MASTER DRAINAGE STUDY
for

SHARP MMC CAMPUS REDEVELOPMENT

PACKAGE 1A UTILITY RE-ROUTE
PACKAGE 3A MARY BIRCH EXPANSION
PACKAGE 4 ED EXPANSION
PACKAGE 5A NEW CEP
PACKAGE 7A NEW TOWER
PACKAGE 8 CONCOURSE ADDITION

Prepared By:

BWE

STRUCTURAL ENGINEERING • CIVIL ENGINEERING • SURVEYING • LAND PLANNING

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APPROVED
E. Landeros
Development Services Department
8-25-22

Date: July, 2022

PROJECT NAME	PKG #	ADDRESS	LEGAL DESCRIPTION	PROJECT NO.	DWG NO..
ED EXPANSION	4	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976.	694841	42503
NEW CEP	5A	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976. AND A PORTION OF PUEBLO LOT 1199 OF MISCELLENOUS MAP NO. 36 FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY NOVEMBER 14,1921.	694839	42504
UTILITY RE-REOUTE	1	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976	N/A	N/A

PROJECT NAME	PKG #	ADDRESS	LEGAL DESCRIPTION	PROJECT NO.	DWG NO..
MARY BIRCH EXPANSION	3A	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976. AND A PORTION OF PUEBLO LOT 1199 OF MISCELLENOUS MAP NO. 36 FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY NOVEMBER 14,1921.		
NEW TOWER	7A	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976.		
CONCOURSE ADDITION	8	7901 FROST STREET SAN DIEGO, CA-92123	PARCEL 1 OF PARCEL MAP NO. 5131 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILLED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, SEPTEMBER 24, 1976.		

DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE CIVIL 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 DESIGN.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWING AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

July 20, 2022

MICHAEL A. SLAWSON — DATE:
R.C.E. # 56127
EXP. 12/31/2022

Table of Contents

Appendices

1. Purpose

The purpose of this drainage study is to analyze the existing and proposed drainage patterns, and peak flow rates for the Sharp MMC Campus redevelopment site in the City of San Diego, California. This study also provides recommendation(s) to mitigate drainage impacts due to the redevelopment. Post development peak flow rates are mitigated to their predevelopment condition level for this purpose.

To determine the drainage impacts of the proposed redevelopment on the existing drainage patterns, the pre- and post-peak flow rates are analyzed and compared for the 100-year storm event using the Rational Method. 50-year storm event is also analyzed to perform the hydraulic analysis of the proposed storm drain system within the public Right of Way. This report has been prepared in accordance with the requirements of the City of San Diego Hydrology Manual.

2. Project Background

This multi-phased development project will be constructed in a series of "Packages" corresponding to similarly named grading plan submittals.

This study covers Package 4 Stephen Birch/Emergency Department Expansion, which in addition to Package 5A New Central Plant, have been submitted and been reviewed by the City under SCR project number 677608 for CUP 11504/PDP 11505-88-0253/88-1297.

Package 3A Mary Birch Addition, Package 7A New Tower, and Package 8 Concourse Area, which have been submitted and reviewed as a Conditional Use Permit (CUP) and Planned Development Permit (PDP) amendment.

This report's Proposed Condition calculations analyze the ultimate built-out condition of all Packages.

The Federal Emergency Management Agency (FEMA) categorizes the project site as Zone X, where Zone X is area determined to be outside the 500-year floodplain. Appendix E illustrates the FEMA floodplain mapping within the vicinity of the project site.

The site does not consist of, nor will this project disturb any Waters of the United States. Therefore, the site is not subject to the Regional Water Quality Control Board requirements under the Federal Clean Water Act Section 401 or 404.

3. Existing Condition

The existing site is located at the southeast corner of the intersection of Health Center Drive and Frost Street in the City of San Diego, CA 92123 in San Diego, California. See Appendix A for Vicinity and Imagery Maps.

Most of the site area is already developed and covered mainly by buildings, pavements, walkways and landscaping. Site topography is relatively flat and generally slopes from east to west and north to south. Northerly portion of the site drains to northwest corner of the site via an existing storm drain system prior to discharging offsite. Majority of the southerly portion of the site surface flows to Birmingham Way via an existing curb outlet. The runoff from the proposed central plant site discharges west via an existing storm drain system.

The hydrology of the site area can be analyzed at five distinct Discharge Points as described in the following paragraphs.

Discharge Point #1 is the confluence point for runoff from the central part of the site. The existing Central Energy Plant (CEP), existing tower, and loading dock areas contribute to this point. An existing 24" storm drain system collects runoff from this area and discharges west in the current condition, and ultimately to Mission Bay via Tecalote Creek. However, historical topographic maps indicate that this area used to surface flow south to Birmingham Way and the San Diego River.

Discharge Point #2 is located the intersection of Birmingham Way and Meadow Lark Drive. This location currently receives runoff from the asphalt roadway and adjacent buildings south of the existing loading dock, as well as the existing surface parking lot west of the Sharp Knollwood Building. There are currently two minor discharge points at this location – one at Meadow Lark Drive and one at Birmingham Way. However, based on the historic drainage pattern these two minor discharge points are analyzed as a single discharge point in Birmingham Way. Drainage Basin "A" is associated with Discharge Point 2.

Discharge point #2 is further divided into 3 different discharge points for analysis purposes. These discharge points are designated as 2.1, 2.2 and 2.3. Discharge point 2.1 is located at the existing curb outlet whereas, discharge points 2.2 and 2.3 are located at the existing driveways.

Discharge Point #3 is analyzed near the intersection of Frost Street and Health Center Drive. The existing Stephen Birch building, parking structure south of Frost Street, emergency drop-off, and ambulance parking areas contribute runoff to this discharge point. Drainage Basin "C" is associated with Discharge Point 3.

Discharge Point #4 receives runoff from the existing Emergency Room Building roof and flows towards Health Center Drive via an existing storm drain. Drainage Basin "D" is associated with Discharge Point 4.

Discharge Point #5 is located in the asphalt parking lot southwest of the Sharp Rehabilitation Center. This area receives runoff from the portable building south of the Rehabilitation Center, and surrounding asphalt parking lot. Drainage Basin "E" is associated with Discharge Point 5.

See Appendix B for Existing Condition Hydrology Map.

4. Proposed Improvements

The major redevelopment activities include, but are not limited to, clearing and grubbing vegetation, demolition, construction of new buildings (Stephen Birch Addition, Mary Birch Addition, New Tower, Concourse Addition, Central Plant), paved parking, walkways, streets, and landscaping. The demolition activities include mainly the removal existing building and the concrete/asphalt pavements.

The associated improvements will also include drainage improvements, and construction of Best Management Practices (BMPs). BMPs such as biofiltration, and detention basins are proposed to control pollutant and hydromodification impacts respectively. Detention is proposed because the site must comply with the requirements of hydromodification management and mitigate the peak flow rates. Runoff from the site does not discharge to an exempt system for hydromodification management.

The site is designed to maintain the historical on-site drainage pattern. The runoff from the site will continue to discharge to the existing discharge locations, with the exception of Discharge Point #1 which is diverted to Discharge Point #2 to match historical patterns.

Because the peak flow rate from the site is mitigated in the proposed condition, the redevelopment will not create drainage impacts to the existing receiving storm drain system.

Discharge Point #1 is eliminated in the proposed condition. The runoff that was contributing to this point in the existing condition is directed south to Birmingham Way via the proposed storm drain system.

Discharge Point #2 is the confluence point for site runoff for the area situated south of the new tower and existing parking structure near Frost Street. The runoff from existing central plant building, proposed new tower, Mary Birch addition, associated surface parking, and new loading dock areas contribute to this point. Runoff from the new tower, loading dock, and adjacent asphalt roadway collect near the loading dock and are pumped to a Biofiltration BMP which discharges to a proposed 18” storm drain. The storm drain flows south and connects to an existing curb inlet in Birmingham Way. Drainage Basin “A” is associated with Discharge Point #2.

Discharge point #2 is further divided into 2 different discharge points for analysis purposes. These discharge points are designated as 2, and 2.1. Discharge point 2.1 is located at the existing curb outlet whereas, discharge points 2 is located at the storm drain cleanout at node 107. In the ultimate condition, the existing curb outlet is not utilized for conveyance of onsite flow. Majority of the site runoff is directed to the BMPs. Therefore, only the

runoff due to direct precipitation over the area of existing ditch (A=0.006 ac) situated upstream is conveyed via this outlet.

Discharge Point #3 continues to receive stormwater from the northwest portion of the site, as in the existing condition. The existing Stephen Birch building, new Stephen Birch building addition, parking structure south of Frost Street, emergency drop-off, and ambulance parking areas contribute runoff to this discharge point. Two proposed storm drains run west along Frost Street, one connected directly to the existing storm drain system at health center drive, and one which is routed though BMPs for pollutant and hydromodification control. Discharge Point #3 is associated with Grading Package 4.

Discharge Point #4 receives runoff from the proposed concourse area and is piped west towards Health Center Drive via an existing and proposed storm drain system. Drainage Basin "D" is associated with Discharge Point #4 and Grading Package 8.

Discharge Point #5 receives runoff from the proposed Central Energy Plant and surrounding asphalt parking lot. A Modular Wetland Biofiltration BMP and underground vault pollutant and hydromodification mitigation for this area. Drainage Basin "E" and Grading Package 5A are associated with Discharge Point #5.

See Appendix C for Proposed Conditions Hydrology Map.

5. Soil Characteristics

Hydrologic analysis is performed by utilizing soil type D. Soil type D has higher runoff potential.

See Appendix D for soil map.

6. Methodology

Rational Method: A rational method analysis was utilized to perform hydrologic calculations in this study.

Rational Equation: $Q = C * I * A$

Where;
Q = Peak discharge, cfs
C = Rational method runoff coefficient
I = Rainfall intensity, inch/hour
A = Drainage area, acre

A computer model CivilD is used to automate the hydrology analysis process. This computer version of the rational method analysis allows user to develop a node-link model of the watershed. CivilD computer program has the capability of performing calculations

utilizing mathematical functions. These functions are assigned code numbers, which appear in the printed results. The code numbers and their corresponding functions are described below;

Sub area Hydrologic Processes;

Code 1 - INITIAL subarea input, top of stream
Code 2 - STREET flow through subarea, includes subarea runoff
Code 3 - ADDITION of runoff from subarea to stream
Code 4 - STREET INLET + parallel street & pipe flow + area
Code 5 - PIPEFLOW travel time (program estimated pipe size)**
Code 6 - PIPEFLOW travel time (user specified pipe size)
Code 7 - IMPROVED channel travel time (open or box)**
Code 8 - IRREGULAR channel travel time**
Code 9 - USER specified entry of data at a point
Code 10 - CONFLUENCE at downstream point in current stream
Code 11 - CONFLUENCE of mainstreams
**NOTE: These options do not include subarea runoff
**NOTE: (#) - Required pipe size determined by the hydrology program

7. Calculations

a. Impervious and Pervious Areas

The impervious and pervious areas are calculated for both the existing and proposed site conditions. A summary is shown in Table 7-1.

Table 7-1 Summary of Areas

Discharge Point #1 & 2

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	5.54	5.00	0.54	90.3%	9.7%
Proposed	5.35	4.32	1.03	80.7%	19.3%
Percentage Change		**-13.6%**	**90.7%**		

Discharge Point #3

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	2.50	2.00	0.50	80.0%	20.0%
Proposed	2.40	1.93	0.47	80.4%	19.6%
Percentage Change		**-3.5%**	**19.6%**		

Discharge Point #4

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	0.46	0.41	0.05	89.1%	10.9%
Proposed	0.95	0.72	0.23	75.8%	24.2%
Percentage Change		**75.6%**	**360.0%**		

The increase in impervious area in proposed condition is due to a minor diversion of additional impervious area to Discharge Point #4 in proposed condition.

Discharge Point #5

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	2.00	1.60	0.40	80.0%	20.0%
Proposed	2.00	1.68	0.32	84.0%	16%
Percentage Change		**5.0%**	**-20.0%**		

b. Runoff Coefficient

The coefficients of runoff for the site are determined by utilizing Table A-1 of the City of San Diego Drainage Design Manual by assuming commercial type land use and soil type D. Similar assumptions are made for both the existing and proposed conditions. Following equation is used to determine the revised C value.

$$\text{The "Revised C" value} = \frac{\text{(Actual Percentage of Impervious Area)}}{(80\%)} \times (0.85)$$

Example:

Actual Imperviousness = 77%

Tabulated Imperviousness = 80%

	Revised C =	(77 /80)*0.85
	C =	0.82

Table 7-2 Existing and Proposed Runoff Coefficient Value Summary

	Runoff Coefficient	
Discharge Point(s) #	**Existing Condition**	**Proposed Condition**
1	0.96	0.86
2	0.96	0.86
3	0.85	0.85
4	0.95	0.81
5	0.85	0.89

See Appendices B and C for the runoff coefficient calculations.

c. Peak Flow Rates

The rational method is used to perform the hydrologic analysis. The CivilD computer program, which utilizes the rational method of analysis, is used to determine peak flow rates in this study.

The peak flow rates for the 100-year storm event are calculated for both existing and proposed conditions and results are summarized in Table 7-3 for comparison purpose. The existing and proposed condition results (CivilD results) are located in Appendices B and C respectively.

Table 7-3 Existing and Proposed Conditions Peak Flow Rates Summary

Discharge Points #1 & 2

	Drainage Area (acres)		100 Yr Flow (cfs)		
Discharge Point(s) #	**Existing Condition**	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
1	3.34	-	17.45	-	**-**
2	2.20	5.35	8.37	24.36	**-**
Total	5.54	5.35	25.82	24.36	**-5.65%**

In the proposed condition the unmitigated peak flow rate due to the 100-year storm event can be expected to decrease by 1.46 cfs.

Discharge Point #3

Drainage Area (acres)		100 Yr Flow (cfs)		
Existing Condition	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
2.50	2.46	11.10	11.21	**0.99%**

In the proposed condition the unmitigated peak flow rate due to the 100-year storm event can be expected to increase by 0.11 cfs.

Discharge Point #4

Drainage Area (acres)		100 Yr Flow (cfs)		
Existing Condition	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
0.46	0.95	2.88	5.32	**84.72%**

In the proposed condition the unmitigated peak flow rate due to the 100-year storm event can be expected to increase by 2.44 cfs.

Discharge Point #5

Drainage Area (acres)		100 Yr Flow (cfs)		
Existing Condition	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
2.00	2.00	9.85	10.02	**1.73%**

In the proposed condition the unmitigated peak flow rate due to the 100-year storm event can be expected to increase by 0.17 cfs.

A slight increase in peak flow rate for most discharge points in the proposed conditions is primarily due to the increase in impervious area.

Discharge and velocity are calculated at each discharge/outlet location. Results are tabulated below for discharge point 2 only. Refer to existing and proposed condition hydrology exhibits for discharge & velocity for other outlet locations.

Discharge Point 2 (Existing Condition): In the existing condition discharge point #2 is further divided into 3 distinct discharge points 2.1, 2.2, and 2.3. Discharges and velocities are tabulated below.

			100 Yr Storm	
Discharge Point(s) #	**Outlet Description**	**Area (ac)**	**Discharge (cfs)**	**Velocity (fps)**
2.1	Existing Curb-Outlet	0.48	1.40	3.33
2.2	Existing Driveway	0.87	2.52	1.75
2.3	Existing Driveway	0.85	2.78	3.41

Discharge Point 2 (Proposed Condition): In the proposed condition discharge point #2 is further divided into 2 distinct discharge points 2, and 2.1. Discharges and velocities are tabulated below.

			100 Yr Storm	
Discharge Point(s) #	**Outlet Description**	**Area (ac)**	**Discharge (cfs)**	**Velocity (fps)**
2	Proposed Cleanout	5.35	8.13	7.51
2.1	Existing Curb-Outlet	0.006	0.03	0.50

d. Detention & Mitigated Flow Rates

The peak flow rate will be mitigated by routing the flow through underground detention basins. Detention basins are proposed to control hydromodification impacts due to redevelopment. These detention basins will also be utilized to rout and mitigate the peak flow rate for the 100-yr storm event and are summarized in Table 7-4.

Table 7-4 Detention Summary Table

		100-yr Detention Flow Rate (cfs)			Approx. 100-yr Detention Volume Required (cf)	Detention Volume Provided (cf)
		Inflow	Outflow	Detained		
Discharge Location 2	**BMP #3**	11.80	1.48	10.32	16,448	16,910
Discharge Location 2	**BMP #4**	3.74	2.09	1.65	3,404	5,453
Discharge Location 2	**BMP #10**	3.00	0.34	2.66	3,131	3,496
Discharge Location 3	**BMP #5**	5.10	0.36	4.74	5,050	5,667
Discharge Location 4	**BMP #12**	5.30	2.12	3.18	4,634	4,679
Discharge Location 5	**BMP #8**	9.72	4.44	5.28	9,802	10,013
	Total	38.66	10.82	27.84	42,469	46,218

The peak flow rates for the 100 year storm event are calculated for mitigated conditions with detention are summarized in Table 7-5 for comparison purpose. Results are presented separately for discharge points #1/#2 and #4.

Table 7-5 Existing and Proposed Conditions Peak Flow Rates Summary

Discharge Points #1 & 2

	100 Yr Flow (cfs)			
Discharge Point(s) #	**Existing Condition**	**Proposed Condition (Unmitigated)**	**Proposed Condition (Mitigated)**	**% Change from Existing Condition**
1	17.45	-	-	**-**
2	8.37	24.36	9.73	**-**
Total	25.82	24.36	9.73	**-62.32%**

In the proposed condition the mitigated peak flow rate due to the 100-year storm event and detention provided BMPs #3,#4 and 10 can be expected to decrease by 16.09 cfs.

Discharge Point #3

100 Yr Flow (cfs)			
Existing Condition	**Proposed Condition (Unmitigated)**	**Proposed Condition (Mitigated)**	**% Change from Existing Condition**
11.10	11.21	6.74	**-39.28%**

In the proposed condition the mitigated peak flow rate due to the 100-year storm event and detention provided BMP #5 can be expected to decrease by 4.36 cfs.

Discharge Point #4

100 Yr Flow (cfs)			
Existing Condition	**Proposed Condition (Unmitigated)**	**Proposed Condition (Mitigated)**	**% Change from Existing Condition**
2.88	5.32	2.12	**-26.39%**

In the proposed condition the mitigated peak flow rate due to the 100-year storm event and detention provided BMP #12 can be expected to decrease by 0.68 cfs.

Discharge Point #5

100 Yr Flow (cfs)			
Existing Condition	**Proposed Condition (Unmitigated)**	**Proposed Condition (Mitigated)**	**% Change from Existing Condition**
9.85	10.02	4.74	**-51.88%**

In the proposed condition the mitigated peak flow rate due to the 100-year storm event and detention provided BMP #8 can be expected to decrease by 5.11 cfs.

Hydraulic Analysis of 18" System: There are no existing storm drain system in the proximity of discharge point #2 where proposed underground detention structures/vaults can be connected utilizing gravity system. Therefore site runoff from discharge point #2 is connected to a first curb inlet situated within RoW of Birmingham Way approximately 285 feet south of the site. Approximately, 5.52 acres of site area is tributary to this system.

18" storm drain system is proposed at this point because of two reasons, 1) it is situated within the public right of way of Birmingham Way, a minimum pipe size and material within public RoW is 18" RCP, 2) the receiving storm drain system is 18" and larger system cannot be utilized upstream of smaller storm drain system.

The 100-yr peak flow rate for mitigated condition for Discharge Location #2 is 9.73. The 100-yr mitigated peak flow rate can be conveyed through the 18" pipe.

See appendix C for calculations.

8. Downstream Drainage Impact Analysis

The onsite drainage pattern will change in the proposed condition. The runoff will continue flowing in the same general direction as in the existing condition. New storm drain system is proposed to capture and convey runoff into detention basin for peak flow rate control and facilitate site drainage in the proposed condition.

All discharge points are designed with peak 100-year flow rates smaller than the existing peak flow rates. Detention basins are proposed to mitigate the peak flow rates. Therefore, negative downstream drainage impacts are not anticipated due to the redevelopment.

9. Conclusion

Storm water runoff from the site is collected and conveyed by a system of roof downspouts, inlets, conduits, and swales. The site is designed to mitigate the stormwater quantity (peak flow rate) impacts due to the redevelopment. New storm drain system will be designed to convey the runoff from the site. The proposed detention basins are designed to mitigate and the peak flow rate due to 100-year storm event.

Total peak 100 year flow rates in the existing and proposed conditions are 49.65 cfs and 50.91 cfs respectively. But, the mitigated condition peak flow rate from the site is 23.33 cfs.

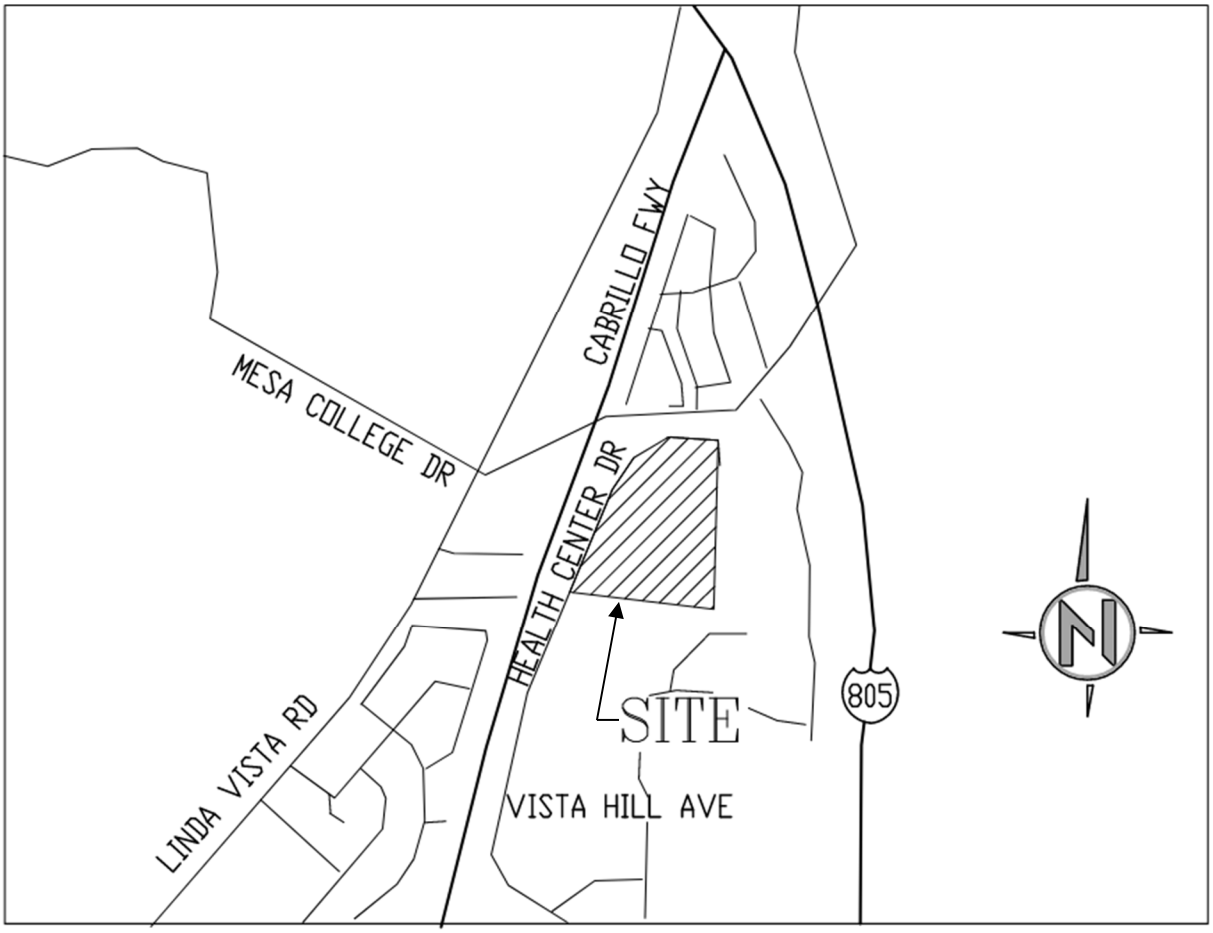
The existing drainage pattern changed slightly but runoff discharge points are maintained in the proposed condition. Since the redevelopment of the site creates slightly more impervious area as compared to existing condition the net increase in peak flow rate is minimal and adverse downstream impacts are not anticipated. Detention basins are proposed to control peak flow rates at each discharge location.

