscape area fronting Vermont Avenue including the southerly landscaped area adjacent to Redondo Beach Boulevard (Subarea 1B, 0.45 acres) will surface drain to Redondo Beach Boulevard. The 50-year peak flow rate from these areas is approximately 0.8 cfs.

See Appendix "B" for proposed condition hydrology calculations and Appendix "E" for proposed condition hydrology map.

Detention

The proposed condition 50-year runoff from the project site (31.5 cfs) to Project No. 74 is higher than the allowable discharge (15.05 acres x 1.15 cfs/acre = 17.3 cfs). Detention in the northerly truck yard will be utilized to reduce overall proposed condition site discharge to below the allowable discharge.

Per detention calculations, approximately 5.1 cfs out of the proposed condition runoff tributary to the truck yard (20.1 cfs in Subareas 1A-2A) will be allowed to discharge via the proposed storm drain system. The remaining runoff of 15.0 cfs or 14,828 cubic feet will be detained in the truck yard at a depth of 1.27 ft or 48.20 W.S.E. Runoff from the remainder of the site (10.0 cfs from Subarea 3A + 1.4 cfs from Subarea 4A) will be allowed to discharge undetained via the proposed storm drain system. With detention in the truck yard, the total proposed condition 50-year discharge from the project site will be 16.5 cfs (5.1 cfs from Subareas 1A-2A + 10.0 cfs from Subarea 3A + 1.4 cfs from Subarea 4A), which is less than the allowable discharge of 17.3 cfs.

See Appendix "D" for detention analysis.

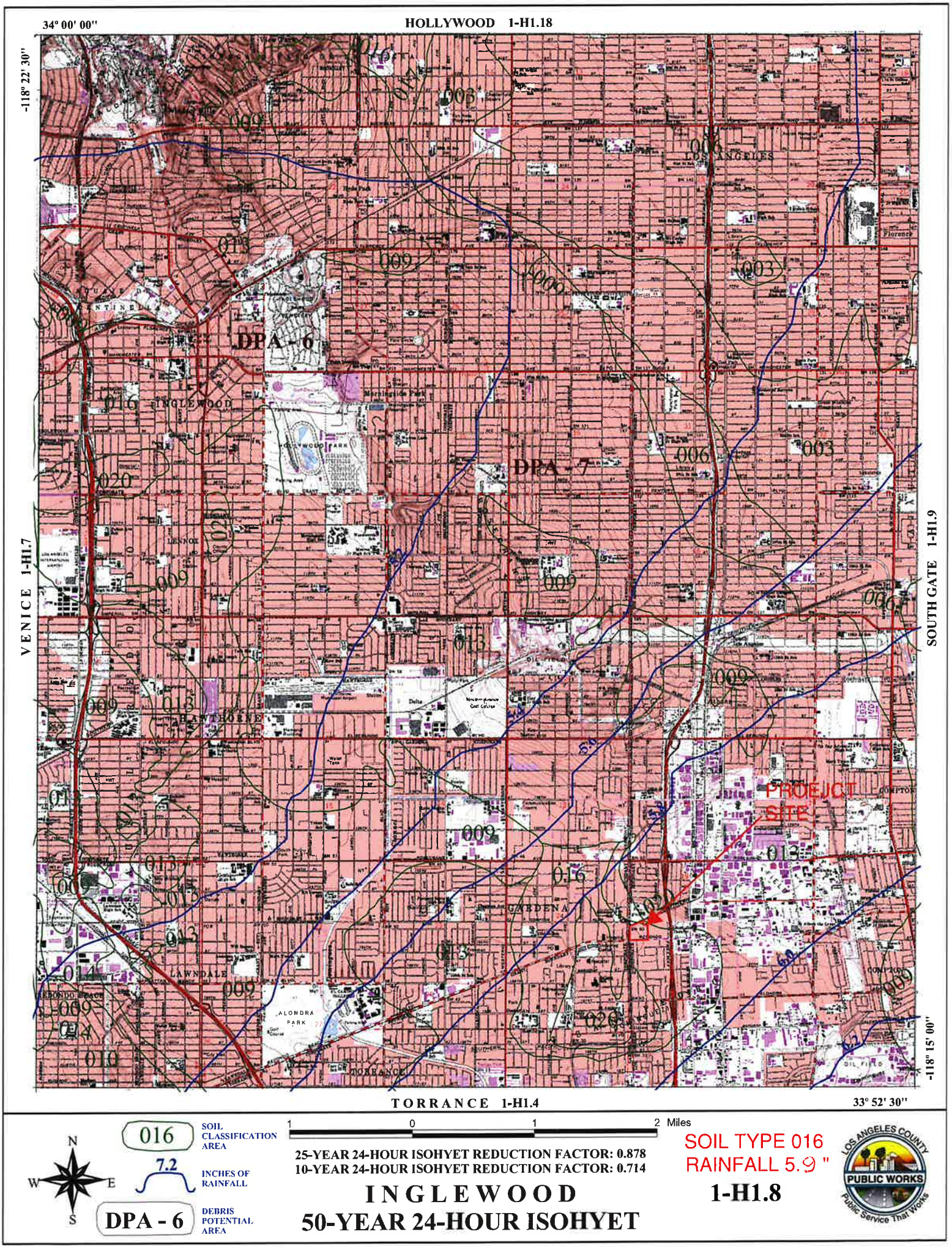
Methodology

Hydrology and hydrograph were computed using the L.A.C.D.P.W. HydroCalc calculator. The soil type is 16 and the rainfall is 5.9" per the Los Angeles County Hydrology Manual. See Appendix "A" for pertinent reference materials.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	HYDROLOGY CALCULATIONS
C	HYDRAULIC CALCULATIONS
D	DETENTION ANALYSIS
E	HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS



INGLEWOOD
50-YEAR 24-HOUR ISOHYET

Office Use Only
☐ Sent Initials: _____
☐ Fax ☒ Email ☐ Other: _____
Date: _____ Time: _____

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

*Requester's Name: Angie Lomeli
Company: Thienes Engineering, Inc
*Phone Number: 714-521-4811 Fax Number: 714-521-4173
*Email: Angie@ThienesEng.com

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☒ Email ☐ Prelim. Mtg. Date: 9/14/2016

Intended Use: Research

Proposed Project Type: Industrial Acreage Involved: _____

*Will information be used in any litigation? ☐ YES ☒ NO
Case Info. Name: _____ No: _____ Location: _____

INFORMATION REQUESTED (Attach Assessor Map)

LACFCD Facility: Name: _____
Unit: _____ Line: _____ Station: _____
City: Los Angeles
*Street/Cross-street: N/S of Redondo Beach Blvd, between Vermont Ave & Orchard Ave
*Thomas Guide: Page: 734 Grid: B4, B5 ☒ Site Map/Plans Submitted
Info. Requested:
- Hydrology Map
- Allowable 'Q'
- Hydraulic calcs

***Required Information. See Page 2 of 2 for Instructions.**

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED: Allowable q per acre. BI 74 as built, hydrology map Hydraulic and hydrologic calculation.

REFERENCES SEARCHED: BI 74 Hydrology and hydraulic analysis

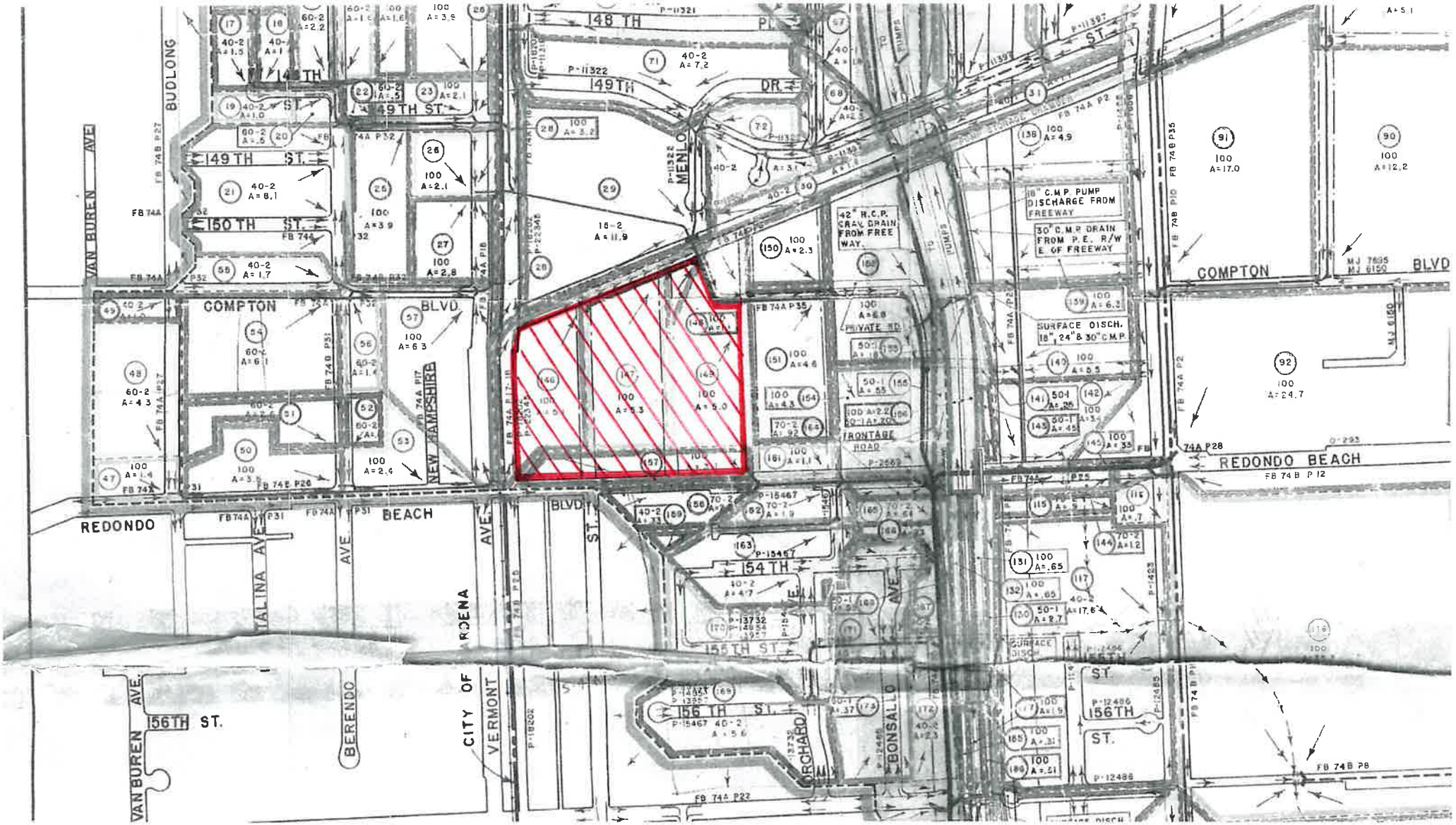
COMMENTS, ETC: Allowable q per acre = 1.15 cfs

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By:
Date:
Public Service That Works

INFORMATION PROVIDED BY: Ambrose C Ajaelo PE Date: 09/26/2016

INFORMATION REVIEWED BY: Date:

Print Save a Copy


148 TH PL
149TH DR.
149 TH ST.
150 TH ST.
BUDLONG
VAN BUREN AVE
COMPTON BLVD
MENLO
NEW HAMPSHIRE
REDONDO BEACH
REDONDO BEACH BLVD
154 TH
155TH ST.
156 TH ST.
156TH ST.
VERMONT
BONSALLO
ORCHARD
BERENDO
CITY OF
42" R.C.P. CRAL DRAIN FROM FREE WAY.
18" C.M.P PUMP DISCHARGE FROM FREEWAY
30" C.M.P DRAIN FROM P.E. R/W E. OF FREEWAY
SURFACE DISCH. 18", 24" & 30" C.M.P.
FRONTAGE ROAD
PRIVATE RD.

—— LOS ANGELES COUNTY FLOOD CONTROL DISTRICT ——

Hydrology Calculation Sheet

PROJECT 74
FREQUENCY 5
ISOHYETAL ZONE K

Line 8 [illegible] Line [illegible]

CALCULATED BY [illegible]
CHECKED BY
DATE [illegible] 56

DRAINAGE AREA	Soil & Development	A Acres	I in/hr.	C	ΔQ CFS	ΣQ CFS	SLOPE	SEC-TION	v FPS	L FT.	T MIN.	ΣT MIN.	REMARKS
Assume Tc of	12.3 as	Submitted											
146	Y-Com	5.1	1.98	.830	5.4	5.4	.0058	21"	3.4	350	1.7	12.3	Assumed Tc
147	Y-Com	5.3	1.83	.821	5.0	10.4	.0200	21"	6.8	140	0.3	14.0	1st [illegible]
148	Y-Com	1.1	1.81	.820	1.6	15.[illegible]	.0080	21"	7.4	[illegible]	[illegible]	14.3	[illegible] Junction [illegible]
												14.3	@ Main Line
Adjust Q	15.[illegible] × 1.35/1.[illegible] = 12.4												
						Assume	Tc	=	12.1	as submitted			
Part 211	[illegible]	4.1	2.00	.615	6.1								[illegible]
212-213	[illegible]	9.1	1.85	.662	12.4	6.1	.0037	[illegible]	.4	367	1.8	13.9	1st Inlet [illegible]
214	[illegible]	0.78	1.76	.576	1.0	18.5	.0026	27"	4.6	365	1.3	15.2	[illegible]
215	[illegible]	2.6	1.76	.716	3.3								
216-217	Y-Com	4.9	1.70	.811	6.6	22.8	.0036	30"	4.6	377	1.4	16.6	[illegible]
						29.6	.0050	30"	6.0	60	0.1	16.7	Main Line
Adjust Q	29.6 × 1.15/1.69 =	20.2											

Line 10

Line 11

DA-2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Sht. 1 of 13

Hydrology Calculation Sheet

PROJECT

FREQUENCY

ISOHYETAL ZONE C

CALCULATED BY

CHECKED BY

DATE

DRAINAGE AREA	Soil & Development	A Acres	I in/hr.	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	v FPS	L FT	T MIN.	ΣT MIN.	REMARKS
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
157	[illegible]	3.1	[illegible]	[illegible]	[illegible]								
161	[illegible]	1.1	1.97	.53	1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
162	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
163	[illegible]	1.7	1.97	[illegible]	[illegible]								
164	[illegible]	1.7	1.82	.72	1.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
						[illegible]	[illegible]	[illegible]	~	[illegible]	~	15.6	[illegible]
[illegible]	[illegible]	= 15	1.51									[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]								
253-254-255	[illegible]	1.7	2.35	.81	1.4								
256-257-258-259	[illegible]	1.2	1.97	.72	1.7	[illegible]	[illegible]	[illegible]	4.1	[illegible]	3.3	5.8	[illegible]
260-261	[illegible]	5.5	[illegible]	[illegible]	8.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.1	[illegible]
263-264	[illegible]	4.3	1.97	.520	7.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.8	[illegible]
262	[illegible]	6.6	1.56	.520	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.5	[illegible]
						[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.8	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]									14.6	[illegible]

DA-2

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT — Sht [illegible] of [illegible]

Hydrology Calculation Sheet

PROJECT 74
FREQUENCY 5 year
ISOHYETAL ZONE K

CALCULATED BY [illegible]
CHECKED BY [illegible]
DATE [illegible]

DRAINAGE AREA	Soil & Development	A Acres	I in/hr.	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ΣT MIN.	REMARKS
[illegible]	70.2 x 1.35/1.70	= 71.5			71.5	[illegible]							
29	Y-½(Sc. Res.)	11.7	1.35	.675	16.7	234.4						26.1	[illegible]
30	Y-Sf	1.5	1.35	.755	1.7							26.1	
Line 8	See Sht 6				13.4	247.0	[illegible]	[illegible]	7.5	[illegible]	[illegible]	27.1	[illegible]
149	Y-Com	5.6	1.34	.779	5.2	[illegible]	[illegible]	[illegible]	7.6	[illegible]	0.7	[illegible]	[illegible]
150-151	Y-Com	6.7	1.32	.776	7.1	265.6	[illegible]	[illegible]	7.4	[illegible]	[illegible]	28.5	[illegible]
Part 136-137	[illegible]	8.5	[illegible]	.775	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29.6	[illegible]
" "	[illegible]	4.1	[illegible]	[illegible]	3.7								
152	Y-Com	6.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.4	[illegible]		[illegible]	[illegible]
153 + 155	Y-Sf	[illegible]	1.27	.685	6.6	[illegible]	[illegible]	[illegible]	7.6	[illegible]	[illegible]	30.8	[illegible]
154	Y-Com	4.3	1.27	[illegible]	4.2								
[illegible] Lat.	See Sht 7				216	296.1	[illegible]	[illegible]	[illegible]	[illegible]	0.1	30.7	[illegible]
Line 9	See Sht 9				15.7	512.6	—					30.7	77 + [illegible]
165-To 168	Y-Sf	2.8	1.25	[illegible]	2.4	529.3	.0020	[illegible]	8.7	[illegible]	0.5	31.4	74 + 88
Line 10	See Sht [illegible]				[illegible]	[illegible]	.002	[illegible]	7.0	334	[illegible]	[illegible]	71 + 54
174	Y-Sf	1.3	1.23	.678	1.1	[illegible]	[illegible]	[illegible]	7.2	[illegible]	1.2	[illegible]	[illegible] 157th St.
175-176	Y-Sf	3.4	1.20	.670	2.7	551.4	[illegible]	[illegible]	9.3	[illegible]	[illegible]	34.5	57 + 72 @ Estrella
177 To 194	Y-Comm	5.9	1.20	.760	5.4							34.5	
185-To 196	Y-Com	2.0	1.18	[illegible]	1.8	557	.0025	[illegible]	7.5	633	1.1	35.6	51 + 37 - Estrella [illegible]
" "	Y-Sf	23.7	1.18	.663	18.6								
209	Y-Com	.46	1.18	.758	.4								
216	Y-Sf	.40	1.18	.663	.3								
197	Y-Sf	.22	1.15	.660	.2	580.6	[illegible]	114"	6.8	855	1.7	37.3	42 + 54 [illegible]
198 To 201	Y-Com	1.7	1.15	.752	1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Hydraulic Calculation Sheet

