PRELIMINARY DRAINAGE REPORT

WEST WING RECYCLING AND TRANSFER STATION MARICOPA COUNTY, AZ

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CEC Project 312-017

NOVEMBER 2021





Civil & Environmental Consultants, Inc.

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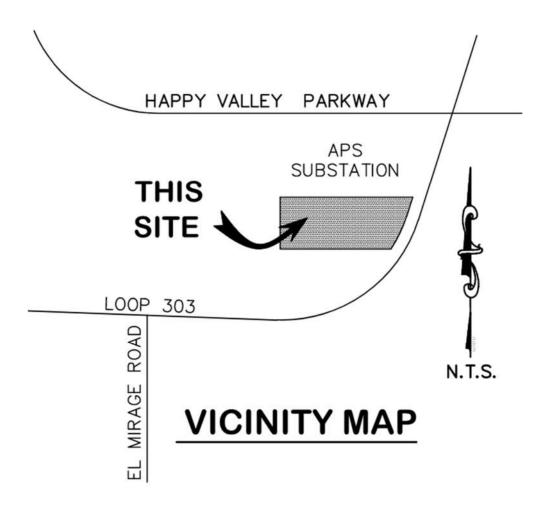
1.0 INTRODUCTION

The purpose of this preliminary drainage report is to provide the conceptual drainage analysis for the proposed recycling and transfer facility. The West Wing Recycling and Transfer Station (Site) is located southwest of the southwest corner of the intersection of Happy Valley Parkway and Loop 303, Maricopa County, Arizona. It is further described as a portion of the southwest quarter of Section 12, Township 4 North, Range 1 East of the Gila and Salt River Meridian. Refer to the vicinity map on the following page.

The site encompasses approximately 10.01 acres of Parcel No.1 (+/- 75.22 acres); APN: 503-53-025U. The proposed commercial development consists of a transfer station, scale house, designated parking area, and onsite retention. Site development improvements include the construction of driveway entrances to provided ingress and egress off the existing road located south of the proposed site. Refer to **Appendix D- Figure 3** for the proposed site layout.

This preliminary drainage report consists of discussions and calculations defining the onsite and offsite storm water management concepts to comply with the drainage requirements established by Maricopa County. The preparation of this report has been done in accordance with the Drainage Design Manual for Maricopa County, Volumes I and II, Hydrology and Hydraulics.

VICINITY MAP



2.0 EXISTING CONDITIONS AND OFFSITE DRAINAGE

The proposed Site is located on approximately 10.01 acres of net land designated as IND-2 IUPD zoning per Maricopa County. The Site is currently undeveloped and drains north to south onto a temporary retention basin at an average slope of 1%. The site contains two manmade channels that convey offsite runoff along the south and east boundaries to the site ultimate outfall at the southeast corner.

According to the Flood Insurance Rate Map (FIRM) #04013C1230 L, dated October 16, 2013, this property is located in flood zone "X". This area is defined as "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1-square mile; and areas protected by levees from 1% chance annual flood."

Refer to the **Appendix A** for a copy of the FIRM map for this area.

Offsite drainage from the northern parcel, APN: 503-53-024H, discharges on-site through existing culvert, EXCV-1. The previous Final Drainage Report for WestWing Business Park-Onsite, dated April 2021, quantified an offsite flow of 277 cubic feet per second (cfs) at EXCV-1 to be diverted along the northeast and east boundary of the proposed site through existing channel, EXCH-1. Existing channel EXCH-1 conveys the runoff to existing culvert EXCV-2 located at the southeast corner of the site.

Refer to **Appendix D- Figure** 1 for Existing Conditions Drainage Area Map.

The proposed site is also affected by offsite flows from the west parcel identified as State Trust Land. A portion of the State Trust Land, depicted as Drainage Area DA-1, drains north to south onto an existing channel, EXCH-2,that conveys the captured flow west to east along the site's south boundary and outfalls at the existing culvert, EXCV-2. The 100-year peak flow entering the site at the southwest corner is approximately 37.55 cfs.

Refer to **Appendix B** for Hydrology Calculations.