10. References

- City of San Diego, Drainage Design Manual, 2017

APPENDIX A:

Site Vicinity/Imagery Maps



VICINITY MAP

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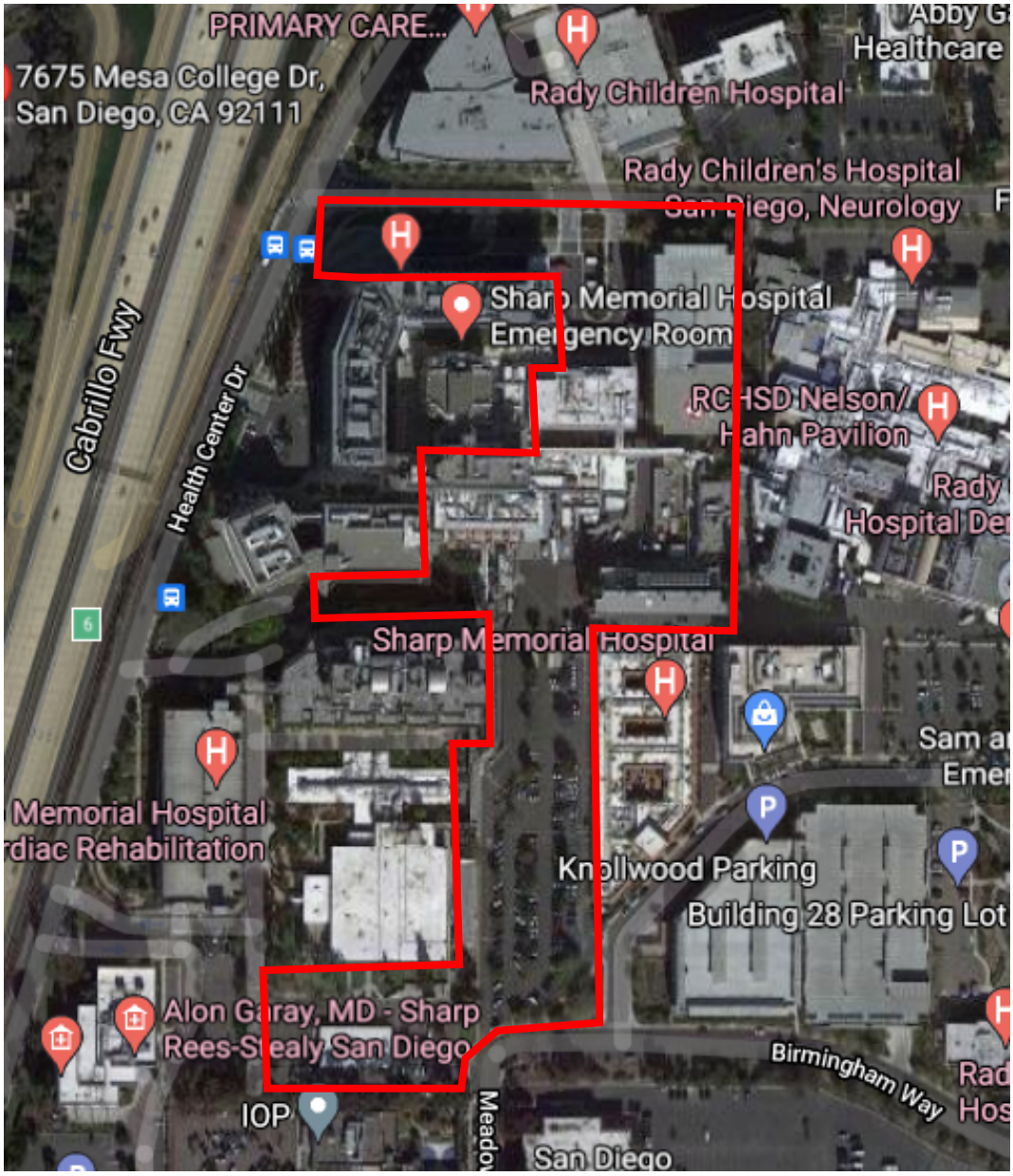

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IMAGERY MAP

APPENDIX B:

Existing Condition Runoff Coefficient Calculations
Existing Condition Hydrology Calculations
Existing Condition Hydrology Map

Runoff Coefficient Calculation (Existing Condition)

Project: Sharp MMC Redevelopment

Similar to commercial development

C = 0.85 (Per Table A-1, Soil Class D, Drainage Design Manual)

% imperviousness= 80%

Revised C= (Actual % Imp./Tabulated % Imp.)*0.85

Discharge Point #	Area (Acres)		Actual % Imperviousness	Calculated Revised Runoff Coeff. (C)	Used Runoff Coef. (C)
	Total Area	Imp. Area (Ai)			
1 & 2	5.54	5.00	90%	0.96	0.96
3	2.50	2.00	80%	0.85	0.85
4	0.46	0.41	89%	0.95	0.95
5	2.00	1.60	80%	0.85	0.85

*C value for commercial development shall not be less than = 0.5

Example:

Actual Imperviousness =	77%	(per plan)
Tabulated Imperviousness =	80%	(Commercial Land Use Per table A-1)
Revised C =	(77/80)*0.85	
C =	0.82	

CUP PACKAGES 3A, & 7 ANALYSIS

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                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 12/22/21
--------------------------------------------------------------------------
EXISTING CONDITION HYDROLOGY ANALYSIS
ANALYSIS POINT 1
100 yr Storm Event
City of San Diego
--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

--------------------------------------------------------------------------


Program License Serial Number 6116

--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
__________________________________________________________________________
User specified 'C' value of 0.960 given for subarea
Initial subarea flow distance  =   54.000(Ft.)
Highest elevation =  421.000(Ft.)
Lowest elevation =  413.000(Ft.)
Elevation difference =    8.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     0.75 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9600)*(  54.000^.5)/(  14.815^(1/3)]=   0.75
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.960
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Subarea runoff =      0.548(CFS)
Total initial stream area =        0.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.948(CFS)
Depth of flow =   0.422(Ft.), Average velocity =   5.323(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.50              0.00
        3              1.00              0.50
Manning's 'N' friction factor =   0.013
------------------------------------------------------------------
Sub-Channel flow  =      0.948(CFS)
  '     '        flow top width =      0.844(Ft.)
  '     '    velocity=    5.323(Ft/s)
  '     '        area =      0.178(Sq.Ft)
  '     '        Froude number =     2.042

Upstream point elevation =   413.000(Ft.)
Downstream point elevation =   409.000(Ft.)
Flow length =   146.000(Ft.)
Travel time  =    0.46 min.
Time of concentration =    5.46 min.
Depth of flow =   0.422(Ft.)
Average velocity =   5.323(Ft/s)
Total irregular channel flow =     0.948(CFS)
Irregular channel normal depth above invert elev. =   0.422(Ft.)
Average velocity of channel(s) =   5.323(Ft/s)

Sub-Channel No. 1 Critical depth =      0.555(Ft.)
  '     '       '     Critical flow top width =      1.000(Ft.)
  '     '       '     Critical flow velocity=    3.111(Ft/s)
  '     '       '     Critical flow area =      0.305(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.960 given for subarea
Rainfall intensity =      4.236(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      0.773(CFS) for    0.190(Ac.)
Total runoff =      1.320(CFS)  Total area =        0.32(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   406.000(Ft.)
Downstream point/station elevation =   393.000(Ft.)
Pipe length  =   255.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.320(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.320(CFS)
Normal flow depth in pipe =    3.70(In.)
Flow top width inside pipe =    8.86(In.)
Critical Depth =    6.35(In.)
Pipe flow velocity =      7.73(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =     6.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
User specified 'C' value of 0.960 given for subarea
Time of concentration =     6.01 min.
Rainfall intensity =      4.079(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      1.292(CFS) for    0.330(Ac.)
Total runoff =      2.613(CFS)  Total area =        0.65(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   393.000(Ft.)
Downstream point/station elevation =   386.370(Ft.)
Pipe length  =    89.50(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.613(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.613(CFS)
Normal flow depth in pipe =    4.92(In.)
Flow top width inside pipe =    8.96(In.)
Critical Depth =    8.40(In.)
Pipe flow velocity =     10.57(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     6.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** SUBAREA FLOW ADDITION ****
```

```
User specified 'C' value of 0.960 given for subarea
Time of concentration =     6.15 min.
Rainfall intensity =      4.042(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      0.698(CFS) for    0.180(Ac.)
Total runoff =      3.311(CFS)  Total area =        0.83(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =   386.250(Ft.)
Downstream point/station elevation =   384.390(Ft.)
Pipe length  =   218.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.311(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.311(CFS)
Normal flow depth in pipe =    7.98(In.)
Flow top width inside pipe =   14.97(In.)
Critical Depth =    8.80(In.)
Pipe flow velocity =      4.99(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =     6.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
User specified 'C' value of 0.960 given for subarea
Time of concentration =     6.88 min.
Rainfall intensity =      3.872(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      0.818(CFS) for    0.220(Ac.)
Total runoff =      4.129(CFS)  Total area =        1.05(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
User specified 'C' value of 0.960 given for subarea
Time of concentration =     6.88 min.
Rainfall intensity =      3.872(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      3.606(CFS) for    0.970(Ac.)
Total runoff =      7.735(CFS)  Total area =        2.02(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.960 given for subarea
Time of concentration =     6.88 min.
Rainfall intensity =      3.872(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.960
Subarea runoff =      4.907(CFS) for    1.320(Ac.)
Total runoff =     12.642(CFS)  Total area =        3.34(Ac.)
End of computations, total study area =           3.340 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

EXISTING CONDITION HYDROLOGY ANALYSIS
ANALYSIS POINT 2
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   200.000 to Point/Station   201.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance =   77.000(Ft.)
Highest elevation = 390.000(Ft.)
Lowest elevation = 389.000(Ft.)
Elevation difference =   1.000(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   3.62 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(77.000^.5)/(1.299^(1/3)]=   3.62
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

```
Subarea runoff =      0.448(CFS)
Total initial stream area =        0.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.157(CFS)
Depth of flow =   0.137(Ft.), Average velocity =   2.468(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             10.00              0.20
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      1.157(CFS)
  '     '        flow top width =      6.821(Ft.)
  '     '    velocity=    2.468(Ft/s)
  '     '        area =      0.469(Sq.Ft)
  '     '        Froude number =     1.660

Upstream point elevation =   389.000(Ft.)
Downstream point elevation =   385.000(Ft.)
Flow length =   156.000(Ft.)
Travel time  =    1.05 min.
Time of concentration =    6.05 min.
Depth of flow =   0.137(Ft.)
Average velocity =   2.468(Ft/s)
Total irregular channel flow =     1.157(CFS)
Irregular channel normal depth above invert elev. =   0.137(Ft.)
Average velocity of channel(s) =   2.468(Ft/s)

Sub-Channel No. 1 Critical depth =      0.168(Ft.)
  '     '       '     Critical flow top width =      8.338(Ft.)
  '     '       '     Critical flow velocity=    1.652(Ft/s)
  '     '       '     Critical flow area =      0.700(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.850 given for subarea
Rainfall intensity =      4.067(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.313(CFS) for    0.380(Ac.)
Total runoff =      1.761(CFS)  Total area =        0.50(Ac.)


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```
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
____________________________________________________________________
Estimated mean flow rate at midpoint of channel =      2.378(CFS)
Depth of flow =   0.233(Ft.), Average velocity =   1.797(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             10.00              0.20
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      2.378(CFS)
  '     '        flow top width =      9.936(Ft.)
  '     '    velocity=    1.797(Ft/s)
  '     '        area =      1.323(Sq.Ft)
  '     '        Froude number =     0.868

Upstream point elevation =   385.000(Ft.)
Downstream point elevation =   382.800(Ft.)
Flow length =   390.000(Ft.)
Travel time  =    3.62 min.
Time of concentration =    9.67 min.
Depth of flow =   0.233(Ft.)
Average velocity =   1.797(Ft/s)
Total irregular channel flow =     2.378(CFS)
Irregular channel normal depth above invert elev. =   0.233(Ft.)
Average velocity of channel(s) =   1.797(Ft/s)

Sub-Channel No. 1 Critical depth =      0.221(Ft.)
  '     '       '     Critical flow top width =      9.933(Ft.)
  '     '       '     Critical flow velocity=    1.984(Ft/s)
  '     '       '     Critical flow area =      1.198(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.850 given for subarea
Rainfall intensity =      3.415(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.016(CFS) for    0.350(Ac.)
Total runoff =      2.777(CFS)  Total area =        0.85(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     9.67 min.
```

Rainfall intensity = 3.415(In/Hr) for a 100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff = 3.919(CFS) for 1.350(Ac.)
Total runoff = 6.696(CFS) Total area = 2.20(Ac.)
End of computations, total study area = 2.200 (Ac.)

CUP PACKAGE 8 ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

EXISTING CONDITION HYDROLOGY ANALYSIS
ANALYSIS POINT 4
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   400.000 to Point/Station   401.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance =   92.000(Ft.)
Highest elevation = 399.840(Ft.)
Lowest elevation = 398.000(Ft.)
Elevation difference =   1.840(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   2.06 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(92.000^.5)/(2.000^(1/3)]=   2.06
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950

Subarea runoff = 1.918(CFS)
Total initial stream area = 0.460(Ac.)
End of computations, total study area = 0.460 (Ac.)

PACKAGE 4 (STEPHEN BIRCH ADDITION) ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

Existing Condition Hydrology Analysis
Analysis Point 3
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   300.000 to Point/Station   301.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance =   58.000(Ft.)
Highest elevation = 407.240(Ft.)
Lowest elevation = 402.000(Ft.)
Elevation difference =   5.240(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   1.65 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(58.000^.5)/(9.034^(1/3)]=   1.65
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

```
Subarea runoff =      0.149(CFS)
Total initial stream area =        0.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.895(CFS)
Depth of flow =   0.098(Ft.), Average velocity =   2.255(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             20.00              0.24
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      0.895(CFS)
  '     '        flow top width =      8.122(Ft.)
  '     '    velocity=    2.255(Ft/s)
  '     '        area =      0.397(Sq.Ft)
  '     '        Froude number =     1.797

Upstream point elevation =   402.000(Ft.)
Downstream point elevation =   396.790(Ft.)
Flow length =   156.000(Ft.)
Travel time  =    1.15 min.
Time of concentration =    6.15 min.
Depth of flow =   0.098(Ft.)
Average velocity =   2.255(Ft/s)
Total irregular channel flow =     0.895(CFS)
Irregular channel normal depth above invert elev. =   0.098(Ft.)
Average velocity of channel(s) =   2.255(Ft/s)

Sub-Channel No. 1 Critical depth =      0.124(Ft.)
  '     '       '     Critical flow top width =     10.303(Ft.)
  '     '       '     Critical flow velocity=    1.401(Ft/s)
  '     '       '     Critical flow area =      0.639(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.850 given for subarea
Rainfall intensity =      4.041(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.374(CFS) for    0.400(Ac.)
Total runoff =      1.523(CFS)  Total area =        0.44(Ac.)


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```

```
Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.15 min.
Rainfall intensity =      4.041(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.202(CFS) for    0.350(Ac.)
Total runoff =      2.725(CFS)  Total area =        0.79(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.15 min.
Rainfall intensity =      4.041(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.992(CFS) for    0.580(Ac.)
Total runoff =      4.717(CFS)  Total area =        1.37(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   396.790(Ft.)
Downstream point/station elevation =   393.400(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.717(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.717(CFS)
Normal flow depth in pipe =    6.56(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =   10.81(In.)
Pipe flow velocity =     10.74(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     6.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.25 min.
Rainfall intensity =      4.015(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.956(CFS) for    0.280(Ac.)
```

```
Total runoff =      5.673(CFS)  Total area =        1.65(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   393.400(Ft.)
Downstream point/station elevation =   392.300(Ft.)
Pipe length  =   137.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.673(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.673(CFS)
Normal flow depth in pipe =   12.02(In.)
Flow top width inside pipe =   11.96(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      5.38(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =     6.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.68 min.
Rainfall intensity =      3.915(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.666(CFS) for    0.200(Ac.)
Total runoff =      6.339(CFS)  Total area =        1.85(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   392.300(Ft.)
Downstream point/station elevation =   390.840(Ft.)
Pipe length  =   175.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.339(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.339(CFS)
Normal flow depth in pipe =   10.69(In.)
Flow top width inside pipe =   17.68(In.)
Critical Depth =   11.69(In.)
Pipe flow velocity =      5.80(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =     7.18 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      305.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     7.18 min.
Rainfall intensity =      3.810(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.550(CFS) for    0.170(Ac.)
Total runoff =      6.889(CFS)  Total area =        2.02(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      305.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     7.18 min.
Rainfall intensity =      3.810(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.425(CFS) for    0.440(Ac.)
Total runoff =      8.314(CFS)  Total area =        2.46(Ac.)
End of computations, total study area =           2.460 (Ac.)
```

PACKAGE 5A (CEP) ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

Existing Condition Hydrology Analysis
Analysis Point 5
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

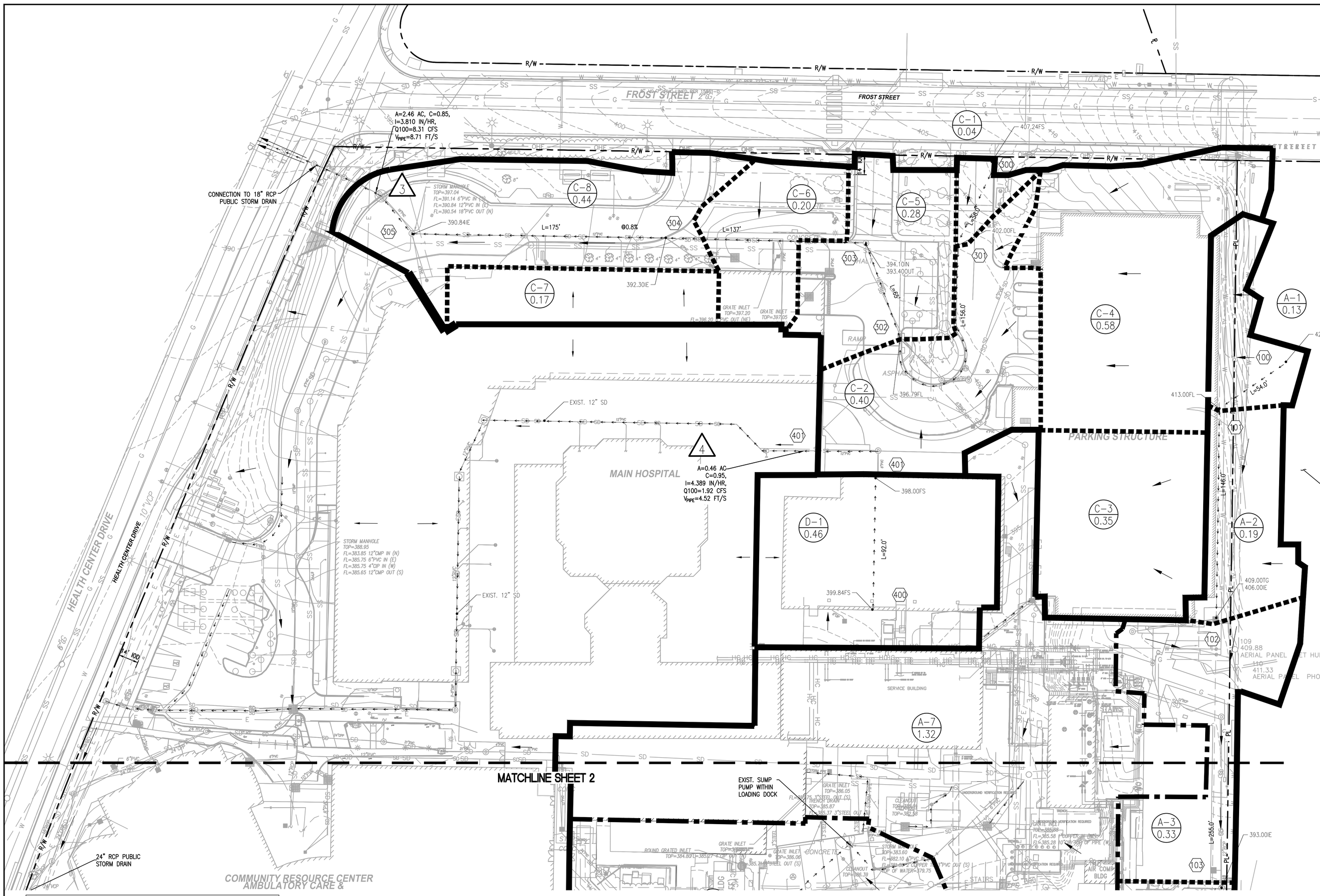
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   500.000 to Point/Station   501.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance = 200.000(Ft.)
Highest elevation = 382.500(Ft.)
Lowest elevation = 377.920(Ft.)
Elevation difference =   4.580(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   4.83 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(200.000^.5)/(2.290^(1/3)]=   4.83
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

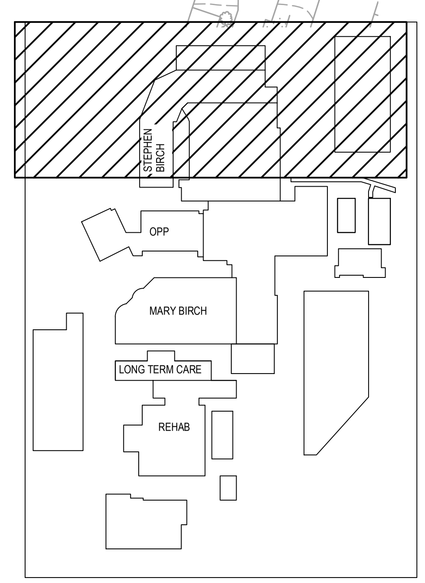
```
Subarea runoff =      1.828(CFS)
Total initial stream area =        0.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   376.520(Ft.)
Downstream point/station elevation =   373.000(Ft.)
Pipe length  =   235.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.828(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.828(CFS)
Normal flow depth in pipe =    6.69(In.)
Flow top width inside pipe =    7.86(In.)
Critical Depth =    7.42(In.)
Pipe flow velocity =      5.19(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =     5.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      502.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     5.75 min.
Rainfall intensity =      4.148(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      3.279(CFS) for    0.930(Ac.)
Total runoff =      5.107(CFS)  Total area =        1.42(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   373.000(Ft.)
Downstream point/station elevation =   371.490(Ft.)
Pipe length  =   163.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.107(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.107(CFS)
Normal flow depth in pipe =   10.35(In.)
Flow top width inside pipe =   13.88(In.)
Critical Depth =   10.99(In.)
Pipe flow velocity =      5.65(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =     6.24 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      503.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.24 min.
Rainfall intensity =      4.020(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.982(CFS) for    0.580(Ac.)
Total runoff =      7.089(CFS)  Total area =        2.00(Ac.)
End of computations, total study area =           2.000 (Ac.)
```



DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
A-1	0.13	0.96	4.389	0.55
A-2	0.19	0.96	4.236	0.77
A-7	1.32	0.96	4.907	4.91
C-1	0.04	0.85	4.389	0.15
C-2	0.40	0.85	4.041	1.37
C-3	0.35	0.85	4.041	1.20
C-4	0.58	0.85	4.041	1.99
C-5	0.28	0.85	4.015	0.95
C-6	0.20	0.85	3.915	0.67
C-7	0.17	0.85	3.810	0.55
C-8	0.44	0.85	3.810	1.43
D-1	0.46	0.95	4.389	1.92



KEY PLAN

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MSC
BWE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
EXISTING CONDITION HYDOLOGY EXHIBIT

SHEET 1 OF 3

MATCHLINE SHEET 1

MATCHLINE SHEET 3

COMMUNITY RESOURCE CENTER AMBULATORY CARE &

WOMENS CENTER

PARKING STRUCTURE

REHABILITATION BUILDING

REHABILITATION CENTER

CENTRAL PLANT

KNOLLWOOD BUILDING

SHARP HOSPITAL BUILDING

EXISTING BUILDING (384.92FF)

EXIST. SUMP PUMP WITHIN LOADING DOCK

24" RCP PUBLIC STORM DRAIN

24" PVC PRIVATE STORM DRAIN CONNECTS WITH 24" RCP PUBLIC STORM DRAIN

GRATE INLET W/SUMP PUMP
A=3.34 AC, C=0.96,
I=4.907 IN/HR,
Q100=12.64 CFS
V_{100}=7.91 FT/S

RUNOFF FROM KNOLLWOOD BUILDING NOT ANALYZED (OFFSITE AREA)

EXIST 15" PVC PRIVATE STORM DRAIN

LEGEND

LEGEND	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	306.43TG 301.33IE
HYDROLOGY NODE	200
ANALYSIS/DISCHARGE POINT	
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX

30 15 0 30 60 90
SCALE: 1"=30'

KEY PLAN

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
A-3	0.33	0.96	4.079	1.29
A-4	0.18	0.96	4.042	0.70
A-5	0.22	0.96	3.872	0.82
A-6	0.97	0.96	3.872	3.61
B-1	0.40	0.85	4.389	0.45
B-2	0.35	0.85	4.067	1.31

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
B-3	0.35	0.85	3.415	1.02
B-4	1.35	0.85	3.415	3.92

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

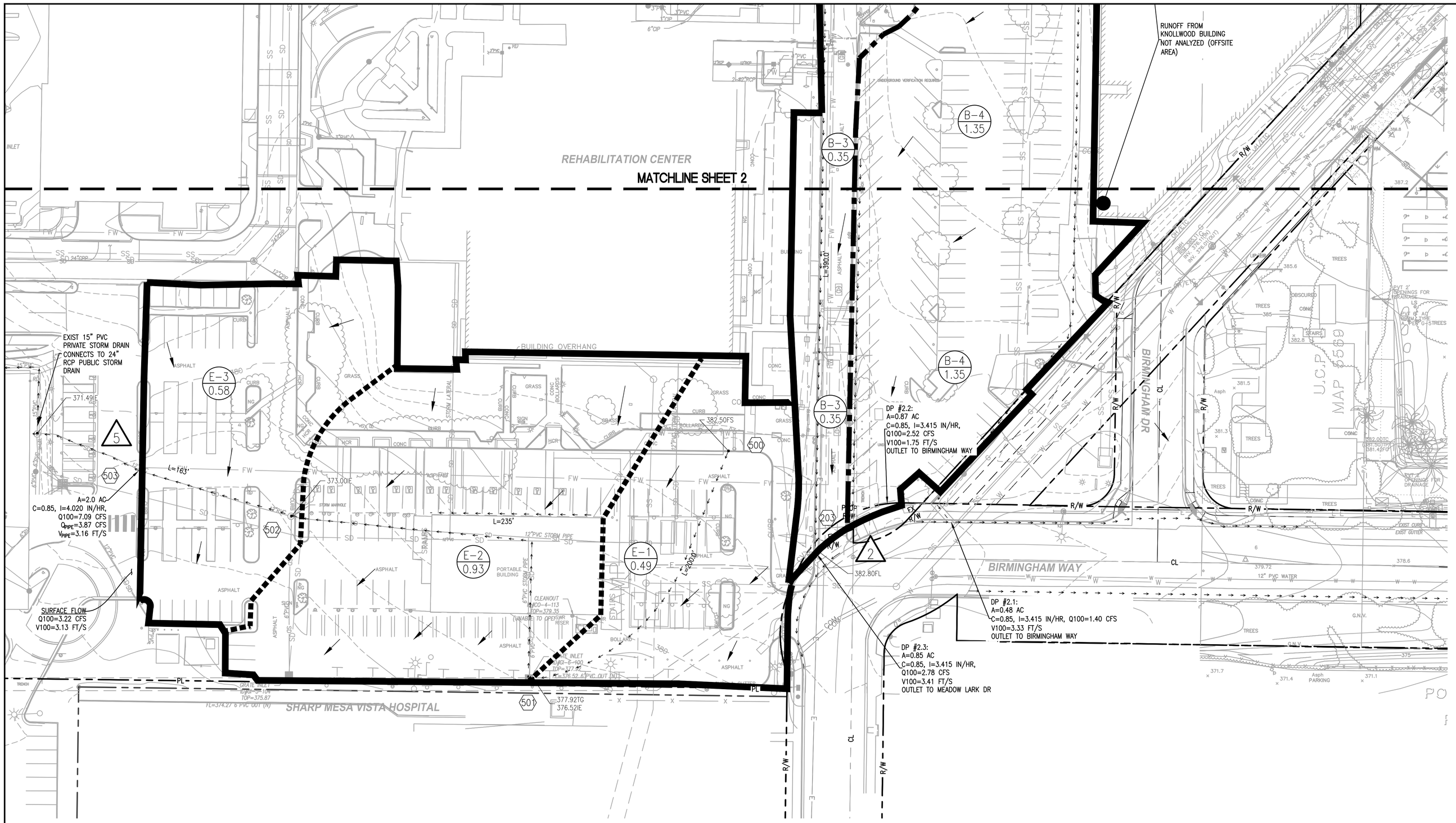
ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MJC
BVE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
EXISTING CONDITION
HYDOLOGY EXHIBIT

SHEET 2 OF 3

PLOT: M:\PROJECTS\9500\9545\10.00 SHARP MMC\DWGS\EXHIBITS\DRAINAGE\9545U10.00 HYDR-EXIST-DWG.DWG BY: DC 4/21/2022 2:03 PM

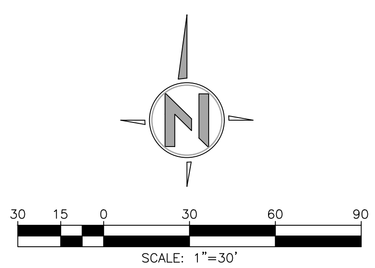


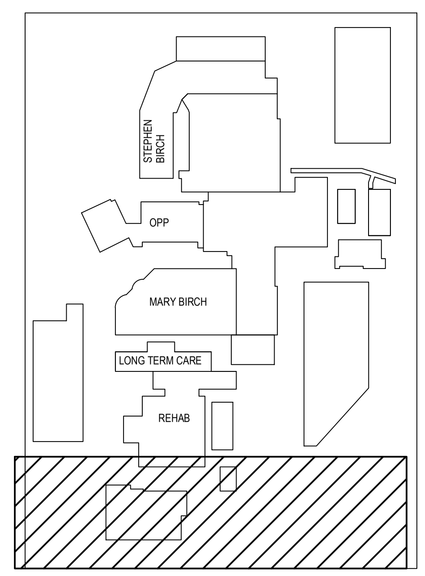
LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	306.43TG / 301.33IE
HYDROLOGY NODE	200
ANALYSIS/DISCHARGE POINT	
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
E-1	0.49	0.85	4.389	1.83
E-2	0.93	0.85	4.148	3.28
E-3	0.58	0.85	4.020	1.98





KEY PLAN

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MCC
BVE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT

SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE

EXISTING CONDITION
HYDOLOGY EXHIBIT

SHEET 3 OF 3

APPENDIX C:

Proposed Condition Runoff Coefficient Calculations
Proposed Condition Hydrology Calculations
Proposed Condition Hydraulics Calculations
Proposed Condition Hydrology Map

CUP PACKAGES 3A, & 7 ANALYSIS

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 12/22/21
------------------------------------------------------------------------
Proposed Condition Hydrology Analysis
Analysis Point 1
100 yr Storm Event
City of San Diego
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------


Program License Serial Number 6116

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Initial subarea flow distance  =   82.000(Ft.)
Highest elevation =  385.700(Ft.)
Lowest elevation =  384.000(Ft.)
Elevation difference =    1.700(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.07 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8600)*(  82.000^.5)/(   2.073^(1/3)]=   3.07
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
```

```
Subarea runoff =      2.001(CFS)
Total initial stream area =        0.530(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   393.710(Ft.)
Downstream point/station elevation =   388.130(Ft.)
Pipe length  =   167.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.001(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.001(CFS)
Normal flow depth in pipe =    5.34(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      7.31(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     5.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   388.130(Ft.)
Downstream point/station elevation =   385.130(Ft.)
Pipe length  =    67.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.001(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.001(CFS)
Normal flow depth in pipe =    4.88(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      8.19(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     5.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     5.52 min.
Rainfall intensity =      4.218(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      4.063(CFS) for    1.120(Ac.)
Total runoff =      6.063(CFS)  Total area =        1.65(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   385.130(Ft.)
Downstream point/station elevation =   382.410(Ft.)
Pipe length  =    98.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.063(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.063(CFS)
Normal flow depth in pipe =    8.06(In.)
Flow top width inside pipe =   14.96(In.)
Critical Depth =   11.94(In.)
Pipe flow velocity =      9.03(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     5.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   382.410(Ft.)
Downstream point/station elevation =   378.740(Ft.)
Pipe length  =   454.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.063(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.063(CFS)
Normal flow depth in pipe =   10.49(In.)
Flow top width inside pipe =   17.75(In.)
Critical Depth =   11.40(In.)
Pipe flow velocity =      5.67(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =     7.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     7.03 min.
Rainfall intensity =      3.840(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      3.434(CFS) for    1.040(Ac.)
Total runoff =      9.498(CFS)  Total area =        2.69(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     7.03 min.
Rainfall intensity =      3.840(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      4.128(CFS) for    1.250(Ac.)
Total runoff =     13.626(CFS)  Total area =        3.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     7.03 min.
Rainfall intensity =      3.840(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      1.783(CFS) for    0.540(Ac.)
Total runoff =     15.409(CFS)  Total area =        4.48(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   378.740(Ft.)
Downstream point/station elevation =   377.380(Ft.)
Pipe length  =    34.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.409(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    15.409(CFS)
Normal flow depth in pipe =   11.45(In.)
Flow top width inside pipe =   17.32(In.)
Critical Depth =   16.97(In.)
Pipe flow velocity =     12.99(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   377.380(Ft.)
Downstream point/station elevation =   377.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.409(CFS)
```

```
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    15.409(CFS)
Normal flow depth in pipe =   16.71(In.)
Flow top width inside pipe =   16.93(In.)
Critical Depth =   17.42(In.)
Pipe flow velocity =      7.51(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     7.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      107.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     7.16 min.
Rainfall intensity =      3.814(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      2.854(CFS) for    0.870(Ac.)
Total runoff =     18.262(CFS)  Total area =        5.35(Ac.)
End of computations, total study area =           5.350 (Ac.)
```