PROJECT: No. 74 - Line A

CALCULATED BY: ACA

DATE: Jul, 1967

	STA.	ELEV. INV.	D	ELEV. W.S.	SECTION	A	K	Q	V	$\frac{v^2}{2g}$	E.G.	S_f	Av. S_f	L	h_f	h_b	h_j	h_t	E.G.
	50+87	18.13		29.04	8'-0"x9'-1"	75.42	11182	665.4	8.83	1.21	30.25	.00200							30.25
	50+87	✓		28.78	W" x H 7'-6"x9"	66.94	12699	✓	9.95	1.54	30.32	.00275						.07	30.32
B.C.	51+63			28.99	W ✓ H	✓	✓	✓	✓	✓	30.53	✓	.00275	76	.21				30.53
E.C.	52+07			29.42	✓	✓	✓	✓	✓	✓	30.96		✓	44	.12	.31			30.96
	52+07			29.56	✓	✓	✓	651.8	9.75	1.47	31.03	.00264					.07		31.03
	54+86			30.30	✓	✓	✓	✓	✓	✓	31.77	✓	.00264	279	.74				31.77
	54+86			30.33	✓	✓	✓	✓	✓	✓	31.80						.03		31.80
	56+00	20.20		30.63	✓	✓	✓	✓	✓	✓	32.10		✓	114	.30	.17			32.10
B.C.	56+13.50			30.66	✓	✓	✓	✓	✓	✓	32.13		✓	13.5	.03				32.13
E.C.	58+03.37			31.69	✓	✓	✓	✓	✓	✓	33.16		✓	190	.50	.53			33.16
	60+15	21.88		32.25	✓	✓	✓	✓	✓	✓	33.72		✓	212	.56				33.72
Sec 9	66+00	23.33		33.75	✓	✓	✓	✓	✓	✓	35.22		✓	569	1.50				35.22
	71+63			35.24	✓	✓	✓	✓	✓	✓	36.71		✓	563	1.49				36.71
	71+63			35.28	✓	✓	✓	646.6	9.68	1.45	36.73	.00260					.02		36.73
	75+75			36.31	✓	✓	✓	✓	✓	✓	37.76	✓	.00260	412	1.03				37.76
	75+75			36.33	✓	✓	✓	645.5	9.65	1.44	37.77	.00259					.01		37.77
	76+00			36.39	✓	✓	✓	✓	✓	✓	37.83	✓	.00259	25	.06				37.83
	77+77	26.02	10.83	36.85	✓	✓	✓	✓	✓	✓	38.29		✓	177	.46				38.29
T.S. B.C.	78+12	26.68	10.15	36.83	6'-6"x7'-1"	47.36	2420	366.7	7.74	.84	37.67	.00190							37.67
E.C.	78+33			36.98	W ✓ H	✓	✓	✓	✓	✓	37.82	✓	.00190	21+	.04	.11			37.82
B.C.	78+65			37.04	✓	✓	✓	✓	✓	✓	37.88		✓	32	.06				37.88
E.C.	78+97			37.22	✓	✓	✓	✓	✓	✓	[illegible]		✓	26	.05	.12			38.06
B.C.	81+97			37.30	✓	✓	✓	✓	✓	✓	[illegible]		✓	300	.59				[illegible]
	83+97			38.25	✓	✓	✓	✓	✓	✓	39.09		✓	302	.36	.07			39.09
	83+97			38.45	✓	✓	✓	343.3	6.78	.71	39.19	.0017					.10		39.19
E.C.	85+10			38.6?	✓	✓	✓	✓	✓	✓	39.40	✓	.0017	101	.1?	.04			39.40

Sta. (78+12) Line B

DB-3

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Sht 4 of 5

Hydraulic Calculation Sheet

PROJECT No. 74 - Line A

CALCULATED BY ACA

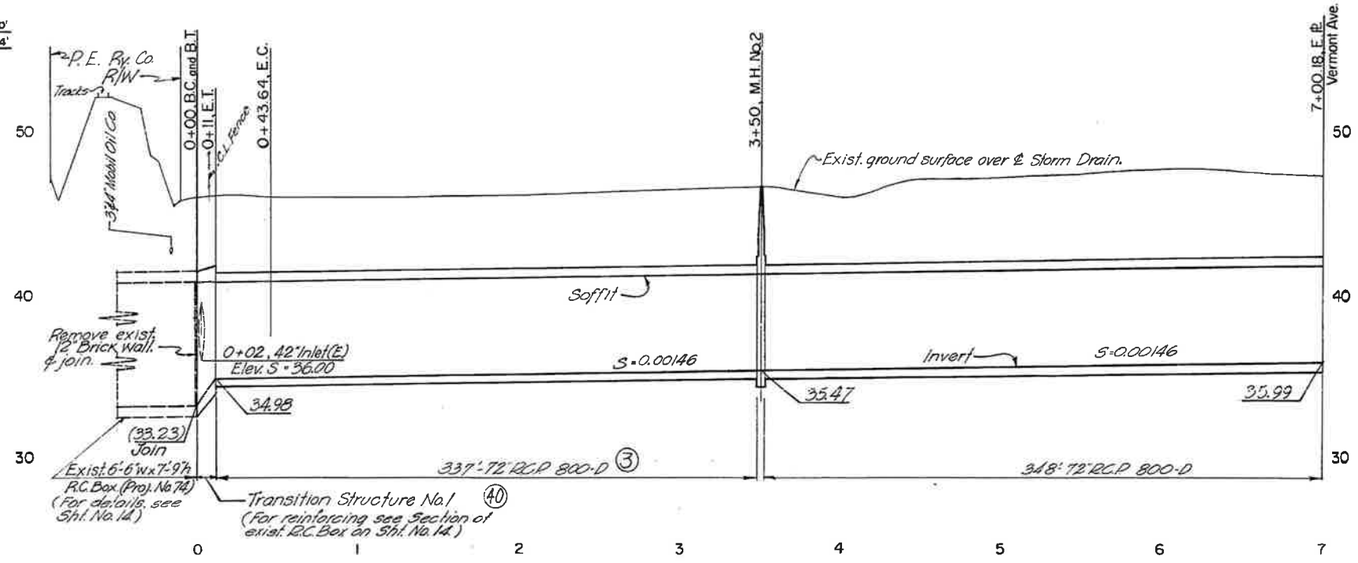
DATE Jul, 1967

	STA.	ELEV. INV.	D	ELEV. W.S.	SECTION	A	K	Q	V	$\frac{v^2}{2g}$	E.G.	S_f	Av. S_f	L	h_f	h_b	h_j	h_t	E.G.
B.C.	85+10			38.66	6'-6"x7'-9"	49.86	8420	343.3	6.90	.74	39.40	.0011							39.40
E.C.	85+64			38.93	W ✓ 4	✓	✓	✓	✓	✓	39.67		.0017	54	.09	.18			39.67
	86+00	30.96		38.99	✓	✓	✓	✓	✓	✓	39.73		✓	36	.06				39.73
B.C.	89+78			39.64	✓	✓	✓	✓	✓	✓	40.38		✓	378	.65				40.38
P.R.C.	90+00			39.79	✓	✓	✓	✓	✓	✓	40.53		✓	22	.04	.11			40.53
E.C.	90+21			39.94	✓	✓	✓	✓	✓	✓	40.68		✓	21+	.04	.11			40.68
B.C.	93+23			40.46	✓	✓	✓	✓	✓	✓	41.20		✓	302	.52				41.20
E.C.	93+87			40.95	✓	✓	✓	✓	✓	✓	41.49		✓	64	.11	.18			41.49
B.C.	94+72			40.90	✓	✓	✓	✓	✓	✓	41.64		✓	85	.15				41.64
E.C.	94+81			40.99	✓	✓	✓	✓	✓	✓	41.73		✓	9	.02	.07			41.73
	96+02			41.20	✓	✓	✓	✓	✓	✓	41.94		✓	121	.21				41.94

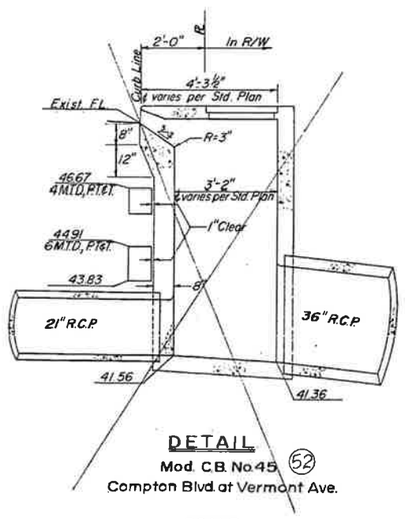
DB-3

PROFILE

HORIZ. SCALE: 1" = 40'
VERT. SCALE: 1" = 4'



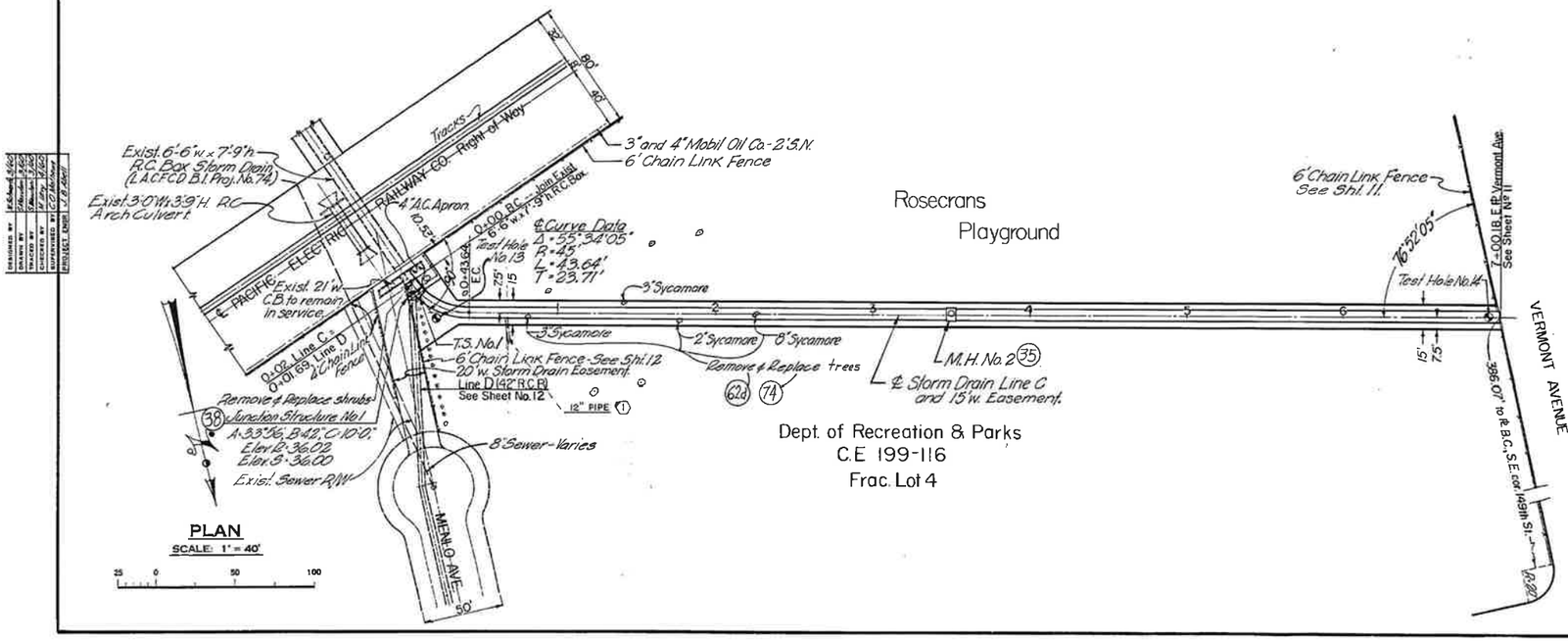
LINE C



DETAIL
Mod. C.B. No. 45 (52)
Compton Blvd. at Vermont Ave.

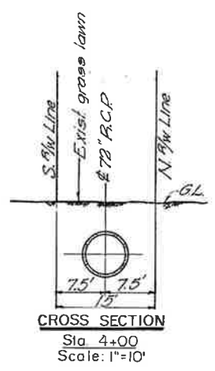
SCALE
½" = 1'-0"

● Modified C.B. No. 3
See Dwg. 275-490-F12



PLAN
SCALE: 1" = 40'

25 0 50 100



CROSS SECTION
Sta. 4+00
Scale: 1"=10'

Resurfacing Schedule
Sta. 0+00 to 0+08.....AC4

PLAN REFERENCES
Plan No.
181-74 ___ L.A.C.F.C.D. ___ Storm Drain
P-11322 ___ City of L.A. Street Plan & Profile
F.B. 205/10

Bench Marks:
Spk. Top of Hdwall, S. end of culvert at P.E. Ry. R/W on extension of Menlo Avenue.
Elev. 49.603 F.B. 205/10-43
(1956 Precise)

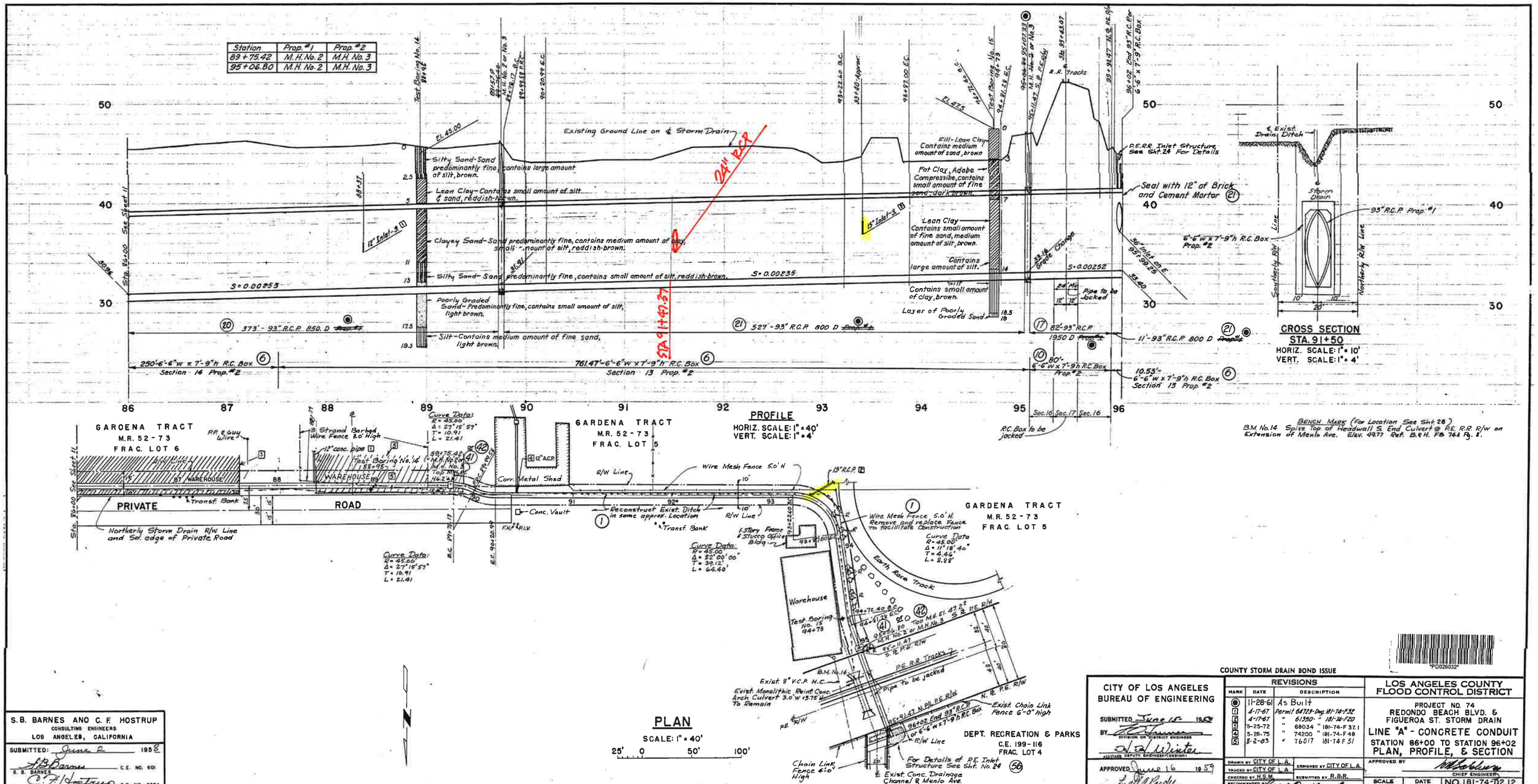
Spk. E. curb Vermont Avenue, 450'S. of 149th Street.
Elev. 48.008 F.B. 205/10-43
(1956 Precise)

"PD029802"

1958 STORM DRAIN BOND ISSUE

CITY OF LOS ANGELES BUREAU OF ENGINEERING	REVISIONS			LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
SUBMITTED February 7 1961	MARK	DATE	DESCRIPTION	PROJECT No. 490
BY Jim Albert, DIVISION OF STREET ENGINEERING, DEPUTY ENGINEER (DESIGN)	● ①	5-18-64 9-13-72	As Built PERMIT 67084 275-490-F15	113th STREET LINE C STA. 0+00 to STA. 7+00.18 PLAN and PROFILE
APPROVED Feb 7 1961	DRAWN BY City of L.A.		DESIGNED BY City of L.A.	APPROVED BY, CHIEF ENGINEER
Ira A. Reader, CITY ENGINEER	TRACED BY City of L.A.		SUBMITTED C.W.H.	
	CHECKED BY			SCALE: AS SHOWN; DATE: JULY 61; NO. 275-490-D210; SHEET 10 OF 17
	RECOMMENDED BY C.W. Dutton, DIVISION ENGINEER (DESIGN)			

Station	Prop. #1	Prop. #2
89+75.42	M.H. No. 2	M.H. No. 3
95+06.80	M.H. No. 2	M.H. No. 3



BENCH MARK (For Location See Sht 26)
B.M. No. 14 Spike Top of Headwall S. End Culvert @ P.E. R.R. R/W on Extension of Menlo Ave. Elev. 49.77 Ref. B.& H. Fb 764 Pg. 8.