3.0 PROPOSED DRAINAGE AND INFRASTRUCTURE IMPROVEMENTS

Offsite Drainage

The existing drainage facilities along the northeast and east boundaries will remain in place and will continue to discharge the 277 cfs at EXCV-2. The southwest offsite flow will be mitigated through four 24-inch storm drains conveying the 40 cfs under the proposed driveway, and will continue to be conveyed through EXCH-2 to the historical outfall at EXCV-2. Inlet headwalls and riprap will be incorporated for erosion protection.

The preliminary sizing of the storm drains were calculated using Hydraflow Hydrographs Extension for Autodesk ® with a normal depth calculation. Calculations are presented in **Appendix C**. The final drainage report will provide a hydraulic grade analysis to ensure storm drains are sized appropriately.

Onsite Drainage and Stormwater Retention

Onsite drainage in paved areas will be handled through catch basins and curb openings conveying onsite runoff to their respective retention systems. Onsite retention will be designed to retain the required 100-year, 2-hour storm event for the proposed Site and will drain within the required 36-hours.

Refer to **Appendix D**, Figure 2- Proposed Conditions Drainage Area Map for drainage areas and proposed basin locations.

Retention volume requirements for the development are calculated as follows:

Retention Volume - V = P/12*C*A

Where V = Volume, cubic feet

P = Rainfall Depth, 2.28 inches (NOAA 14 Atlas)

C = runoff coefficient, Industrial - 0.95; Landscape - 0.50

A = Area, Sq. Ft.

The following tables represent calculations for required retention for each drainage area for the Site.

Retention Calculations

DRAINAGE			VOLUME	VOLUME	EXCESS/
AREA	AREA	AREA	REQUIRED	PROVIDED	SHORT
I.D.	(sf)	(Ac)	(cf)	(cf)	(cf)
DA1	69,013	1.58	12,457	12,605	148
DA2A	90,995	2.90	22,796	24,263	1,467
DA2B	35,299	2.90	22,790	24,203	1,407
DA3	26,321	0.60	4,751	4,784	33
DA4	178,913	4.11	16,997	41,817	24,820
TOTAL	400,541	9.19	57,001	83,468	26,468

Retention Basin Volume Calculations

Onsite retention will consist of surface basins with maximum side slopes of 4:1 with a maximum depth of 3-feet. The volume for open basins is calculated using the conical method based on design contours.

RETENTION VOLUME PROVIDED CALCULATIONS: CONICAL METHOD

RETENTION PROVIDED = $(ELEV1-ELEV2)/3*((A1+A2+(A1*A2)^0.5))$

RETEN	RETENTION		DEPTH	AVG	CUM
BASIN	ELEV.	AREA	DIFF.	VOLUME	VOLUME
ID		(SF)	(FT)	(CF)	(CF)
1	1300	2,386	0.00		
	1301	3,533	1.00	2,941	2,941
	1302	4,806	1.00	4,153	7,094
	1303	6,247	1.00	5,511	12,605
2	1298	5,645	0.00		
	1299	7,205	1.00	6,409	6,409
	1300	8,908	1.00	8,041	14,450
	1301	10,746	1.00	9,813	24,263
3	1299	687	0.00		
	1300	1,230	1.00	945	945
	1301	1,900	1.00	1,553	2,498
	1302	2,695	1.00	2,286	4,784
4	1299	39,735	0.00		
	1300	43,934	1.00	41,817	41,817
TOTAL					83,468

Onsite Hydrology

The hydrology analysis for the proposed Site was performed based on procedures dictated in the Drainage Design Manual for Maricopa County, Volumes I Hydrology. The rational method was used to compute the onsite peak discharges for the 10-year and 100-year storm event, assuming a 5-minute time of concentration. The rational method equation is as follows:

Q=CiA

Where Q = peak discharge, cfs

C = runoff coefficient, Industrial - 0.95; Landscape - 0.50

i = average rainfall intensity, inches/hour (NOAA 14 Atlas)

A = Area, Sq. Ft.