CUP PACKAGE 8 ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

PROPOSED CONDITION HYDROLOGY ANALYSIS
ANALYSIS POINT 4
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   400.000 to Point/Station   401.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance =   44.000(Ft.)
Highest elevation = 385.700(Ft.)
Lowest elevation = 384.820(Ft.)
Elevation difference =   0.880(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   2.37 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(44.000^.5)/(2.000^(1/3)]=   2.37
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

```
Subarea runoff =      0.672(CFS)
Total initial stream area =        0.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     5.00 min.
Rainfall intensity =      4.389(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      2.873(CFS) for    0.770(Ac.)
Total runoff =      3.544(CFS)  Total area =        0.95(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   393.300(Ft.)
Downstream point/station elevation =   393.130(Ft.)
Pipe length  =    42.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.544(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.544(CFS)
Normal flow depth in pipe =   10.75(In.)
Flow top width inside pipe =   13.52(In.)
Critical Depth =    9.12(In.)
Pipe flow velocity =      3.77(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =     5.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      404.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   393.130(Ft.)
Downstream point/station elevation =   393.000(Ft.)
Pipe length  =    77.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.544(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     3.544(CFS)
Normal flow depth in pipe =   12.42(In.)
Flow top width inside pipe =   16.65(In.)
Critical Depth =    8.62(In.)
Pipe flow velocity =      2.73(Ft/s)
Travel time through pipe =    0.47 min.
Time of concentration (TC) =     5.66 min.
```

End of computations, total study area = 0.950 (Ac.)

PACKAGE 4 (STEPHEN BIRCH ADDITION) ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/22/21

Proposed Condition Hydrology Analysis
Analysis Point 3
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   300.000 to Point/Station   301.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance = 144.000(Ft.)
Highest elevation = 403.840(Ft.)
Lowest elevation = 397.730(Ft.)
Elevation difference =   6.110(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   3.34 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(144.000^.5)/(4.243^(1/3)]=   3.34
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

```
Subarea runoff =      1.492(CFS)
Total initial stream area =        0.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   395.140(Ft.)
Downstream point/station elevation =   394.420(Ft.)
Pipe length  =   138.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.492(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.492(CFS)
Normal flow depth in pipe =    6.56(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    6.22(In.)
Pipe flow velocity =      3.40(Ft/s)
Travel time through pipe =    0.68 min.
Time of concentration (TC) =     5.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   394.420(Ft.)
Downstream point/station elevation =   393.360(Ft.)
Pipe length  =   203.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.492(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.492(CFS)
Normal flow depth in pipe =    6.56(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    6.22(In.)
Pipe flow velocity =      3.40(Ft/s)
Travel time through pipe =    1.00 min.
Time of concentration (TC) =     6.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.67 min.
Rainfall intensity =      3.917(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.731(CFS) for    0.520(Ac.)
Total runoff =      3.224(CFS)  Total area =        0.92(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   393.360(Ft.)
Downstream point/station elevation =   392.820(Ft.)
Pipe length  =    92.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.224(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.224(CFS)
Normal flow depth in pipe =    8.82(In.)
Flow top width inside pipe =   14.76(In.)
Critical Depth =    8.68(In.)
Pipe flow velocity =      4.30(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     7.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      309.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     7.03 min.
Rainfall intensity =      3.840(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.653(CFS) for    0.200(Ac.)
Total runoff =      3.876(CFS)  Total area =        1.12(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      309.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.120(Ac.)
Runoff from this stream =      3.876(CFS)
Time of concentration =    7.03 min.
Rainfall intensity =     3.840(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance  =   58.000(Ft.)
Highest elevation =  407.240(Ft.)
```

```
Lowest elevation =  402.000(Ft.)
Elevation difference =    5.240(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     1.65 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(  58.000^.5)/(   9.034^(1/3)]=   1.65
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      0.187(CFS)
Total initial stream area =        0.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      307.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.466(CFS)
Depth of flow =   0.094(Ft.), Average velocity =   2.118(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             10.00              0.20
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      0.466(CFS)
  '     '        flow top width =      4.675(Ft.)
  '     '    velocity=    2.118(Ft/s)
  '     '        area =      0.220(Sq.Ft)
  '     '        Froude number =     1.720

Upstream point elevation =   402.000(Ft.)
Downstream point elevation =   400.500(Ft.)
Flow length =    48.000(Ft.)
Travel time  =    0.38 min.
Time of concentration =    5.38 min.
Depth of flow =   0.094(Ft.)
Average velocity =   2.118(Ft/s)
Total irregular channel flow =     0.466(CFS)
Irregular channel normal depth above invert elev. =   0.094(Ft.)
Average velocity of channel(s) =   2.118(Ft/s)

Sub-Channel No. 1 Critical depth =      0.117(Ft.)
  '     '       '     Critical flow top width =      5.817(Ft.)
  '     '       '     Critical flow velocity=    1.368(Ft/s)
  '     '       '     Critical flow area =      0.341(Sq.Ft)
```

```
 Adding area flow to channel
User specified 'C' value of 0.850 given for subarea
Rainfall intensity =      4.261(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.543(CFS) for    0.150(Ac.)
Total runoff =      0.730(CFS)  Total area =        0.20(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      308.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   397.000(Ft.)
Downstream point/station elevation =   394.450(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.730(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.730(CFS)
Normal flow depth in pipe =    3.03(In.)
Flow top width inside pipe =    6.00(In.)
Critical Depth =    5.15(In.)
Pipe flow velocity =      7.34(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     5.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      308.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     5.47 min.
Rainfall intensity =      4.234(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.259(CFS) for    0.350(Ac.)
Total runoff =      1.989(CFS)  Total area =        0.55(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      308.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     5.47 min.
Rainfall intensity =      4.234(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      2.087(CFS) for    0.580(Ac.)
Total runoff =      4.077(CFS)  Total area =        1.13(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   394.450(Ft.)
Downstream point/station elevation =   390.250(Ft.)
Pipe length  =   445.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.077(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.077(CFS)
Normal flow depth in pipe =    8.80(In.)
Flow top width inside pipe =   14.77(In.)
Critical Depth =    9.81(In.)
Pipe flow velocity =      5.44(Ft/s)
Travel time through pipe =    1.36 min.
Time of concentration (TC) =     6.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      309.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.83 min.
Rainfall intensity =      3.882(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.693(CFS) for    0.210(Ac.)
Total runoff =      4.770(CFS)  Total area =        1.34(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      310.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.340(Ac.)
Runoff from this stream =      4.770(CFS)
Time of concentration =    6.83 min.
Rainfall intensity =     3.882(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        3.876      7.03                3.840
2        4.770      6.83                3.882
Qmax(1) =
           1.000 *    1.000 *     3.876) +
           0.989 *    1.000 *     4.770) + =       8.594
```

```
Qmax(2) =
          1.000 *    0.971 *     3.876) +
          1.000 *    1.000 *     4.770) + =       8.535

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.876       4.770
Maximum flow rates at confluence using above data:
        8.594        8.535
Area of streams before confluence:
        1.120        1.340
Results of confluence:
Total flow rate =      8.594(CFS)
Time of concentration =     7.029 min.
Effective stream area after confluence =      2.460(Ac.)
End of computations, total study area =           2.460 (Ac.)
```

PACKAGE 5A (CEP) ANALYSIS

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 12/29/21

Proposed Condition Hydrology analysis
Analysis Point 5
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   500.000 to Point/Station   501.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.890 given for subarea
Initial subarea flow distance = 139.000(Ft.)
Highest elevation = 383.900(Ft.)
Lowest elevation = 379.800(Ft.)
Elevation difference =   4.100(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   3.11 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8900)*(139.000^.5)/(2.950^(1/3)]=   3.11
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890

```
Subarea runoff =      0.977(CFS)
Total initial stream area =        0.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   377.800(Ft.)
Downstream point/station elevation =   376.520(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.977(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.977(CFS)
Normal flow depth in pipe =    4.62(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    5.44(In.)
Pipe flow velocity =      4.28(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =     5.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      502.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     5.39 min.
Rainfall intensity =      4.258(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.531(CFS) for    0.140(Ac.)
Total runoff =      1.507(CFS)  Total area =        0.39(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   376.520(Ft.)
Downstream point/station elevation =   374.000(Ft.)
Pipe length  =   177.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.507(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.507(CFS)
Normal flow depth in pipe =    5.89(In.)
Flow top width inside pipe =    8.56(In.)
Critical Depth =    6.79(In.)
Pipe flow velocity =      4.92(Ft/s)
Travel time through pipe =    0.60 min.
Time of concentration (TC) =     5.99 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      503.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     5.99 min.
Rainfall intensity =      4.084(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.582(CFS) for    0.160(Ac.)
Total runoff =      2.089(CFS)  Total area =        0.55(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =   375.500(Ft.)
Downstream point/station elevation =   375.290(Ft.)
Pipe length  =    42.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.089(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.089(CFS)
Normal flow depth in pipe =    8.33(In.)
Flow top width inside pipe =   11.06(In.)
Critical Depth =    7.41(In.)
Pipe flow velocity =      3.59(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     6.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      504.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.18 min.
Rainfall intensity =      4.033(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      1.256(CFS) for    0.350(Ac.)
Total runoff =      3.345(CFS)  Total area =        0.90(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =   375.290(Ft.)
Downstream point/station elevation =   374.850(Ft.)
```

```
Pipe length  =    86.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.345(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.345(CFS)
Normal flow depth in pipe =    9.46(In.)
Flow top width inside pipe =   14.48(In.)
Critical Depth =    8.85(In.)
Pipe flow velocity =      4.10(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =     6.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      505.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.53 min.
Rainfall intensity =      3.949(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      1.933(CFS) for    0.550(Ac.)
Total runoff =      5.278(CFS)  Total area =        1.45(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      505.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.53 min.
Rainfall intensity =      3.949(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.492(CFS) for    0.140(Ac.)
Total runoff =      5.770(CFS)  Total area =        1.59(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      505.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.890 given for subarea
Time of concentration =     6.53 min.
Rainfall intensity =      3.949(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff =      0.668(CFS) for    0.190(Ac.)
Total runoff =      6.437(CFS)  Total area =        1.78(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      506.000 to Point/Station      506.000
```

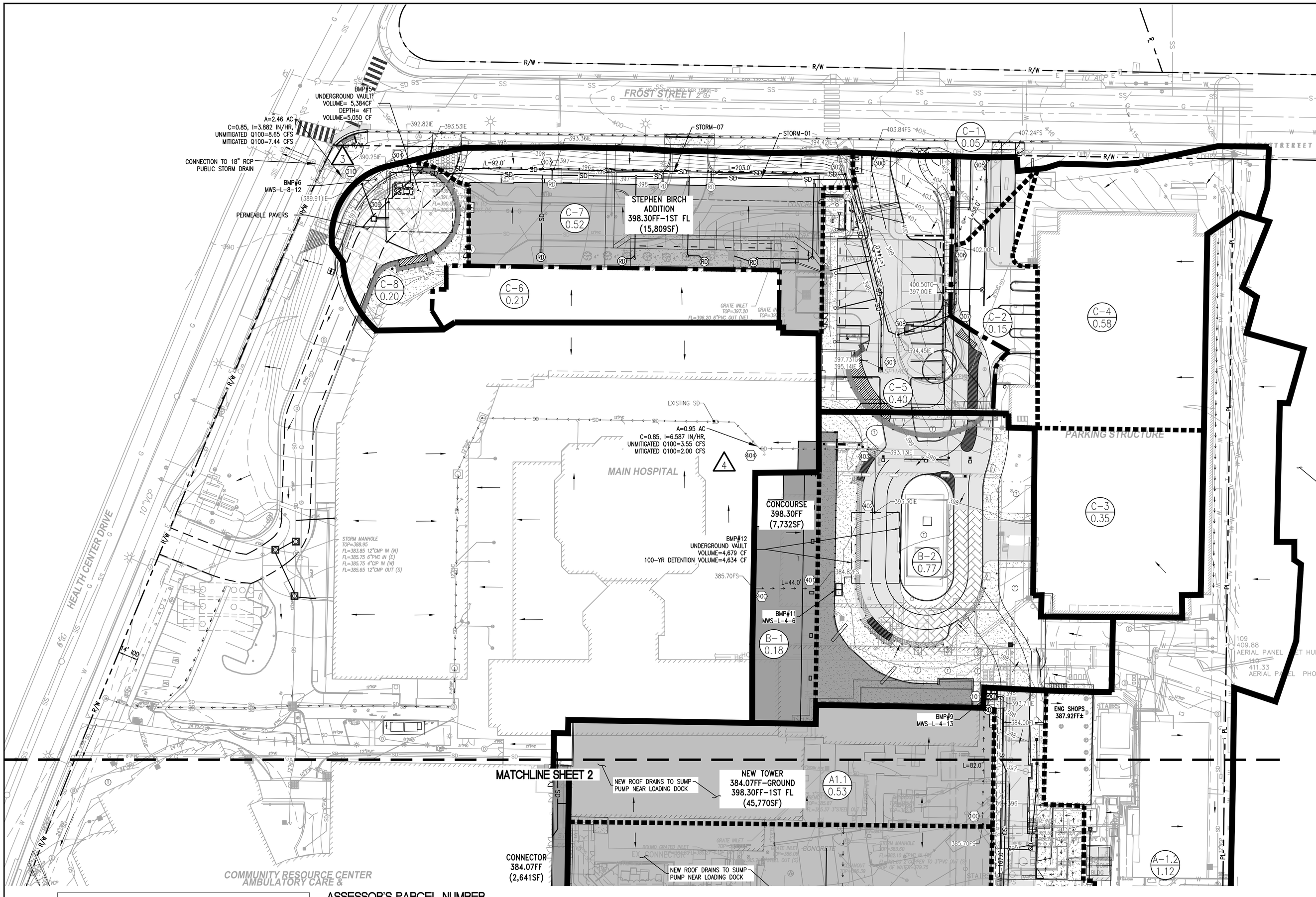
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.890 given for subarea
Time of concentration = 6.53 min.
Rainfall intensity = 3.949(In/Hr) for a 100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff = 0.562(CFS) for 0.160(Ac.)
Total runoff = 7.000(CFS) Total area = 1.94(Ac.)

++

Process from Point/Station 506.000 to Point/Station 506.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.890 given for subarea
Time of concentration = 6.53 min.
Rainfall intensity = 3.949(In/Hr) for a 100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.890
Subarea runoff = 0.211(CFS) for 0.060(Ac.)
Total runoff = 7.210(CFS) Total area = 2.00(Ac.)
End of computations, total study area = 2.000 (Ac.)



DRAINAGE BASIN DETAILS				
DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
B-1	0.18	0.85	4.389	0.67
B-2	0.77	0.85	4.389	2.87
C-1	0.05	0.85	4.389	0.19
C-2	0.15	0.85	4.261	0.55
C-3	0.35	0.85	4.234	1.26
C-4	0.58	0.85	4.234	2.09
C-5	0.40	0.85	4.389	1.49
C-6	0.21	0.85	4.770	0.69
C-7	0.52	0.85	3.917	1.73
C-8	0.20	0.85	3.840	0.65

ASSESSOR'S PARCEL NUMBER

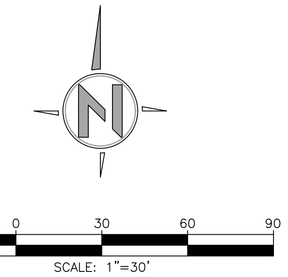
427-530-02

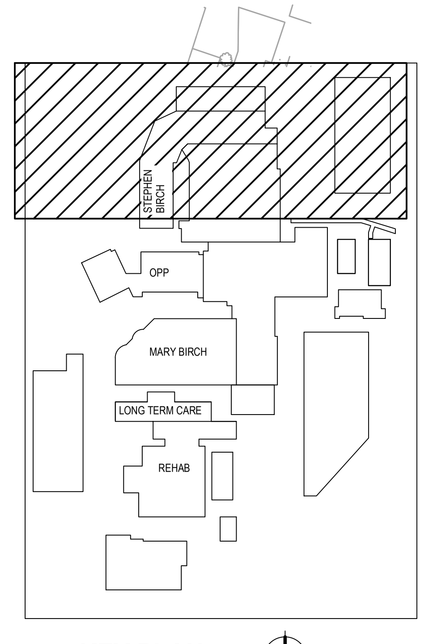
BRIEF LEGAL DESCRIPTION

PARCEL 1 OF PARCEL MAP 5131 IN THE CITY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY SEPTEMBER 24, 1976.

Q AND V AT DISCHARGE POINTS

Discharge Point #	Type of Discharge	Discharge Location	Proposed Unmitigated Q (cfs)	Proposed Unmitigated V (ft/s)	Proposed Mitigated Q (cfs)	Proposed Mitigated V (ft/s)
3	Pipe	18" PIPE @2.08%	8.65	8.84	7.44	8.38
4	Pipe	12" PIPE @1.00%	3.55	5.14	2	4.6





KEY PLAN

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

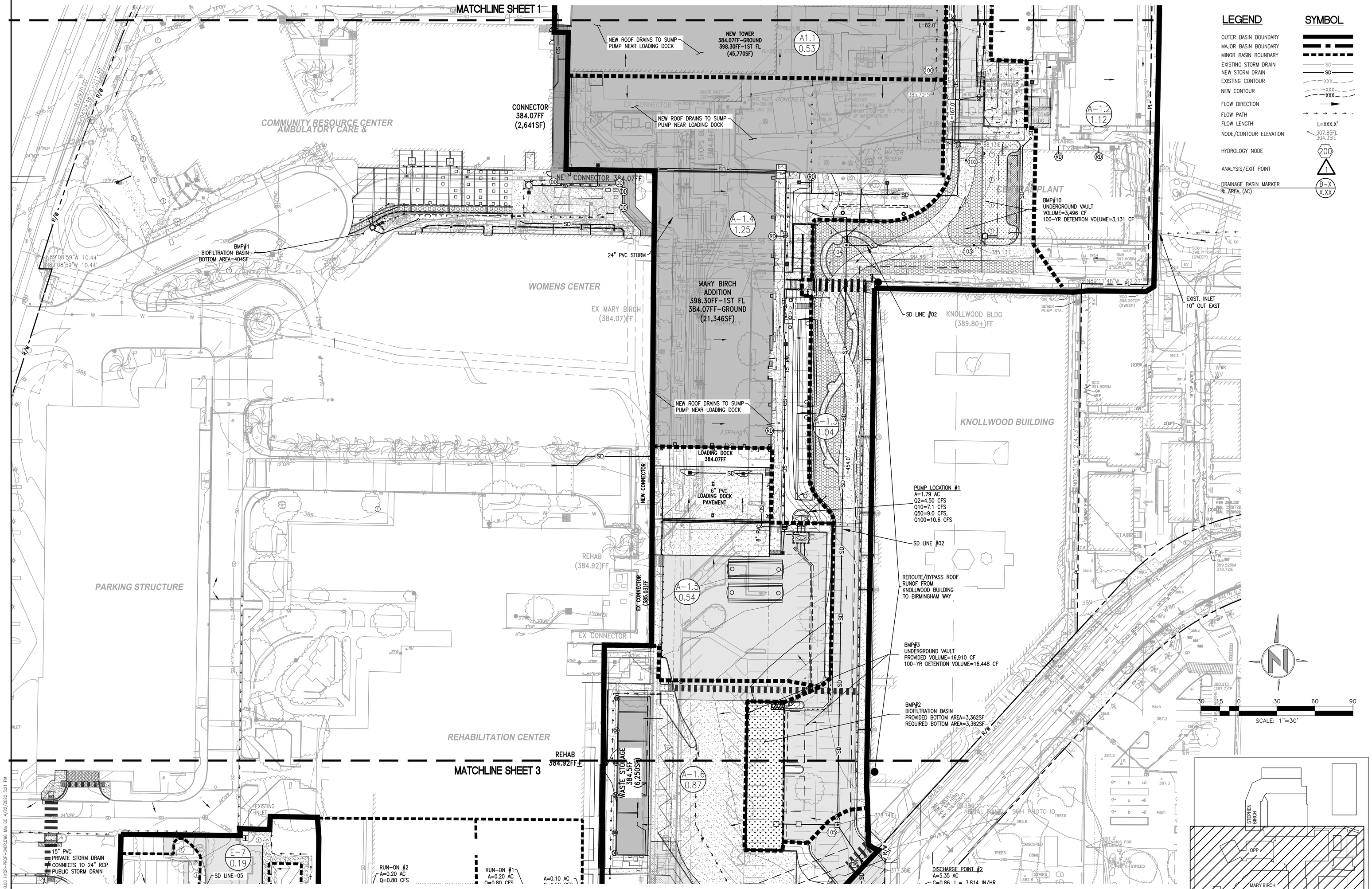
BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MSC
BWE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
PROPOSED CONDITION HYDOLOGY EXHIBIT

SHEET 1 OF 3



DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
A-1.1	0.53	0.86	4.389	2.00
A-1.2	1.12	0.86	4.218	4.06
A-1.3	1.04	0.86	3.840	3.43
A-1.4	1.25	0.86	3.840	4.13
A-1.5	0.54	0.86	3.840	1.78

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MCC
BVE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT:
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE:
PROPOSED CONDITION
HYDOLOGY EXHIBIT

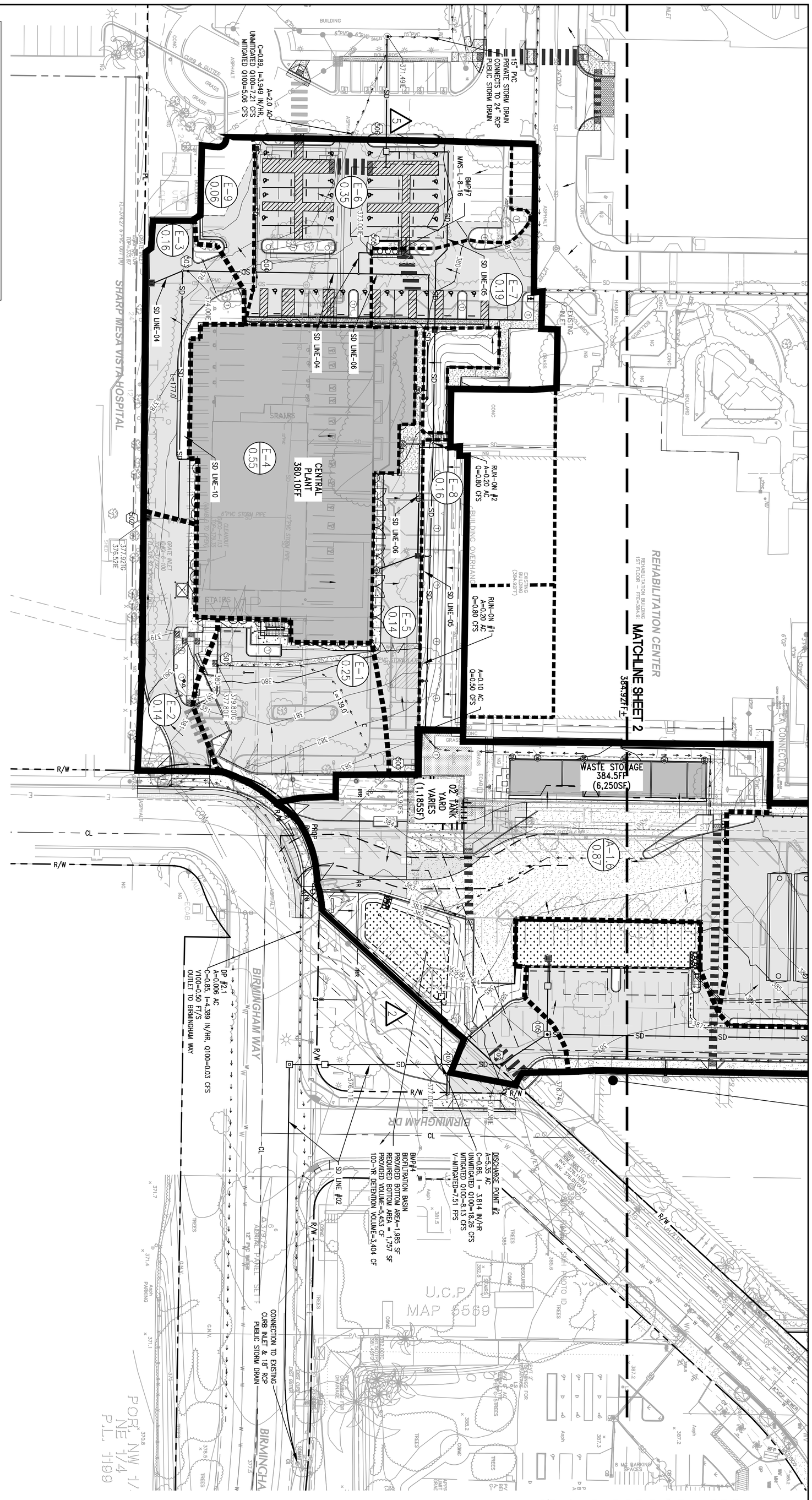
SHEET 2 OF 3

PLOT: M:\PROJECTS\9500\9545\10.00 SHARP MMC\DWGS\EXHIBITS\DRAINAGE\9545X10.00 HYDR-PROP-EXHIBIT.DWG MH CC 4/22/2022 2:21 PM

