Appendix I Drainage Study



Carson Self-Storage Drainage Study 21611 South Perry St. Carson, CA 90745

Date Prepared: October 12, 2021

Prepared for: 21611 Perry Street, LLC 4132 Katella Avenue, #205B Los Alamitos, CA 90720

Prepared By:



4340 Viewridge Ave, Suite B San Diego, CA 92113 Ph: (858) 634-8620

Declaration of Responsible Charge:

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards. I understand that the check of the project drawings and specifications by the City of Carson is confined to a review only and does not relieve me, as an engineer of work, of my responsibilities for project design.

Patric T. de Boer Registration Expires

RCE 83583 3-31-2023



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Site & Project Description

This drainage study has been prepared for Carson Self-Storage located at 21611 South Perry Street in the City of Carson.

The project involves the construction of three two-story storage buildings with asphalt paving throughout the development. The total area of analysis is 2.77 acres.

See figure No.1 for a Vicinity Map. Figures 2 and 3 show the existing and proposed drainage flow paths and basins.

Methodology

This drainage report has been prepared in accordance with current County of Los Angeles regulations and procedures. The LA County Hydrology Manual was used to determine the hydrologic features of the site.

LA County provides a free program called HydroCalc (Version 1.02) to calculate runoff rates and volumes. Given the area, length of flow path, average slope, design storm depth, imperviousness, and soil type, HydroCalc generates a hydrograph for the existing and proposed conditions. LA County provides hydrology maps online where the soil type and 50-year rainfall can be found.

This report analyzes the flow generated by the 50 and 100-year storm events for storm drain sizing and flood control purposes.

- (1) <u>Handbook of Hydraulics</u>, E.F. Brater & H.W. King, 6th Ed., 1976.
- (2) Los Angeles County Department of Public Works Hydrology Manual, 2006

Existing Conditions

For the purposes of the hydrology analysis, the existing conditions are assumed to be the preexisting conditions which consisted of a commercial building that covered the majority of the site and a parking lot. The site is approximately 96.4% impervious and underlain by soil type # 3.

The entire site drains via surface flow from east to west to an existing 5' storm drain inlet that outlets to the Dominguez Channel, a concrete lined channel. This point is referred to as Discharge Point # 1 in this report.

Proposed Conditions

The proposed development will re-grade the entire site but will keep the same discharge point as the existing conditions. The proposed site will be 89.7% impervious.

The project will construct gutters that wrap around the self-storage facilities and direct the runoff generated from the site towards the westerly portion of the site. Runoff will then drain into a 10'x20' Modular Wetland System for treatment. Following treatment, the stormwater will drain out

via pipe flow to a storm drain clean out structure thence to the existing 5' storm drain inlet and ultimately the Dominguez Channel. This point is referred to as Discharge Point # 1 in this report.

The discharge point will have a 50-year peak discharge that does not increase from the existing conditions. This is accomplished by reducing the impervious footprint of the proposed site.

Existing HydroCalc Analysis

The existing conditions were modeled using HydroCalc. The area of analysis consists of one basin being E-1.1.

Below is a summary of the results of the HydroCalc Calculations for the existing conditions.

Basin #	Area (ac)	Soil Type	Imperv. (%)	T _{C 50} (min)	I ₅₀ (in/hr)	T _{C 100} (min)	I ₁₀₀ (in/hr)	Q ₅₀ (cfs)	Q ₁₀₀ (cfs)
E-1.1	2.77	3	96.4	7.0	3.11	7.0	3.49	7.61	8.55
							Total	7.61	8.55

Proposed HydroCalc Analysis

The proposed site was modeled as two basins, referred to as P-1.1 and P-1.2 in this report.

Below is a summary of the HydroCalc calculations for the proposed conditions.

Basin #	Area (ac)	Soil Type	Imperv. (%)	T _{C 50} (min)	I ₅₀ (in/hr)	T _{C 100} (min)	I_{100} (in/hr)	Q ₅₀ (cfs)	Q ₁₀₀ (cfs)
P-1.1	1.44	3	90.6	10.0	2.63	9.0	3.10	3.23	3.83
P-1.2	1.33	3	88.9	7.0	3.11	7.0	3.49	3.52	3.97
<u> </u>							Total	6 74	7 7 9

Results and Conclusions

The development of the project site will slightly modify the onsite drainage patterns; however, the existing point of discharge and the point of compliance remain the same.