S. B. BARNES AND C. F. HOSTRUP
CONSULTING ENGINEERS
LOS ANGELES, CALIFORNIA
SUBMITTED: June 2 1958
S. B. BARNES C.E. NO. 601
C. F. HOSTRUP C.E. NO. 5374

COUNTY STORM DRAIN BOND ISSUE

CITY OF LOS ANGELES
BUREAU OF ENGINEERING
SUBMITTED June 16 1958
BY DIVISION OR DISTRICT ENGINEER
ASSISTANT DEPUTY ENGINEER (DESIGN)
APPROVED June 16 1958
CITY ENGINEER

REVISIONS		
MARK	DATE	DESCRIPTION
◉	11-28-61	As Built
1	4-17-67	Permit 64729-Dwg. 181-74-F32
2	4-17-67	" 61350- " 181-74-F20
3	5-25-72	" 68034 " 181-74-F 37.1
4	5-28-75	" 74200 " 181-74-F 48
5	5-2-83	" 76017 181-74 F 51

DRAWN BY CITY OF L.A. DESIGNED BY CITY OF L.A.
TRACED BY CITY OF L.A. SUBMITTED BY R.B.R.
CHECKED BY H.S.M.
RECOMMENDED BY DIVISION ENGINEER (DRAIN)

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
PROJECT NO. 74
REDONDO BEACH BLVD. & FIGUEROA ST. STORM DRAIN
LINE "A" - CONCRETE CONDUIT
STATION 86+00 TO STATION 96+02
PLAN, PROFILE, & SECTION
APPROVED BY CHIEF ENGINEER
SCALE AS SHOWN
DATE JUNE 58
NO. 181-74-D2.12
SHEET 12 OF 33

DEPT. RECREATION & PARKS
C.E. 199-116
FRAC. LOT 4

APPENDIX B

HYDROLOGY CALCULATIONS

Peak Flow Hydrologic Analysis

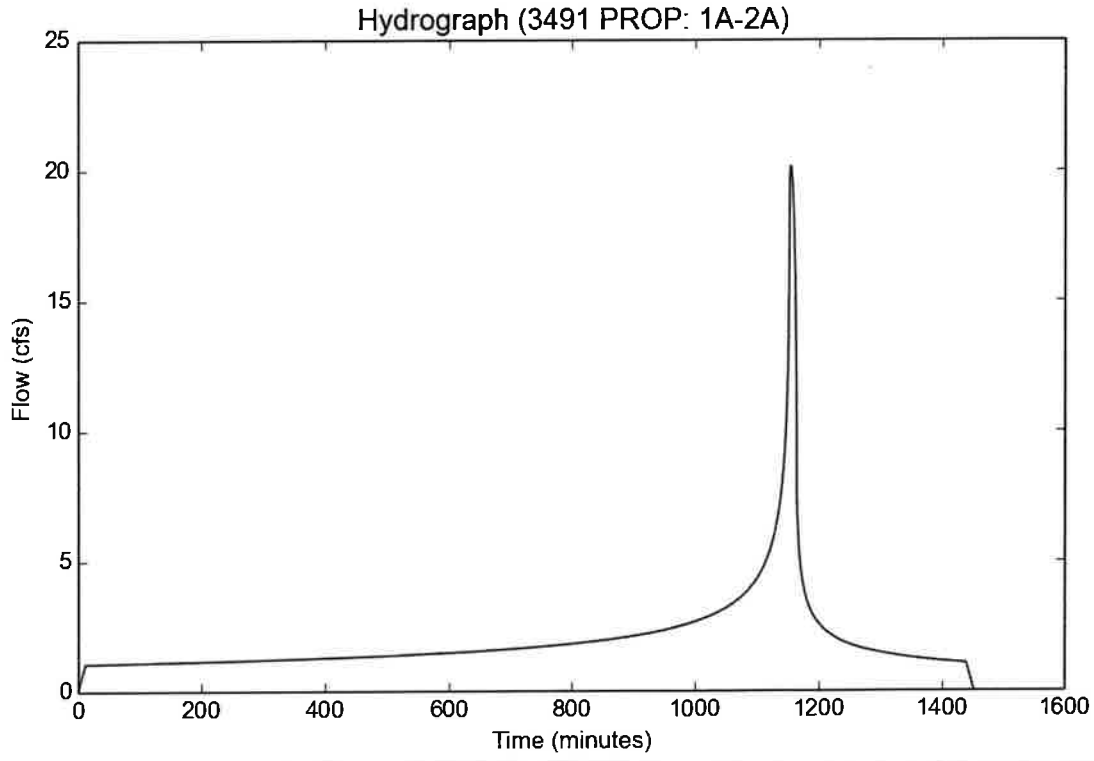
File location: O:/3400-3499/3491/HYDRO CALC/3491 PROP - 1A-2A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	3491 PROP
Subarea ID	1A-2A
Area (ac)	9.7
Flow Path Length (ft)	1219.0
Flow Path Slope (vft/hft) = (56.38 − 43.3) / 1219 =	0.0106
50-yr Rainfall Depth (in)	5.9
Percent Impervious	0.9
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.9
Peak Intensity (in/hr)	2.3327
Undeveloped Runoff Coefficient (Cu)	0.7929
Developed Runoff Coefficient (Cd)	0.8893
Time of Concentration (min)	12.0
Clear Peak Flow Rate (cfs)	20.1219
Burned Peak Flow Rate (cfs)	20.1219
24-Hr Clear Runoff Volume (ac-ft)	3.9239
24-Hr Clear Runoff Volume (cu-ft)	170924.1974



Peak Flow Hydrologic Analysis

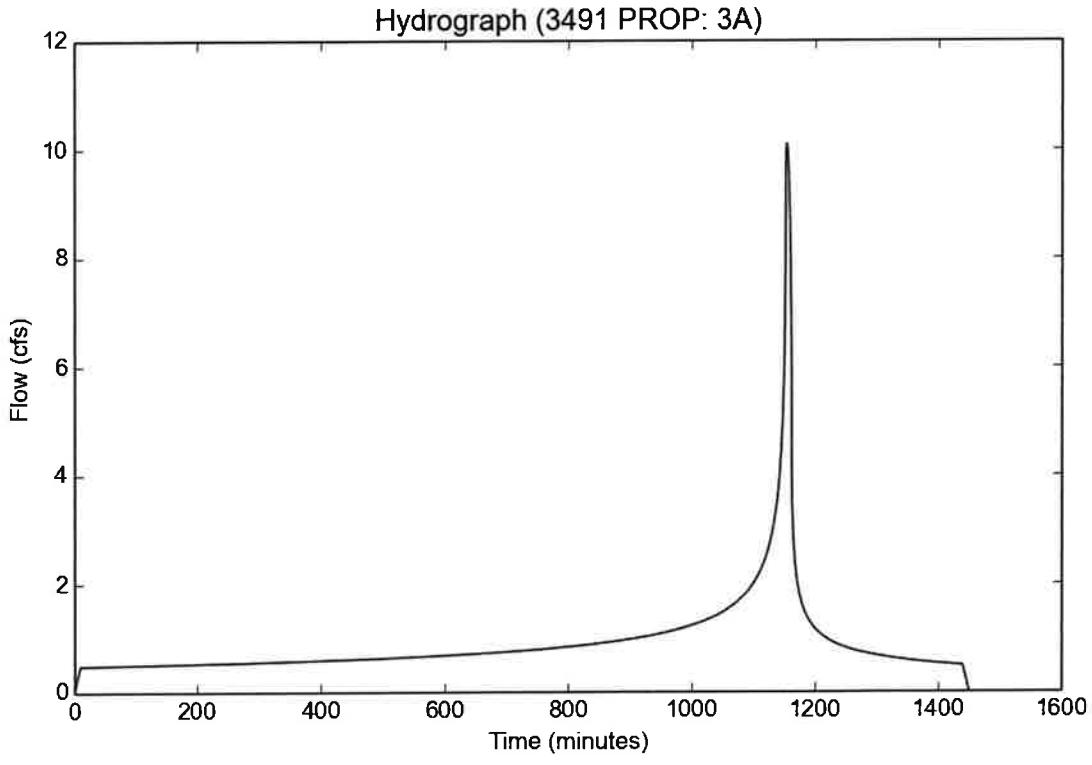
File location: O:/3400-3499/3491/HYDRO CALC/3491 PROP - 3A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	3491 PROP
Subarea ID	3A
Area (ac)	4.45
Flow Path Length (ft)	846.0
Flow Path Slope (vft/hft) = (56.38 - 48.29)/846 =	0.0096
50-yr Rainfall Depth (in)	5.9
Percent Impervious	0.9
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.9
Peak Intensity (in/hr)	2.5414
Undeveloped Runoff Coefficient (Cu)	0.8139
Developed Runoff Coefficient (Cd)	0.8914
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	10.0809
Burned Peak Flow Rate (cfs)	10.0809
24-Hr Clear Runoff Volume (ac-ft)	1.8002
24-Hr Clear Runoff Volume (cu-ft)	78417.1513



Peak Flow Hydrologic Analysis

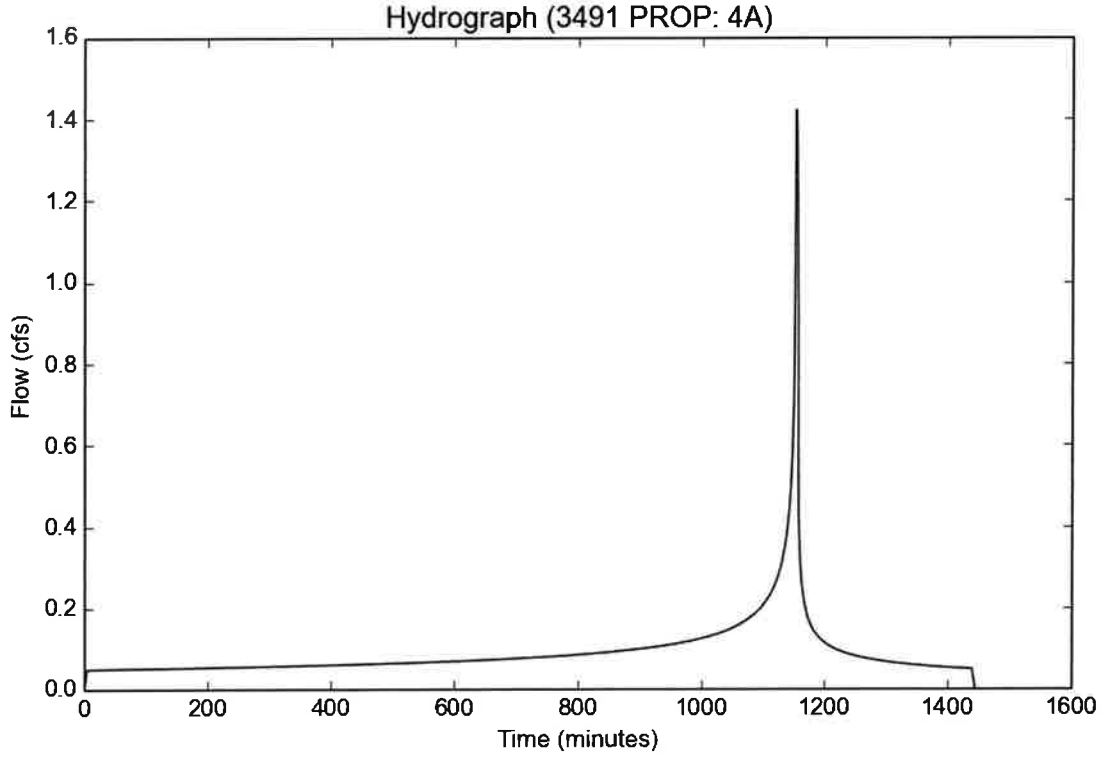
File location: O:/3400-3499/3491/HYDRO CALC/3491 PROP - 4A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	3491 PROP
Subarea ID	4A
Area (ac)	0.45
Flow Path Length (ft)	289.0
Flow Path Slope (vft/hft) = (49.96 - 47.87)/ 289 =	0.0072
50-yr Rainfall Depth (in)	5.9
Percent Impervious	0.9
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.9
Peak Intensity (in/hr)	3.5201
Undeveloped Runoff Coefficient (Cu)	0.8761
Developed Runoff Coefficient (Cd)	0.8976
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4218
Burned Peak Flow Rate (cfs)	1.4218
24-Hr Clear Runoff Volume (ac-ft)	0.1821
24-Hr Clear Runoff Volume (cu-ft)	7930.4878



Peak Flow Hydrologic Analysis

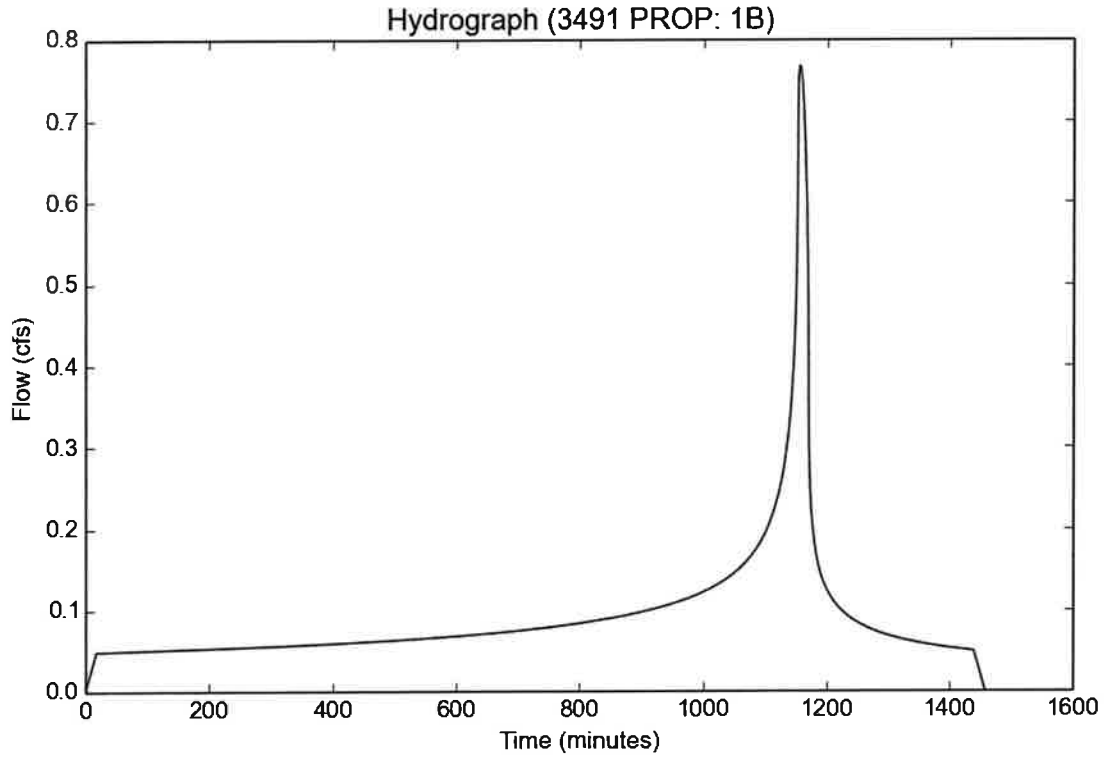
File location: O:/3400-3499/3491/HYDRO CALC/3491 PROP - 1B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	3491 PROP
Subarea ID	1B
Area (ac)	0.45
Flow Path Length (ft)	1458.0
Flow Path Slope (vft/hft) = (51.97 - 48.46)/1458 =	0.0024
50-yr Rainfall Depth (in)	5.9
Percent Impervious	0.9
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.9
Peak Intensity (in/hr)	1.9279
Undeveloped Runoff Coefficient (Cu)	0.7459
Developed Runoff Coefficient (Cd)	0.8846
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	0.7674
Burned Peak Flow Rate (cfs)	0.7674
24-Hr Clear Runoff Volume (ac-ft)	0.182
24-Hr Clear Runoff Volume (cu-ft)	7928.5568