PLOT: M:\PROJECTS\9500\9545U.10.00 SHARP MMC\DWGS\EXHIBITS\DRAINAGE\9545U.10.00 HYDR-PROP-OVER.DWG Min GC 8/17/2022 4:00 PM

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
A-1.6	0.87	0.86	3.814	2.85
E-1	0.25	0.89	4.389	0.98
E-2	0.14	0.89	4.258	0.53
E-3	0.16	0.89	4.084	0.58
E-4	0.55	0.89	3.949	1.93
E-5	0.14	0.89	3.949	0.49
E-6	0.35	0.89	4.033	1.26
E-7	0.19	0.89	3.949	0.69
E-8	0.16	0.89	3.949	0.56
E-9	0.06	0.89	3.949	0.21



LEGEND

SYMBOL	
	OUTER BASIN BOUNDARY
	MAJOR BASIN BOUNDARY
	MINOR BASIN BOUNDARY
SD	EXISTING STORM DRAIN
SD	NEW STORM DRAIN
XXX	EXISTING CONTOUR
XXX	NEW CONTOUR
	FLOW DIRECTION
	FLOW PATH
L=XXX.X'	FLOW LENGTH
307.85FL 304.35IE	NODE/CONTOUR ELEVATION
200	HYDROLOGY NODE
1	ANALYSIS/EXIT POINT
B-X X.XX	DRAINAGE BASIN MARKER & AREA (AC)

SHEET 3 OF 3	SHEET TITLE: PROPOSED CONDITION HYDOLOGY EXHIBIT	PROJECT: SHARP MMC CAMPUS REDEVELOPMENT, 7901 FROST STREET, SAN DIEGO, CA 92123	BENCHMARK:		SYM	DESCRIPTION	DATE	APPR
			ISSUE DATE:	09/17/2021				
			DRAWN BY:	MDS				
			CHECKED BY:	MGC				
			B&W JOB NUMBER:	9545.10.00				
			CLIENT JOB NUMBER:					

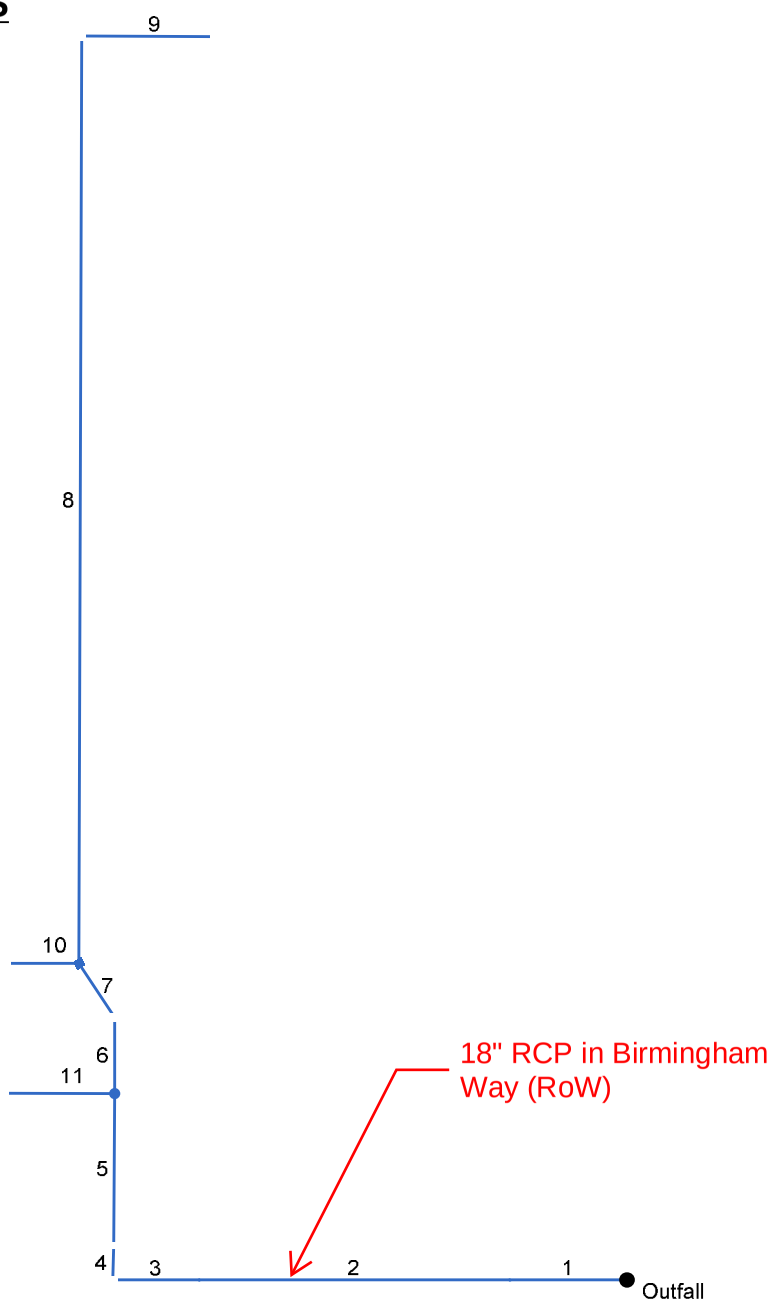
BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

HYDRAULIC ANALYSIS

CUP PACKAGE (PACAKAGES 3A, 7, & 8) STORM DRAIN SYSTEM

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

MITIGATED CONDITION ANALYSIS



Project File: SD Line-02 South-100yrMitigated.stm	Number of lines: 11	Date: 10/15/2021

Hydraulic Grade Line Computations

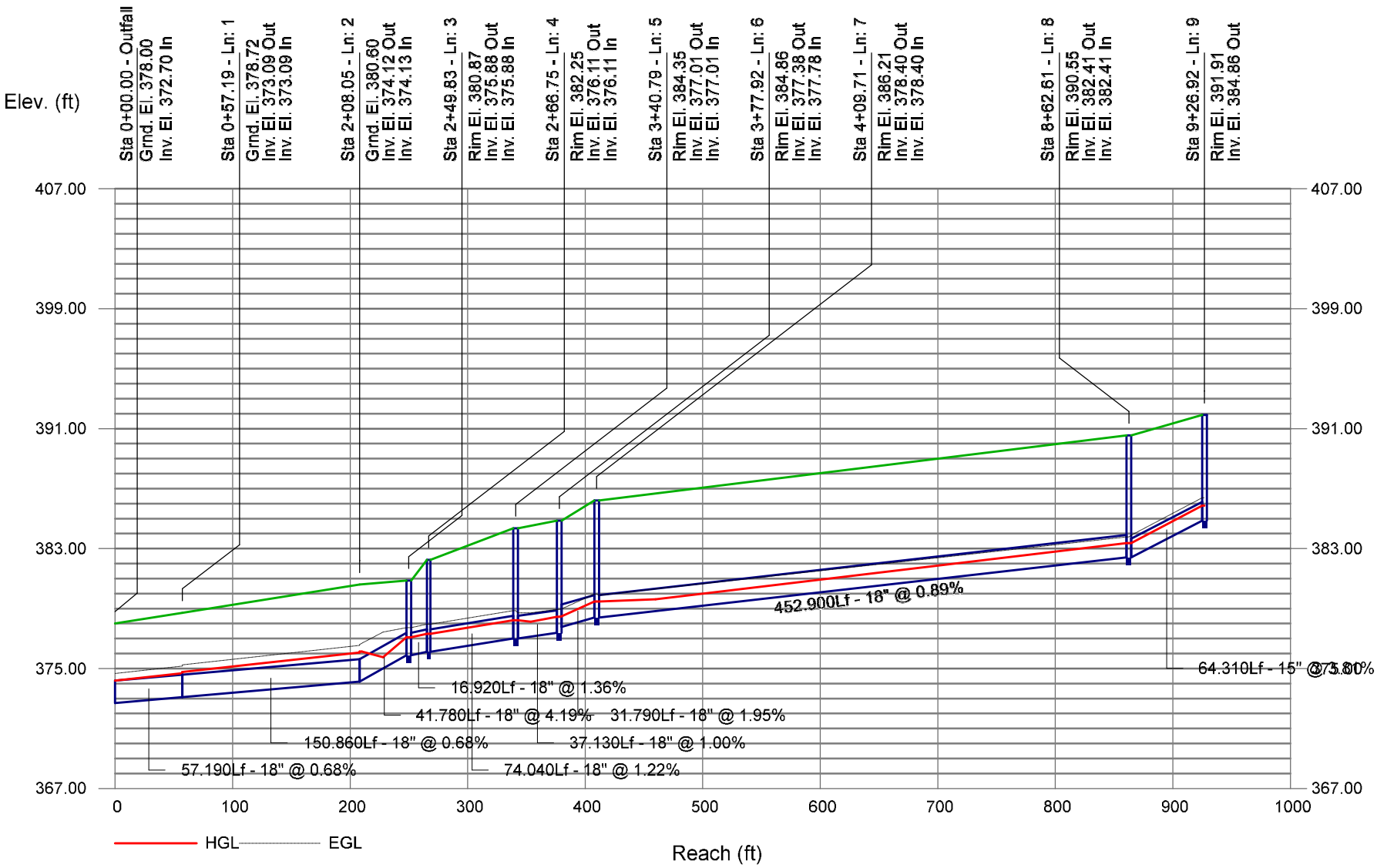
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
11	15	2.10	377.01	378.21	1.20	0.55	1.73	0.22	378.44	0.000	52.240	378.11	378.69 j	0.58**	0.55	3.79	0.22	378.91	0.000	0.000	n/a	1.00	0.22
10	15	1.50	378.17	379.47	1.25	1.23	1.22	0.02	379.49	0.039	34.319	378.50	379.47	0.97	1.03	1.46	0.03	379.51	0.043	0.041	0.014	1.00	0.03
9	15	6.15	382.41	383.37	0.96	1.01	6.10	0.53	383.90	0.000	64.310	384.86	385.86	1.00**	1.05	5.84	0.53	386.39	0.000	0.000	n/a	1.00	0.53
8	18	6.15	378.40	379.47	1.07	1.19	4.56	0.41	379.89	0.000	452.900	382.41	383.37 j	0.96**	1.19	5.17	0.41	383.78	0.000	0.000	n/a	1.00	0.41
7	18	7.65	377.78	378.48	0.70*	0.81	9.50	0.50	378.98	0.000	31.790	378.40	379.47	1.07**	1.35	5.67	0.50	379.97	0.000	0.000	n/a	0.86	0.43
6	18	7.65	377.01	378.21	1.20	1.35	5.03	0.50	378.71	0.000	37.130	377.38	378.45 j	1.07**	1.35	5.67	0.50	378.95	0.000	0.000	n/a	0.62	0.31
5	18	9.75	376.11	377.31	1.20*	1.52	6.41	0.64	377.95	0.000	74.040	377.01	378.21	1.20**	1.52	6.41	0.64	378.85	0.000	0.000	n/a	1.00	0.64
4	18	9.75	375.88	377.08	1.20*	1.52	6.41	0.64	377.72	0.000	16.920	376.11	377.31	1.20**	1.52	6.41	0.64	377.95	0.000	0.000	n/a	0.50	0.32
3	18	9.75	374.13	376.14	1.50	1.52	5.52	0.47	376.61	0.862	41.780	375.88	377.08 j	1.20**	1.52	6.41	0.64	377.72	0.896	0.879	n/a	1.00	0.64
2	18	9.75	373.09	374.76	1.50	1.77	5.52	0.47	375.24	0.862	150.860	374.12	376.07	1.50	1.77	5.52	0.47	376.54	0.862	0.862	1.301	0.15	0.07
1	18	9.75	372.70	374.20	1.50	1.77	5.52	0.47	374.67	0.862	57.190	373.09	374.69	1.50	1.77	5.52	0.47	375.17	0.862	0.862	0.493	0.15	0.07

Project File: SD Line-02 South-100yrMitigated.stm | Number of lines: 11 | Run Date: 10/15/2021

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

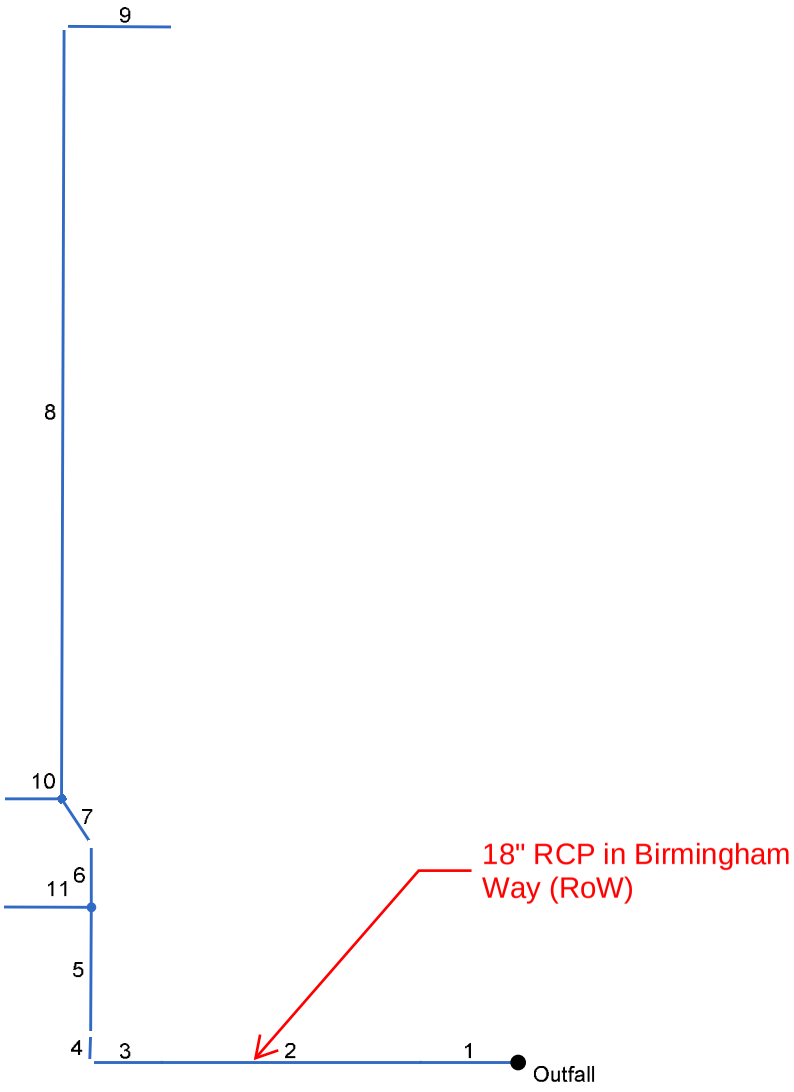
Storm Sewer Profile

Proj. file: SD Line-02 South-100yrMitigated.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

UNMITIGATED CONDITION ANALYSIS



Project File: SD Line-02 South-100yrFull.stm	Number of lines: 11	Date: 10/15/2021

Hydraulic Grade Line Computations

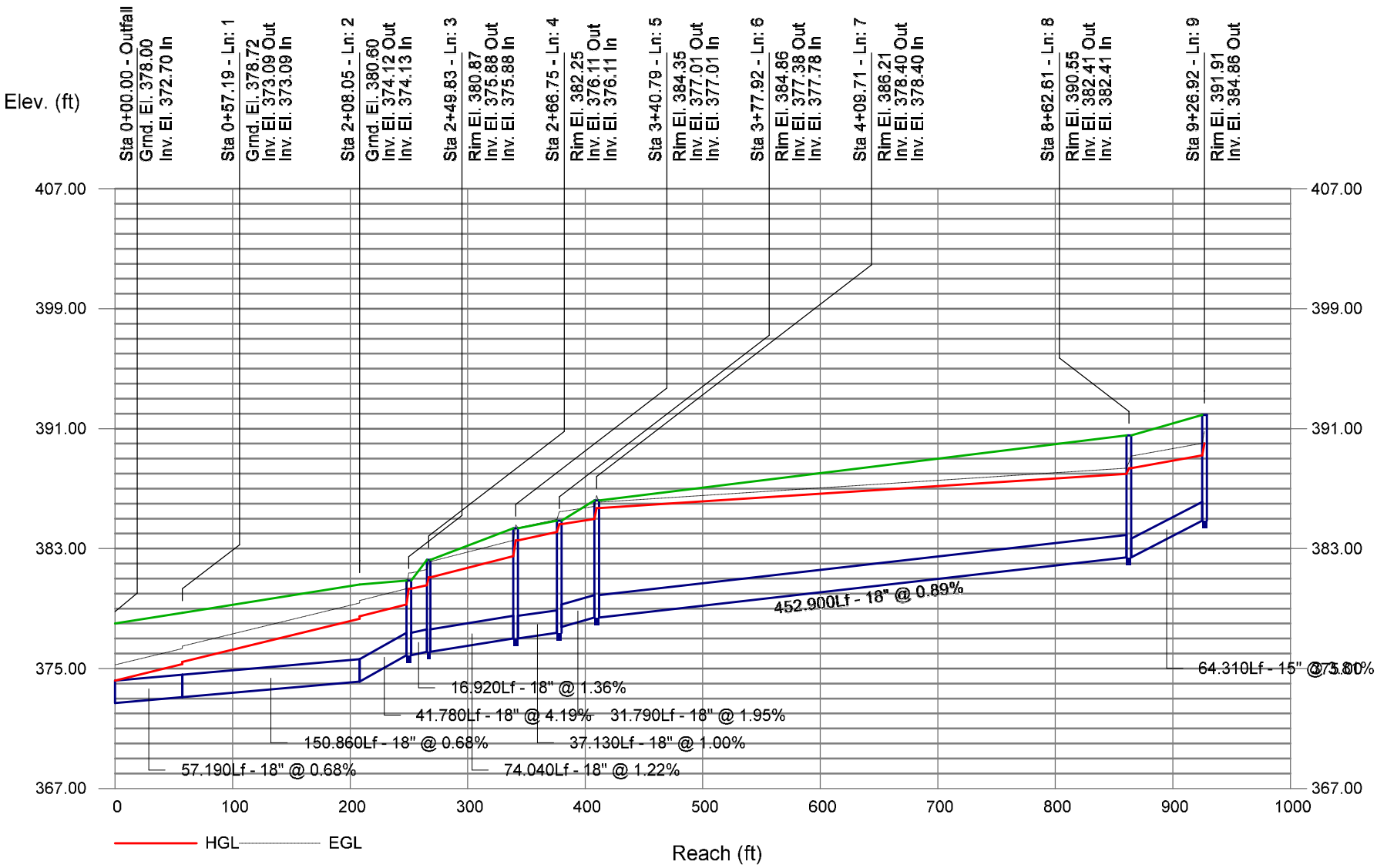
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
11	15	1.50	377.01	383.54	1.25	1.23	1.22	0.02	383.56	0.039	52.240	378.11	383.56	1.25	1.23	1.22	0.02	383.58	0.039	0.039	0.020	1.00	0.02
10	15	4.20	378.17	385.70	1.25	1.23	3.42	0.18	385.89	0.303	34.319	378.50	385.81	1.25	1.23	3.42	0.18	385.99	0.303	0.303	0.104	1.00	0.18
9	15	8.80	382.41	388.37	1.25	1.23	7.17	0.80	389.17	1.330	64.310	384.86	389.22	1.25	1.23	7.17	0.80	390.02	1.330	1.330	0.855	1.00	0.80
8	18	8.80	378.40	385.70	1.50	1.77	4.98	0.39	386.09	0.503	452.900	382.41	387.98	1.50	1.77	4.98	0.39	388.37	0.503	0.503	2.278	1.00	0.39
7	18	13.00	377.78	384.63	1.50	1.77	7.36	0.84	385.47	1.098	31.790	378.40	384.98	1.50	1.77	7.36	0.84	385.82	1.097	1.098	0.349	0.86	0.72
6	18	13.00	377.01	383.54	1.50	1.77	7.36	0.84	384.38	1.533	37.130	377.38	384.11	1.50	1.77	7.36	0.84	384.95	1.533	1.533	0.569	0.62	0.52
5	18	14.50	376.11	381.08	1.50	1.77	8.21	1.05	382.13	1.907	74.040	377.01	382.49	1.50	1.77	8.21	1.05	383.54	1.907	1.907	1.412	1.00	1.05
4	18	14.50	375.88	380.33	1.50	1.77	8.21	1.05	381.37	1.366	16.920	376.11	380.56	1.50	1.77	8.21	1.05	381.60	1.365	1.365	0.231	0.50	0.52
3	18	14.50	374.13	378.48	1.50	1.77	8.21	1.05	379.53	1.907	41.780	375.88	379.28	1.50	1.77	8.21	1.05	380.33	1.907	1.907	0.797	1.00	1.05
2	18	14.50	373.09	375.45	1.50	1.77	8.21	1.05	376.50	1.907	150.860	374.12	378.33	1.50	1.77	8.21	1.05	379.37	1.907	1.907	2.877	0.15	0.16
1	18	14.50	372.70	374.20	1.50	1.77	8.21	1.05	375.25	1.907	57.190	373.09	375.29	1.50	1.77	8.21	1.05	376.34	1.907	1.907	1.091	0.15	0.16

Project File: SD Line-02 South-100yrFull.stm | Number of lines: 11 | Run Date: 10/15/2021

; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: SD Line-02 South-100yrFull.stm



RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/23/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 2.83 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 9.4 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 0.4
TIME (MIN) = 14	DISCHARGE (CFS) = 0.4
TIME (MIN) = 21	DISCHARGE (CFS) = 0.4
TIME (MIN) = 28	DISCHARGE (CFS) = 0.4
TIME (MIN) = 35	DISCHARGE (CFS) = 0.4
TIME (MIN) = 42	DISCHARGE (CFS) = 0.4
TIME (MIN) = 49	DISCHARGE (CFS) = 0.4
TIME (MIN) = 56	DISCHARGE (CFS) = 0.4
TIME (MIN) = 63	DISCHARGE (CFS) = 0.4
TIME (MIN) = 70	DISCHARGE (CFS) = 0.4
TIME (MIN) = 77	DISCHARGE (CFS) = 0.5
TIME (MIN) = 84	DISCHARGE (CFS) = 0.5
TIME (MIN) = 91	DISCHARGE (CFS) = 0.5
TIME (MIN) = 98	DISCHARGE (CFS) = 0.5
TIME (MIN) = 105	DISCHARGE (CFS) = 0.5
TIME (MIN) = 112	DISCHARGE (CFS) = 0.5
TIME (MIN) = 119	DISCHARGE (CFS) = 0.6
TIME (MIN) = 126	DISCHARGE (CFS) = 0.6
TIME (MIN) = 133	DISCHARGE (CFS) = 0.6
TIME (MIN) = 140	DISCHARGE (CFS) = 0.6
TIME (MIN) = 147	DISCHARGE (CFS) = 0.7
TIME (MIN) = 154	DISCHARGE (CFS) = 0.7
TIME (MIN) = 161	DISCHARGE (CFS) = 0.7
TIME (MIN) = 168	DISCHARGE (CFS) = 0.8
TIME (MIN) = 175	DISCHARGE (CFS) = 0.8
TIME (MIN) = 182	DISCHARGE (CFS) = 0.9
TIME (MIN) = 189	DISCHARGE (CFS) = 0.9
TIME (MIN) = 196	DISCHARGE (CFS) = 1
TIME (MIN) = 203	DISCHARGE (CFS) = 1.2
TIME (MIN) = 210	DISCHARGE (CFS) = 1.2
TIME (MIN) = 217	DISCHARGE (CFS) = 1.5
TIME (MIN) = 224	DISCHARGE (CFS) = 1.7
TIME (MIN) = 231	DISCHARGE (CFS) = 2.6
TIME (MIN) = 238	DISCHARGE (CFS) = 7.1
TIME (MIN) = 245	DISCHARGE (CFS) = 9.4
TIME (MIN) = 252	DISCHARGE (CFS) = 2
TIME (MIN) = 259	DISCHARGE (CFS) = 1.4
TIME (MIN) = 266	DISCHARGE (CFS) = 1.1
TIME (MIN) = 273	DISCHARGE (CFS) = 0.9
TIME (MIN) = 280	DISCHARGE (CFS) = 0.8
TIME (MIN) = 287	DISCHARGE (CFS) = 0.7
TIME (MIN) = 294	DISCHARGE (CFS) = 0.6
TIME (MIN) = 301	DISCHARGE (CFS) = 0.6
TIME (MIN) = 308	DISCHARGE (CFS) = 0.5
TIME (MIN) = 315	DISCHARGE (CFS) = 0.5
TIME (MIN) = 322	DISCHARGE (CFS) = 0.5
TIME (MIN) = 329	DISCHARGE (CFS) = 0.5
TIME (MIN) = 336	DISCHARGE (CFS) = 0.4
TIME (MIN) = 343	DISCHARGE (CFS) = 0.4
TIME (MIN) = 350	DISCHARGE (CFS) = 0.4
TIME (MIN) = 357	DISCHARGE (CFS) = 0.4
TIME (MIN) = 364	DISCHARGE (CFS) = 0

Watershed Model Schematic

Legend

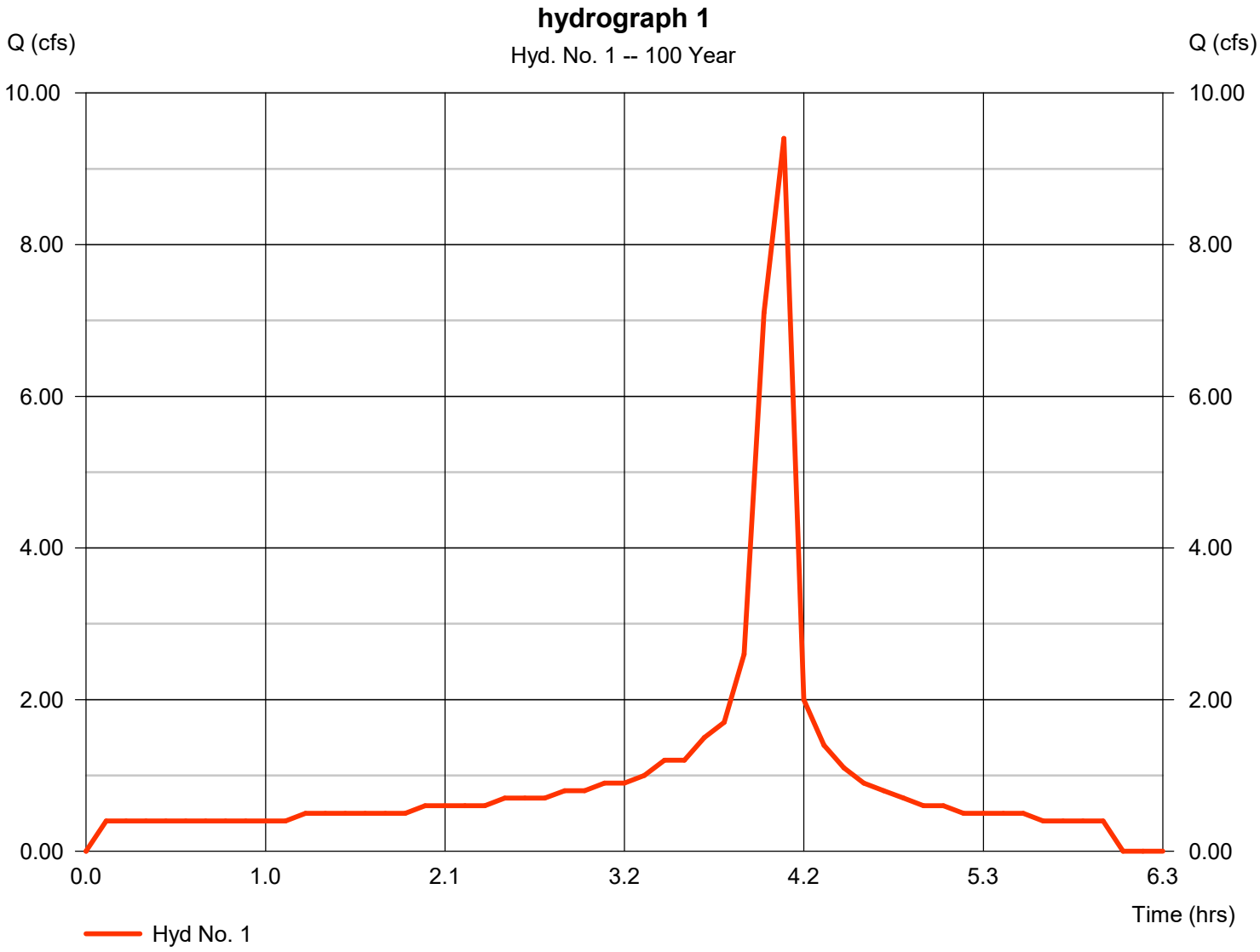
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 9.400 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 21,966 cuft