	ONSITE PEAK RUNOFF CALCULATIONS								
AREA	AREA	Tc	I10	I100	C10	C100	Q10	Q100	
I.D.	(ac)	(min.)	(in/hr)	(in/hr)			(cfs)	(cfs)	
EX1	12.89	11	3.62	5.72	0.40	0.51	18.66	37.55	
DA1	1.58	5	4.93	7.81	0.80	0.95	6.23	11.72	
DA2A	2.09	5	4.93	7.81	0.80	0.95	8.24	15.51	
DA2B	0.81	5	4.93	7.81	0.80	0.95	3.19	6.01	
DA3	0.60	5	4.93	7.81	0.80	0.95	2.37	4.45	
DA4	4.11	5	4.93	7.81	0.40	0.50	8.10	16.05	

Onsite Hydraulics and Drainage Infrastructure

Curb openings and grouted riprap spillways will be utilized to collect and convey stormwater flow into the onsite retention basins. Break over elevations for retention basins will be a minimum of 14-inches below finished floor elevations. Calculations for the curb opening widths are shown on the following table and in Appendix C.

CURB OPENING CALCULATIONS						
Curb Opening	Area	Q100	Width	Curb Opening Capacity		
I.D.	I.D.	(cfs)	(ft)	(cfs)		
CO#1	DA1	11.72	4.00	12.41		
CO#2A	DA2A	15.51	6.00	19.49		
CO#2B	DA2B	6.01	4.00	12.41		
CO#3	DA3	4.45	4.00	12.41		

Percolation Calculations

Percolation tests have not be performed for the Site in association with this Preliminary Drainage Report. Once these tests have been performed, final calculation will be utilized to compute percolation rates and dewatering times for the retention basins within the 36-hour Maricopa County criteria. The following is an estimated rate based on a minimum percolation rate of a drywell, 0.1 cfs.

Volume to be drained in 36 hours = 0.1 cfs * 36 hours * 3600 sec/hour = 12,960 cf

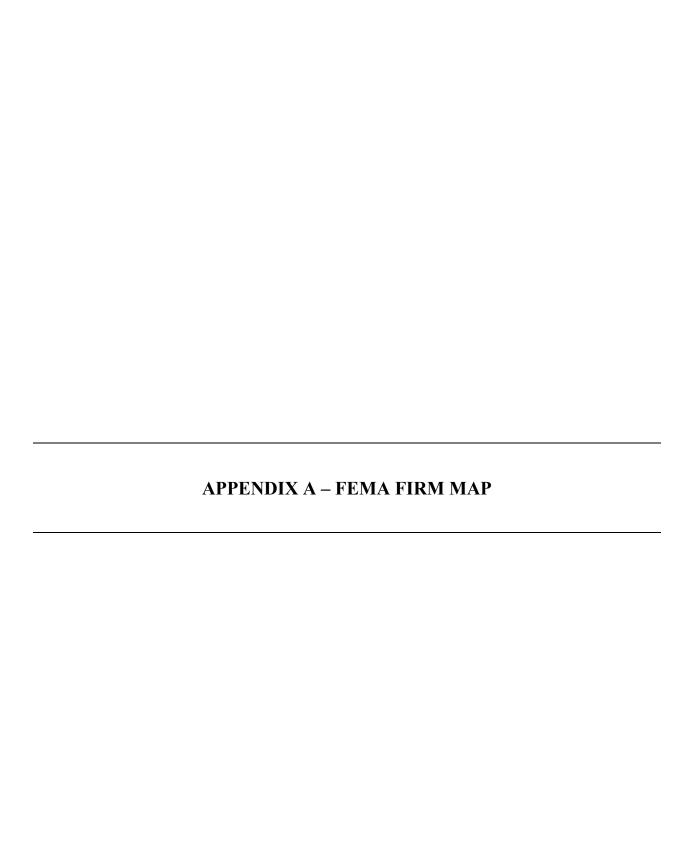
RETENTION	VOLUME	DRYWELLS
BASIN	PROVIDED	REQUIRED
ID	(cf)	(SF)
1	12,605	1
2	24,263	2
3	4,784	1
TOTAL	41,651	4

Existing Basin 4 is a one-foot temporary basin and will not need a drywell.

4.0 CONCLUSIONS

The proposed Happy Valley Recycling and Transfer Facility project will adhere to Maricopa County onsite drainage criteria to retain the 100-year, 2-hour storm onsite within the proposed retention basins. Retention basins are to have a maximum ponding depth of 3-feet and 4:1 side slopes unless otherwise approved by the County Engineer.