Peak Flow Hydrologic Analysis

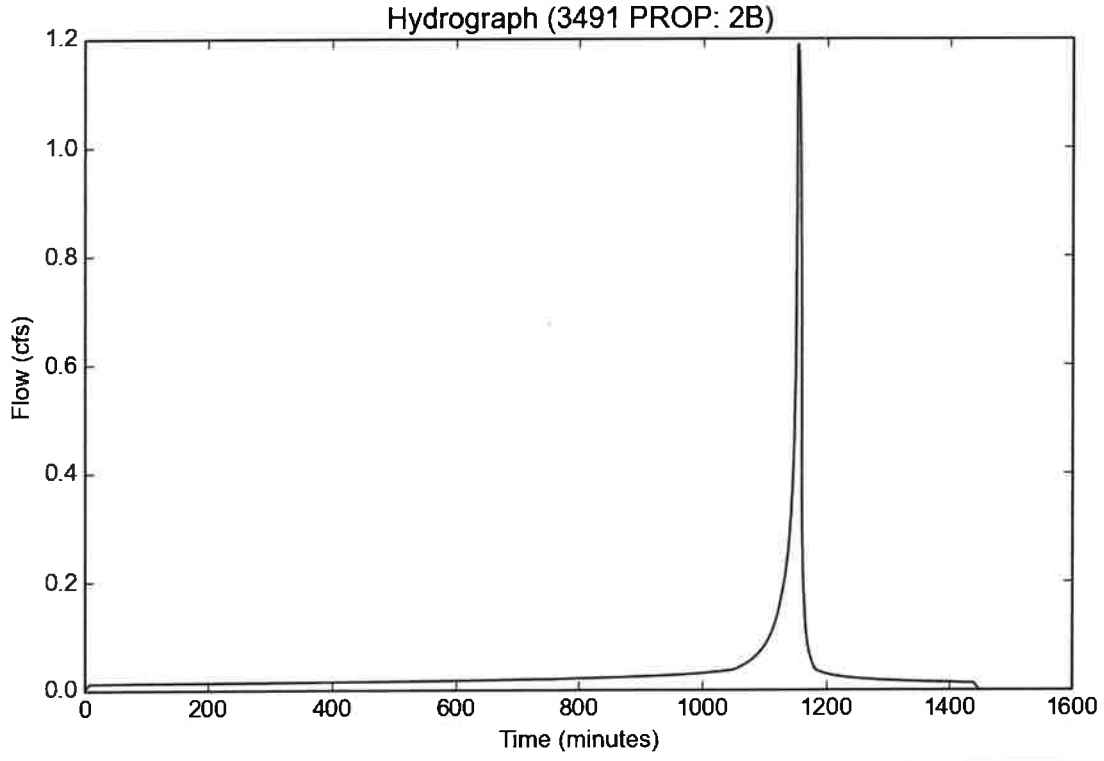
File location: O:/3400-3499/3491/HYDRO CALC/3491 PROP - 2B.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	3491 PROP (OFFSITE)
Subarea ID	2B
Area (ac)	0.5
Flow Path Length (ft)	495.0
Flow Path Slope (vft/hft) = (49.71 - 46.5) / 495 =	0.0065
50-yr Rainfall Depth (in)	5.9
Percent Impervious	0.1
Soil Type	16
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.9
Peak Intensity (in/hr)	2.8224
Undeveloped Runoff Coefficient (Cu)	0.8357
Developed Runoff Coefficient (Cd)	0.8421
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	1.1884
Burned Peak Flow Rate (cfs)	1.1884
24-Hr Clear Runoff Volume (ac-ft)	0.0651
24-Hr Clear Runoff Volume (cu-ft)	2836.9445



APPENDIX C

HYDRAULIC CALCULATIONS

```
0
T1 3491
T2 LINE "A" (PUBLIC)
T3 Q50
SO   1003.88  40.69 24                                  45.66
R    1060.14  41.08 24       .013
JX   1060.14  41.09 24 18    .013      1.2             41.46         45.00
R    1113.16  41.47 24       .013
R    1128.28  41.58 24       .013                                 22.50 38.50
R    1137.09  41.63 24       .013
JX   1137.09  41.64 24 18    .013      5.1             42.18         90.00
R    1145.37  41.70 24       .013
SH   1145.37  41.70 24
CD    8  4                0.67
CD   12  4                1.00
CD   18  4                1.50
CD   24  4                2.00
```

DATE: 8/ 5/2019
TIME: 11:40

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "A" (PUBLIC)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET												W S ELEV				
U/S DATA	STATION	INVERT	SECT									45.66				
	1003.88	40.69	24													
ELEMENT NO 2 IS A REACH						N							RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT										0.00	0.00	0.00	0
	1060.14	41.08	24			0.013										
ELEMENT NO 3 IS A JUNCTION																
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
	1060.14	41.09	24	18	0	0.013	1.2	0.0	41.46	0.00	45.00	0.00				
ELEMENT NO 4 IS A REACH						N							RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT										0.00	0.00	0.00	0
	1113.16	41.47	24			0.013										
ELEMENT NO 5 IS A REACH						N							RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT										22.50	38.50	0.00	0
	1128.28	41.58	24			0.013										
ELEMENT NO 6 IS A REACH						N							RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT										0.00	0.00	0.00	0
	1137.09	41.63	24			0.013										
ELEMENT NO 7 IS A JUNCTION																
U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4				
	1137.09	41.64	24	18	0	0.013	5.1	0.0	42.18	0.00	90.00	0.00				
ELEMENT NO 8 IS A REACH						N							RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	STATION	INVERT	SECT										0.00	0.00	0.00	0
	1145.37	41.70	24			0.013										
ELEMENT NO 9 IS A SYSTEM HEADWORKS												W S ELEV				
U/S DATA	STATION	INVERT	SECT									0.00				
	1145.37	41.70	24													

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

LICENSEE: THIENES ENGINEERING

F0515P
WATER SURFACE PROFILE LISTING

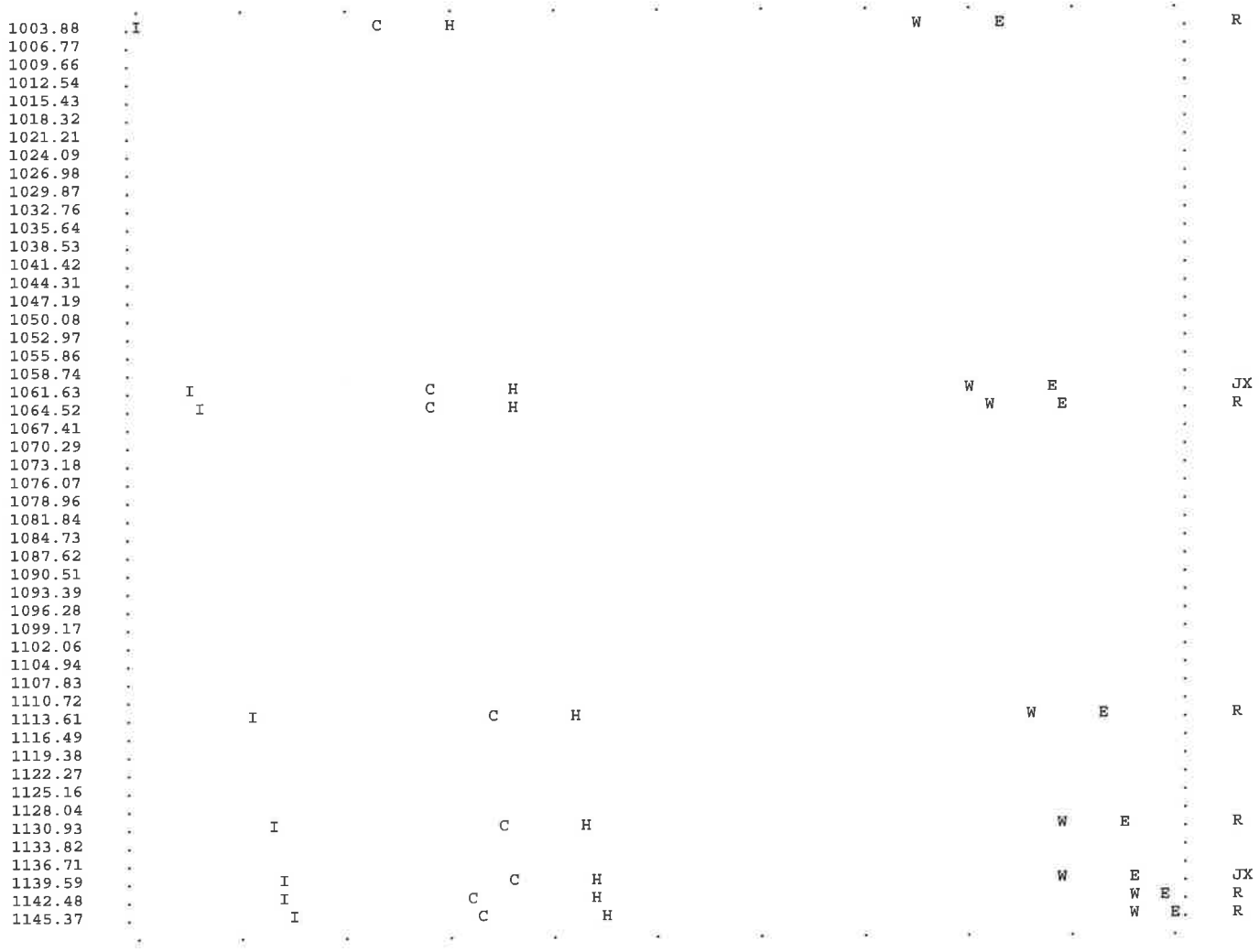
3491
LINE "A" (PUBLIC)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1003.88	40.69	4.970	45.660	17.7	5.63	0.493	46.153	0.00	1.516		2.00	0.00	0.00	0	0.00
56.26	0.00693					.006122	0.34			1.540			0.00		
1060.14	41.08	4.924	46.004	17.7	5.63	0.493	46.497	0.00	1.516		2.00	0.00	0.00	0	0.00
JUNCT STR	0.00000					.005721	0.00						0.00		
1060.14	41.09	5.038	46.128	16.5	5.25	0.428	46.556	0.00	1.465		2.00	0.00	0.00	0	0.00
53.02	0.00717					.005320	0.28			1.430			0.00		
1113.16	41.47	4.940	46.410	16.5	5.25	0.428	46.838	0.00	1.465		2.00	0.00	0.00	0	0.00
15.12	0.00728					.005320	0.08			1.420			0.00		
1128.28	41.58	4.966	46.546	16.5	5.25	0.428	46.974	0.00	1.465		2.00	0.00	0.00	0	0.00

8.81	0.00568					.005320	0.05			1.581			0.00			
1137.09	41.63	4.963	46.593	16.5	5.25	0.428	47.021	0.00	1.465		2.00	0.00	0.00	0	0.00	
JUNCT STR	0.00000					.003929	0.00						0.00			
1137.09	41.64	5.401	47.041	11.4	3.63	0.204	47.245	0.00	1.212		2.00	0.00	0.00	0	0.00	
8.28	0.00725					.002539	0.02			1.110			0.00			
1145.37	41.70	5.362	47.062	11.4	3.63	0.204	47.266	0.00	1.212		2.00	0.00	0.00	0		

0.00□

3491
LINE "A" (PUBLIC)
Q50



N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

```
0
T1 3491
T2 LINE "B" (PRIVATE)
T3 Q50
SO    1001.00  41.89 18                                  47.04
R     1093.76  42.19 18       .012
R     1097.76  42.21 18       .015                                                  1
R     1136.54  42.33 18       .012                              90.00 24.69
R     1276.61  42.79 18       .012
R     1280.71  42.80 15       .015                                                  1
R     1317.55  42.92 15       .012                              45.00 46.91
R     1373.16  43.10 15       .012
SH    1373.16  43.10 15
CD    8  4               0.67
CD   12  4               1.00
CD   15  4               1.25
CD   18  4               1.50
CD   24  4               2.00
```

DATE: 8/ 5/2019
TIME: 13:28

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1

WATER SURFACE PROFILE LISTING

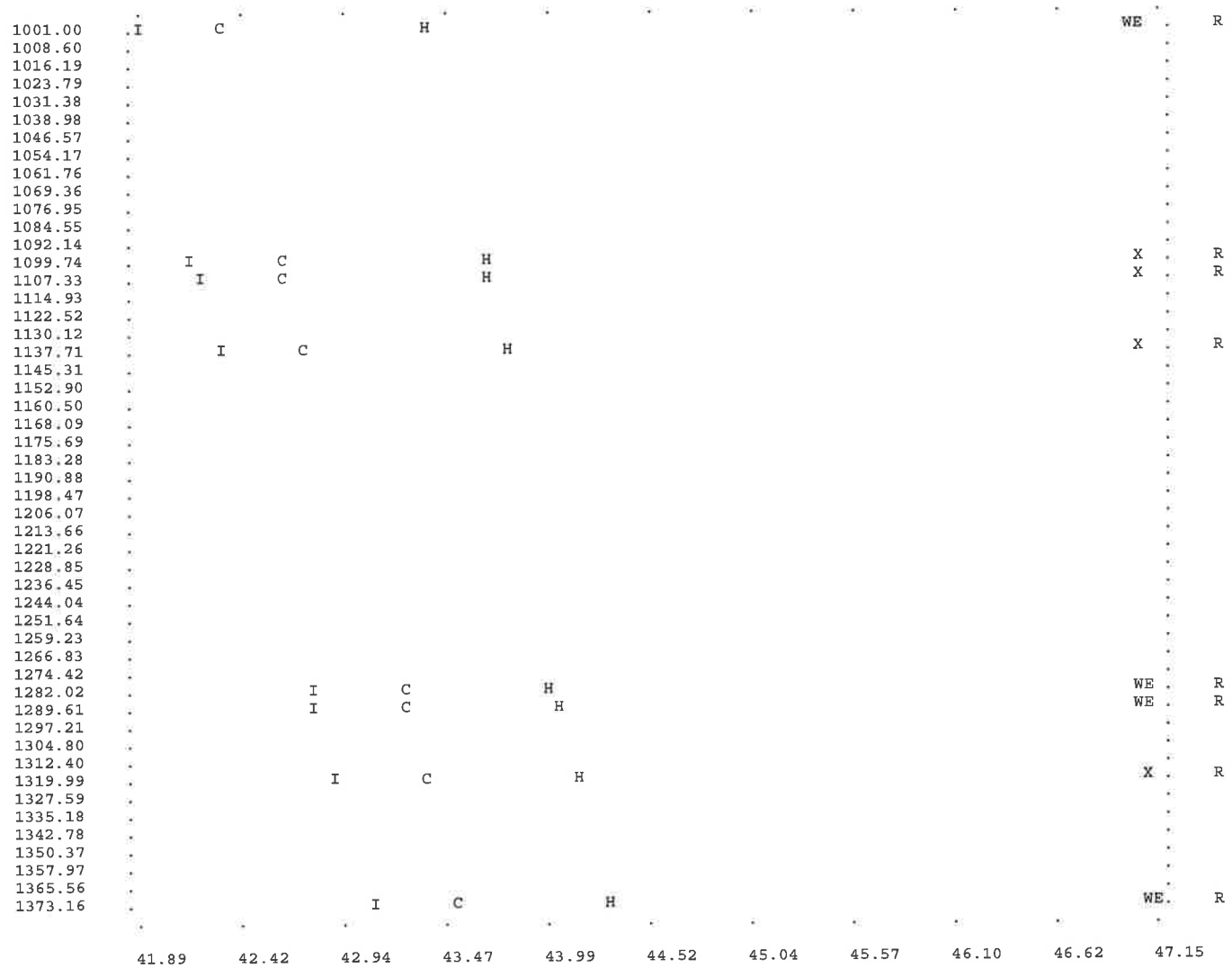
3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	1.4	0.79	0.010	47.050	0.00	0.443	1.50	0.00	0.00	0	0.00
92.76	0.00323					.000151	0.01		0.470			0.00		
1093.76	42.19	4.864	47.054	1.4	0.79	0.010	47.064	0.00	0.443	1.50	0.00	0.00	0	0.00
4.00	0.00500					.000236	0.00		0.470			0.00		
1097.76	42.21	4.845	47.055	1.4	0.79	0.010	47.065	0.00	0.443	1.50	0.00	0.00	0	0.00
38.78	0.00309					.000151	0.01		0.480			0.00		
1136.54	42.33	4.732	47.062	1.4	0.79	0.010	47.072	0.00	0.443	1.50	0.00	0.00	0	0.00
140.07	0.00328					.000151	0.02		0.470			0.00		

1276.61	42.79	4.294	47.084	1.4	1.14	0.020	47.104	0.00	0.468		1.25	0.00	0.00	0	0.00
4.10	0.00244					.000625	0.00			0.630			0.00		
1280.71	42.80	4.287	47.087	1.4	1.14	0.020	47.107	0.00	0.468		1.25	0.00	0.00	0	0.00
36.84	0.00326					.000400	0.01			0.510			0.00		
1317.55	42.92	4.185	47.105	1.4	1.14	0.020	47.125	0.00	0.468		1.25	0.00	0.00	0	0.00
55.61	0.00324					.000400	0.02			0.510			0.00		
1373.16	43.10	4.027	47.127	1.4	1.14	0.020	47.147	0.00	0.468		1.25	0.00	0.00	0	