Hydrograph Report

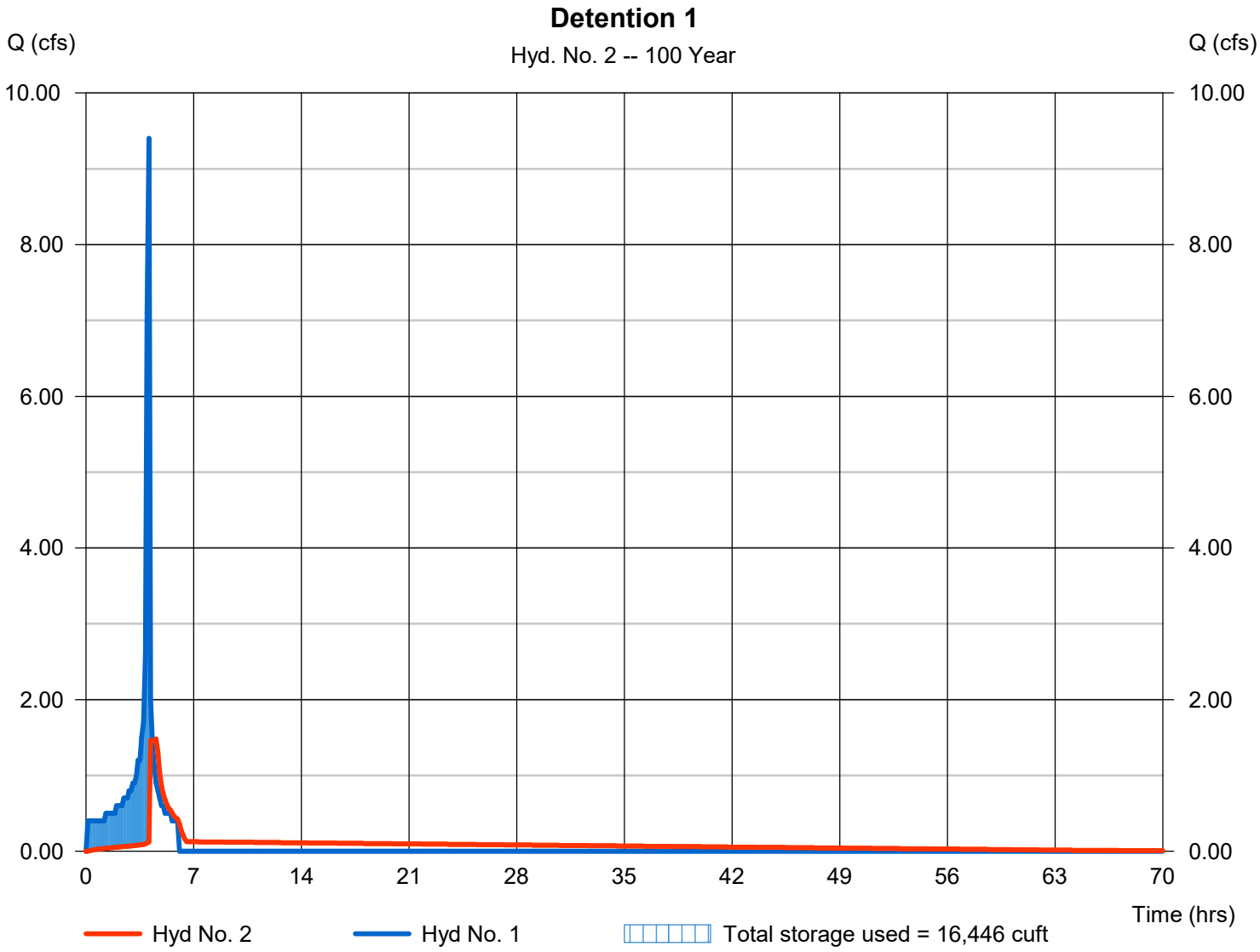
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 12 / 23 / 2021

Hyd. No. 2

Detention 1

Hydrograph type	= Reservoir	Peak discharge	= 1.481 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.55 hrs
Time interval	= 7 min	Hyd. volume	= 21,932 cuft
Inflow hyd. No.	= 1 - hydrograph 1	Max. Elevation	= 103.80 ft
Reservoir name	= Det-CUP pk7-BMP #3	Max. Storage	= 16,446 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Det-CUP pk7-BMP #3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	4,450	0	0
1.00	101.00	4,450	4,228	4,228
2.00	102.00	4,450	4,228	8,455
3.00	103.00	4,450	4,228	12,683
4.00	104.00	4,450	4,228	16,910

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.62	Inactive	Inactive
Span (in)	= 18.00	1.62	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.50	Inactive	Inactive	Inactive
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

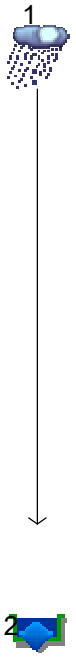
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	4,228	101.00	0.07 ic	0.07 ic	---	---	0.00	---	---	---	---	---	0.065
2.00	8,455	102.00	0.10 ic	0.09 ic	---	---	0.00	---	---	---	---	---	0.094
3.00	12,683	103.00	0.12 ic	0.12 ic	---	---	0.00	---	---	---	---	---	0.116
4.00	16,910	104.00	1.62 oc	0.13 ic	---	---	1.49 ic	---	---	---	---	---	1.610

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/23/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.87 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 2.85 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 0.1
TIME (MIN) = 14	DISCHARGE (CFS) = 0.1
TIME (MIN) = 21	DISCHARGE (CFS) = 0.1
TIME (MIN) = 28	DISCHARGE (CFS) = 0.1
TIME (MIN) = 35	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 49	DISCHARGE (CFS) = 0.1
TIME (MIN) = 56	DISCHARGE (CFS) = 0.1
TIME (MIN) = 63	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 77	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 91	DISCHARGE (CFS) = 0.1
TIME (MIN) = 98	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 112	DISCHARGE (CFS) = 0.2
TIME (MIN) = 119	DISCHARGE (CFS) = 0.2
TIME (MIN) = 126	DISCHARGE (CFS) = 0.2
TIME (MIN) = 133	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 147	DISCHARGE (CFS) = 0.2
TIME (MIN) = 154	DISCHARGE (CFS) = 0.2
TIME (MIN) = 161	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 182	DISCHARGE (CFS) = 0.3
TIME (MIN) = 189	DISCHARGE (CFS) = 0.3
TIME (MIN) = 196	DISCHARGE (CFS) = 0.3
TIME (MIN) = 203	DISCHARGE (CFS) = 0.4
TIME (MIN) = 210	DISCHARGE (CFS) = 0.4
TIME (MIN) = 217	DISCHARGE (CFS) = 0.5
TIME (MIN) = 224	DISCHARGE (CFS) = 0.5
TIME (MIN) = 231	DISCHARGE (CFS) = 0.8
TIME (MIN) = 238	DISCHARGE (CFS) = 2.2
TIME (MIN) = 245	DISCHARGE (CFS) = 2.85
TIME (MIN) = 252	DISCHARGE (CFS) = 0.6
TIME (MIN) = 259	DISCHARGE (CFS) = 0.4
TIME (MIN) = 266	DISCHARGE (CFS) = 0.3
TIME (MIN) = 273	DISCHARGE (CFS) = 0.3
TIME (MIN) = 280	DISCHARGE (CFS) = 0.2
TIME (MIN) = 287	DISCHARGE (CFS) = 0.2
TIME (MIN) = 294	DISCHARGE (CFS) = 0.2
TIME (MIN) = 301	DISCHARGE (CFS) = 0.2
TIME (MIN) = 308	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 322	DISCHARGE (CFS) = 0.1
TIME (MIN) = 329	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 343	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0.1
TIME (MIN) = 357	DISCHARGE (CFS) = 0.1
TIME (MIN) = 364	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

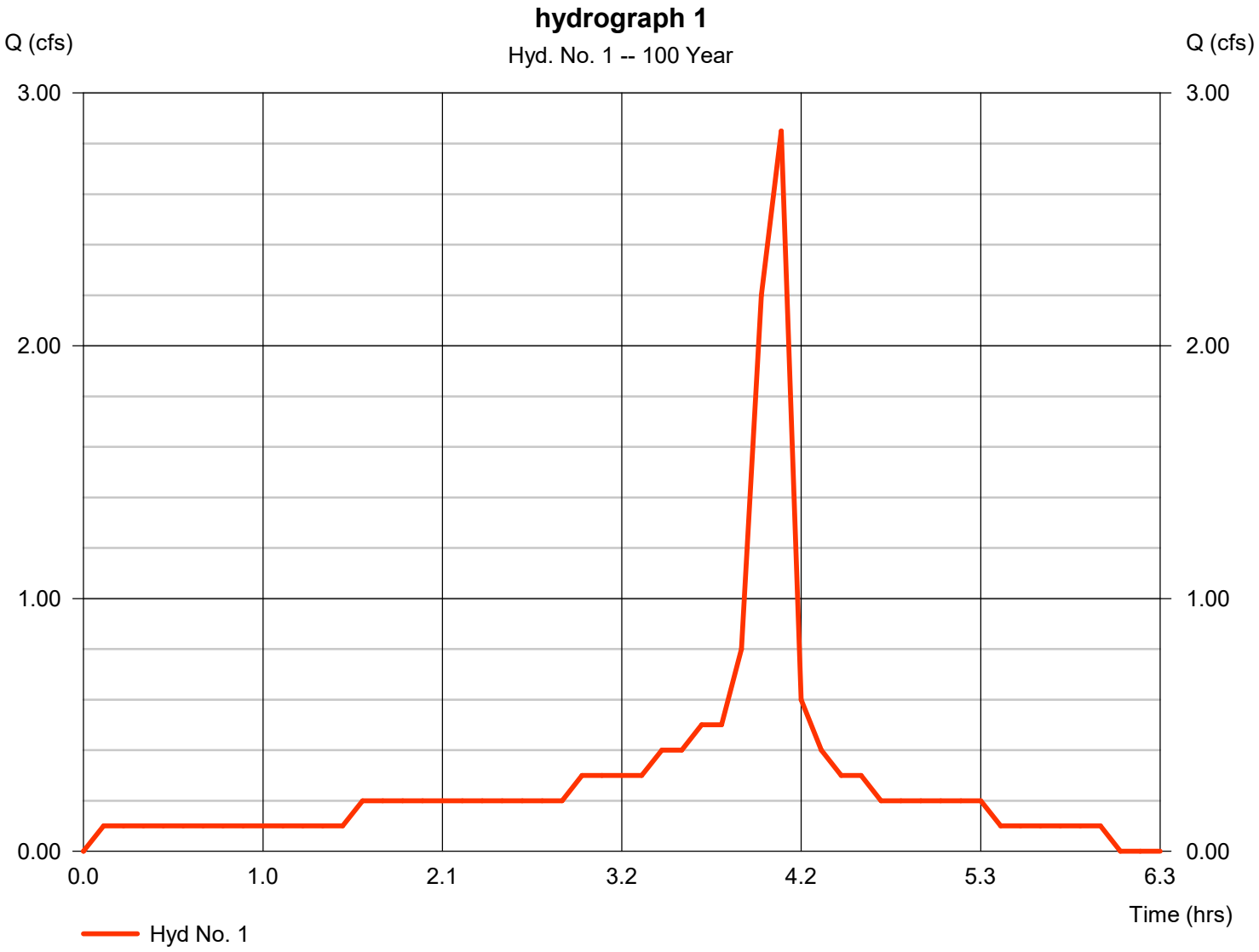
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 2.850 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 6,615 cuft



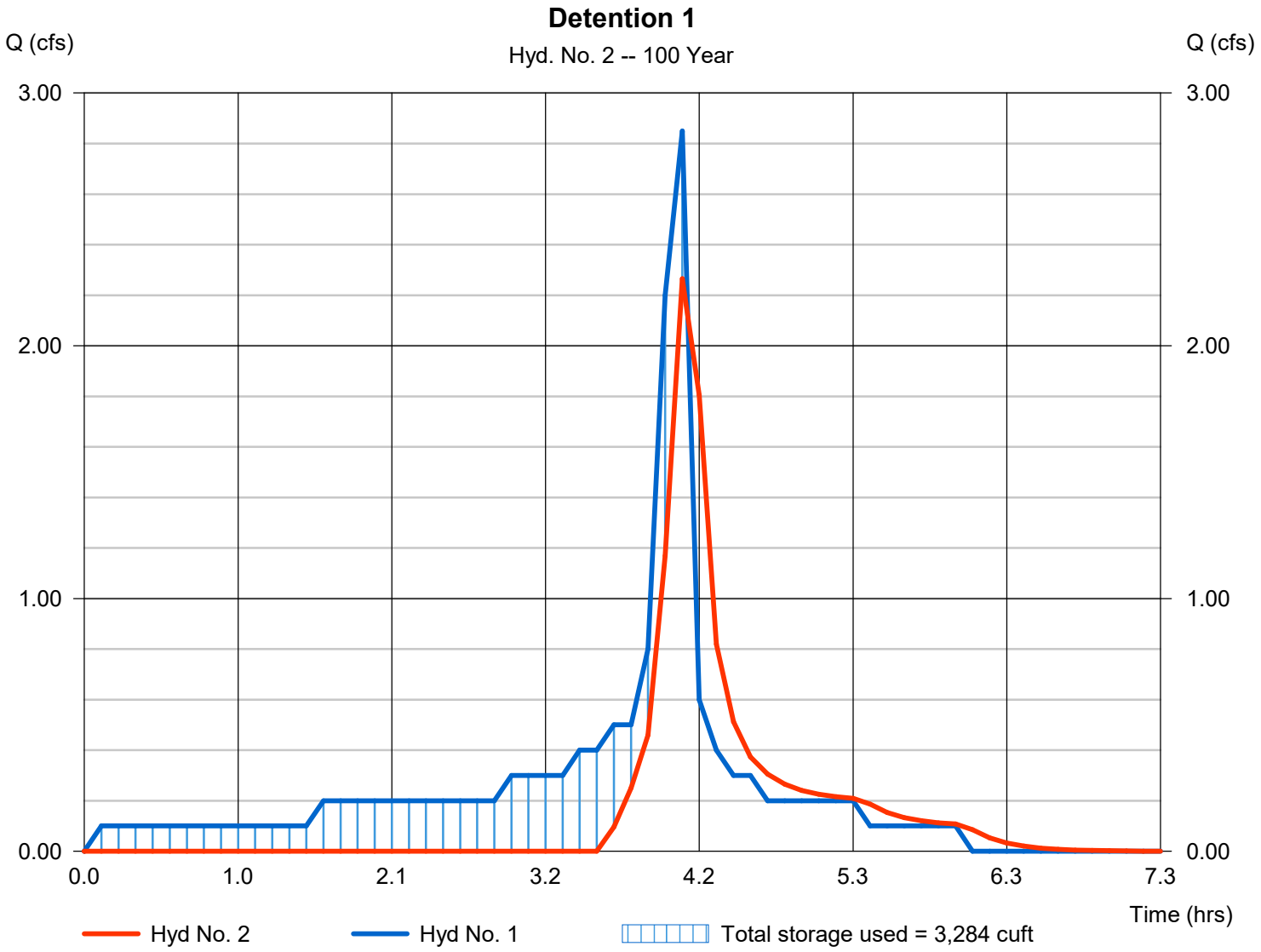
Hydrograph Report

Hyd. No. 2

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	2.265 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.08 hrs
Time interval	=	7 min	Hyd. volume	=	4,305 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	382.44 ft
Reservoir name	=	Det-CUP Pk3A-BMP #4	Max. Storage	=	3,284 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Det-CUP Pk3A-BMP #4

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 381.11 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	381.11	1,985	0	0
0.89	382.00	2,555	2,020	2,020
1.89	383.00	3,220	2,887	4,908

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	Inactive	Inactive
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.60	Inactive	Inactive	Inactive
Crest El. (ft)	= 382.11	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

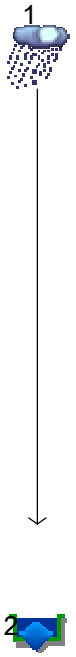
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	381.11	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.89	2,020	382.00	98.95 ic	---	---	---	0.00	---	---	---	---	---	0.000
1.89	4,908	383.00	98.95 ic	---	---	---	4.11 ic	---	---	---	---	---	4.109

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/23/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.53 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 2 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 126	DISCHARGE (CFS) = 0.1
TIME (MIN) = 132	DISCHARGE (CFS) = 0.1
TIME (MIN) = 138	DISCHARGE (CFS) = 0.1
TIME (MIN) = 144	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 156	DISCHARGE (CFS) = 0.1
TIME (MIN) = 162	DISCHARGE (CFS) = 0.1
TIME (MIN) = 168	DISCHARGE (CFS) = 0.1
TIME (MIN) = 174	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 186	DISCHARGE (CFS) = 0.2
TIME (MIN) = 192	DISCHARGE (CFS) = 0.2
TIME (MIN) = 198	DISCHARGE (CFS) = 0.2
TIME (MIN) = 204	DISCHARGE (CFS) = 0.2
TIME (MIN) = 210	DISCHARGE (CFS) = 0.2
TIME (MIN) = 216	DISCHARGE (CFS) = 0.3
TIME (MIN) = 222	DISCHARGE (CFS) = 0.3
TIME (MIN) = 228	DISCHARGE (CFS) = 0.4
TIME (MIN) = 234	DISCHARGE (CFS) = 0.5
TIME (MIN) = 240	DISCHARGE (CFS) = 1.4
TIME (MIN) = 246	DISCHARGE (CFS) = 2
TIME (MIN) = 252	DISCHARGE (CFS) = 0.4
TIME (MIN) = 258	DISCHARGE (CFS) = 0.3
TIME (MIN) = 264	DISCHARGE (CFS) = 0.2
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 276	DISCHARGE (CFS) = 0.2
TIME (MIN) = 282	DISCHARGE (CFS) = 0.1
TIME (MIN) = 288	DISCHARGE (CFS) = 0.1
TIME (MIN) = 294	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 306	DISCHARGE (CFS) = 0.1
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

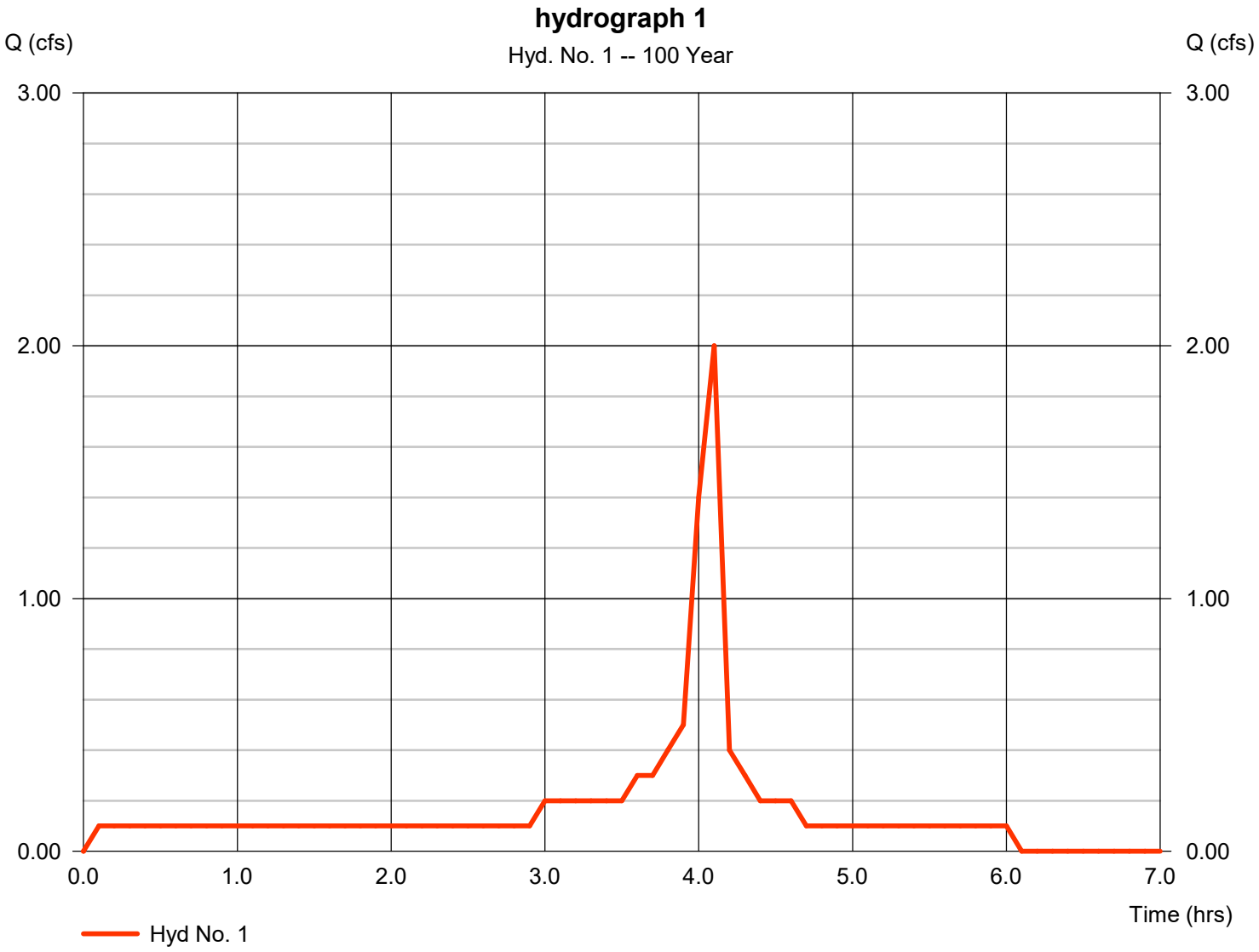
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 2.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.10 hrs
Time interval	= 6 min	Hyd. volume	= 4,212 cuft



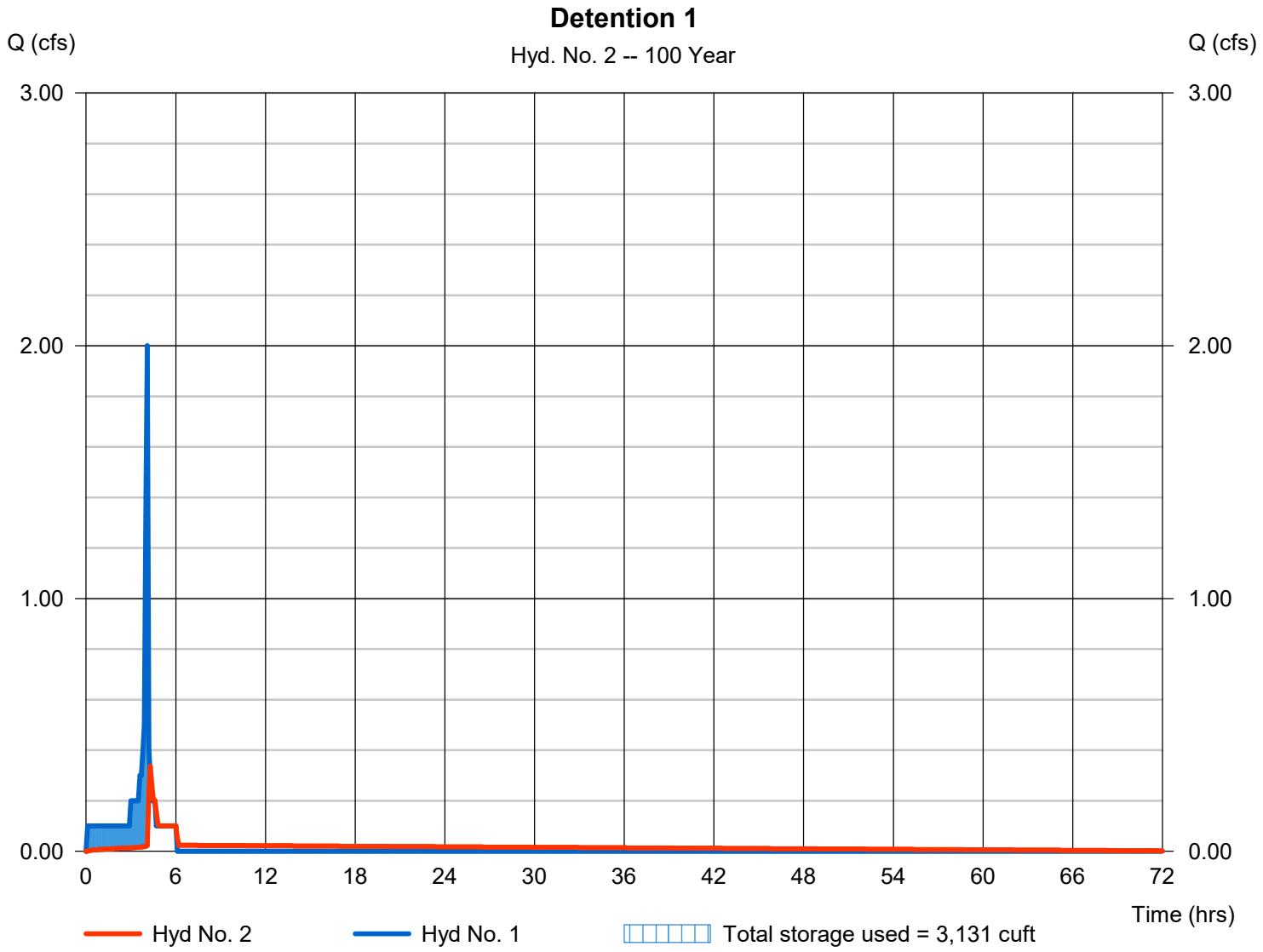
Hydrograph Report

Hyd. No. 2

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	0.336 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.30 hrs
Time interval	=	6 min	Hyd. volume	=	4,186 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	103.58 ft
Reservoir name	=	Det-CUP Pk7A-BMP 10	Max. Storage	=	3,131 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Det-CUP Pk7A-BMP 10

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	920	0	0
1.00	101.00	920	874	874
2.00	102.00	920	874	1,748
3.00	103.00	920	874	2,622
4.00	104.00	920	874	3,496

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.70	Inactive	Inactive
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.60	Inactive	Inactive	Inactive
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

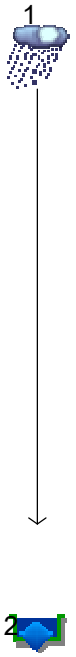
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	874	101.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.013
2.00	1,748	102.00	0.02 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.018
3.00	2,622	103.00	0.02 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.022
4.00	3,496	104.00	3.10 oc	0.02 ic	---	---	3.08 ic	---	---	---	---	---	3.101