The proposed improvements will decrease the peak flowrates generated by the area of analysis at the discharge point. The 50-year storm flow decreases from 7.61 cfs to 6.74 cfs and the 100-year storm flow decreases from 8.55 cfs to 7.79 cfs.

It is the opinion of Omega Engineering Consultants that the project will not cause adverse effects to the downstream facilities or receiving waters as a result of increased peak flowrate during the 50-year and 100-year storms.





SIN DATA						
SOIL YPE	IMPERV. (%)	₅₀ (IN/HR)	l ₁₀₀ (IN/HR)	Q50 (CFS)	Q ₁₀₀ (CFS)	
3	<i>96.4</i>	3.11	3.49	7.61	<i>8.55</i>	

EXHIBIT HYDROLOGY



SIN DATA						
IOIL YPE	IMPERV. (%)	₅₀ (IN/HR)	l ₁₀₀ (IN/HR)	Q50 (CFS)	Q ₁₀₀ (CFS)	
3	90.6	2.63	3.10	<i>3.23</i>	3.83	
3	<i>88.9</i>	3.11	3.49	<i>3.52</i>	3.97	

SLOPE (%)	DEPTH /DIA	V ₁₀₀ (FPS)	Q ₁₀₀ (CFS)
1.0	0.64	<i>6.52</i>	7.79

EXHIBIT HYDROLOGY PROP.

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/50-Year/Carson Self-Storage 50-Year - E-1 Version: HydroCalc 1.0.3

Input Parameters			
Project Name	Carson Self-Storage 50-Year		
Subarea ID	F-1 1		
Area (ac)	2 77		
Flow Path Length (ft)	475.0		
Flow Path Slope (vft/hft)	0.005		
50-vr Rainfall Depth (in)	6.1		
Percent Impervious	0.964		
Soil Type	3		
Design Storm Frequency	50-vr		
Fire Factor	0		
	False		
LiD	1 4100		
Output Results			
Modeled (50-yr) Rainfall Depth (in)	61		
Peak Intensity (in/hr)	3 1071		
Undeveloped Runoff Coefficient (Cu)	0 4613		
Developed Runoff Coefficient (Cd)	0.8842		
Time of Concentration (min)	7.0		
Clear Peak Flow Rate (cfs)	7.61		
Burned Peak Flow Rate (cfs)	7.61		
24-Hr Clear Runoff Volume (ac-ft)	1 2178		
24-Hr Clear Runoff Volume (cu-ft)	530/7 6/79		
	000110110		
Hydrograph (Carson Self-Stor	age 50-Year: E-1.1)		
Time (minutes	s)		

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/50-Year/Carson Self-Storage 50-Year - P-1 Version: HydroCalc 1.0.3

Input Parameters			
Project Name	Carson Self Storage 50-Year		
Subarea ID	P-1 1		
Area (ac)	1 44		
Flow Path Length (ft)	635.0		
Flow Path Slope (vft/hft)	0.0036		
50-vr Rainfall Denth (in)	6.1		
Percent Impervious	0.906		
Soil Type	3		
Design Storm Frequency	50-vr		
Fire Factor	0		
	False		
Output Results			
Modeled (50-yr) Rainfall Depth (in)	6.1		
Peak Intensity (in/hr)	2.6275		
Undeveloped Runoff Coefficient (Cu)	0 411		
Developed Runoff Coefficient (Cd)	0.854		
Time of Concentration (min)	10.0		
Clear Peak Flow Rate (cfs)	3 2314		
Burned Peak Flow Rate (cfs)	3.2314		
24-Hr Clear Runoff Volume (ac-ft)	0.6003		
24-Hr Clear Runoff Volume (cu-ff)	26150.392		
3.5 Hydrograph (Carson Self Stor	age 50-Year: P-1.1)		
3.0 -	-		
2.5 -	-		
2.0			
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5) M			
10-			
0.5			
0.0			
0 200 400 600 800	1000 1200 1400 1600		
Time (minute:	S)		

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/50-Year/Carson Self-Storage 50-Year - P-1 Version: HydroCalc 1.0.3