0.00□

3491
LINE "B" (PRIVATE)
Q50



N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

DATE: 8/ 5/2019
TIME: 13:29

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1

WATER SURFACE PROFILE LISTING

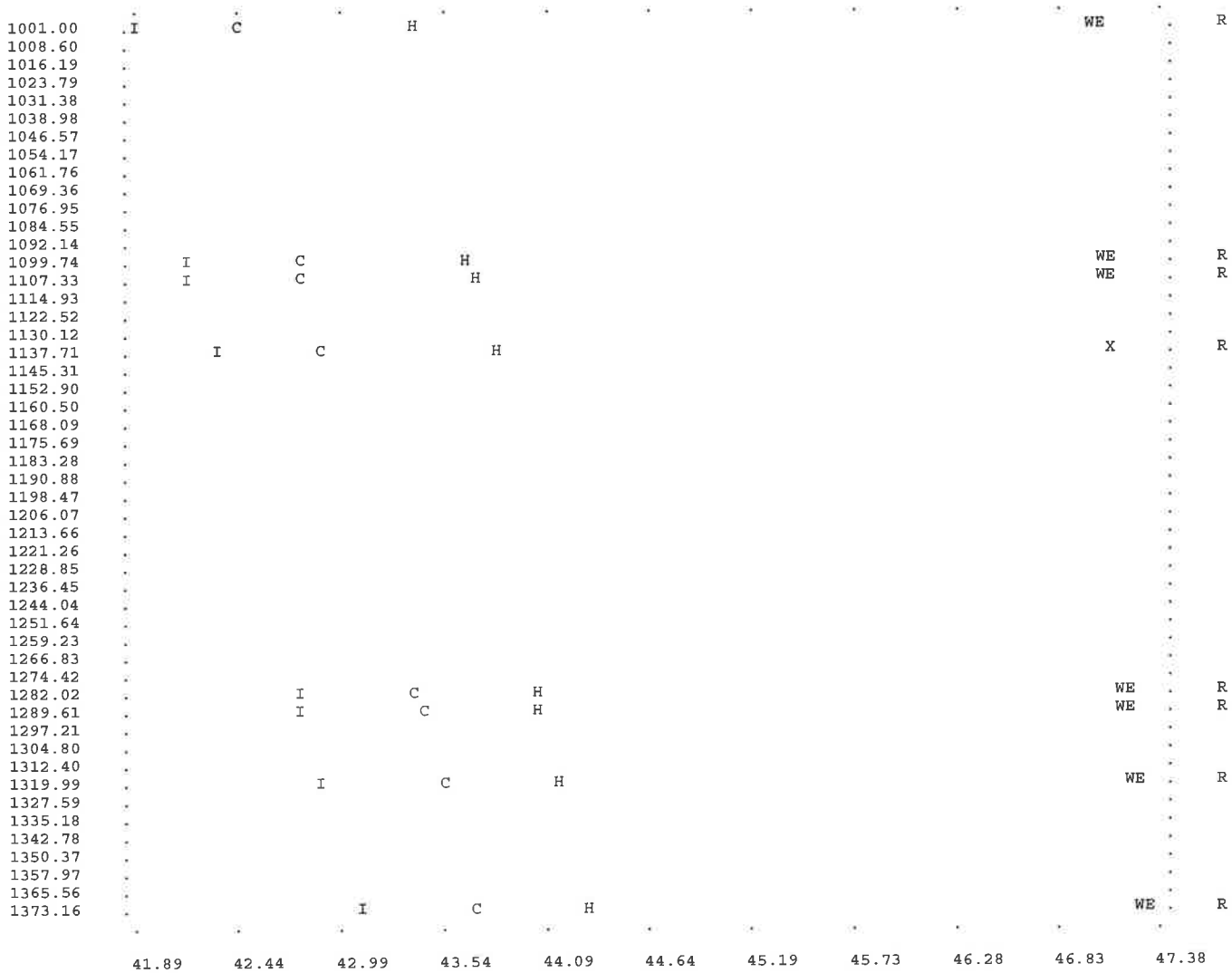
3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	2.5	1.41	0.031	47.071	0.00	0.599		1.50	0.00	0.00	0	0.00
92.76	0.00323					.000483	0.04			0.650			0.00		
1093.76	42.19	4.895	47.085	2.5	1.41	0.031	47.116	0.00	0.599		1.50	0.00	0.00	0	0.00
4.00	0.00500					.000754	0.00			0.650			0.00		
1097.76	42.21	4.879	47.089	2.5	1.41	0.031	47.120	0.00	0.599		1.50	0.00	0.00	0	0.00
38.78	0.00309					.000483	0.02			0.650			0.00		
1136.54	42.33	4.781	47.111	2.5	1.41	0.031	47.142	0.00	0.599		1.50	0.00	0.00	0	0.00
140.07	0.00328					.000483	0.07			0.640			0.00		

1276.61	42.79	4.389	47.179	2.5	2.04	0.064	47.243	0.00	0.633		1.25	0.00	0.00	0	0.00
4.10	0.00244					.001994	0.01			0.930			0.00		
1280.71	42.80	4.390	47.190	2.5	2.04	0.064	47.254	0.00	0.633		1.25	0.00	0.00	0	0.00
36.84	0.00326					.001276	0.05			0.720			0.00		
1317.55	42.92	4.327	47.247	2.5	2.04	0.064	47.311	0.00	0.633		1.25	0.00	0.00	0	0.00
55.61	0.00324					.001276	0.07			0.720			0.00		
1373.16	43.10	4.218	47.318	2.5	2.04	0.064	47.382	0.00	0.633		1.25	0.00	0.00	0	

0.00□

3491
LINE "B" (PRIVATE)
Q50



N O T E S
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   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

DATE: 8/ 5/2019
TIME: 13:29

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1
WATER SURFACE PROFILE LISTING

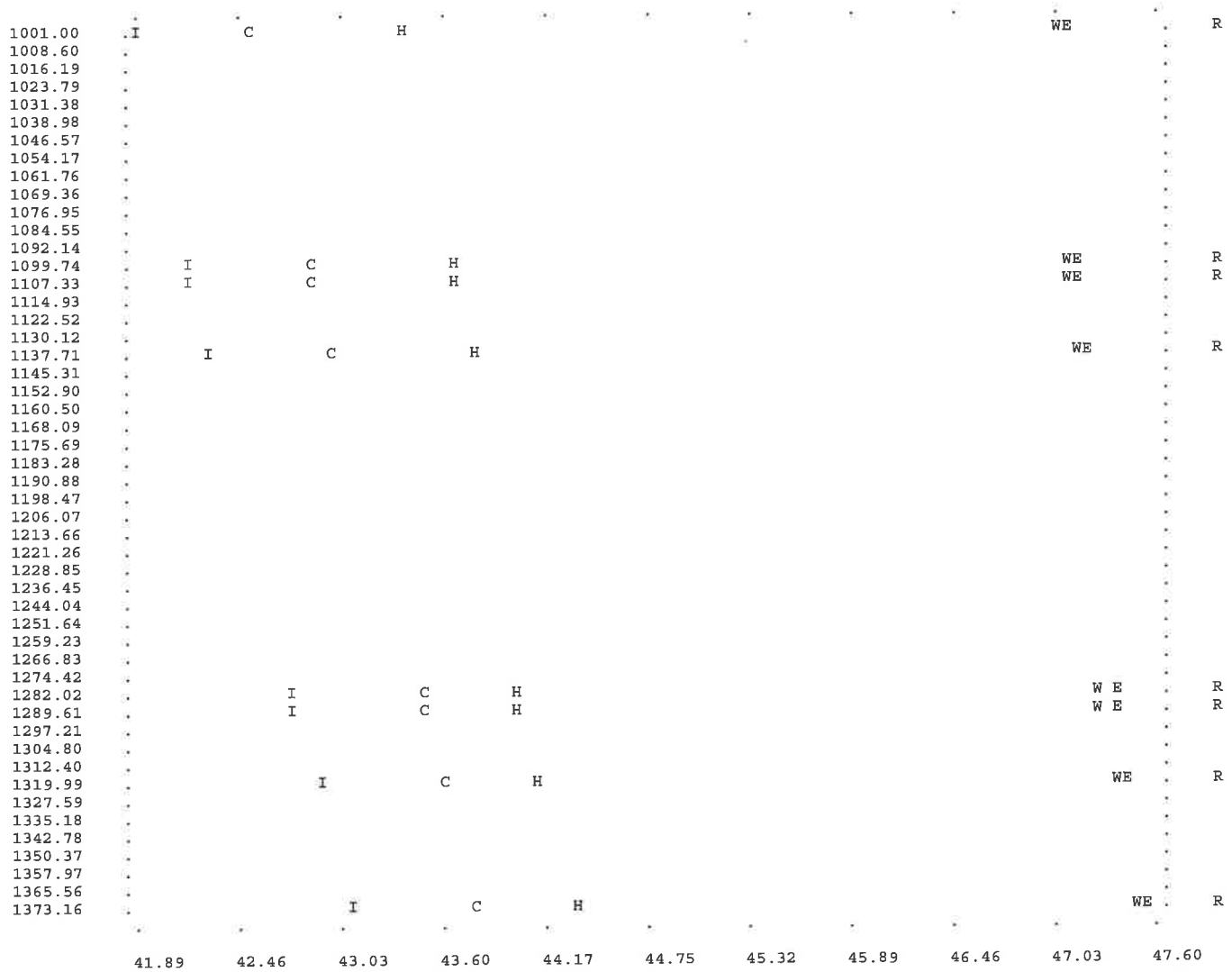
3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	3.2	1.81	0.051	47.091	0.00	0.681		1.50	0.00	0.00	0	0.00
92.76	0.00323					.000791	0.07			0.741			0.00		
1093.76	42.19	4.923	47.113	3.2	1.81	0.051	47.164	0.00	0.681		1.50	0.00	0.00	0	0.00
4.00	0.00500					.001236	0.00			0.750			0.00		
1097.76	42.21	4.911	47.121	3.2	1.81	0.051	47.172	0.00	0.681		1.50	0.00	0.00	0	0.00
38.78	0.00309					.000791	0.03			0.751			0.00		
1136.54	42.33	4.827	47.157	3.2	1.81	0.051	47.208	0.00	0.681		1.50	0.00	0.00	0	0.00
140.07	0.00328					.000791	0.11			0.740			0.00		

1276.61	42.79	4.478	47.268	3.2	2.61	0.106	47.374	0.00	0.721		1.25	0.00	0.00	0	0.00
4.10	0.00244					.003267	0.01			1.250			0.00		
1280.71	42.80	4.486	47.286	3.2	2.61	0.106	47.392	0.00	0.721		1.25	0.00	0.00	0	0.00
36.84	0.00326					.002091	0.08			0.840			0.00		
1317.55	42.92	4.459	47.379	3.2	2.61	0.106	47.485	0.00	0.721		1.25	0.00	0.00	0	0.00
55.61	0.00324					.002091	0.12			0.850			0.00		
1373.16	43.10	4.395	47.495	3.2	2.61	0.106	47.601	0.00	0.721		1.25	0.00	0.00	0	

0.00□

3491
LINE "B" (PRIVATE)
Q50



N O T E S
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   I = INVERT ELEVATION
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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

DATE: 8/ 5/2019
TIME: 13:30

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1
WATER SURFACE PROFILE LISTING

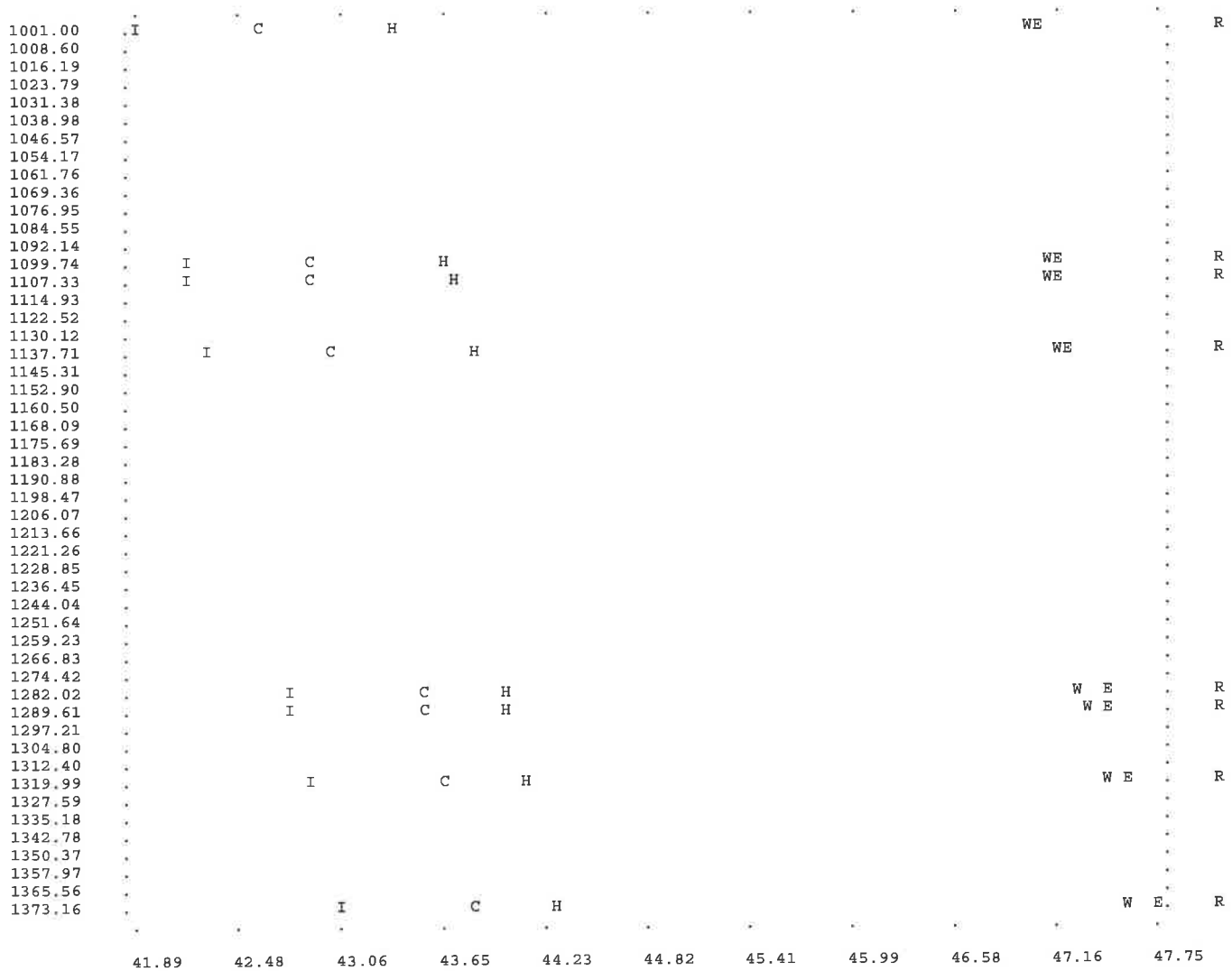
3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	3.6	2.04	0.064	47.104	0.00	0.724		1.50	0.00	0.00	0	0.00
92.76	0.00323					.001001	0.09			0.800			0.00		
1093.76	42.19	4.943	47.133	3.6	2.04	0.064	47.197	0.00	0.724		1.50	0.00	0.00	0	0.00
4.00	0.00500					.001564	0.01			0.800			0.00		
1097.76	42.21	4.932	47.142	3.6	2.04	0.064	47.206	0.00	0.724		1.50	0.00	0.00	0	0.00
38.78	0.00309					.001001	0.04			0.810			0.00		
1136.54	42.33	4.858	47.188	3.6	2.04	0.064	47.252	0.00	0.724		1.50	0.00	0.00	0	0.00
140.07	0.00328					.001001	0.14			0.800			0.00		

1276.61	42.79	4.538	47.328	3.6	2.93	0.134	47.462	0.00	0.766		1.25	0.00	0.00	0	0.00
4.10	0.00244					.004135	0.02			1.250			0.00		
1280.71	42.80	4.552	47.352	3.6	2.93	0.134	47.486	0.00	0.766		1.25	0.00	0.00	0	0.00
36.84	0.00326					.002646	0.10			0.930			0.00		
1317.55	42.92	4.548	47.468	3.6	2.93	0.134	47.602	0.00	0.766		1.25	0.00	0.00	0	0.00
55.61	0.00324					.002646	0.15			0.930			0.00		
1373.16	43.10	4.516	47.616	3.6	2.93	0.134	47.750	0.00	0.766		1.25	0.00	0.00	0	

0.00□

3491
LINE "B" (PRIVATE)
Q50



N O T E S
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   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

DATE: 8/ 5/2019
TIME: 13:31

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

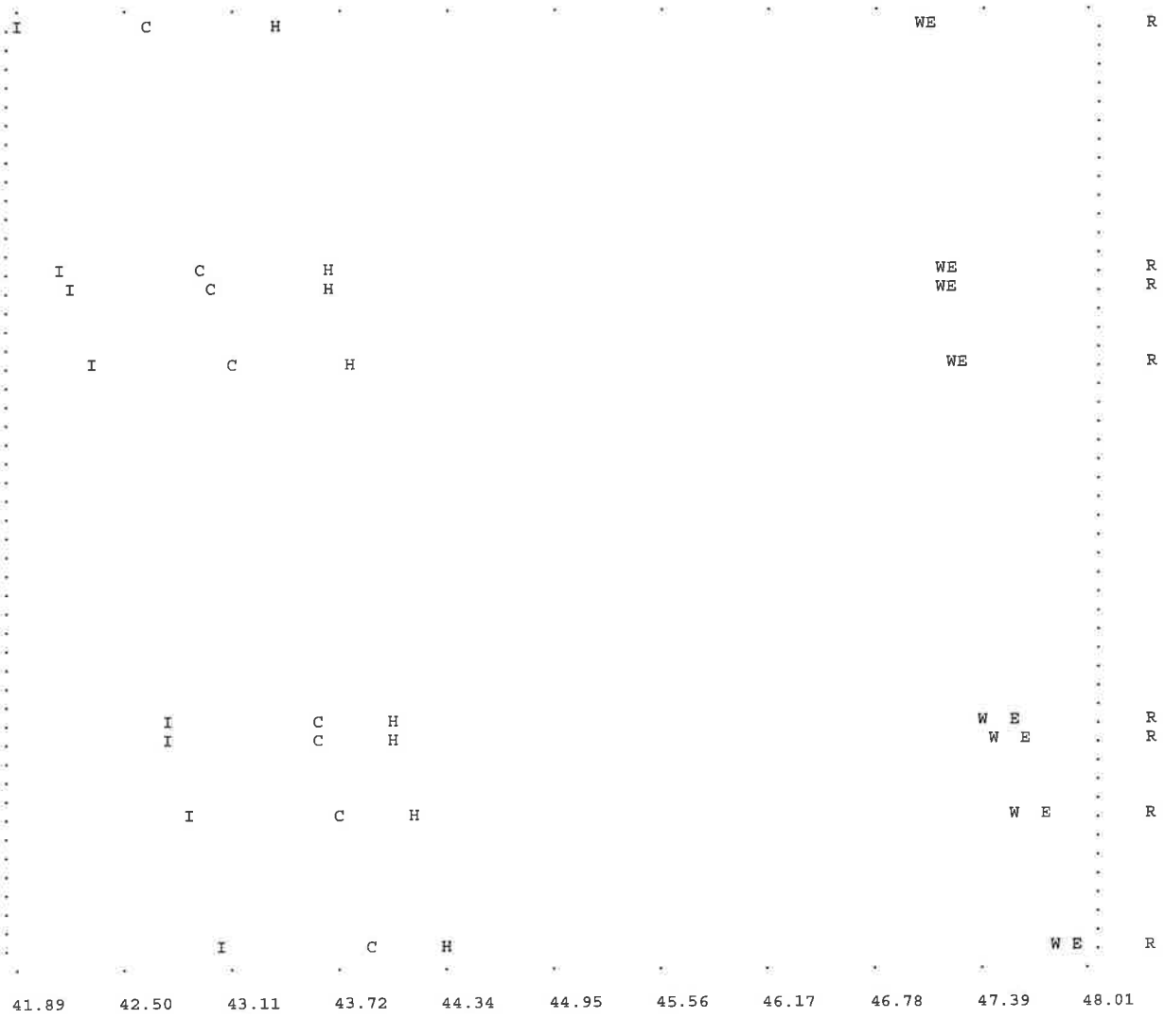
NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1
WATER SURFACE PROFILE LISTING