The low outfall elevation for the Site is located on the southwest side of the property at an elevation of 1296.49. The finished floor for the development is 1307.00 and the bottom of the transfer station pit is 1303.00. Offsite flows will be conveyed through the Site through a four 24-inch storm drains and will exit the property at existing outfall locations.



To obtain more detailed information in areas where Base Flood Elevations (FFE) and/or floodways have been detailed, used as enchanged to consult me Flood Pointes and Floodway Data and/or Summary of Stimster Elevations than Enchanted within the Pool insurance Study (FSE) input that accompanies makes conserved within the Pool insurance Study (FSE) input that accompanies for flood which lost of the Elevation Study (FSE) in that it also accompanies of the Pool insurance Study (FSE) in the Insurance of the Insurance of Insurance and Insurance in Insurance of Insurance information. Accordingly, thou development are series in the FSE sport should be unitiest in conjunction with the FFIM for purposes of construction and/or floodpian management. NOTES TO USERS
This map is for use in administering the Nation Flood Insurance Program. It not necessarily definity has east subject to lifoding, particularly from local dra sources of small size. The community map repository should be consulte possible updated or additional food hazard information.

Coastal Base Flood Elevations shown on this map apply only landward of (
North American Vendor Dalam of 1988) (AVOV 38), Users of this Filth's should
aware that coastal lood elevations are also provided in the Summary of Stilware
Elevations ables in the Tood Insurance Study reduced to the summary
Elevations shown in the Summary of Stilware Itself elevations shown in the Summary of Stilware Itself elevations table should be used onderstood and or indeptien management purposes when they are higher the elevations that when they are higher the elevations that when they are higher the elevations that the summary of the summary of Stilware Itself elevations that the summary of Stilware Itself elevations that the summary of the summary of

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydradiic considerations with regard to requirements of the National Flood insurance Program. Roodway widths and other pertinent Boodway data are provided in the Flood insurance Shudy report for this principlent. Broad insurance Shudy report for this principlent. The control structures Relief to Section 2.4 Flood Protection Research of the Flood insurance Shudy report for information on flood control structures for this

(2)

The projection used in the preparation of this map was Arizona State Plane Coderial zone (FIPSZONE COSC). The inductorial datum was NAD 87 HARN, GRISt990 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of PIRMs for addisony jurisdictions may result in slight positional differences in map feature across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of of 1988 RNVD 881. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Map users visiting to obtain flood elevations referenced to the National Geodetic Vertical Datum of 1989 (MGVD 29) may use the following Marricopa County, website application; mtp://www.tcd.marcopa.gov/Maps/genmaps.apps/glaca.application.ndoc.cfm

To obtain current elevation, description, and/or location information for Natio Geodetic Survey better marks shown on this map, please contact the information Services Bearch of the National Geodetic Survey at (201) 713-5242, or veix website at the/privensity and ago, 10 obtain information about Geodetic Bearch of Description and Cadestain Survey bench marks produced by the Macros County Department of Transportation, please visit the Flood Control District Marcropa County veelste at such supplication of produced by the Macros Harrison and County veelste at supplication of Control District Marcropa County veelste at supplication index.cfm. This web tool allows users to obtain point-specific datum conversion values zooming in and hovering over a VERTOOK checkbook on the layers menu on left side of the screen. The VERTOOK grid referenced in this web application also used to convert existing flood elevations from NGVD 29 to NAVD 88.

(3) get

Base map information shown on this FIRM was derived from multiple sources Aseit Improp was provided in Sight Internal by the Markota County Department of Public Works, Flood Control District. The Imagery is claded Coston 2009 in November 2009, Additional Malacinel Adjusted Imagery is claded Coston 2009 in November 2009, Additional Malacinel Adjusted Imagery is claded 2009 in November 2009, Additional Sight Imagery County Imagery County Imagery The controlled system and to the product of the digital FirMs is State Plan Account Control March 2009.

The profile baseline depicted on this map represents the hydraulic mod baselines that mach froot profiles in the FSI report. As a result of impri topographic data, the profile baseline, in some cases, may devide signific from the channel centerine or appear outside the SFHA.

neare occurred stitler this map was published, map users should contact appropriate community officials to verify current corporate lamb (bostlows even to the separately partied flags index for an overview map of the county showing the layout of map pareles; community map repository addresses; and a Listing of Communities table containing National Flood insurance Program community is located. Corporate limits shown on this map are based on the best data available at the lime of publication. Because fraings et due in amenations or de-amenations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit bactions.