Input Parameters			
Project Name	Carson Self Storage 50-Year		
Subarea ID	P-1 2		
Area (ac)	1 33		
Flow Path Length (ft)	645.0		
Flow Path Slope (vft/hft)	0.0177		
50-vr Rainfall Depth (in)	61		
Percent Impervious	0.889		
Soil Type	3		
Design Storm Frequency	50-vr		
Fire Factor			
	False		
LID	1 4100		
Output Results			
Modeled (50-yr) Rainfall Depth (in)	61		
Peak Intensity (in/hr)	3 1071		
Undeveloped Runoff Coefficient (Cu)	0.4613		
Developed Runoff Coefficient (Cd)	0.8513		
Time of Concentration (min)	7.0		
Clear Peak Flow Rate (cfs)	3.518		
Burned Peak Flow Rate (cfs)	3.518		
24-Hr Clear Runoff Volume (ac-ft)	0.5457		
24-Hr Clear Runoff Volume (ac-ft)	0.0407		
	20111.0044		
4.0 Hydrograph (Carson Self Sto	rage 50-Year: P-1.2)		
35			
0.0			
3.0 -	-		
25			
2.3			
(sl			
S 2.0 -	-		
1.5 -	1		
1.0 -			
0.5			
0.5 -			
0.0			
0 200 400 600 800	1000 1200 1400 1600		
Time (minute	es)		

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/100-Year/Carson Self-Storage 100-Year - E Version: HydroCalc 1.0.3

Input Parameters			
Project Name	Carson Self-Storage 100-Year		
Subarea ID	F-1.1		
Area (ac)	2.77		
Flow Path Length (ft)	475.0		
Flow Path Slope (vft/hft)	0.005		
50-vr Rainfall Depth (in)	61		
Percent Impervious	0.964		
Soil Type	3		
Design Storm Frequency	100-vr		
Fire Factor	0		
LID	False		
Output Results			
Modeled (100-yr) Rainfall Depth (in)	6.8442		
Peak Intensity (in/hr)	3.4861		
Undeveloped Runoff Coefficient (Cu)	0.5012		
Developed Runoff Coefficient (Cd)	0.8856		
Time of Concentration (min)	7.0		
Clear Peak Flow Rate (cfs)	8.5523		
Burned Peak Flow Rate (cfs)	8.5523		
24-Hr Clear Runoff Volume (ac-ft)	1.3666		
24-Hr Clear Runoff Volume (cu-ft)	59530.2221		
م Hydrograph (Carson Self-Storage	e 100-Year: E-1.1)		
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0 200 400 600 800	1000 1200 1400 1600		
Time (minutes)			

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/100-Year/Carson Self-Storage 100-Year - F Version: HydroCalc 1.0.3

Input Parameters			
Project Name	Carson Self Storage 100-Year		
Subarea ID	P-1.1		
Area (ac)	1.44		
Flow Path Length (ft)	635.0		
Flow Path Slope (vft/hft)	0.0036		
50-vr Rainfall Depth (in)	6.1		
Percent Impervious	0.906		
Soil Type	3		
Design Storm Frequency	100-vr		
Fire Factor	0		
LID	False		
Output Results	0.0440		
Noueleu (100-yr) Kalmall Depth (m)	0.044Z		
Feak Intensity (III/III)	3.U970 0.4604		
Developed Runoff Coefficient (Cd)	0.4004		
Developed Runoll Coefficient (Cd)	0.8087		
Clear Dock Flow Date (efc)	9.0		
Clear Peak Flow Rate (CIS) Burnad Daak Flow Rate (cfa)	3.0304 2.820 <i>4</i>		
Duffied Peak Flow Rate (CIS)	0.0304 0.6720		
24-FIT Clear Runoff Volume (au ft)	0.07.39		
24-Hr Clear Runoπ Volume (cu-π)	29356.4034		
4.0 Hydrograph (Carson Self Storag	ge 100-Year: P-1.1)		
3.5 -	-		
3.0 -	-		
2.5 -	-		
2.0 -	_		
1.5 -	-		
1.0			
0.5 -			
0.0 0 200 400 600 800 Time (minutes)	1000 1200 1400 1600		

File location: P:/DWG OMEGA/0633 Faring SS Carson/STORMWATER REPORTS/H&H/HydroCalc Exhibits/100-Year/Carson Self-Storage 100-Year - F Version: HydroCalc 1.0.3