3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH	HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF		NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	4.2	2.38	0.088	47.128	0.00	0.785	1.50	0.00	0.00	0	0.00
92.76	0.00323					.001362	0.13		0.880			0.00		
1093.76	42.19	4.976	47.166	4.2	2.38	0.088	47.254	0.00	0.785	1.50	0.00	0.00	0	0.00
4.00	0.00500					.002128	0.01		0.880			0.00		
1097.76	42.21	4.969	47.179	4.2	2.38	0.088	47.267	0.00	0.785	1.50	0.00	0.00	0	0.00
38.78	0.00309					.001362	0.05		0.890			0.00		
1136.54	42.33	4.911	47.241	4.2	2.38	0.088	47.329	0.00	0.785	1.50	0.00	0.00	0	0.00
140.07	0.00328					.001362	0.19		0.880			0.00		

1276.61	42.79	4.642	47.432	4.2	3.42	0.182	47.614	0.00	0.830		1.25	0.00	0.00	0	0.00
4.10	0.00244					.005628	0.02			1.250			0.00		
1280.71	42.80	4.664	47.464	4.2	3.42	0.182	47.646	0.00	0.830		1.25	0.00	0.00	0	0.00
36.84	0.00326					.003602	0.13			1.100			0.00		
1317.55	42.92	4.703	47.623	4.2	3.42	0.182	47.805	0.00	0.830		1.25	0.00	0.00	0	0.00
55.61	0.00324					.003602	0.20			1.100			0.00		
1373.16	43.10	4.724	47.824	4.2	3.42	0.182	48.006	0.00	0.830		1.25	0.00	0.00	0	0.00□

3491
LINE "B" (PRIVATE)
Q50



N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

DATE: 8/ 5/2019
TIME: 13:32

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

	STATION	INVERT	SECT		W S ELEV
U/S DATA	1001.00	41.89	18		47.04

ELEMENT NO 2 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
U/S DATA	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

	STATION	INVERT	SECT	W S ELEV
U/S DATA	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING F0515P PAGE 1
WATER SURFACE PROFILE LISTING

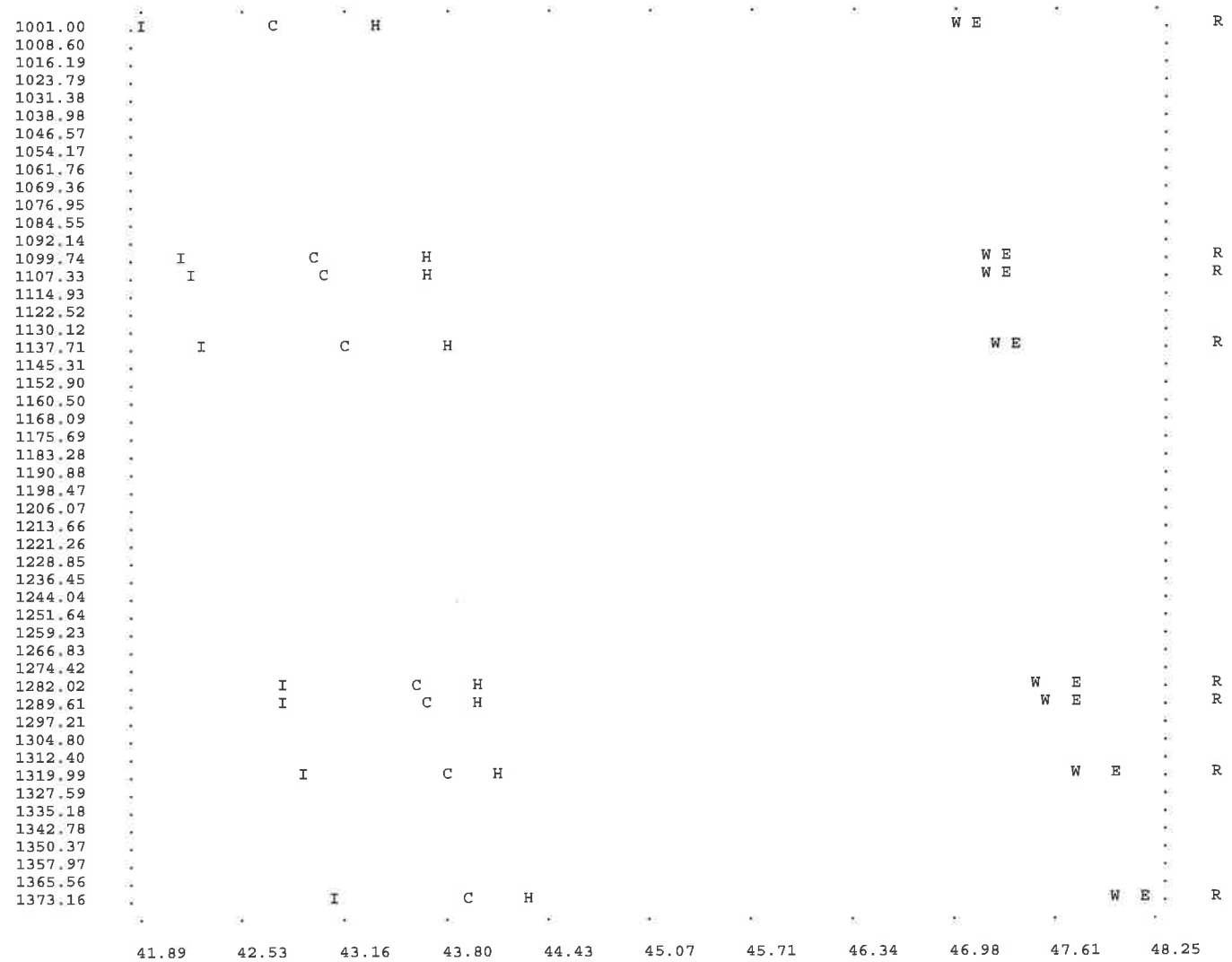
3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	4.7	2.66	0.110	47.150	0.00	0.833		1.50	0.00	0.00	0	0.00
92.76	0.00323					.001706	0.16			0.950			0.00		
1093.76	42.19	5.008	47.198	4.7	2.66	0.110	47.308	0.00	0.833		1.50	0.00	0.00	0	0.00
4.00	0.00500					.002665	0.01			0.950			0.00		
1097.76	42.21	5.004	47.214	4.7	2.66	0.110	47.324	0.00	0.833		1.50	0.00	0.00	0	0.00
38.78	0.00309					.001706	0.07			0.960			0.00		
1136.54	42.33	4.962	47.292	4.7	2.66	0.110	47.402	0.00	0.833		1.50	0.00	0.00	0	0.00
140.07	0.00328					.001706	0.24			0.940			0.00		

1276.61	42.79	4.741	47.531	4.7	3.83	0.228	47.759	0.00	0.879		1.25	0.00	0.00	0	0.00	
4.10	0.00244					.007048	0.03			1.250			0.00			
1280.71	42.80	4.771	47.571	4.7	3.83	0.228	47.799	0.00	0.879		1.25	0.00	0.00	0	0.00	
36.84	0.00326					.004511	0.17			1.250			0.00			
1317.55	42.92	4.850	47.770	4.7	3.83	0.228	47.998	0.00	0.879		1.25	0.00	0.00	0	0.00	
55.61	0.00324					.004511	0.25			1.250			0.00			
1373.16	43.10	4.921	48.021	4.7	3.83	0.228	48.249	0.00	0.879		1.25	0.00	0.00	0		

0.00□

3491
LINE "B" (PRIVATE)
Q50



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DATE: 8/ 5/2019
TIME: 12:38

F0515P
WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	8	4			0.67														
CD	12	4			1.00														
CD	15	4			1.25														
CD	18	4			1.50														
CD	24	4			2.00														

F 0 5 1 5 P PAGE NO 3

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

3491

HEADING LINE NO 2 IS -

LINE "B" (PRIVATE)

HEADING LINE NO 3 IS -

Q50

F 0 5 1 5 P PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1001.00	41.89	18	47.04

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1093.76	42.19	18	0.012	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1097.76	42.21	18	0.015	0.00	0.00	0.00	1

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1136.54	42.33	18	0.012	90.00	24.69	0.00	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1276.61	42.79	18	0.012	0.00	0.00	0.00	0

WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1280.71	42.80	15	0.015	0.00	0.00	0.00	1

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1317.55	42.92	15	0.012	45.00	46.91	0.00	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1373.16	43.10	15	0.012	0.00	0.00	0.00	0

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1373.16	43.10	15	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC
LICENSEE: THIENES ENGINEERING PAGE 1

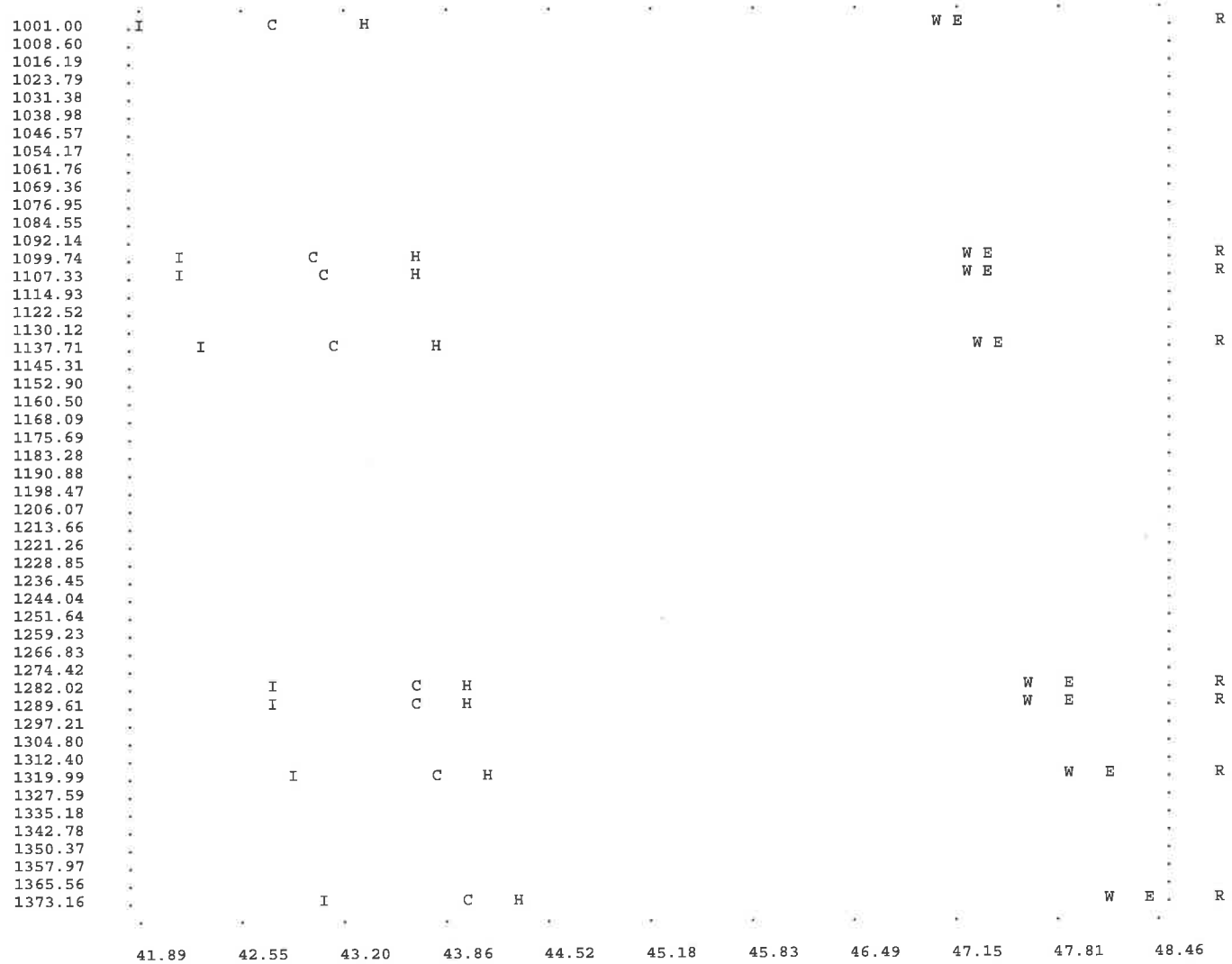
F0515P
WATER SURFACE PROFILE LISTING

3491
LINE "B" (PRIVATE)
Q50

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1001.00	41.89	5.150	47.040	5.1	2.89	0.129	47.169	0.00	0.869		1.50	0.00	0.00	0	0.00
92.76	0.00323					.002009	0.19			1.000			0.00		
1093.76	42.19	5.036	47.226	5.1	2.89	0.129	47.355	0.00	0.869		1.50	0.00	0.00	0	0.00
4.00	0.00500					.003138	0.01			1.010			0.00		
1097.76	42.21	5.035	47.245	5.1	2.89	0.129	47.374	0.00	0.869		1.50	0.00	0.00	0	0.00
38.78	0.00309					.002009	0.08			1.020			0.00		
1136.54	42.33	5.007	47.337	5.1	2.89	0.129	47.466	0.00	0.869		1.50	0.00	0.00	0	0.00
140.07	0.00328					.002009	0.28			1.000			0.00		

1276.61	42.79	4.828	47.618	5.1	4.16	0.268	47.886	0.00	0.916		1.25	0.00	0.00	0	0.00
4.10	0.00244					.008298	0.03			1.250			0.00		
1280.71	42.80	4.866	47.666	5.1	4.16	0.268	47.934	0.00	0.916		1.25	0.00	0.00	0	0.00
36.84	0.00326					.005311	0.20			1.250			0.00		
1317.55	42.92	4.980	47.900	5.1	4.16	0.268	48.168	0.00	0.916		1.25	0.00	0.00	0	0.00
55.61	0.00324					.005311	0.30			1.250			0.00		
1373.16	43.10	5.095	48.195	5.1	4.16	0.268	48.463	0.00	0.916		1.25	0.00	0.00	0	0.00□

3491
LINE "B" (PRIVATE)
Q50



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2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY□

APPENDIX D

DETENTION ANALYSIS

TRUCK YARD DETENTION AREA "2A"

T (MIN.)			In (In/HR)	Cu	Cd	Q (CFS.)		Volume (CF.)
1115.4	0.671422	3.961392	0.615143	0.29568	0.839568	5.009609	60.04413	111780
1115.6	0.671795	3.963592	0.616519	0.296931	0.839693	5.02156	60.18701	111840.2
1115.8	0.672169	3.965798	0.617904	0.298191	0.839819	5.033598	60.33095	111900.5
1116	0.672544	3.968009	0.619299	0.29946	0.839946	5.045726	60.47595	111961
1116.2	0.67292	3.970226	0.620704	0.300738	0.840074	5.057944	60.62202	112021.6
1116.4	0.673296	3.972449	0.62212	0.302026	0.840203	5.070253	60.76918	112082.4
1116.6	0.673674	3.974678	0.623545	0.303322	0.840332	5.082654	60.91744	112143.3
1116.8	0.674053	3.976913	0.624981	0.304628	0.840463	5.095149	61.06682	112204.4
1117	0.674433	3.979153	0.626427	0.305943	0.840594	5.107739	61.21733	112265.6 ←
1117.2	0.674814	3.9814	0.627884	0.307268	0.840727	5.120425	61.36898	112327
1117.4	0.675195	3.983653	0.629351	0.308603	0.84086	5.133207	61.52179	112388.5
1117.6	0.675578	3.985912	0.63083	0.309948	0.840995	5.146089	61.67578	112450.2
1117.8	0.675962	3.988177	0.632319	0.311303	0.84113	5.15907	61.83095	112512
1118	0.676347	3.990448	0.63382	0.312667	0.841267	5.172152	61.98733	112574
1118.2	0.676733	3.992726	0.635332	0.314042	0.841404	5.185336	62.14493	112636.1
1118.4	0.67712	3.99501	0.636855	0.315428	0.841543	5.198625	62.30377	112698.4
1118.6	0.677509	3.9973	0.63839	0.316824	0.841682	5.212018	62.46385	112760.9
1118.8	0.677898	3.999597	0.639936	0.318231	0.841823	5.225518	62.62521	112823.5
1119	0.678288	4.001901	0.641495	0.319648	0.841965	5.239125	62.78786	112886.3
1119.2	0.67868	4.004211	0.643065	0.321076	0.842108	5.252842	62.95181	112949.3
1119.4	0.679072	4.006527	0.644648	0.322516	0.842252	5.26667	63.11708	113012.4
1119.6	0.679466	4.00885	0.646243	0.323967	0.842397	5.28061	63.28368	113075.7
1119.8	0.679861	4.01118	0.64785	0.325429	0.842543	5.294665	63.45165	113139.1
1120	0.680257	4.013517	0.649471	0.326902	0.84269	5.308834	63.62099	113202.7
1120.2	0.680654	4.015861	0.651104	0.328388	0.842839	5.323121	63.79173	113266.5
1120.4	0.681053	4.018211	0.65275	0.329885	0.842988	5.337526	63.96388	113330.5
1120.6	0.681452	4.020569	0.654409	0.331394	0.843139	5.352052	64.13747	113394.6
1120.8	0.681853	4.022934	0.656082	0.332915	0.843292	5.3667	64.31251	113458.9
1121	0.682255	4.025305	0.657768	0.334449	0.843445	5.381471	64.48903	113523.4
1121.2	0.682658	4.027684	0.659468	0.335995	0.8436	5.396368	64.66704	113588.1
1121.4	0.683063	4.030071	0.661182	0.337554	0.843755	5.411393	64.84657	113652.9
1121.6	0.683469	4.032464	0.66291	0.339126	0.843913	5.426546	65.02764	113718
1121.8	0.683876	4.034865	0.664652	0.34071	0.844071	5.441831	65.21026	113783.2
1122	0.684284	4.037274	0.666409	0.342308	0.844231	5.457249	65.39448	113848.6
1122.2	0.684693	4.03969	0.668181	0.34392	0.844392	5.472801	65.5803	113914.2
1122.4	0.685104	4.042114	0.669967	0.345545	0.844554	5.488491	65.76775	113979.9
1122.6	0.685516	4.044545	0.671769	0.347184	0.844718	5.504319	65.95686	114045.9
1122.8	0.68593	4.046984	0.673586	0.348836	0.844884	5.520289	66.14765	114112
1123	0.686344	4.049432	0.675419	0.350503	0.84505	5.536401	66.34014	114178.4
1123.2	0.68676	4.051887	0.677268	0.352185	0.845218	5.552659	66.53437	114244.9
1123.4	0.687178	4.05435	0.679132	0.353881	0.845388	5.569065	66.73035	114311.6