For information on available products associated with this FIRM, visit the Map Service Center (MSC) visited as if they investigate any explanate produces may include previously issued Letters of high Chinnys, a Froot insurance Study Report, or digital visitions of this map. Many of these products can be ordered or obtained develty from the website.

If you have questions about this map, how to order products, or the National Flood insurance Program in general, please call the FEMA Nap information e-Achienge (HNIX) at 1-477-436-2627) or visit the FEMA websites at http://www.fema.com/.

Avess of 0.2% aroual chance flood; area of 1% aroual chance flood with artistic delices than 1 foot or with distings areas less than 1 foot or with distings areas less than 1 stodare mile; and areas protected by levees from 1% aroual chance Chance depths of 1 to 3 feet (usually sheet flow on sloping terms depths determined. For areas of alluvial fan flooding, veloc SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT INUNDATION BY THE 1% ANNUAL CHANCE FLOOD For community map revision history prior to countywide mapping, refer to the Map History table located in the Flood Insurence Study report for this jurisdic weas determined to be outside the 0.2% annual chance weeks in which flood hazards are undetermined, but possitives To determine if flood insurance is available in this community, contain agent or call the National Plood Insurance Program at 1-800-658-6620. OTHERWISE PROTECTED AREAS (OPAs) is the channel of a stream plus any adjacent reproachment so that the 1% annual chance if reases in flood heights. FLOODWAY AREAS IN ZONE AE OTHER FLOOD AREAS 513 Site

5000-foot grid bids: Articona system, central zone (FIPSZONE)

MAP NUMBER 04013C1230L

FIRM FLOOD INSURANCE RATE MAP

PANEL 1230L

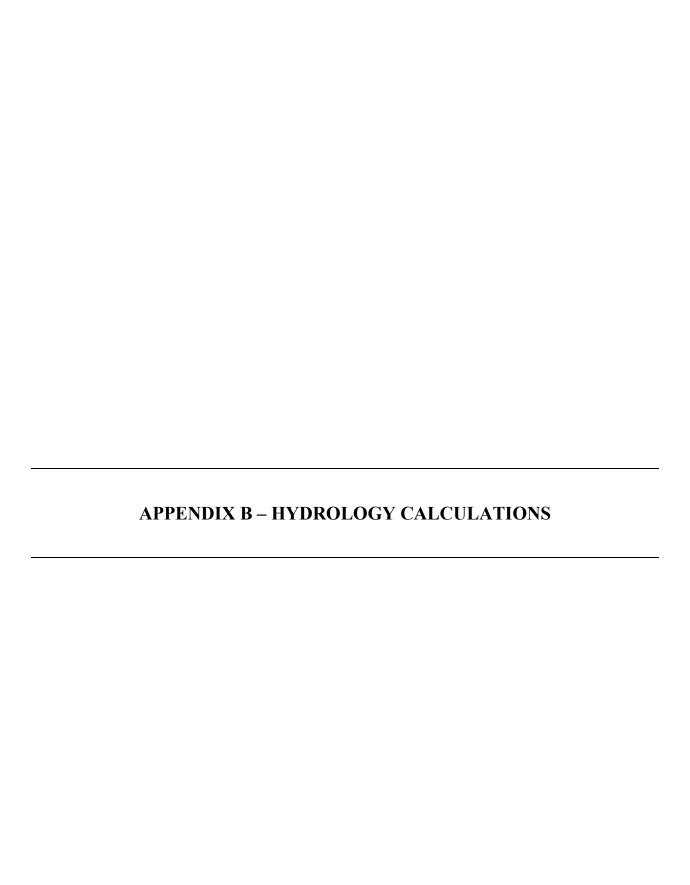
MAP SCALE 1"= 1000'

MARICOPA COUNTY,

AND INCORPORATED AREAS

ARIZONA

PANEL 1230 OF 4425



Project Name: West Wing Recycling and Transfer Station

CEC JOB: 312-017 DATE: 06/16/2021 PREPARED BY: KA CHECKED BY:

EXISTING CONDITIONS RUNOFF CALCULATIONS

Empirical Equation Papadakis and Kazan:

$$T_c = 11.4L^{0.5}K_b^{0.52}S^{-0.31}i^{-0.38}$$

 $Tc=11.4L^0.5*Kb^0.52*S^(-0.31)*i^(-0.38)$

Time of Concentration

Length of the hydraulically longest flow path

Watershed resistance coefficient (Table 5.3, DDMMC,

Vol. I Hydrology)

Watercourse slope

S ft/mi

The average rainfall excess intensity

i inches/ hr

Tc Drainage Area : EX1					
A (ac)	12.89				
L (mi)	0.16				
m	-0.01375				
Ъ	0.08				
Kb=mlogA+b	0.065				
S (ft/mi)	35.45787546				
i (in/hr)	5.72				
Tc (min)	11.06				

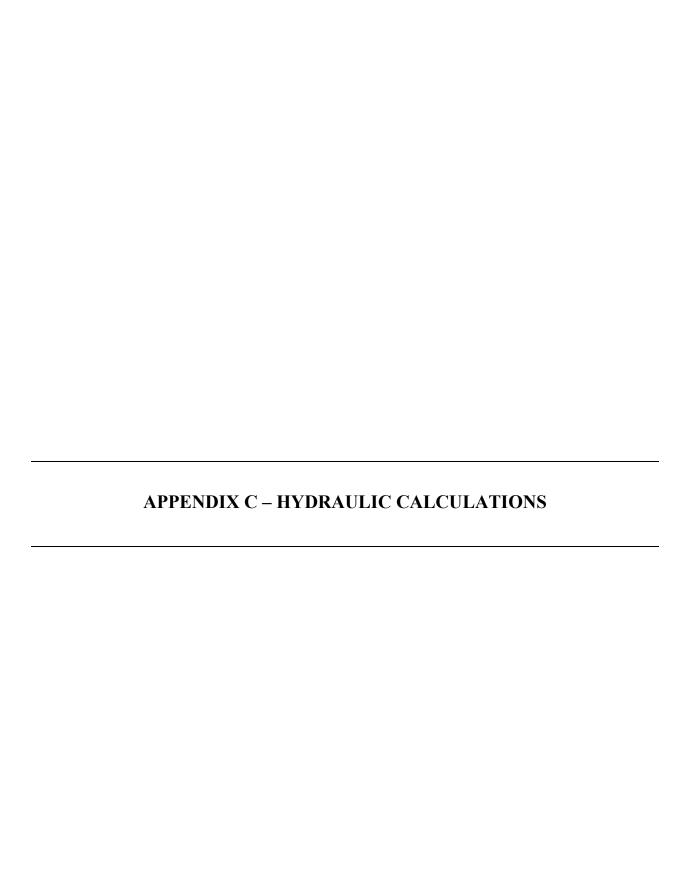
Rational Equation:

O = C*I*A

C = weighted

I= Intensity, in/hr A = Area, Acre

EXISTING CONDITIONS PEAK FLOW						
AREA	AREA	Tc	I100	C100	Q100	
I.D.	(ac)	(min.)	(in/hr)		(cfs)	
EX1	12.89	11.06	5.72	0.51	37.55	



Culvert Report

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

= 1304.32

= 40.00

= 50.00

Wednesday, Jun 16 2021

= 1.24

= Outlet Control

24-inch Storm Drains

Top Elevation (ft)

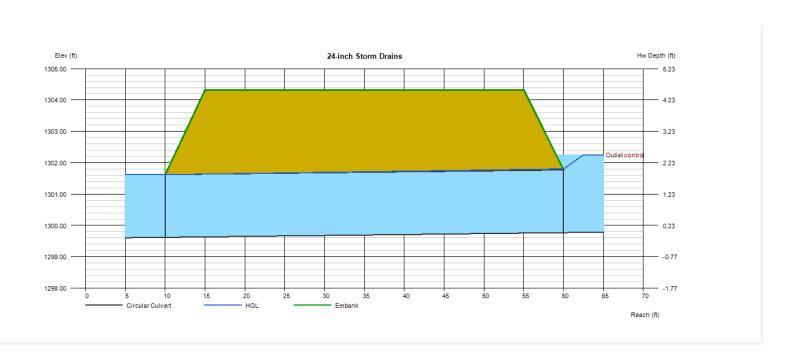
Top Width (ft)