Input Parameters	
Project Name	Carson Self Storage 100-Year
Subarea ID	P-1.2
Area (ac)	1.33
Flow Path Length (ft)	645.0
Flow Path Slope (vft/hft)	0.0177
50-yr Rainfall Depth (in)	6.1
Percent Impervious	0.889
Soil Type	3
Design Storm Frequency	100-yr
Fire Factor	0
LID	False
Output Results	0.0440
iviodeled (100-yr) Rainfall Depth (in)	0.8442
Peak Intensity (In/nr)	3.4861
Undeveloped Runoff Coefficient (Cu)	
Developed Runoff Coefficient (Cd)	0.8557
Time of Concentration (min)	7.0
Clear Peak Flow Rate (CIS)	3.9676
Duffied Peak Flow Rate (CIS)	0.6407
24-FIT Clear Runoff Volume (ac-it)	0.0127
24-Hr Clear Runoff Volume (cu-π)	20087.391
4.0 Hydrograph (Carson Self Stora	ge 100-Year: P-1.2)
3.5 -	-
3.0 -	-
2.5 -	
<u> </u>	
\$5) 2.0 - 0	-
1.5 -	-
1.0 -	
0.5 -	
0.0 0.0 200 400 600 800 0 200 Time (minutes	1000 1200 1400 1600 ;)

Appendix 1

LA County Hydrology Map 2 Dominguez W Griffith St S"Alameda"S Technology 177 ft +W-190th St Center Toyota E University Dr. Victoria Park RR otor Sales (n) J.S.A., Inc Galway Goodyear E Elsmere Dr Blimp Base Knok St KM 0 E Gladwick St Victoria E Turmont St 7 Harbor Golf Course E Helmick St ħ Curtiss Francisco St de. Middle N Sandiegoria Dominguez Del School ŵ Golf Course Amo 00 👼 E Cyrene Dr Park 213 50yr Two Tenths (Rainfall) E Del Amo Bj South Bay ID 783 Lenardo Dr Pavilion CONTOUR 6.20 The Torrance Bl/d Carson American Boulevard Town Honda At South 4 Center Zoom to Motor Co Bay 405 Ave Site Location Dolphin E Harrison St PHO Park 50-Year Rainfall=6.10" E Jackson Ave E 213th St Martin St E Madison Ave Carson W 214th St Olli-Park E Adams Ave Carsor s Ave City Hall õ E Carson St Carson Carson W Carson St 19 D E Carson St-2 Ave Ave 60 65 La County Town Camedie Harbor-UCLA Harva Square Middle Border Ave 2 8 Medical Center B amedais School W 220th St 🗳 Abalo E 2207 Calas 'Igton Ave Gran White Park Middle School W-223rd St 5 E 223rd St 5 ton Ave 16 m 1.62 W 225th St High · Ave School 2 1000 BULL NO. W 227th St E Watson Genter Rd 3 E 228th St W 228th St 0 ada St の E-229th PI m E 230th St TIK NOT PH Sepulveda Blvd ull 213 Springs W 231st St が Dolo idle hoot S. Alan nut E 233rd St S=W.e 819 Scott W 234th St to. Park 4 47 Ma E 236th St. Sur W Canton St La Brea Park William Storebryn Dr Logan Stephens W 238th St E Sepulveda Blvd W Sepulveda Blvd E Sepulveda Blvc Middle School õ 240th St Carson E Pacific St Depot De 5 E-Realty-St nita AT & SF m Lomita Narbonne Park in Ave. 0 High E-246th S, Joint Water School Pollution Control Plant



Appendix 2



Appendix 3

CONDUIT SIZING CALCULATIO	DNS	
The following chart details the sizing p	parameters an	nd for conduits that convey runoff on the site.
Flow parameters from Handbook of H	lydraulics, King	g & Brater were used, see following page.
K'= Discharge factor	=	(Q*n)/(d ^{8/3} *s ^{1/2})
n= Mannings coefficient	=	0.013 for PVC & HDPE
d=diameter of conduit (ft)	=	per chart
Q= Discharge	=	based off portions of basins tributary to outlet
s=Minimum Pipe Slope (ft/ft)	=	per chart
D=depth of flow	=	From table 7-4 of the Handbook of Hydraulics, King & Brater See right
C _a = Flow factor	=	From table 7-14 of the Handbook of Hydraulics, King & Brater See right
A=Cross sectional area of flow	=	C _a *d ²
V=Velocity	=	Q/A