1123.6	0.687597	4.056821	0.681013	0.355592	0.845559	5.58562	66.92811	114378.6
1123.8	0.688017	4.0593	0.682911	0.357318	0.845732	5.602328	67.12769	114445.7
1124	0.688439	4.061788	0.684825	0.359059	0.845906	5.619189	67.3291	114513
1124.2	0.688862	4.064284	0.686757	0.360816	0.846082	5.636208	67.53239	114580.5
1124.4	0.689286	4.066788	0.688706	0.362588	0.846259	5.653386	67.73757	114648.3
1124.6	0.689712	4.069301	0.690672	0.364377	0.846438	5.670726	67.94467	114716.2
1124.8	0.690139	4.071823	0.692656	0.366181	0.846618	5.688231	68.15374	114784.4
1125	0.690568	4.074353	0.694659	0.368003	0.8468	5.705902	68.3648	114852.7
1125.2	0.690999	4.076892	0.69668	0.369841	0.846984	5.723743	68.57787	114921.3
1125.4	0.691431	4.079441	0.698719	0.371696	0.84717	5.741757	68.793	114990.1
1125.6	0.691864	4.081998	0.700778	0.373568	0.847357	5.759946	69.01022	115059.1
1125.8	0.692299	4.084564	0.702856	0.375458	0.847546	5.778314	69.22956	115128.4
1126	0.692735	4.087139	0.704953	0.377366	0.847737	5.796862	69.45106	115197.8
1126.2	0.693174	4.089724	0.707071	0.379292	0.847929	5.815595	69.67474	115267.5
1126.4	0.693613	4.092318	0.709208	0.381236	0.848124	5.834515	69.90066	115337.4
1126.6	0.694055	4.094922	0.711367	0.383199	0.84832	5.853626	70.12885	115407.5
1126.8	0.694498	4.097536	0.713546	0.385181	0.848518	5.87293	70.35934	115477.9
1127	0.694942	4.100159	0.715747	0.387183	0.848718	5.892432	70.59217	115548.5
1127.2	0.695388	4.102792	0.717969	0.389204	0.84892	5.912134	70.82739	115619.3
1127.4	0.695836	4.105435	0.720213	0.391245	0.849125	5.93204	71.06504	115690.4
1127.6	0.696286	4.108088	0.72248	0.393307	0.849331	5.952153	71.30516	115761.7
1127.8	0.696738	4.110752	0.724769	0.395389	0.849539	5.972478	71.54778	115833.2
1128	0.697191	4.113426	0.727081	0.397492	0.849749	5.993017	71.79297	115905
1128.2	0.697646	4.11611	0.729417	0.399617	0.849962	6.013776	72.04076	115977
1128.4	0.698102	4.118805	0.731777	0.401763	0.850176	6.034757	72.2912	116049.3
1128.6	0.698561	4.12151	0.734162	0.403932	0.850393	6.055965	72.54433	116121.9
1128.8	0.699022	4.124227	0.736571	0.406123	0.850612	6.077404	72.80021	116194.7
1129	0.699484	4.126955	0.739006	0.408338	0.850834	6.099078	73.05889	116267.7
1129.2	0.699948	4.129693	0.741466	0.410575	0.851058	6.120992	73.32042	116341.1
1129.4	0.700414	4.132443	0.743952	0.412837	0.851284	6.14315	73.58485	116414.6
1129.6	0.700882	4.135205	0.746465	0.415123	0.851512	6.165557	73.85224	116488.5
1129.8	0.701352	4.137978	0.749006	0.417433	0.851743	6.188217	74.12265	116562.6
1130	0.701824	4.140763	0.751574	0.4191	0.85191	6.210649	74.3932	116637
1130.2	0.702298	4.14356	0.75417	0.420359	0.852036	6.233023	74.66203	116711.7
1130.4	0.702774	4.146369	0.756794	0.421632	0.852163	6.25565	74.93204	116786.6
1130.6	0.703253	4.14919	0.759449	0.422919	0.852292	6.278537	75.20513	116861.8
1130.8	0.703733	4.152024	0.762132	0.424221	0.852422	6.301688	75.48135	116937.3
1131	0.704215	4.15487	0.764847	0.425537	0.852554	6.325107	75.76077	117013.1
1131.2	0.7047	4.157729	0.767592	0.426868	0.852687	6.348801	76.04345	117089.1
1131.4	0.705187	4.160601	0.770369	0.428215	0.852821	6.372776	76.32946	117165.4
1131.6	0.705676	4.163486	0.773178	0.429577	0.852958	6.397035	76.61887	117242
1131.8	0.706167	4.166384	0.77602	0.430955	0.853096	6.421586	76.91173	117319
1132	0.70666	4.169296	0.778896	0.432349	0.853235	6.446435	77.20813	117396.2
1132.2	0.707156	4.172222	0.781805	0.43376	0.853376	6.471587	77.50813	117473.7
1132.4	0.707654	4.175161	0.78475	0.435188	0.853519	6.49705	77.81182	117551.5

1132.6	0.708155	4.178115	0.78773	0.436634	0.853663	6.522828	78.11927	117629.6
1132.8	0.708658	4.181083	0.790747	0.438096	0.85381	6.54893	78.43055	117708
1133	0.709164	4.184066	0.793801	0.439577	0.853958	6.575363	78.74576	117786.8
1133.2	0.709672	4.187063	0.796893	0.441077	0.854108	6.602132	79.06497	117865.8
1133.4	0.710182	4.190075	0.800023	0.442595	0.854259	6.629247	79.38828	117945.2
1133.6	0.710695	4.193103	0.803194	0.444132	0.854413	6.656714	79.71576	118024.9
1133.8	0.711211	4.196146	0.806404	0.445689	0.854569	6.684541	80.04753	118105
1134	0.71173	4.199205	0.809656	0.447266	0.854727	6.712737	80.38367	118185.4
1134.2	0.712251	4.20228	0.812951	0.448863	0.854886	6.741309	80.72427	118266.1
1134.4	0.712775	4.205371	0.816288	0.450482	0.855048	6.770267	81.06946	118347.2
1134.6	0.713302	4.208479	0.81967	0.452122	0.855212	6.799619	81.41932	118428.6
1134.8	0.713831	4.211604	0.823097	0.453784	0.855378	6.829375	81.77397	118510.4
1135	0.714364	4.214746	0.82657	0.455468	0.855547	6.859544	82.13352	118592.5
1135.2	0.714899	4.217905	0.830091	0.457175	0.855718	6.890137	82.49809	118675
1135.4	0.715438	4.221082	0.83366	0.458906	0.855891	6.921162	82.86779	118757.9
1135.6	0.715979	4.224277	0.837279	0.460661	0.856066	6.952632	83.24277	118841.1
1135.8	0.716524	4.22749	0.840949	0.46244	0.856244	6.984556	83.62313	118924.7
1136	0.717072	4.230722	0.844671	0.464245	0.856425	7.016947	84.00902	119008.7
1136.2	0.717623	4.233973	0.848446	0.466076	0.856608	7.049816	84.40058	119093.1
1136.4	0.718177	4.237243	0.852276	0.467933	0.856793	7.083175	84.79794	119177.9
1136.6	0.718735	4.240534	0.856162	0.469817	0.856982	7.117037	85.20127	119263.1
1136.8	0.719296	4.243844	0.860106	0.47173	0.857173	7.151414	85.6107	119348.8
1137	0.71986	4.247175	0.864108	0.473671	0.857367	7.186322	86.02641	119434.8
1137.2	0.720428	4.250527	0.868171	0.475641	0.857564	7.221773	86.44856	119521.2
1137.4	0.721	4.2539	0.872297	0.477642	0.857764	7.257782	86.87733	119608.1
1137.6	0.721575	4.257295	0.876486	0.479673	0.857967	7.294365	87.31288	119695.4
1137.8	0.722155	4.260712	0.880741	0.481736	0.858174	7.331537	87.75541	119783.2
1138	0.722738	4.264152	0.885063	0.483832	0.858383	7.369316	88.20512	119871.4
1138.2	0.723325	4.267615	0.889454	0.485962	0.858596	7.407717	88.6622	119960
1138.4	0.723916	4.271102	0.893917	0.488126	0.858813	7.44676	89.12686	120049.2
1138.6	0.724511	4.274613	0.898453	0.490325	0.859033	7.486462	89.59933	120138.8
1138.8	0.72511	4.278148	0.903064	0.492561	0.859256	7.526844	90.07984	120228.8
1139	0.725713	4.281709	0.907753	0.494835	0.859483	7.567924	90.56861	120319.4
1139.2	0.726321	4.285296	0.912521	0.497147	0.859715	7.609725	91.0659	120410.5
1139.4	0.726934	4.288909	0.917372	0.499499	0.85995	7.652269	91.57197	120502.1
1139.6	0.727551	4.29255	0.922307	0.501893	0.860189	7.695578	92.08708	120594.1
1139.8	0.728172	4.296218	0.92733	0.504328	0.860433	7.739677	92.61153	120686.8
1140	0.728799	4.299914	0.932442	0.506807	0.860681	7.78459	93.1456	120779.9
1140.2	0.72943	4.303639	0.937648	0.509332	0.860933	7.830345	93.68962	120873.6
1140.4	0.730067	4.307395	0.942949	0.511902	0.86119	7.876969	94.24389	120967.8
1140.6	0.730709	4.31118	0.94835	0.514521	0.861452	7.924491	94.80876	121062.6
1140.8	0.731356	4.314997	0.953852	0.517189	0.861719	7.972941	95.38459	121158
1141	0.732008	4.318847	0.959461	0.519909	0.861991	8.022351	95.97175	121254
1141.2	0.732666	4.322729	0.965179	0.522682	0.862268	8.072754	96.57063	121350.6
1141.4	0.73333	4.326645	0.971009	0.525509	0.862551	8.124187	97.18165	121447.7

1141.6	0.733999	4.330596	0.976957	0.528394	0.862839	8.176686	97.80523	121545.6
1141.8	0.734675	4.334584	0.983027	0.531337	0.863134	8.230289	98.44185	121644
1142	0.735357	4.338607	0.989222	0.534341	0.863434	8.285039	99.09197	121743.1
1142.2	0.736046	4.342669	0.995547	0.537408	0.863741	8.340979	99.75611	121842.8
1142.4	0.736741	4.346771	1.002008	0.540122	0.864012	8.397748	100.4324	121943.3
1142.6	0.737443	4.350912	1.008609	0.541947	0.864195	8.454858	101.1156	122044.4
1142.8	0.738152	4.355095	1.015357	0.543813	0.864381	8.513256	101.8087	122146.2
1143	0.738868	4.359321	1.022256	0.54572	0.864572	8.572994	102.5175	122248.7
1143.2	0.739592	4.363592	1.029313	0.547671	0.864767	8.634126	103.2427	122352
1143.4	0.740323	4.367908	1.036535	0.549667	0.864967	8.696712	103.985	122455.9
1143.6	0.741063	4.372272	1.043928	0.551711	0.865171	8.760813	104.7451	122560.7
1143.8	0.741811	4.376684	1.051501	0.553804	0.86538	8.826496	105.5239	122666.2
1144	0.742567	4.381148	1.05926	0.555949	0.865595	8.893831	106.322	122772.5
1144.2	0.743333	4.385665	1.067214	0.558148	0.865815	8.962894	107.1404	122879.7
1144.4	0.744108	4.390236	1.075373	0.560403	0.86604	9.033766	107.98	122987.7
1144.6	0.744892	4.394864	1.083745	0.562718	0.866272	9.106532	108.8418	123096.5
1144.8	0.745687	4.399551	1.092342	0.565094	0.866509	9.181285	109.7269	123206.2
1145	0.746492	4.4043	1.101173	0.567535	0.866754	9.258125	110.6365	123316.9
1145.2	0.747307	4.409113	1.110252	0.570045	0.867005	9.337158	111.5717	123428.4
1145.4	0.748135	4.413994	1.119591	0.572627	0.867263	9.4185	112.534	123541
1145.6	0.748974	4.418944	1.129203	0.575284	0.867528	9.502276	113.5247	123654.5
1145.8	0.749825	4.423967	1.139105	0.578021	0.867802	9.588619	114.5454	123769
1146	0.750689	4.429067	1.149311	0.580842	0.868084	9.677678	115.5978	123884.6
1146.2	0.751567	4.434248	1.15984	0.583753	0.868375	9.76961	116.6837	124001.3
1146.4	0.75246	4.439514	1.170711	0.586758	0.868676	9.864591	117.8052	124119.1
1146.6	0.753367	4.444868	1.181945	0.589863	0.868986	9.96281	118.9644	124238.1
1146.8	0.754291	4.450317	1.193565	0.593076	0.869308	10.06447	120.1637	124358.3
1147	0.755231	4.455865	1.205596	0.596402	0.86964	10.16982	121.4058	124479.7
1147.2	0.75619	4.461518	1.218067	0.599849	0.869985	10.27909	122.6934	124602.4
1147.4	0.757167	4.467283	1.231009	0.603427	0.870343	10.39257	124.03	124726.4
1147.6	0.758164	4.473168	1.244455	0.607144	0.870714	10.51058	125.4189	124851.8
1147.8	0.759183	4.479179	1.258446	0.611011	0.871101	10.63346	126.8643	124978.7
1148	0.760225	4.485327	1.273023	0.615041	0.871504	10.76162	128.3705	125107
1148.2	0.761292	4.49162	1.288237	0.619246	0.871925	10.89548	129.9426	125237
1148.4	0.762385	4.498072	1.304142	0.623643	0.872364	11.03556	131.5863	125368.6
1148.6	0.763507	4.504694	1.320802	0.628249	0.872825	11.18244	133.308	125501.9
1148.8	0.764661	4.511502	1.338291	0.633083	0.873308	11.33678	135.1153	125637
1149	0.76585	4.518513	1.356692	0.63817	0.873817	11.49936	137.0168	125774
1149.2	0.767076	4.525748	1.376105	0.643537	0.874354	11.67107	139.0225	125913
1149.4	0.768344	4.53323	1.396648	0.649215	0.874922	11.85299	141.1444	126054.2
1149.6	0.769659	4.540987	1.418461	0.655245	0.875525	12.04641	143.3964	126197.6
1149.8	0.771026	4.549055	1.441715	0.661673	0.876167	12.25288	145.7957	126343.4
1150	0.772454	4.557476	1.466619	0.668558	0.876856	12.47433	148.3632	126491.7
1150.2	0.77395	4.566303	1.493437	0.675971	0.877597	12.71317	151.125	126642.9
1150.4	0.775526	4.575604	1.52251	0.681367	0.878137	12.96862	154.0908	126796.9