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/23/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 5 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 0.95 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 3.55 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 5	DISCHARGE (CFS) = 0.1
TIME (MIN) = 10	DISCHARGE (CFS) = 0.1
TIME (MIN) = 15	DISCHARGE (CFS) = 0.1
TIME (MIN) = 20	DISCHARGE (CFS) = 0.1
TIME (MIN) = 25	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 35	DISCHARGE (CFS) = 0.1
TIME (MIN) = 40	DISCHARGE (CFS) = 0.1
TIME (MIN) = 45	DISCHARGE (CFS) = 0.1
TIME (MIN) = 50	DISCHARGE (CFS) = 0.1
TIME (MIN) = 55	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 65	DISCHARGE (CFS) = 0.1
TIME (MIN) = 70	DISCHARGE (CFS) = 0.1
TIME (MIN) = 75	DISCHARGE (CFS) = 0.2
TIME (MIN) = 80	DISCHARGE (CFS) = 0.2
TIME (MIN) = 85	DISCHARGE (CFS) = 0.2
TIME (MIN) = 90	DISCHARGE (CFS) = 0.2
TIME (MIN) = 95	DISCHARGE (CFS) = 0.2
TIME (MIN) = 100	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 110	DISCHARGE (CFS) = 0.2
TIME (MIN) = 115	DISCHARGE (CFS) = 0.2
TIME (MIN) = 120	DISCHARGE (CFS) = 0.2
TIME (MIN) = 125	DISCHARGE (CFS) = 0.2
TIME (MIN) = 130	DISCHARGE (CFS) = 0.2
TIME (MIN) = 135	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 145	DISCHARGE (CFS) = 0.2
TIME (MIN) = 150	DISCHARGE (CFS) = 0.2
TIME (MIN) = 155	DISCHARGE (CFS) = 0.2
TIME (MIN) = 160	DISCHARGE (CFS) = 0.2
TIME (MIN) = 165	DISCHARGE (CFS) = 0.2
TIME (MIN) = 170	DISCHARGE (CFS) = 0.3
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 180	DISCHARGE (CFS) = 0.3
TIME (MIN) = 185	DISCHARGE (CFS) = 0.3
TIME (MIN) = 190	DISCHARGE (CFS) = 0.3
TIME (MIN) = 195	DISCHARGE (CFS) = 0.3
TIME (MIN) = 200	DISCHARGE (CFS) = 0.4
TIME (MIN) = 205	DISCHARGE (CFS) = 0.4
TIME (MIN) = 210	DISCHARGE (CFS) = 0.4
TIME (MIN) = 215	DISCHARGE (CFS) = 0.5
TIME (MIN) = 220	DISCHARGE (CFS) = 0.5
TIME (MIN) = 225	DISCHARGE (CFS) = 0.6
TIME (MIN) = 230	DISCHARGE (CFS) = 0.7
TIME (MIN) = 235	DISCHARGE (CFS) = 1.1
TIME (MIN) = 240	DISCHARGE (CFS) = 3.3
TIME (MIN) = 245	DISCHARGE (CFS) = 3.55
TIME (MIN) = 250	DISCHARGE (CFS) = 0.8
TIME (MIN) = 255	DISCHARGE (CFS) = 0.6
TIME (MIN) = 260	DISCHARGE (CFS) = 0.4
TIME (MIN) = 265	DISCHARGE (CFS) = 0.4
TIME (MIN) = 270	DISCHARGE (CFS) = 0.3
TIME (MIN) = 275	DISCHARGE (CFS) = 0.3
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 285	DISCHARGE (CFS) = 0.2
TIME (MIN) = 290	DISCHARGE (CFS) = 0.2
TIME (MIN) = 295	DISCHARGE (CFS) = 0.2
TIME (MIN) = 300	DISCHARGE (CFS) = 0.2
TIME (MIN) = 305	DISCHARGE (CFS) = 0.2
TIME (MIN) = 310	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 320	DISCHARGE (CFS) = 0.2
TIME (MIN) = 325	DISCHARGE (CFS) = 0.2
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 335	DISCHARGE (CFS) = 0.1
TIME (MIN) = 340	DISCHARGE (CFS) = 0.1
TIME (MIN) = 345	DISCHARGE (CFS) = 0.1
TIME (MIN) = 350	DISCHARGE (CFS) = 0.1
TIME (MIN) = 355	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 365	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

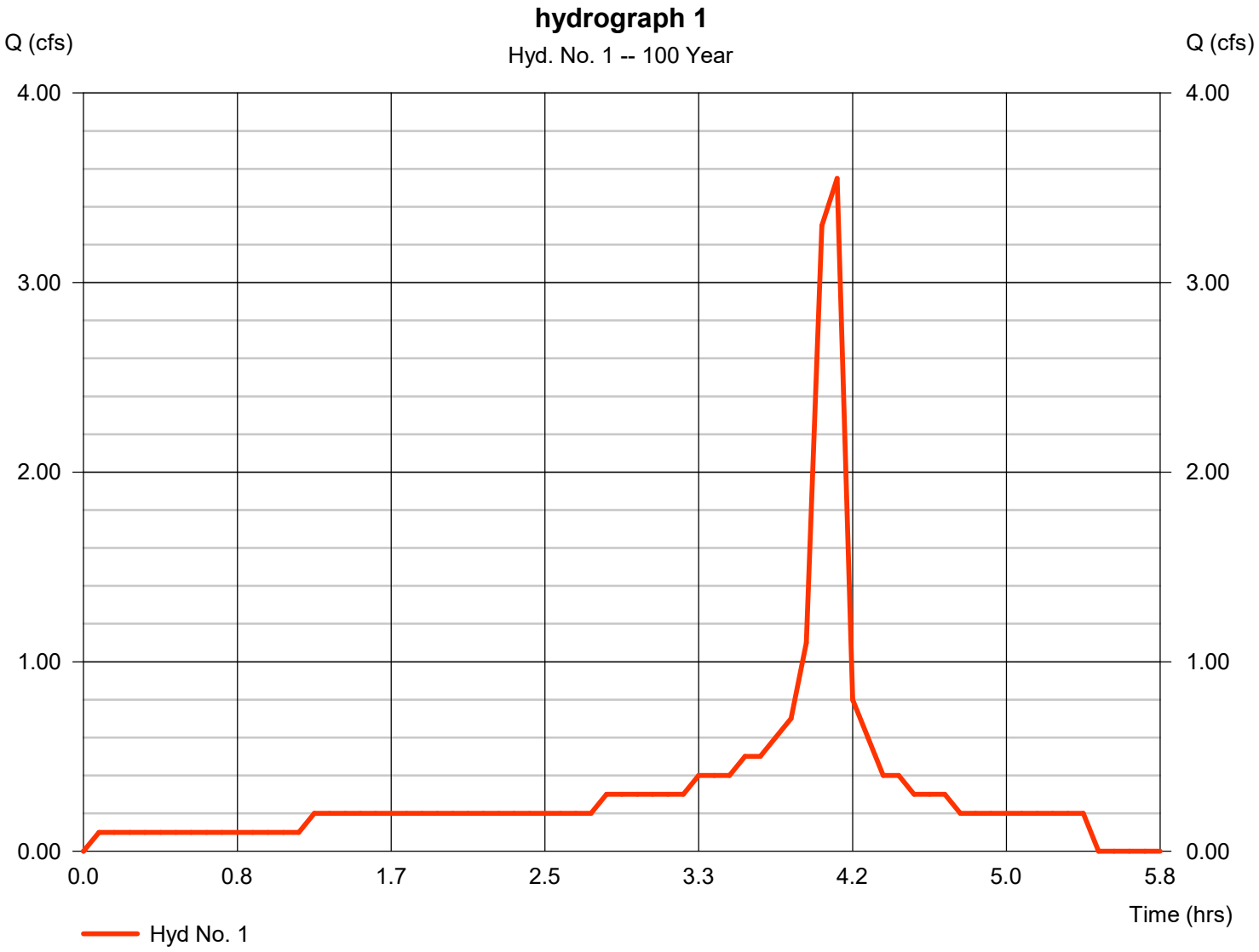
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 3.550 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 5 min	Hyd. volume	= 7,005 cuft



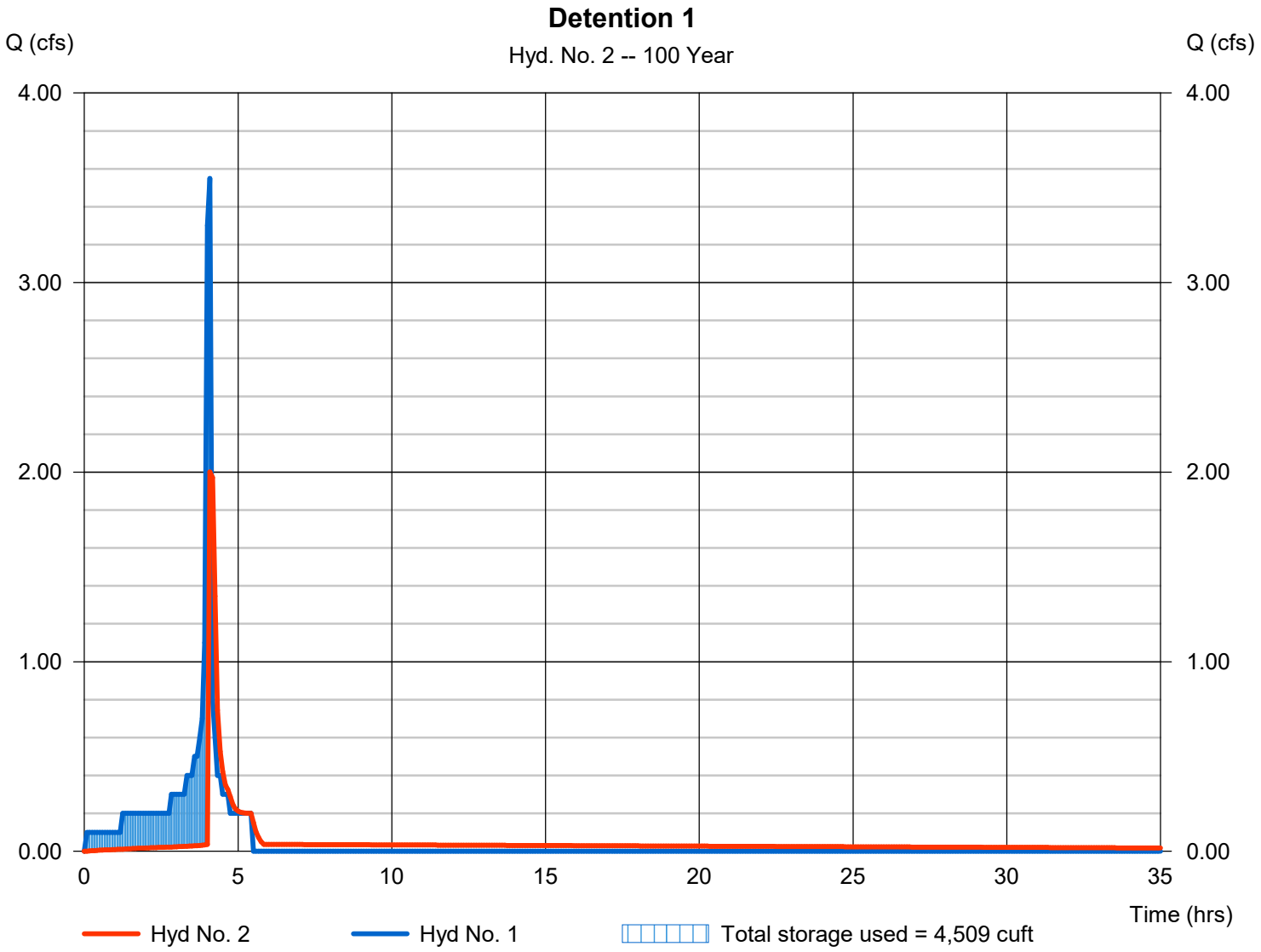
Hydrograph Report

Hyd. No. 2

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	2.001 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.08 hrs
Time interval	=	5 min	Hyd. volume	=	6,976 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	102.34 ft
Reservoir name	=	Detention Basin-BMP #12	Max. Storage	=	4,509 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Basin-BMP #12

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	1,970	0	0
1.00	101.00	1,970	1,872	1,872
2.00	102.00	1,970	1,872	3,743
2.50	102.50	1,970	936	4,679

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.00	Inactive	Inactive
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 102.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

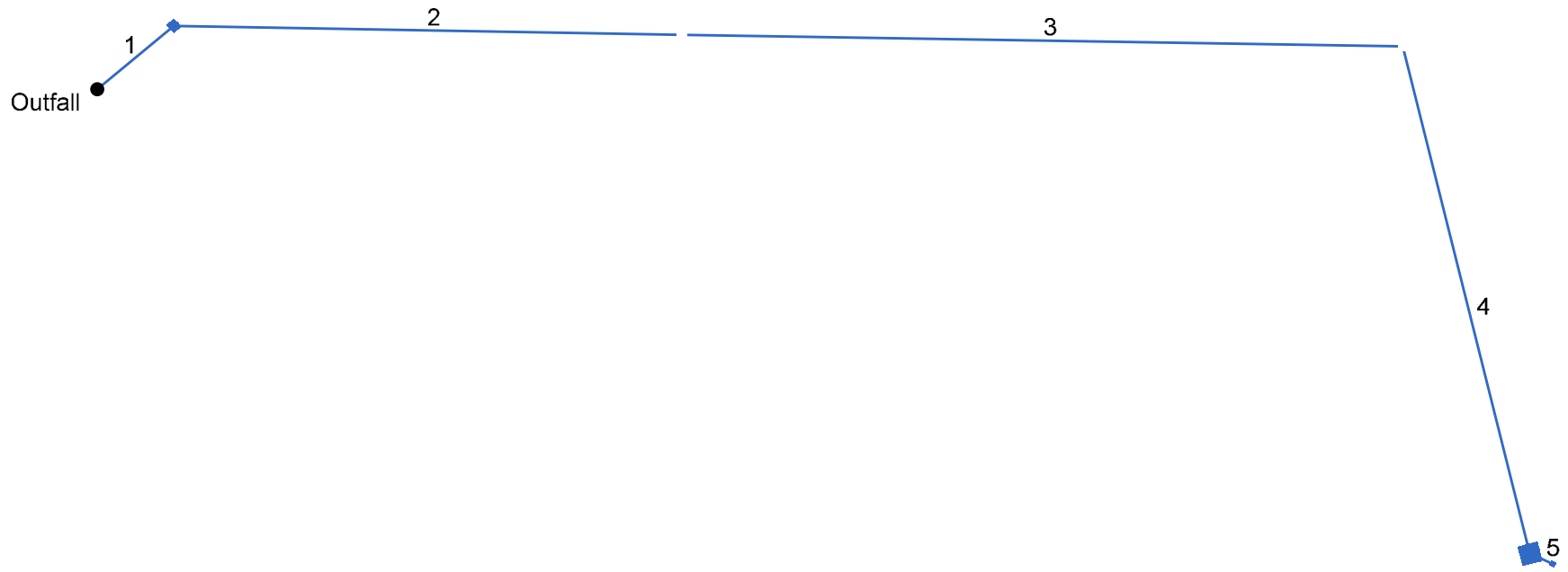
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	1,872	101.00	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.025
2.00	3,743	102.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
2.50	4,679	102.50	2.17 oc	0.03 ic	---	---	2.14 ic	---	---	---	---	---	2.169

PACKAGE 4 (STEPHEN BIRCH ADDITION) STORM DRAIN SYSTEM

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

BYPASS SYSTEM ANALYSIS



Project File: SD Line-01 North-100yr.stm	Number of lines: 5	Date: 12/28/2021

Hydraulic Grade Line Computations

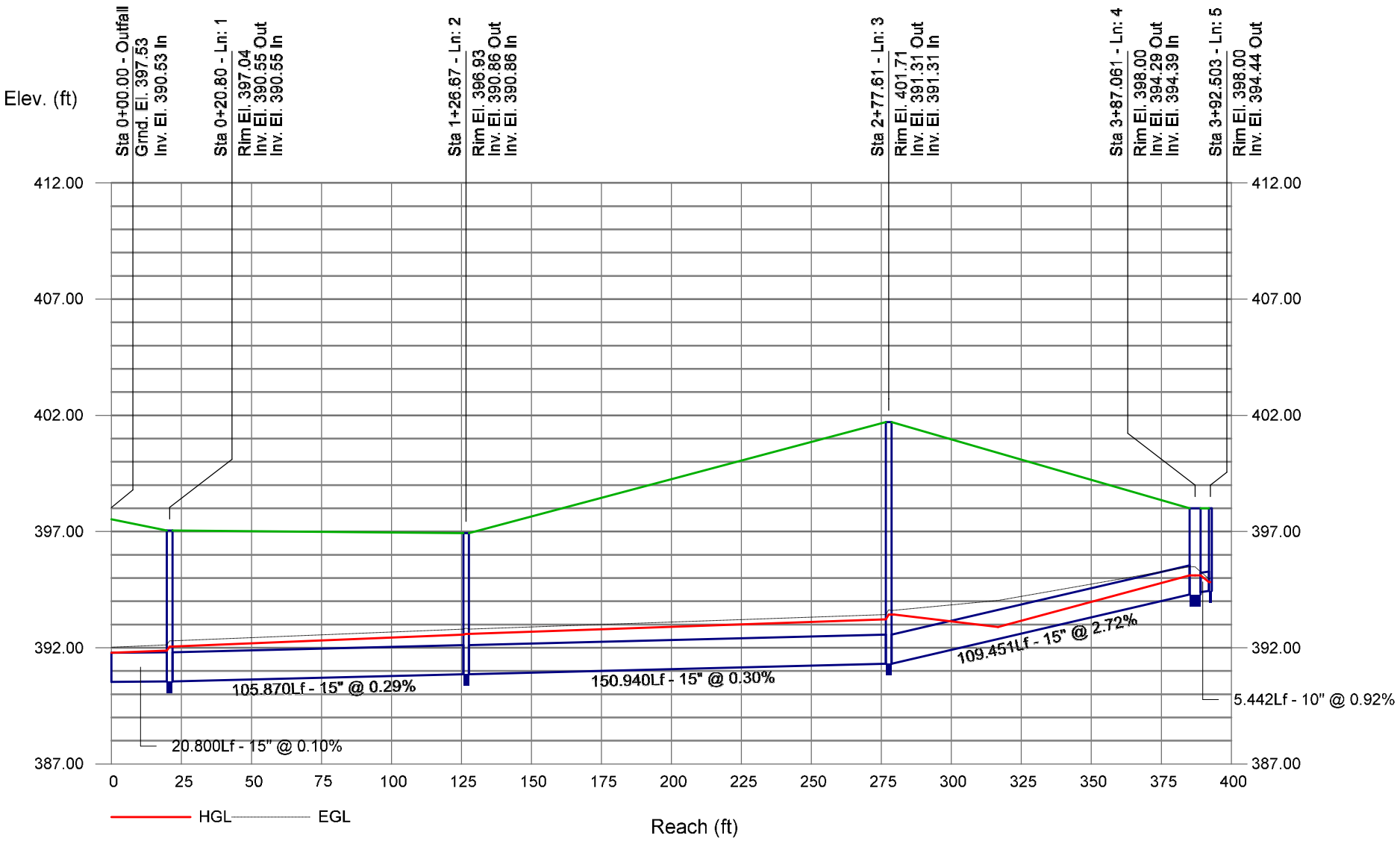
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
5	10	0.75	394.39	395.11	0.72	0.24	1.49	0.15	395.26	0.000	5.442	394.44	394.82	0.38**	0.24	3.08	0.15	394.97	0.000	0.000	n/a	1.00	n/a
4	15	4.15	391.31	393.42	1.25	0.86	3.38	0.18	393.60	0.352	109.451	394.29	395.11 j	0.82**	0.86	4.84	0.36	395.48	0.591	0.471	n/a	0.83	n/a
3	15	4.50	390.86	392.60	1.25	1.23	3.67	0.21	392.80	0.414	150.940	391.31	393.22	1.25	1.23	3.67	0.21	393.43	0.414	0.414	0.625	0.97	0.20
2	15	4.85	390.55	392.05	1.25	1.23	3.95	0.24	392.29	0.481	105.870	390.86	392.56	1.25	1.23	3.95	0.24	392.80	0.481	0.481	0.509	0.15	0.04
1	15	4.85	390.53	391.78	1.25	1.23	3.95	0.24	392.02	0.481	20.800	390.55	391.88	1.25	1.23	3.95	0.24	392.12	0.481	0.481	0.100	0.70	0.17

Project File: SD Line-01 North-100yr.stm | Number of lines: 5 | Run Date: 12/28/2021

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

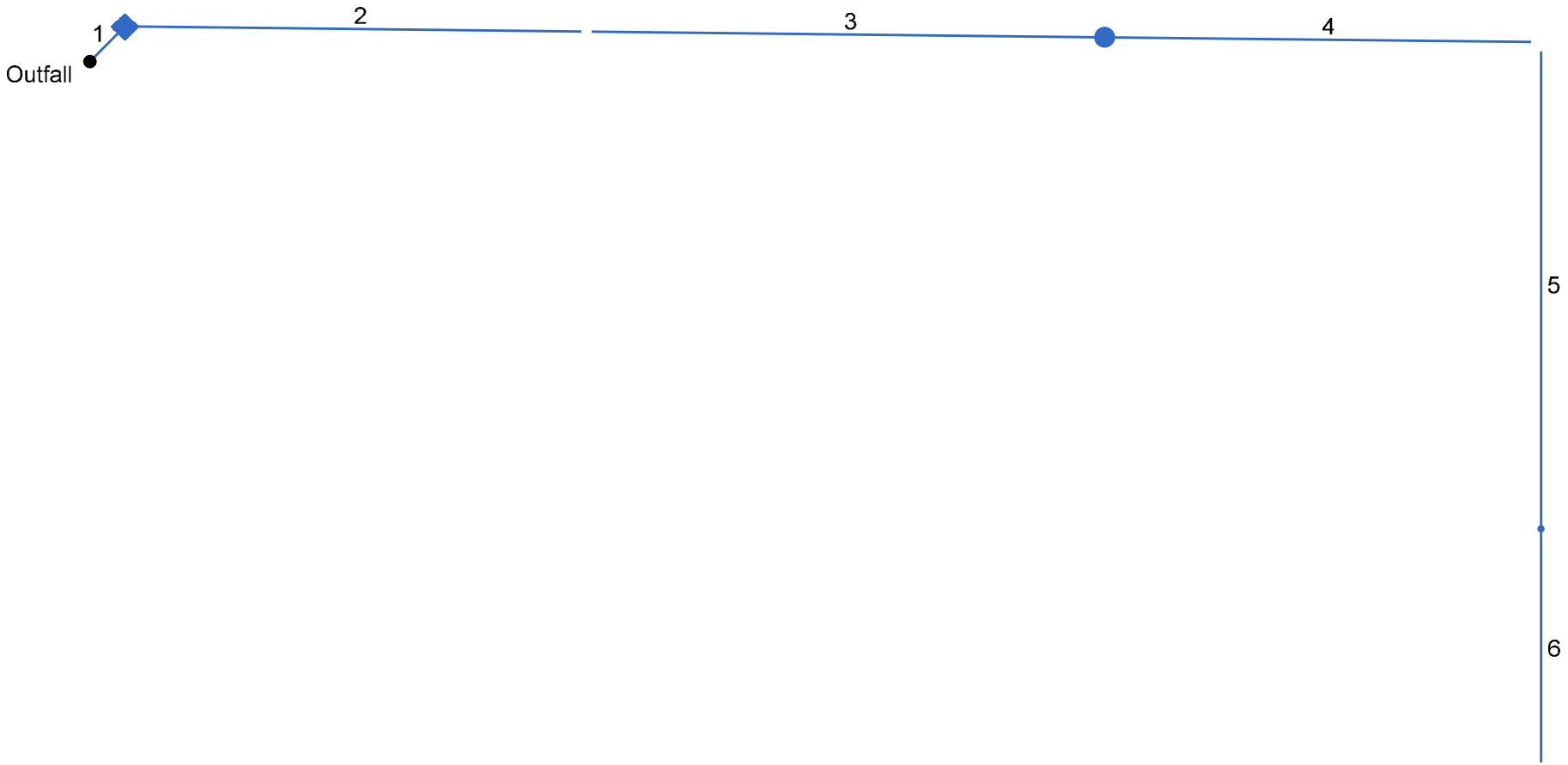
Storm Sewer Profile

Proj. file: SD Line-01 North-100yr.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

MAIN SD ANALYSIS



Project File: SD Line-07 North-100yr.stm	Number of lines: 6	Date: 12/28/2021

Hydraulic Grade Line Computations

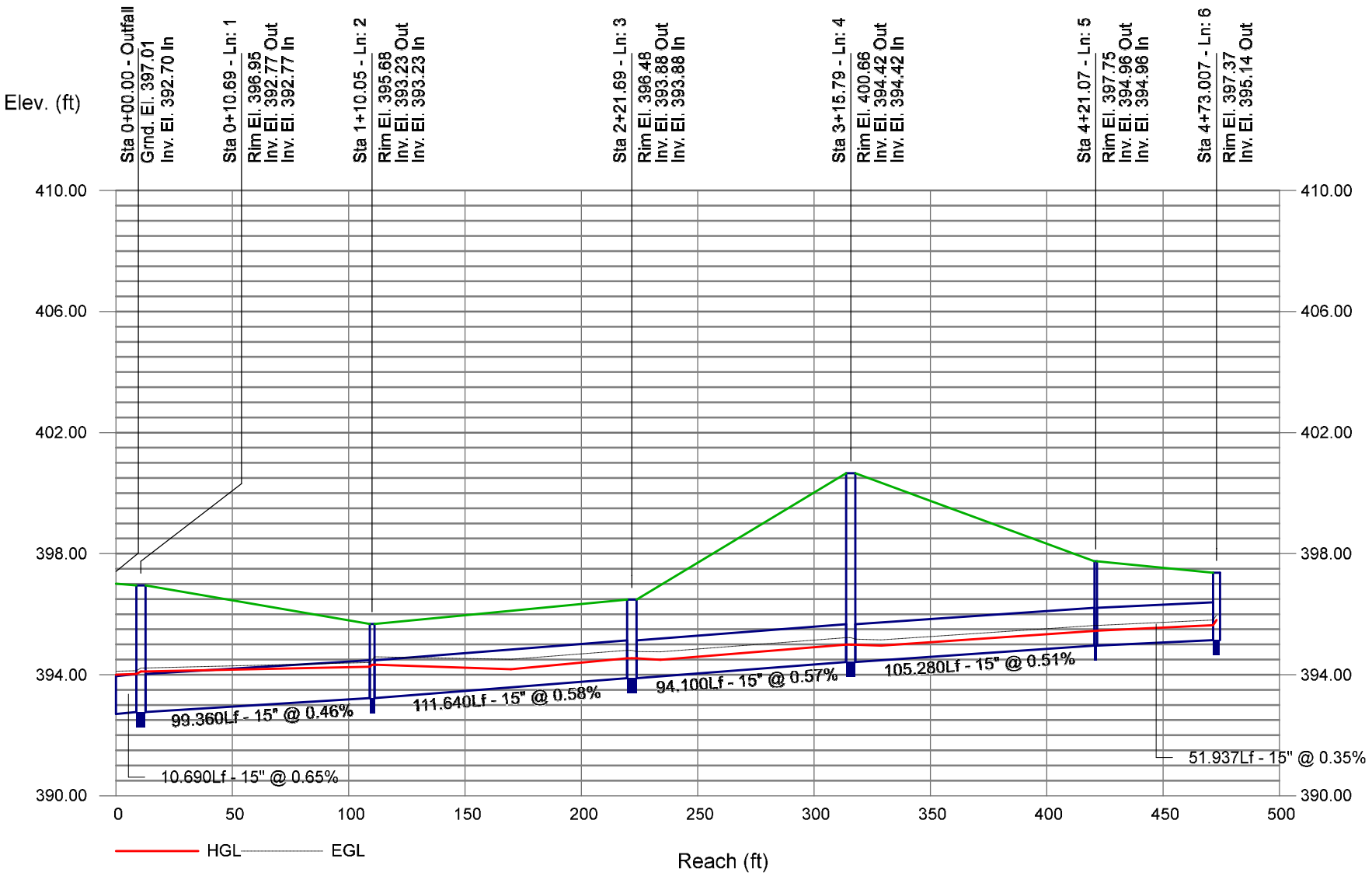
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
6	15	1.50	394.96	395.46	0.50*	0.46	3.29	0.17	395.63	0.346	51.937	395.14	395.64	0.50	0.45	3.30	0.17	395.81	0.349	0.348	0.180	1.00	0.17
5	15	1.50	394.42	395.00	0.58	0.44	2.71	0.18	395.18	0.000	105.280	394.96	395.44 j	0.48**	0.44	3.41	0.18	395.63	0.000	0.000	n/a	0.15	0.03
4	15	2.10	393.88	394.54	0.66	0.55	3.20	0.22	394.76	0.000	94.100	394.42	395.00 j	0.58**	0.55	3.79	0.22	395.22	0.000	0.000	n/a	1.00	0.22
3	15	2.70	393.23	394.33	1.10	0.66	2.36	0.26	394.59	0.000	111.640	393.88	394.54 j	0.66**	0.66	4.12	0.26	394.80	0.000	0.000	n/a	0.15	0.04
2	15	3.30	392.77	394.11	1.25	1.23	2.69	0.11	394.22	0.187	99.360	393.23	394.26	1.03	1.08	3.06	0.15	394.40	0.186	0.186	0.185	0.50	0.07
1	15	3.30	392.70	394.00	1.25	1.23	2.69	0.11	394.11	0.187	10.690	392.77	394.02	1.25	1.23	2.69	0.11	394.13	0.186	0.186	0.020	0.76	0.09