Crest Width (ft)

Invert Elev Dn (ft)	= 1299.62	Calculations	
Pipe Length (ft)	= 50.00	Qmin (cfs)	= 55.00
Slope (%)	= 0.30	Qmax (cfs)	= 55.00
Invert Elev Up (ft)	= 1299.77	Tailwater Elev (ft)	= Normal
Rise (in)	= 24.0		
Shape	= Circular	Highlighted	
Span (in)	= 24.0	Qtotal (cfs)	= 55.00
No. Barrels	= 4	Qpipe (cfs)	= 55.00
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	 Circular Corrugate Metal Pipe 	Veloc Dn (ft/s)	= 4.38
Culvert Entrance	= Headwall	Veloc Up (ft/s)	= 4.38
Coeff. K,M,c,Y,k	= 0.0078, 2, 0.0379, 0.69, 0.5	HGL Dn (ft)	= 1301.62
		HGL Up (ft)	= 1301.81
Embankment		Hw Elev (ft)	= 1302.25

Hw/D (ft)

Flow Regime



Channel Report

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

Wednesday, Jun 16 2021

4' Wide Curb Opening

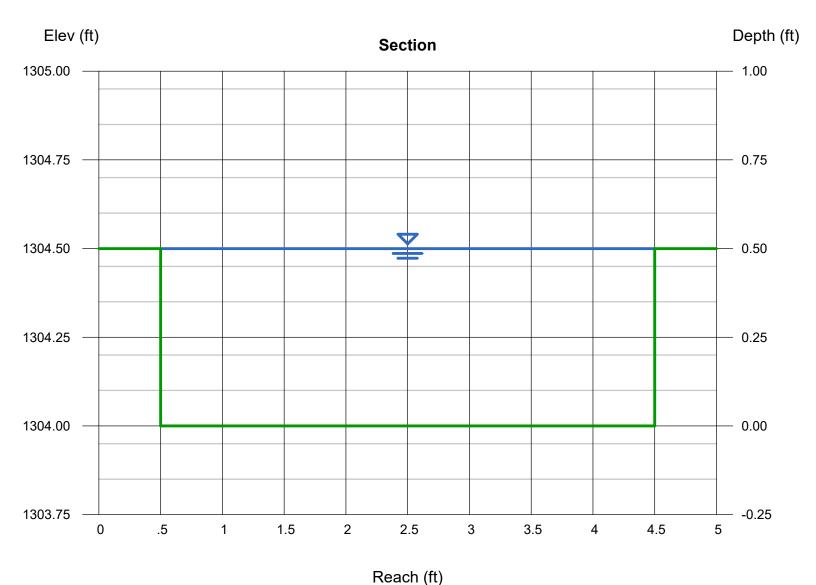
Rectangular Bottom Width (ft) = 4.00Total Depth (ft) = 0.50

Invert Elev (ft) = 1304.00Slope (%) = 1.00N-Value = 0.013

Calculations

Known Depth Compute by: Known Depth (ft) = 0.50

Highlighted		
Depth (ft)	=	0.50
Q (cfs)	=	12.41
Area (sqft)	=	2.00
Velocity (ft/s)	=	6.20
Wetted Perim (ft)	=	5.00
Crit Depth, Yc (ft)	=	0.50
Top Width (ft)	=	4.00
EGL (ft)	=	1.10



Channel Report

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

Wednesday, Jun 16 2021

6' Wide Curb Opening

Rectangular	
Bottom Width (ft)	= 6.00
Total Depth (ft)	= 0.50

Invert Elev (ft) = 1304.00 Slope (%) = 1.00 N-Value = 0.013

Calculations

Compute by: Known Depth Known Depth (ft) = 0.50

Highlighted = 0.50Depth (ft) Q (cfs) = 19.49Area (sqft) = 3.00Velocity (ft/s) = 6.50Wetted Perim (ft) = 7.00Crit Depth, Yc (ft) = 0.50Top Width (ft) = 6.00EGL (ft) = 1.16