1150.6	0.777198	4.58547	1.554285	0.686422	0.878642	13.2469	157.2932	126954.2
1150.8	0.778987	4.596024	1.589377	0.692006	0.879201	13.5546	160.809	127115
1151	0.780923	4.607443	1.628668	0.698257	0.879826	13.89956	164.7249	127279.8
1151.2	0.78305	4.619998	1.673508	0.705392	0.880539	14.29381	169.1603	127448.9
1151.4	0.785447	4.63414	1.726152	0.713767	0.881377	14.75748	174.3078	127623.2
1151.6	0.788262	4.650743	1.790967	0.72408	0.882408	15.32952	180.522	127803.8
1151.8	0.79187	4.672036	1.87909	0.738101	0.88381	16.10936	188.6333	127992.4
1152	0.8	4.72	2.10043	0.768066	0.886807	18.06795	205.0639	128197.5
1152.2	0.804237	4.745001	2.206806	0.779429	0.887943	19.00732	222.4516	128419.9
1152.4	0.806118	4.756099	2.243522	0.783351	0.888335	19.3321	230.0365	128649.9
1152.6	0.807585	4.764753	2.267864	0.785951	0.888595	19.54757	233.278	128883.2
1152.8	0.808835	4.772124	2.285635	0.787849	0.888785	19.70495	235.5151	129118.7
1153	0.809944	4.778668	2.299108	0.789288	0.888929	19.82431	237.1756	129355.9
1153.2	0.810953	4.78462	2.309457	0.790394	0.889039	19.91602	238.442	129594.4
1153.4	0.811885	4.790122	2.317381	0.79124	0.889124	19.98626	239.4137	129833.8
1153.6	0.812757	4.795264	2.323338	0.791876	0.889188	20.03907	240.152	130073.9
1153.8	0.813578	4.800112	2.327643	0.792336	0.889234	20.07724	240.6978	130314.6
1154	0.814358	4.804713	2.330527	0.792644	0.889264	20.10282	241.0803	130555.7
1154.2	0.815102	4.809102	2.332163	0.792819	0.889282	20.11732	241.3208	130797
1154.4	0.815815	4.813307	2.332684	0.792875	0.889287	20.12194	241.4356	131038.5
1154.6	0.8165	4.817351	2.332194	0.792823	0.889282	20.1176	241.4372	131279.9
1154.8	0.817161	4.821251	2.330778	0.792671	0.889267	20.10504	241.3358	131521.2
1155	0.8178	4.825022	2.328502	0.792428	0.889243	20.08486	241.1393	131762.4
1155.2	0.81842	4.828676	2.325422	0.792099	0.88921	20.05755	240.8544	132003.2
1155.4	0.819021	4.832225	2.321584	0.791689	0.889169	20.02351	240.4864	132243.7
1155.6	0.819606	4.835676	2.317024	0.791202	0.88912	19.98309	240.0396	132483.7
1155.8	0.820176	4.839039	2.311773	0.790641	0.889064	19.93655	239.5178	132723.3
1156	0.820732	4.84232	2.305857	0.790009	0.889001	19.88412	238.924	132962.2
1156.2	0.821275	4.845524	2.299296	0.789308	0.888931	19.82598	238.2606	133200.5
1156.4	0.821806	4.848657	2.292106	0.78854	0.888854	19.76227	237.5295	133438
1156.6	0.822326	4.851724	2.284301	0.787707	0.888771	19.69313	236.7324	133674.7
1156.8	0.822835	4.854729	2.275889	0.786808	0.888681	19.61863	235.8706	133910.6
1157	0.823335	4.857676	2.266878	0.785846	0.888585	19.53884	234.9448	134145.5
1157.2	0.823825	4.860568	2.257272	0.784819	0.888482	19.45379	233.9557	134379.5
1157.4	0.824306	4.863408	2.247071	0.78373	0.888373	19.3635	232.9037	134612.4
1157.6	0.824779	4.866199	2.236275	0.782577	0.888258	19.26796	231.7888	134844.2
1157.8	0.825245	4.868943	2.22488	0.781359	0.888136	19.16716	230.6108	135074.8
1158	0.825702	4.871644	2.212881	0.780078	0.888008	19.06104	229.3692	135304.2
1158.2	0.826153	4.874302	2.200269	0.778731	0.887873	18.94953	228.0634	135532.2
1158.4	0.826597	4.87692	2.187034	0.777317	0.887732	18.83254	226.6924	135758.9
1158.6	0.827034	4.879501	2.173162	0.775835	0.887584	18.70997	225.2551	135984.2
1158.8	0.827465	4.882044	2.158638	0.774284	0.887428	18.58167	223.7499	136207.9
1159	0.82789	4.884553	2.143441	0.77266	0.887266	18.44749	222.1749	136430.1
1159.2	0.82831	4.887028	2.127551	0.770963	0.887096	18.30722	220.5283	136650.6
1159.4	0.828724	4.889472	2.110941	0.769189	0.886919	18.16066	218.8073	136869.4

1159.6	0.829133	4.891884	2.093581	0.767334	0.886733	18.00755	217.0093	137086.4
1159.8	0.829537	4.894267	2.075438	0.765396	0.88654	17.84759	215.1309	137301.6
1160	0.829936	4.896621	2.056471	0.76337	0.886337	17.68045	213.1682	137514.7
1160.2	0.83033	4.898947	2.036635	0.761252	0.886125	17.50572	211.117	137725.9
1160.4	0.83072	4.901247	2.015879	0.759034	0.885903	17.32297	208.9722	137934.8
1160.6	0.831105	4.903522	1.99414	0.756406	0.885641	17.13108	206.7244	138141.5
1160.8	0.831487	4.905772	1.971349	0.75278	0.885278	16.92836	204.3566	138345.9
1161	0.831864	4.907998	1.947422	0.748973	0.884897	16.7157	201.8644	138547.8
1161.2	0.832237	4.9102	1.922263	0.74497	0.884497	16.49229	199.248	138747
1161.4	0.832607	4.912381	1.895756	0.740752	0.884075	16.25711	196.4964	138943.5
1161.6	0.832973	4.914539	1.867761	0.736298	0.88363	16.00897	193.5965	139137.1
1161.8	0.833335	4.916677	1.83811	0.731581	0.883158	15.74642	190.5323	139327.6
1162	0.833694	4.918794	1.806593	0.726566	0.882657	15.46763	187.2843	139514.9
1162.2	0.834049	4.920892	1.772946	0.721213	0.882121	15.17035	183.8279	139698.8
1162.4	0.834402	4.92297	1.736831	0.715467	0.881547	14.85164	180.1319	139878.9
1162.6	0.834751	4.925029	1.697798	0.709256	0.880926	14.50765	176.1558	140055
1162.8	0.835097	4.927071	1.655234	0.702484	0.880248	14.13307	171.8443	140226.9
1163	0.83544	4.929094	1.608256	0.69501	0.879501	13.72029	167.1201	140394
1163.2	0.83578	4.931101	1.555515	0.686618	0.878662	13.25768	161.8678	140555.9
1163.4	0.836117	4.93309	1.494753	0.676335	0.877633	12.7249	155.8955	140711.8
1163.6	0.836451	4.935064	1.421603	0.656114	0.875611	12.07428	148.7951	140860.6
1163.8	0.836783	4.937021	1.324926	0.629389	0.872939	11.21882	139.7586	141000.3
1164	0.837112	4.938963	1.094813	0.565777	0.866578	9.202786	122.5296	141122.9
1164.2	0.837439	4.940889	0.979444	0.529599	0.86296	8.19864	104.4086	141227.3
1164.4	0.837763	4.942801	0.933511	0.507325	0.860733	7.793979	95.95572	141323.2
1164.6	0.838085	4.944699	0.899727	0.490943	0.859094	7.497618	91.74958	141415
1164.8	0.838404	4.946582	0.872287	0.477637	0.857764	7.257699	88.5319	141503.5
1165	0.838721	4.948451	0.848916	0.466304	0.85663	7.053906	85.86963	141589.4
1165.2	0.839035	4.950308	0.828435	0.456372	0.855637	6.87575	83.57794	141672.9
1165.4	0.839348	4.95215	0.810144	0.447503	0.85475	6.716969	81.55631	141754.5
1165.6	0.839658	4.95398	0.793582	0.439471	0.853947	6.573468	79.74262	141834.2
1165.8	0.839966	4.955798	0.778429	0.432123	0.853212	6.442399	78.09521	141912.3
1166	0.840272	4.957603	0.76445	0.425344	0.852534	6.321683	76.5845	141988.9
1166.2	0.840576	4.959396	0.751469	0.41905	0.851905	6.20975	75.1886	142064.1
1166.4	0.840877	4.961177	0.739349	0.40865	0.850865	6.102134	73.8713	142138
1166.6	0.841177	4.962947	0.727979	0.398309	0.849831	6.000993	72.61876	142210.6
1166.8	0.841475	4.964705	0.717271	0.38857	0.848857	5.90595	71.44166	142282
1167	0.841772	4.966452	0.707152	0.379366	0.847937	5.816319	70.33361	142352.4
1167.2	0.842066	4.968188	0.697561	0.370642	0.847064	5.731527	69.28707	142421.7
1167.4	0.842358	4.969914	0.688446	0.362351	0.846235	5.651092	68.29571	142490
1167.6	0.842649	4.971629	0.679762	0.354453	0.845445	5.574603	67.35417	142557.3
1167.8	0.842938	4.973333	0.671471	0.346913	0.844691	5.501704	66.45784	142623.8
1168	0.843225	4.975028	0.663542	0.3397	0.84397	5.432089	65.60276	142689.4
1168.2	0.843511	4.976712	0.655943	0.332789	0.843279	5.365488	64.78546	142754.2
1168.4	0.843794	4.978387	0.648651	0.326157	0.842616	5.301666	64.00292	142818.2

1168.6	0.844077	4.980053	0.641642	0.319782	0.841978	5.240412	63.25247	142881.4
1168.8	0.844357	4.981709	0.634897	0.313647	0.841365	5.181542	62.53172	142944
1169	0.844636	4.983355	0.628396	0.307735	0.840773	5.124888	61.83857	143005.8
1169.2	0.844914	4.984993	0.622125	0.302031	0.840203	5.070301	61.17113	143067
1169.4	0.84519	4.986621	0.616068	0.296522	0.839652	5.017647	60.52769	143127.5
1169.6	0.845465	4.988241	0.610213	0.291196	0.83912	4.966804	59.90671	143187.4

SOUTH BAY INDUSTRIAL CENTER
TRUCK YARD PONDING

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Qdischarge (cfs)
46.93	0.00	63				
			63	63	0.00	1.40
47.10	0.17	681				
			383	446	0.01	2.50
47.30	0.37	3145				
			1062	1,508	0.03	3.20
47.50	0.57	7474				
			890	2,398	0.06	3.60
47.60	0.67	10334				
			2775	5,173	0.12	4.20
47.80	0.87	17414				
			4328	9,501	0.22	4.70
48.00	1.07	25868				
			6096	15,597	0.36	5.10
48.20	1.27	35091				

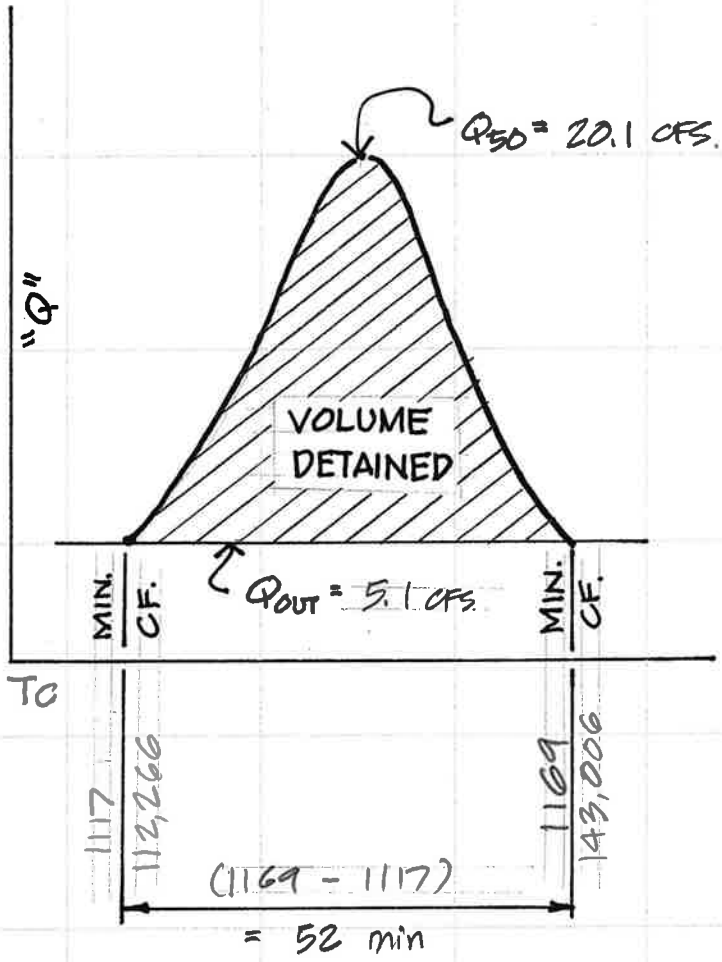
TRACT No. _____

Thienes Engineering, Inc.

CIVIL ENGINEERING • LAND SURVEYING

subject 3491	by	date 8/19	job no. 3491	sheet of

$V_1 = 143{,}006$ CF
$- 112{,}266$ CF.
$30{,}740$ CF.



$V_2 = 5.1 \frac{CF}{sec} \times 60 \frac{sec}{min} \times 52 \text{ min} = 15{,}912$ CF.

Volume required to detained @ the truck yard: $V_{det.}$

$V_{det.} = V_1 - V_2$

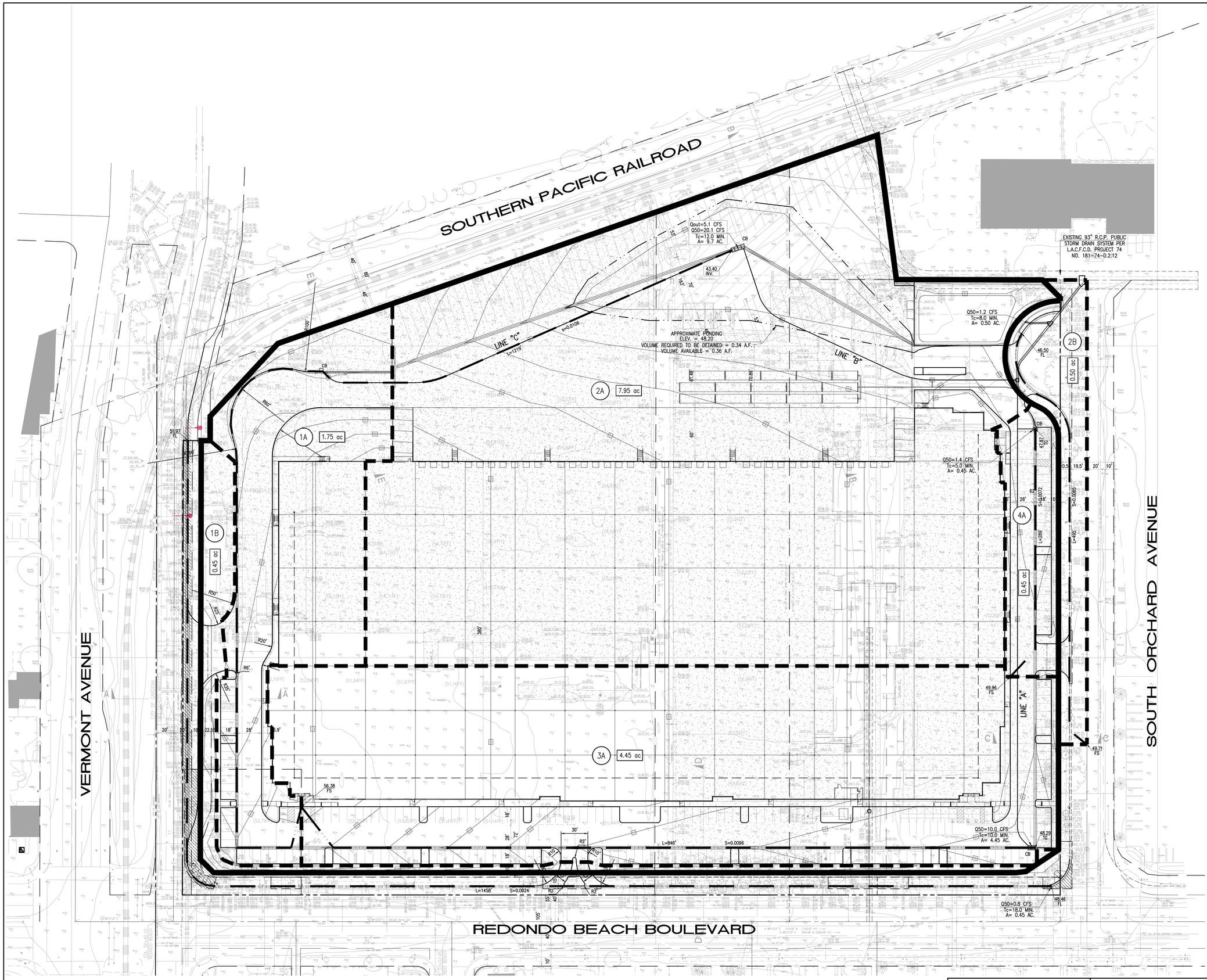
$V_{det} = 30{,}740$ CF $- 15{,}912$ CF $= 14{,}828$ CF.

$V_{det.} = 14{,}828$ CF.

14349 Firestone Blvd. • La Mirada, CA 90638 • Tel: (714) 521-4811 • Fax: (714) 521-4173

APPENDIX E

HYDROLOGY MAP



VICINITY MAP
N.T.S.

SUBAREA DATA SUMMARY

SUBAREA	AREA (ACRES)	LENGTH (FEET)	SLOPE	Tc (MINUTES)	Q50 (CFS)
1A-2A	9.7	1219	0.0106	12.0	20.1
3A	4.45	846	0.0096	10.0	10.0
4A	0.45	289	0.0072	5.0	1.4
1B	0.45	1458	0.0024	18.0	0.8
* 2B	0.50	495	0.0065	8.0	1.2

* OFFSITE STREET RUNOFF

Q50 TRIBUTARY TO 93" R.C.P. (PROJECT 74)
20.1 CFS. +10.0 CFS. + 1.4 CFS. = 31.5 CFS.

Q50 REQUIRED TO BE STORED AT THE TRUCK YARD (Qr)
Qr = 32.3 CFS. - 17.3 CFS. = 15.0 CFS.

REQUIRED DISCHARGE AT THE TRUCK YARD (Qout)
Qout = 17.3 - (10.0 + 1.4 + 0.8) = 5.1 CFS
Qout = 5.1 CFS

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 1.00 AC. — SUBAREA AREA
- 1A — SUBAREA NUMBER
- APPROXIMATE 50-YEAR PONDING LIMIT
- CB — CATCH BASIN

0 20 40 80 120
SCALE:1"=40'

Last Update: 8/5/19
O:\3400-3499\3491\3491HYD.dwg

Q50 ALLOWABLE TO PROJECT 74 = 1.15 CFS. PER ACRE
TOTAL AREA = 15.05 ACRES
TOTAL Q50 ALLOWABLE FROM THE SITE TO PROJECT 74 = 1.15 CFS. PER ACRE x 15.05 ACRES = 17.3 CFS.

CITY OF LOS ANGELES
PUBLIC WORKS DEPARTMENT

PROPOSED HYDROLOGY MAP

SOUTH BAY INDUSTRIAL CENTER
N/E CONER OF
REDONDO BEACH BLVD. AND
VERMONT AVENUE

3491/1 OF 1 SHEET

PREPARED FOR:
PROLOGIS-ONTARIO
3456 CONCOURS STREET, SUITE 100
ONTARIO, CA 91764
PHONE: (909) 673-8700
FAX: (909) 673-8702

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____
Approved by _____ Date _____
Public Works Director _____ R.C.E. _____
Sheet 1 of 1 Sheets