Project File: SD Line-07 North-100yr.stm | Number of lines: 6 | Run Date: 12/28/2021

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: SD Line-07 North-100yr.stm



RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/23/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 1.12 ACRES
RUNOFF COEFFICIENT 0.85
PEAK DISCHARGE 3.88 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 0.1
TIME (MIN) = 14	DISCHARGE (CFS) = 0.1
TIME (MIN) = 21	DISCHARGE (CFS) = 0.1
TIME (MIN) = 28	DISCHARGE (CFS) = 0.2
TIME (MIN) = 35	DISCHARGE (CFS) = 0.2
TIME (MIN) = 42	DISCHARGE (CFS) = 0.2
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TIME (MIN) = 133	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 147	DISCHARGE (CFS) = 0.3
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TIME (MIN) = 203	DISCHARGE (CFS) = 0.5
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TIME (MIN) = 217	DISCHARGE (CFS) = 0.6
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TIME (MIN) = 252	DISCHARGE (CFS) = 0.8
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TIME (MIN) = 273	DISCHARGE (CFS) = 0.4
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 287	DISCHARGE (CFS) = 0.3
TIME (MIN) = 294	DISCHARGE (CFS) = 0.2
TIME (MIN) = 301	DISCHARGE (CFS) = 0.2
TIME (MIN) = 308	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 322	DISCHARGE (CFS) = 0.2
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TIME (MIN) = 336	DISCHARGE (CFS) = 0.2
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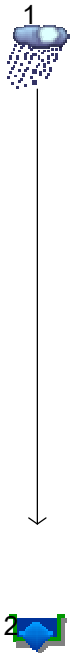
TIME (MIN) = 364	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

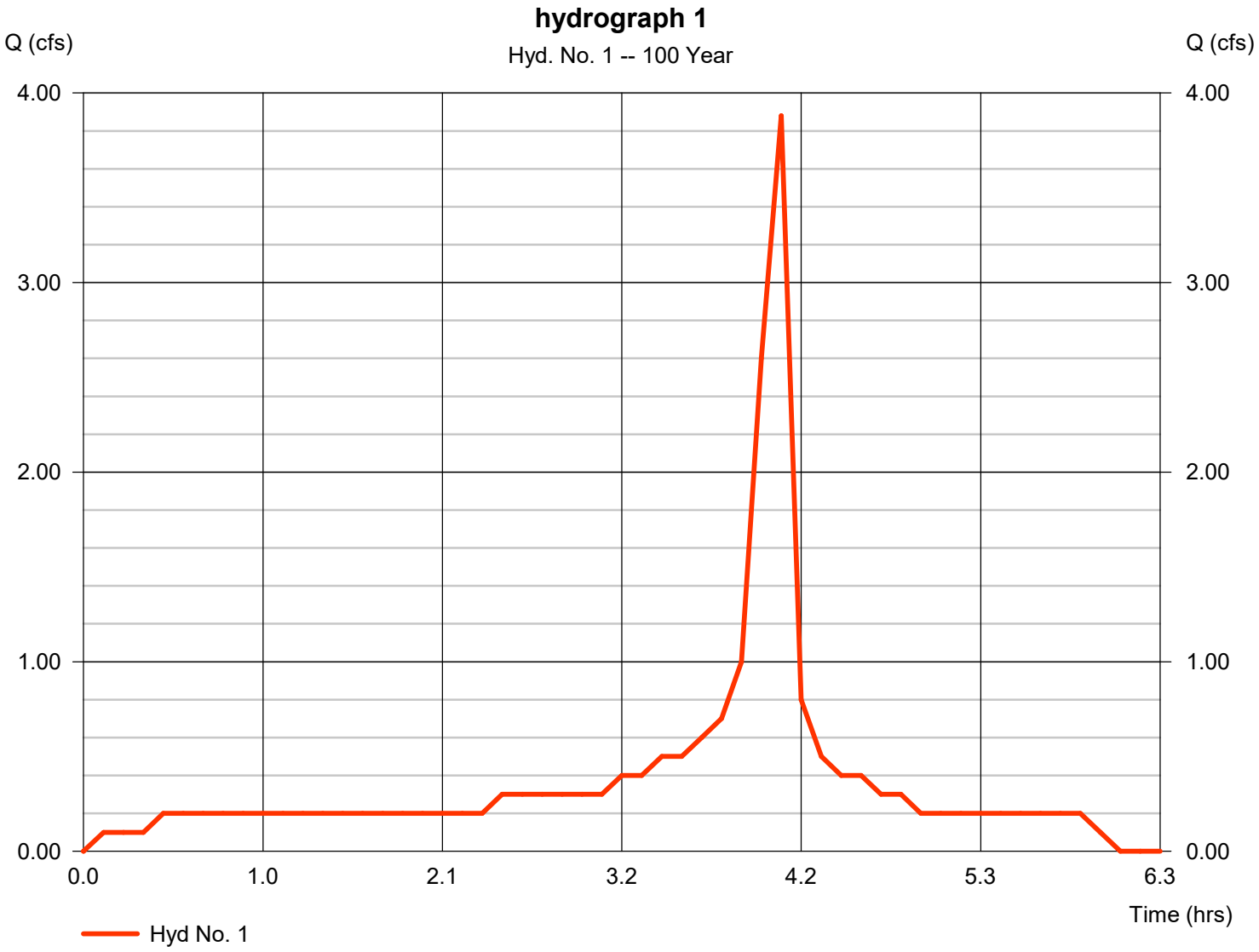
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 3.880 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 8,686 cuft



Hydrograph Report

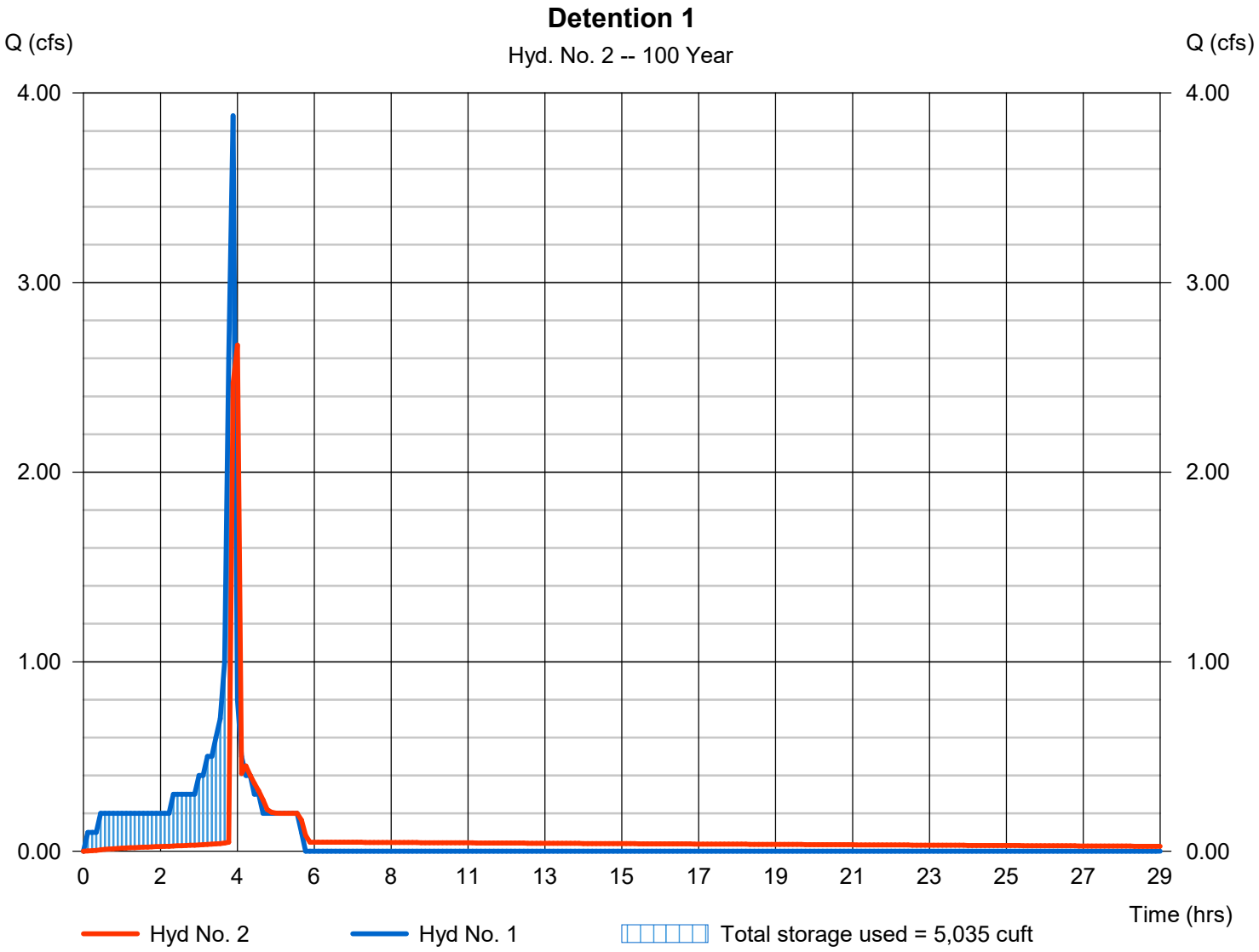
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 12 / 23 / 2021

Hyd. No. 2

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	2.670 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.20 hrs
Time interval	=	7 min	Hyd. volume	=	8,665 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	103.90 ft
Reservoir name	=	Det-SBA pk4-BMP 5	Max. Storage	=	5,035 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Det-SBA pk4-BMP 5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	1,345	0	0
1.00	101.00	1,345	1,278	1,278
2.00	102.00	1,345	1,278	2,556
3.00	103.00	1,345	1,278	3,833
4.00	104.00	1,345	1,278	5,111

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.00	Inactive	Inactive
Span (in)	= 18.00	1.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	Inactive	Inactive	Inactive
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

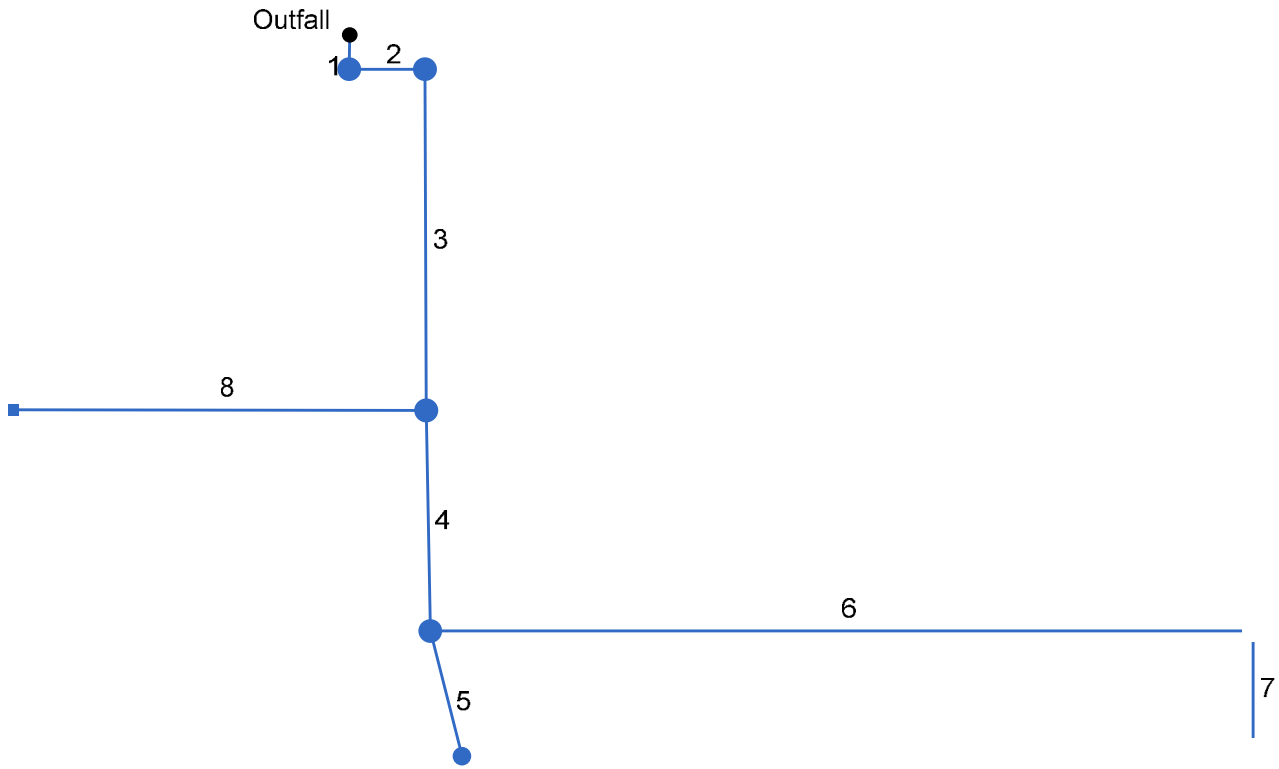
Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	1,278	101.00	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.025
2.00	2,556	102.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
3.00	3,833	103.00	0.05 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.045
4.00	5,111	104.00	2.64 oc	0.05 ic	---	---	2.34 ic	---	---	---	---	---	2.388

PACKAGE 5A (CEP) STORM DRAIN SYSTEM

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

NEW CEP SD ANALYSIS



Project File: SD Line-4-10 CP-100yr.stm	Number of lines: 8	Date: 12/30/2021

Hydraulic Grade Line Computations

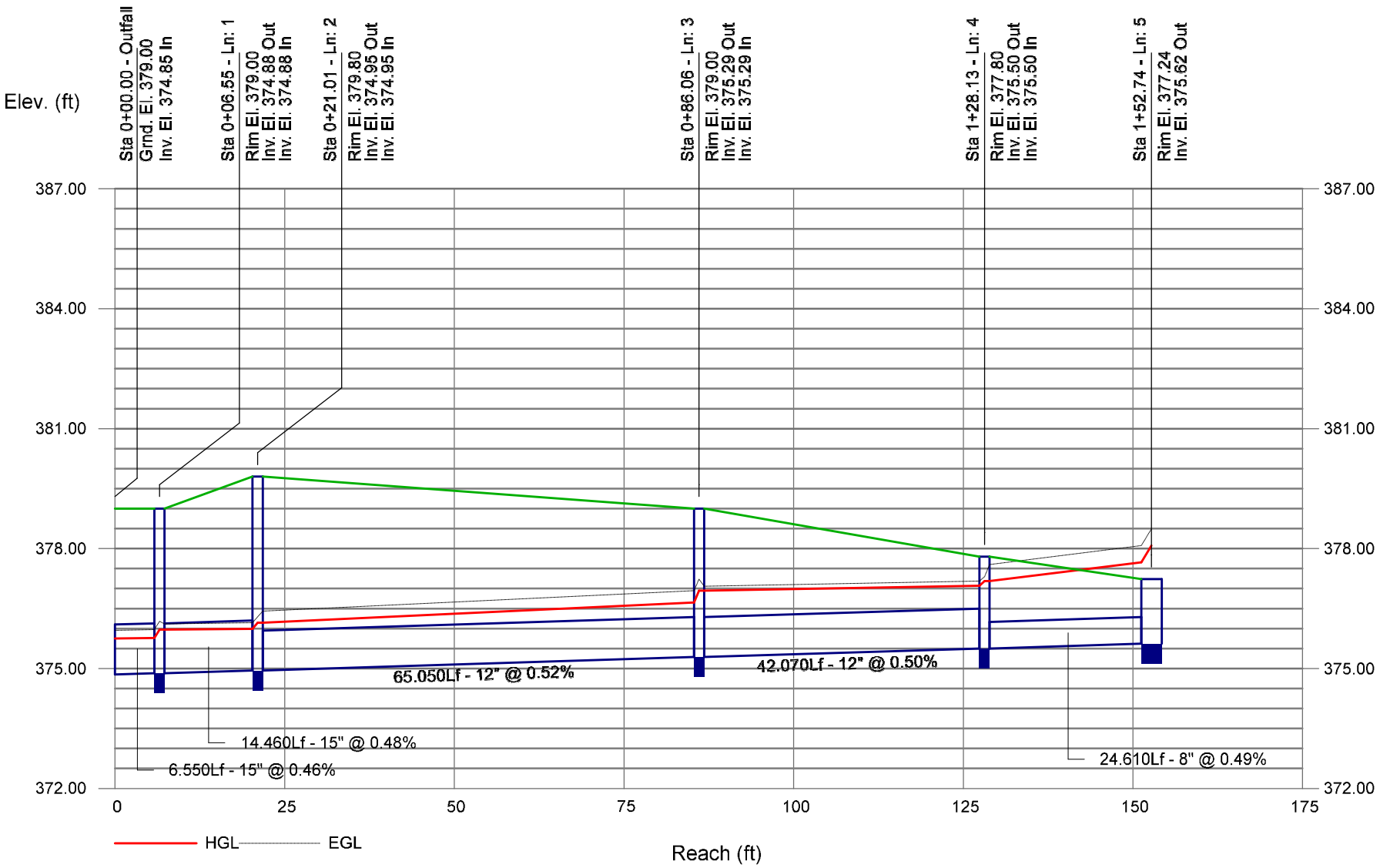
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
8	8	1.30	375.29	376.95	0.67	0.35	3.72	0.22	377.16	0.988	78.860	375.68	377.73	0.67	0.35	3.72	0.22	377.94	0.987	0.987	0.779	1.00	0.22
7	6	0.30	376.16	377.28	0.50	0.20	1.53	0.04	377.32	0.244	22.000	376.52	377.33	0.50	0.20	1.53	0.04	377.37	0.244	0.244	0.054	1.00	0.04
6	8	0.30	375.50	377.19	0.67	0.35	0.86	0.01	377.20	0.053	157.190	376.16	377.27	0.67	0.35	0.86	0.01	377.28	0.053	0.053	0.083	1.00	0.01
5	8	1.81	375.50	377.19	0.67	0.35	5.19	0.42	377.60	1.915	24.610	375.62	377.66	0.67	0.35	5.19	0.42	378.07	1.914	1.914	0.471	1.00	0.42
4	12	2.11	375.29	376.95	1.00	0.79	2.69	0.11	377.06	0.299	42.070	375.50	377.07	1.00	0.79	2.69	0.11	377.19	0.299	0.299	0.126	1.00	0.11
3	12	3.41	374.95	376.15	1.00	0.79	4.34	0.29	376.44	0.782	65.050	375.29	376.65	1.00	0.79	4.34	0.29	376.95	0.781	0.781	0.508	1.00	0.29
2	15	3.41	374.88	375.97	1.09	1.14	2.99	0.14	376.11	0.215	14.460	374.95	375.99	1.04	1.10	3.11	0.15	376.15	0.230	0.222	0.032	1.00	0.15
1	15	3.41	374.85	375.75	0.90	0.95	3.61	0.20	375.95	0.315	6.550	374.88	375.76	0.88	0.93	3.68	0.21	375.97	0.330	0.323	0.021	1.00	0.21

Project File: SD Line-4-10 CP-100yr.stm | Number of lines: 8 | Run Date: 12/30/2021

; c = cir e = ellip b = box

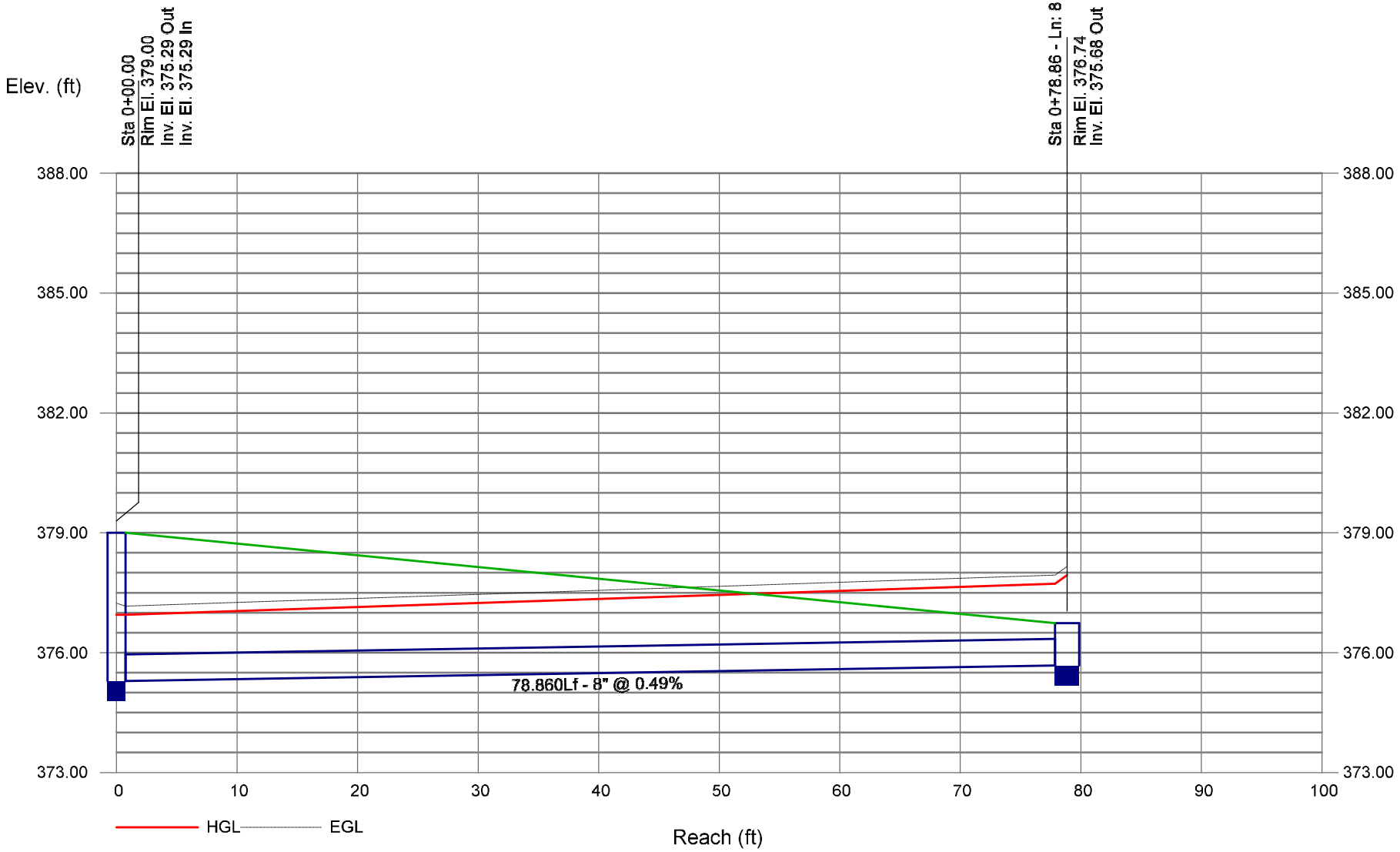
Storm Sewer Profile

Proj. file: SD Line-4-10 CP-100yr.stm



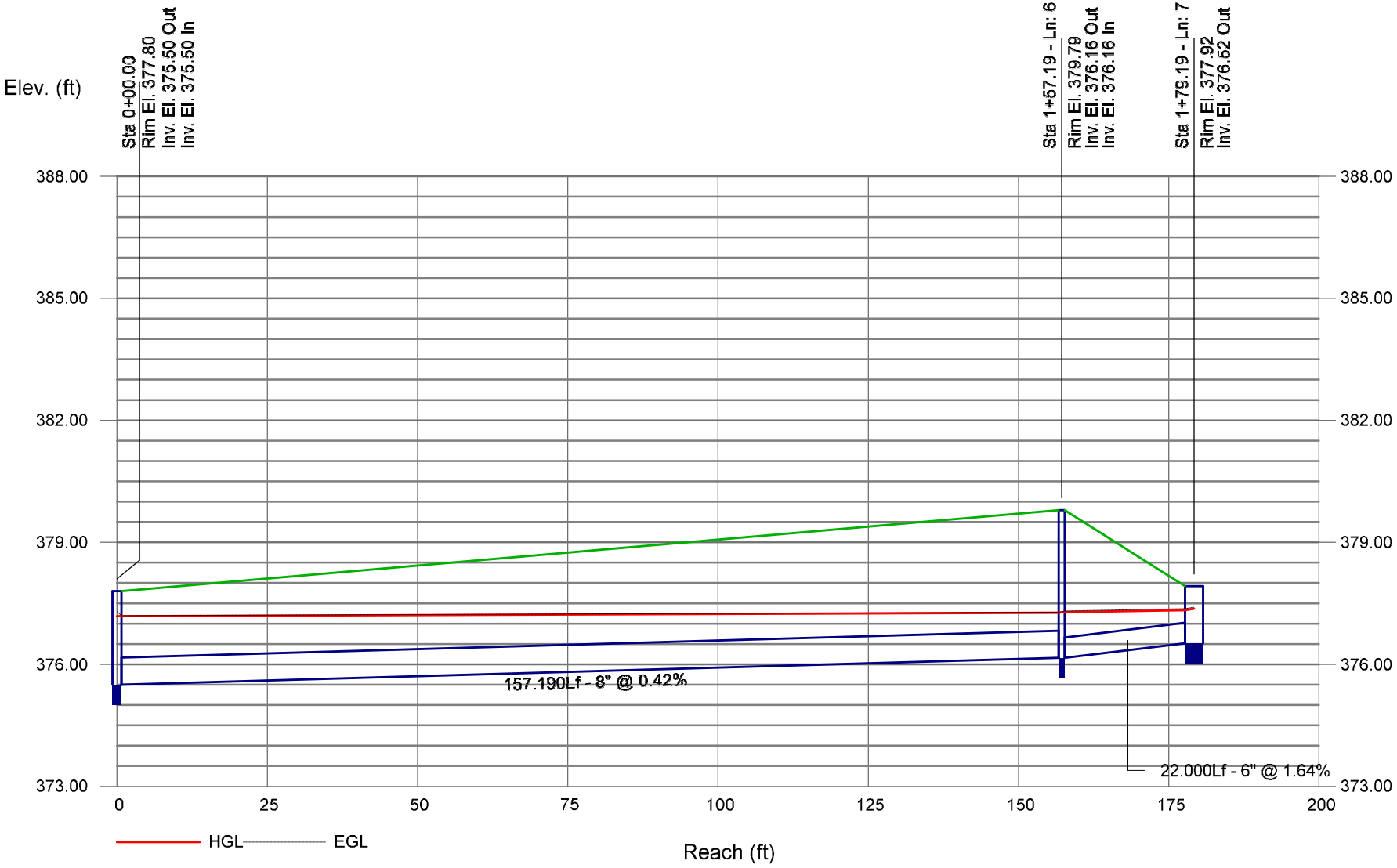
Storm Sewer Profile

Proj. file: SD Line-4-10 CP-100yr.stm

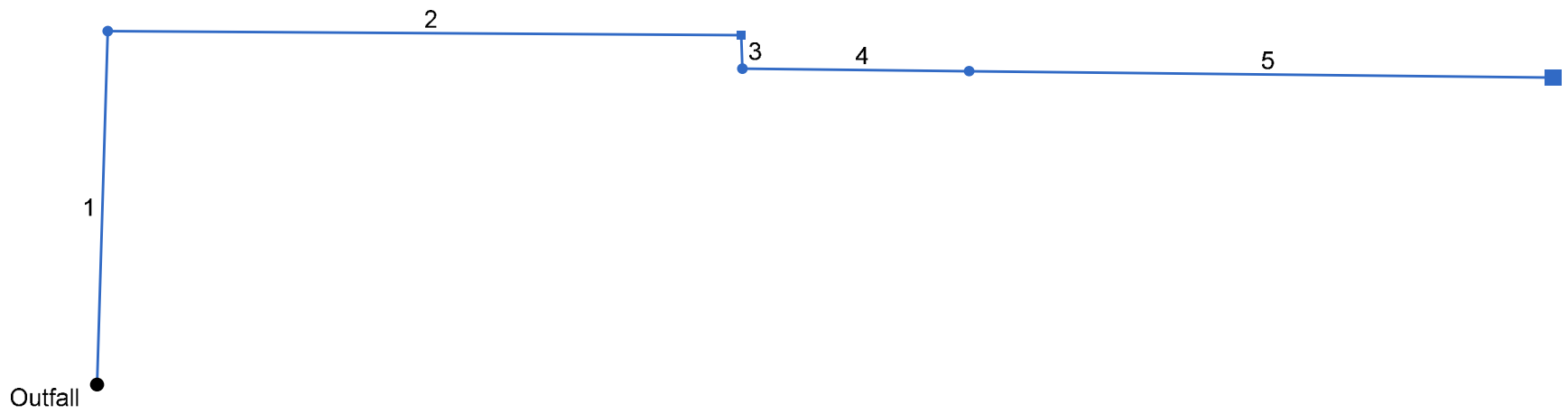


Storm Sewer Profile

Proj. file: SD Line-4-10 CP-100yr.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: SD Line-06 CP-100yr.stm	Number of lines: 5	Date: 12/30/2021