Pipe Flow

Pipe	Tributary Areas	Q (cfs)	S (%)	d (in)	К'	D/d	Ca	A (sf)	V (fps)
1	Entire Site	7.79	1	18	0.3435	0.64	0.531	1.195	6.52

t di	depth of ameter	of water of chan	$\frac{r}{nel} = \frac{1}{2}$	$\frac{D}{i}$ and C	$C_a = th$	e tabul	ated val	lue. T	hen a =	$= C_a d^2$
$\frac{D}{d}$.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0013	.0037	.0069	.0105	.0147	.0192	.0242	.0294	.035
.1	.0409	.0470	.0534	.0600	.0668	.0739	.0811	.0885	.0961	.103
.2	.1118	.1199	.1281	.1365	.1449	.1535	.1623	.1711	.1800	.189
.3	.1982	.2074	.2167	.2260	.2355	.2450	.2546	.2642	.2739	.283
.4	.2934	.3032	.3130	.3229	.3328	.3428	.3527	.3627	.3727	.382
.5	.393	.403	.413	.423	.433	.443	.453	.462	.472	.482
.6	.492	.502	.512	.521	.531	.540	.550	.559	.569	.578
.7	.587	.596	.605	.614	.623	.632	.640	.649	.657	.666
.8	.674	.681	.689	.697	.704	.712	.719	.725	.732	.738
.9	.745	.750	.756	.761	.766	.771	.775	.779	.782	.784

Dd	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0		.00007	.00031	.00074	.00138	.00222	.00328	.00455	.00604	.00775
.1	.00967	.0118	.0142	.0167	.0195	.0225	.0257	.0291	.0327	.0366
.2	.0406	.0448	.0492	.0537	.0585 -	.0634	.0686	.0738	.0793 -	.0849
.3	.0907	.0966	.1027	.1089	.1153	.1218	.1284	.1352 -	.1420	.1490
.4	.1561	.1633	.1705	.1779	.1854	.1929	.2005	.2082	.2160	.2238
.5	.232	.239	.247	.255	.263	.271	.279	.287	.295	.303
.6	.311	.319	.327	.335	.343	.350	.358	.366	.373	.380
.7	.388	.395	.402	.409	.416	.422	.429	.435	.441	.447
.8	.453	.458	.463	.468	.473	.477	.481	.485	.488	.491
.9	.494	.496	.497	.498	.498	.498	.496	.494	.489	.483
1.0	.463	17.12	1.1	Sales.		1910				

Table 7-14. Values of K' for Circular Channels in the Formula $Q = \frac{K'}{n} d^{84}s^{1/2}$

D = depth of water d = diameter of channel

Appendix 4

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section A-A Gutter Analysis

	Highlighted	
= 18.35	Depth (ft)	= 0.21
= 4.00	Q (cfs)	= 3.930
= 0.013	Area (sqft)	= 0.92
	Velocity (ft/s)	= 4.26
	Wetted Perim (ft)	= 11.20
Known Q	Crit Depth, Yc (ft)	= 0.29
= 3.93	Top Width (ft)	= 11.19
	EGL (ft)	= 0.49
	= 18.35 = 4.00 = 0.013 Known Q = 3.93	Highlighted= 18.35Depth (ft)= 4.00Q (cfs)= 0.013Area (sqft)Velocity (ft/s)Wetted Perim (ft)Known QCrit Depth, Yc (ft)= 3.93Top Width (ft)EGL (ft)

(Sta, El, n)-(Sta, El, n)... (0.00, 19.00)-(0.10, 18.90, 0.013)-(12.00, 18.47, 0.013)-(14.00, 18.35, 0.013)-(16.00, 18.47, 0.013)-(28.00, 18.70, 0.013)-(28.10, 18.80, 0.013)



Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section B-B Gutter Analysis

User-defined		Highlighted	
Invert Elev (ft)	= 17.66	Depth (ft)	= 0.32
Slope (%)	= 0.35	Q (cfs)	= 3.930
N-Value	= 0.013	Area (sqft)	= 2.48
		Velocity (ft/s)	= 1.58
Calculations		Wetted Perim (ft)	= 20.03
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.30
Known Q (cfs)	= 3.93	Top Width (ft)	= 20.01
		EGL (ft)	= 0.36

(Sta, El, n)-(Sta, El, n)... (0.00, 18.17)-(0.10, 18.07, 0.013)-(12.33, 17.78, 0.013)-(13.83, 17.66, 0.013)-(15.33, 17.78, 0.013)-(27.77, 18.07, 0.013)-(27.87, 18.17, 0.013)



Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section C-C Gutter Analysis

	Highlighted	
= 17.32	Depth (ft)	= 0.35
= 0.55	Q (cfs)	= 3.930
= 0.013	Area (sqft)	= 1.81
	Velocity (ft/s)	= 2.18
	Wetted Perim (ft)	= 13.18
Known Q	Crit Depth, Yc (ft)	= 0.36
= 3.93	Top Width (ft)	= 13.03
	EGL (ft)	= 0.42
	= 17.32 = 0.55 = 0.013 Known Q = 3.93	Highlighted= 17.32Depth (ft)= 0.55Q (cfs)= 0.013Area (sqft) Velocity (ft/s) Wetted Perim (ft)Known QCrit Depth, Yc (ft) Top Width (ft) EGL (ft)

(Sta, El, n)-(Sta, El, n)... (0.00, 17.82)-(0.50, 17.32, 0.013)-(2.50, 17.45, 0.013)-(27.75, 17.97, 0.013)-(27.85, 18.07, 0.013)



Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section D-D Gutter Analysis

User-defined		Highlighted	
Invert Elev (ft)	= 17.45	Depth (ft)	= 0.21
Slope (%)	= 5.40	Q (cfs)	= 3.930
N-Value	= 0.013	Area (sqft)	= 0.99
		Velocity (ft/s)	= 3.96
Calculations		Wetted Perim (ft)	= 15.09
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.28
Known Q (cfs)	= 3.93	Top Width (ft)	= 15.08
		EGL (ft)	= 0.45

(Sta, El, n)-(Sta, El, n)... (0.00, 17.85)-(0.10, 17.75, 0.013)-(14.79, 17.57, 0.013)-(16.29, 17.45, 0.013)-(17.79, 17.57, 0.013)-(33.05, 17.86, 0.013)-(33.15, 17.96, 0.013)



Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section E-E Gutter Analysis

User-defined		Highlighted	
Invert Elev (ft)	= 16.45	Depth (ft)	= 0.38
Slope (%)	= 0.50	Q (cfs)	= 3.850
N-Value	= 0.013	Area (sqft)	= 1.60
		Velocity (ft/s)	= 2.41
Calculations		Wetted Perim (ft)	= 9.73
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.39
Known Q (cfs)	= 3.85	Top Width (ft)	= 9.56
		EGL (ft)	= 0.47

(Sta, El, n)-(Sta, El, n)... (0.00, 16.95)-(0.50, 16.45, 0.013)-(2.50, 16.58, 0.013)-(28.65, 17.49, 0.013)-(28.75, 17.69, 0.013)



Sta (ft)

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Thursday, May 20 2021

Section F-F Gutter Analysis

	Highlighted	
= 17.02	Depth (ft)	= 0.32
= 0.35	Q (cfs)	= 3.850
= 0.013	Area (sqft)	= 2.53
	Velocity (ft/s)	= 1.52
	Wetted Perim (ft)	= 23.21
Known Q	Crit Depth, Yc (ft)	= 0.31
= 3.85	Top Width (ft)	= 23.07
	EGL (ft)	= 0.36
	= 17.02 = 0.35 = 0.013 Known Q = 3.85	Highlighted= 17.02Depth (ft)= 0.35Q (cfs)= 0.013Area (sqft)Velocity (ft/s)Wetted Perim (ft)Known QCrit Depth, Yc (ft)= 3.85Top Width (ft)EGL (ft)

(Sta, El, n)-(Sta, El, n)... (0.00, 17.52)-(0.50, 17.02, 0.013)-(2.50, 17.15, 0.013)-(40.73, 17.50, 0.013)-(40.83, 17.60, 0.013)