Hydraulic Grade Line Computations

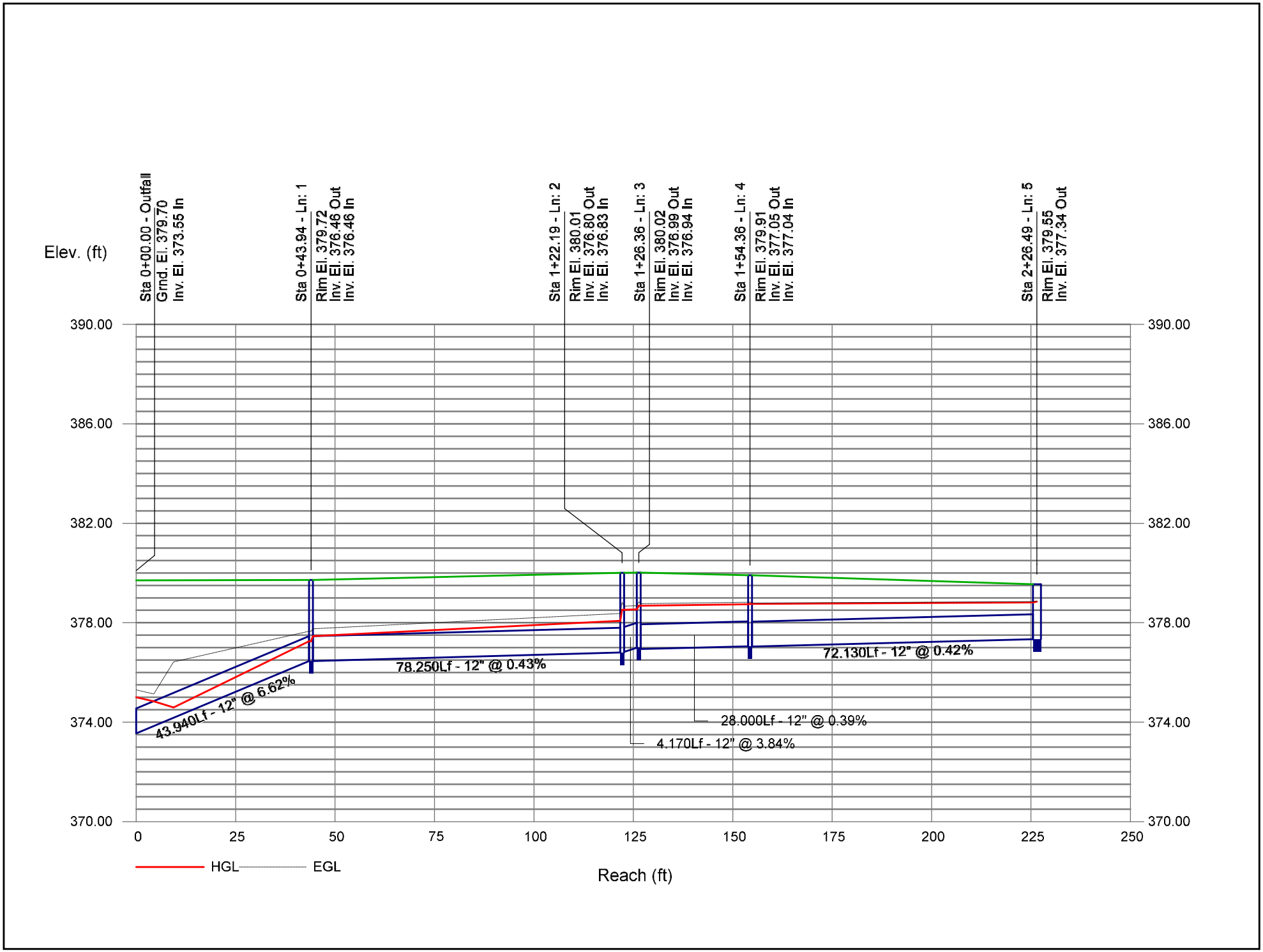
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
5	12	1.10	377.04	378.76	1.00	0.79	1.40	0.03	378.79	0.081	72.130	377.34	378.82	1.00	0.79	1.40	0.03	378.85	0.081	0.081	0.059	1.00	0.03
4	12	1.75	376.94	378.69	1.00	0.79	2.23	0.08	378.77	0.206	28.000	377.05	378.75	1.00	0.79	2.23	0.08	378.82	0.206	0.206	0.058	0.15	0.01
3	12	2.47	376.83	378.52	1.00	0.79	3.15	0.15	378.67	0.410	4.170	376.99	378.53	1.00	0.79	3.14	0.15	378.69	0.410	0.410	0.017	1.00	0.15
2	12	3.42	376.46	377.46	1.00*	0.79	4.36	0.29	377.75	0.786	78.250	376.80	378.08	1.00	0.79	4.35	0.29	378.37	0.786	0.786	0.615	1.50	0.44
1	12	3.42	373.55	375.00	1.00	0.67	4.36	0.29	375.29	0.786	43.940	376.46	377.25 j	0.79**	0.67	5.14	0.41	377.66	0.843	0.815	n/a	1.00	n/a

Project File: SD Line-06 CP-100yr.stm | Number of lines: 5 | Run Date: 12/30/2021

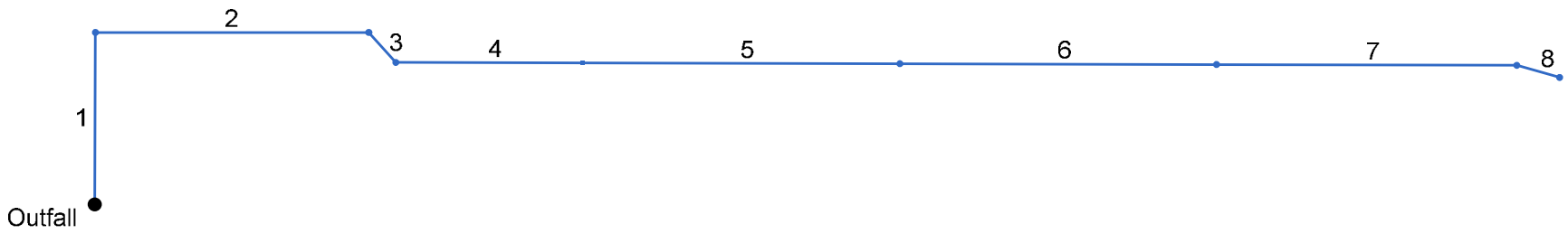
Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: SD Line-06 CP-100yr.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: SD Line-05 CP-100yr Bypass.stm	Number of lines: 8	Date: 12/30/2021

Hydraulic Grade Line Computations

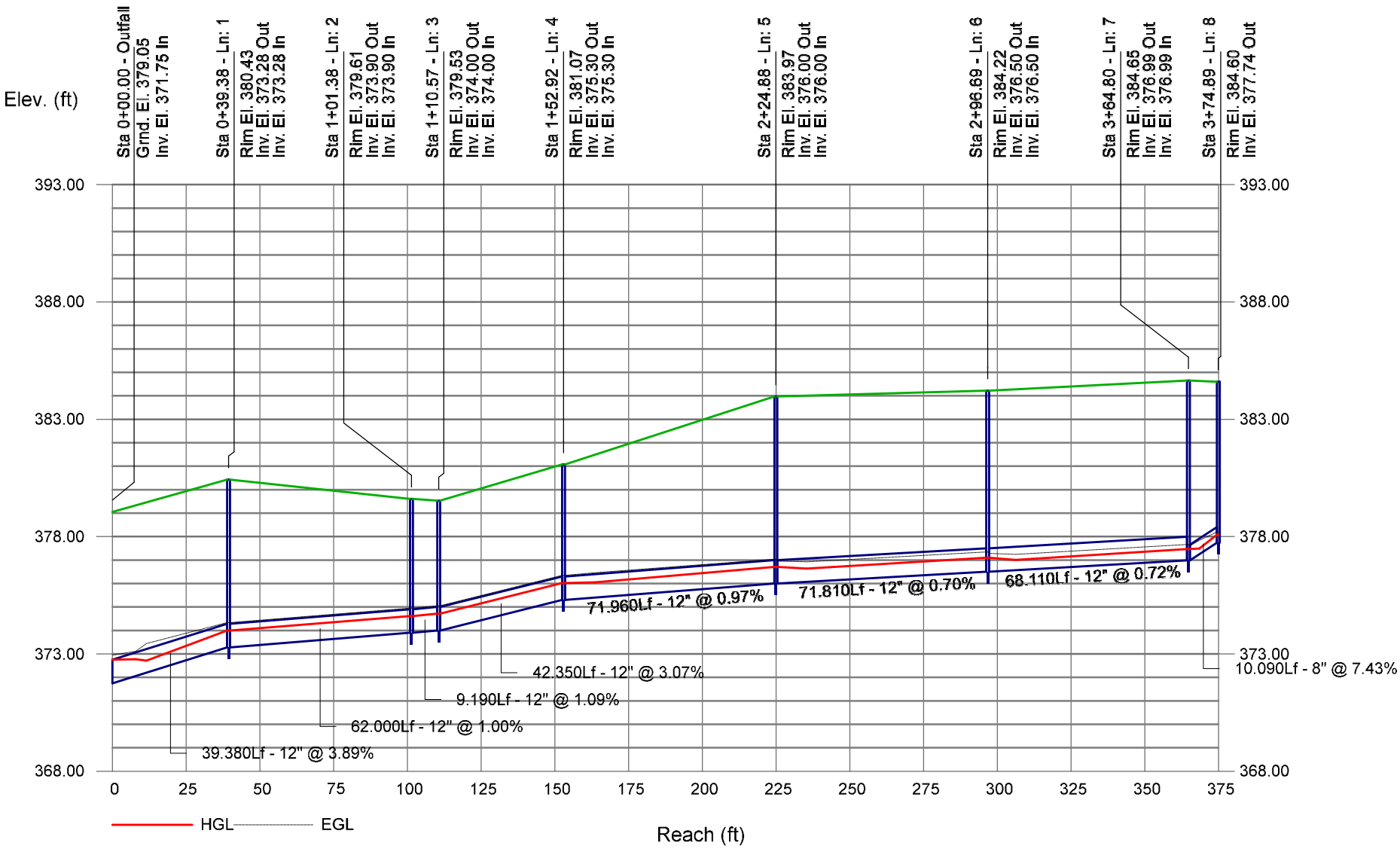
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
8	8	0.50	376.99	377.47	0.48	0.17	1.85	0.13	377.60	0.000	10.090	377.74	378.07 j	0.33**	0.17	2.89	0.13	378.20	0.000	0.000	n/a	1.00	n/a
7	12	1.30	376.50	377.10	0.60	0.37	2.67	0.19	377.28	0.000	68.110	376.99	377.47 j	0.48**	0.37	3.48	0.19	377.66	0.000	0.000	n/a	0.32	0.06
6	12	1.95	376.00	376.71	0.71	0.49	3.27	0.25	376.96	0.000	71.810	376.50	377.10 j	0.60**	0.49	4.00	0.25	377.34	0.000	0.000	n/a	0.50	n/a
5	12	2.75	375.30	376.02	0.72	0.60	4.56	0.33	376.35	0.000	71.960	376.00	376.71 j	0.71**	0.60	4.61	0.33	377.04	0.000	0.000	n/a	0.15	0.05
4	12	2.80	374.00	374.72	0.72*	0.60	4.65	0.34	375.05	0.000	42.350	375.30	376.02	0.72**	0.60	4.65	0.34	376.35	0.000	0.000	n/a	0.50	0.17
3	12	2.80	373.90	374.62	0.72*	0.60	4.65	0.34	374.95	0.000	9.190	374.00	374.72	0.72**	0.60	4.65	0.34	375.05	0.000	0.000	n/a	0.78	0.26
2	12	2.80	373.28	374.00	0.72*	0.60	4.65	0.34	374.33	0.000	62.000	373.90	374.62	0.72**	0.60	4.65	0.34	374.95	0.000	0.000	n/a	0.78	0.26
1	12	2.80	371.75	372.75	1.00	0.60	3.57	0.20	372.95	0.527	39.380	373.28	374.00 j	0.72**	0.60	4.65	0.34	374.33	0.707	0.617	n/a	1.00	0.34

Project File: SD Line-05 CP-100yr Bypass.stm | Number of lines: 8 | Run Date: 12/30/2021

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: SD Line-05 CP-100yr Bypass.stm

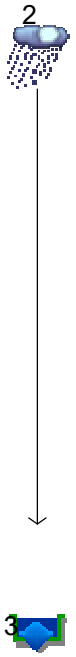


RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 12/30/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 1.78 ACRES
RUNOFF COEFFICIENT 0.89
PEAK DISCHARGE 6.45 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.2
TIME (MIN) = 12	DISCHARGE (CFS) = 0.2
TIME (MIN) = 18	DISCHARGE (CFS) = 0.2
TIME (MIN) = 24	DISCHARGE (CFS) = 0.2
TIME (MIN) = 30	DISCHARGE (CFS) = 0.3
TIME (MIN) = 36	DISCHARGE (CFS) = 0.3
TIME (MIN) = 42	DISCHARGE (CFS) = 0.3
TIME (MIN) = 48	DISCHARGE (CFS) = 0.3
TIME (MIN) = 54	DISCHARGE (CFS) = 0.3
TIME (MIN) = 60	DISCHARGE (CFS) = 0.3
TIME (MIN) = 66	DISCHARGE (CFS) = 0.3
TIME (MIN) = 72	DISCHARGE (CFS) = 0.3
TIME (MIN) = 78	DISCHARGE (CFS) = 0.3
TIME (MIN) = 84	DISCHARGE (CFS) = 0.3
TIME (MIN) = 90	DISCHARGE (CFS) = 0.3
TIME (MIN) = 96	DISCHARGE (CFS) = 0.3
TIME (MIN) = 102	DISCHARGE (CFS) = 0.3
TIME (MIN) = 108	DISCHARGE (CFS) = 0.3
TIME (MIN) = 114	DISCHARGE (CFS) = 0.3
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 126	DISCHARGE (CFS) = 0.4
TIME (MIN) = 132	DISCHARGE (CFS) = 0.4
TIME (MIN) = 138	DISCHARGE (CFS) = 0.4
TIME (MIN) = 144	DISCHARGE (CFS) = 0.4
TIME (MIN) = 150	DISCHARGE (CFS) = 0.4
TIME (MIN) = 156	DISCHARGE (CFS) = 0.4
TIME (MIN) = 162	DISCHARGE (CFS) = 0.5
TIME (MIN) = 168	DISCHARGE (CFS) = 0.5
TIME (MIN) = 174	DISCHARGE (CFS) = 0.5
TIME (MIN) = 180	DISCHARGE (CFS) = 0.5
TIME (MIN) = 186	DISCHARGE (CFS) = 0.6
TIME (MIN) = 192	DISCHARGE (CFS) = 0.6
TIME (MIN) = 198	DISCHARGE (CFS) = 0.7
TIME (MIN) = 204	DISCHARGE (CFS) = 0.7
TIME (MIN) = 210	DISCHARGE (CFS) = 0.8
TIME (MIN) = 216	DISCHARGE (CFS) = 0.9
TIME (MIN) = 222	DISCHARGE (CFS) = 1.1
TIME (MIN) = 228	DISCHARGE (CFS) = 1.3
TIME (MIN) = 234	DISCHARGE (CFS) = 1.8
TIME (MIN) = 240	DISCHARGE (CFS) = 5.4
TIME (MIN) = 246	DISCHARGE (CFS) = 6.45
TIME (MIN) = 252	DISCHARGE (CFS) = 1.5
TIME (MIN) = 258	DISCHARGE (CFS) = 1
TIME (MIN) = 264	DISCHARGE (CFS) = 0.8
TIME (MIN) = 270	DISCHARGE (CFS) = 0.6
TIME (MIN) = 276	DISCHARGE (CFS) = 0.6
TIME (MIN) = 282	DISCHARGE (CFS) = 0.5
TIME (MIN) = 288	DISCHARGE (CFS) = 0.5
TIME (MIN) = 294	DISCHARGE (CFS) = 0.4
TIME (MIN) = 300	DISCHARGE (CFS) = 0.4
TIME (MIN) = 306	DISCHARGE (CFS) = 0.4
TIME (MIN) = 312	DISCHARGE (CFS) = 0.3
TIME (MIN) = 318	DISCHARGE (CFS) = 0.3
TIME (MIN) = 324	DISCHARGE (CFS) = 0.3
TIME (MIN) = 330	DISCHARGE (CFS) = 0.3
TIME (MIN) = 336	DISCHARGE (CFS) = 0.3
TIME (MIN) = 342	DISCHARGE (CFS) = 0.3
TIME (MIN) = 348	DISCHARGE (CFS) = 0.3
TIME (MIN) = 354	DISCHARGE (CFS) = 0.2
TIME (MIN) = 360	DISCHARGE (CFS) = 0.2
TIME (MIN) = 366	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

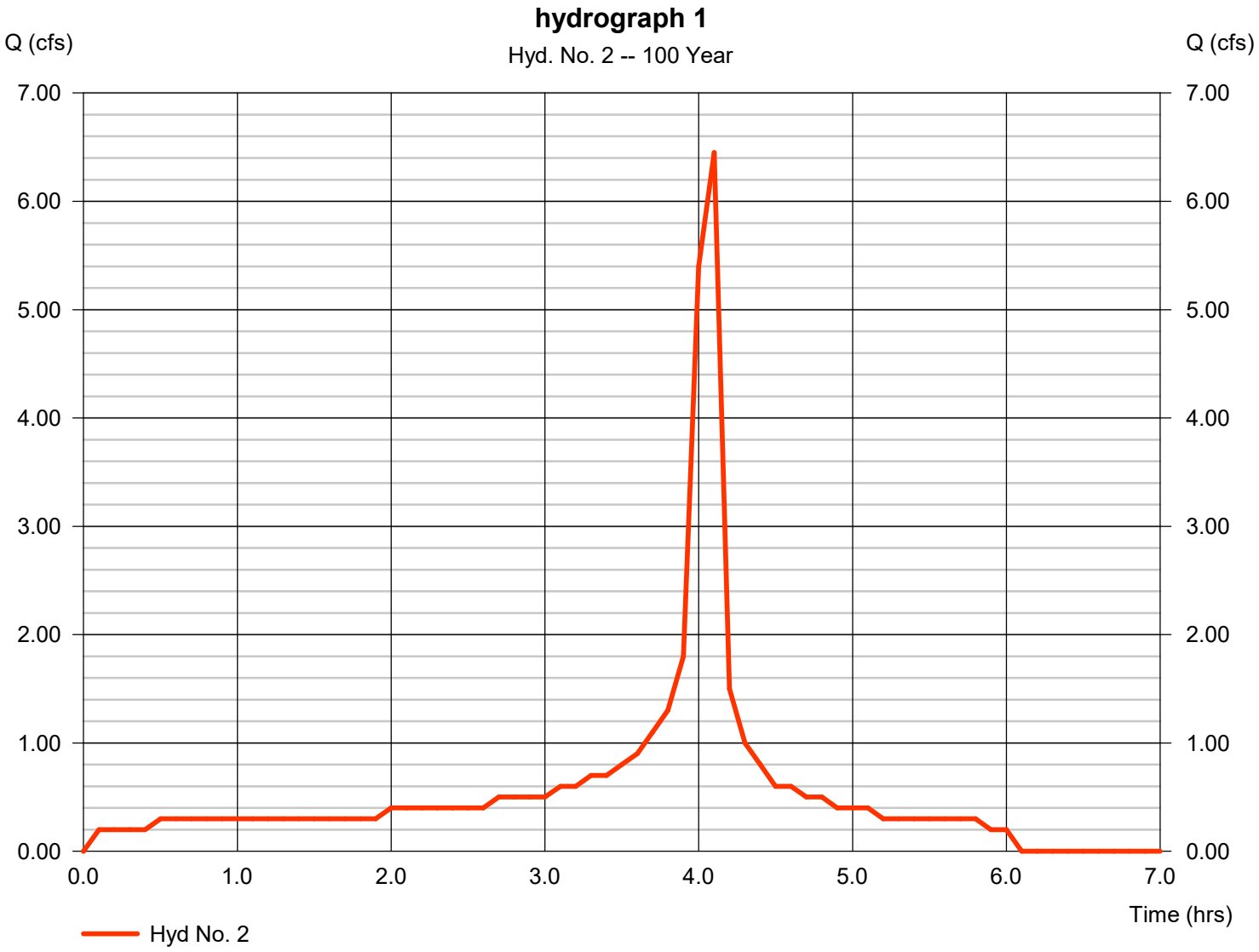
Hyd.	Origin	Description
2	Manual	hydrograph 1
3	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 2

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 6.450 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.10 hrs
Time interval	= 6 min	Hyd. volume	= 14,274 cuft



Hydrograph Report

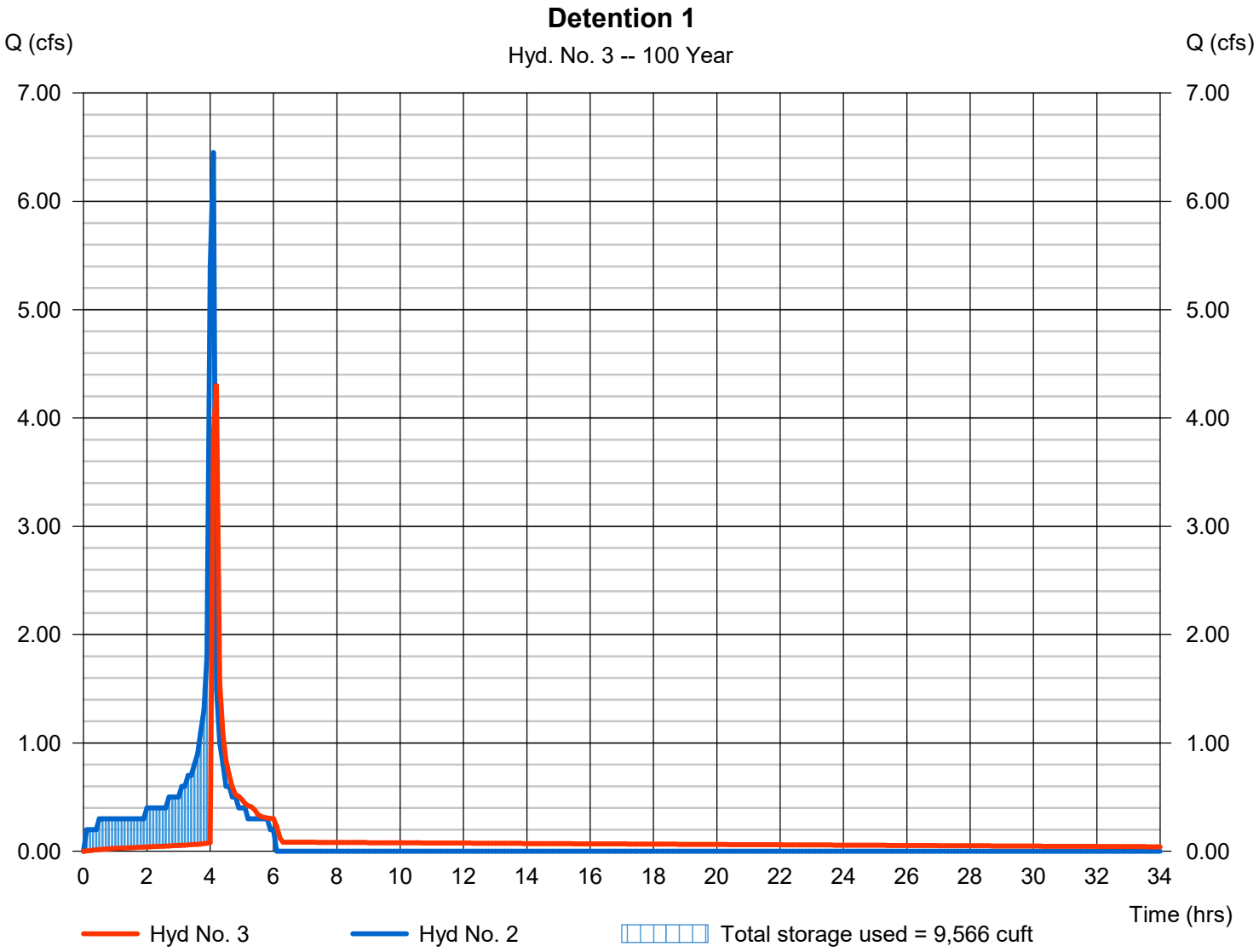
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 12 / 30 / 2021

Hyd. No. 3

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	4.298 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.20 hrs
Time interval	=	6 min	Hyd. volume	=	15,599 cuft
Inflow hyd. No.	=	2 - hydrograph 1	Max. Elevation	=	103.96 ft
Reservoir name	=	Detention Basin-BMP #8	Max. Storage	=	9,566 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Basin-BMP #8

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	2,540	0	0
1.00	101.00	2,540	2,413	2,413
2.00	102.00	2,540	2,413	4,826
3.00	103.00	2,540	2,413	7,239
4.00	104.00	2,540	2,413	9,652

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.32	Inactive	Inactive
Span (in)	= 12.00	1.32	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	2,413	101.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.043
2.00	4,826	102.00	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.063
3.00	7,239	103.00	0.08 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.078
4.00	9,652	104.00	4.77 ic	0.06 ic	---	---	4.71	---	---	---	---	---	4.773

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jul 18 2022

Discharge Point 2 -Ex Curb Outlet

Rectangular

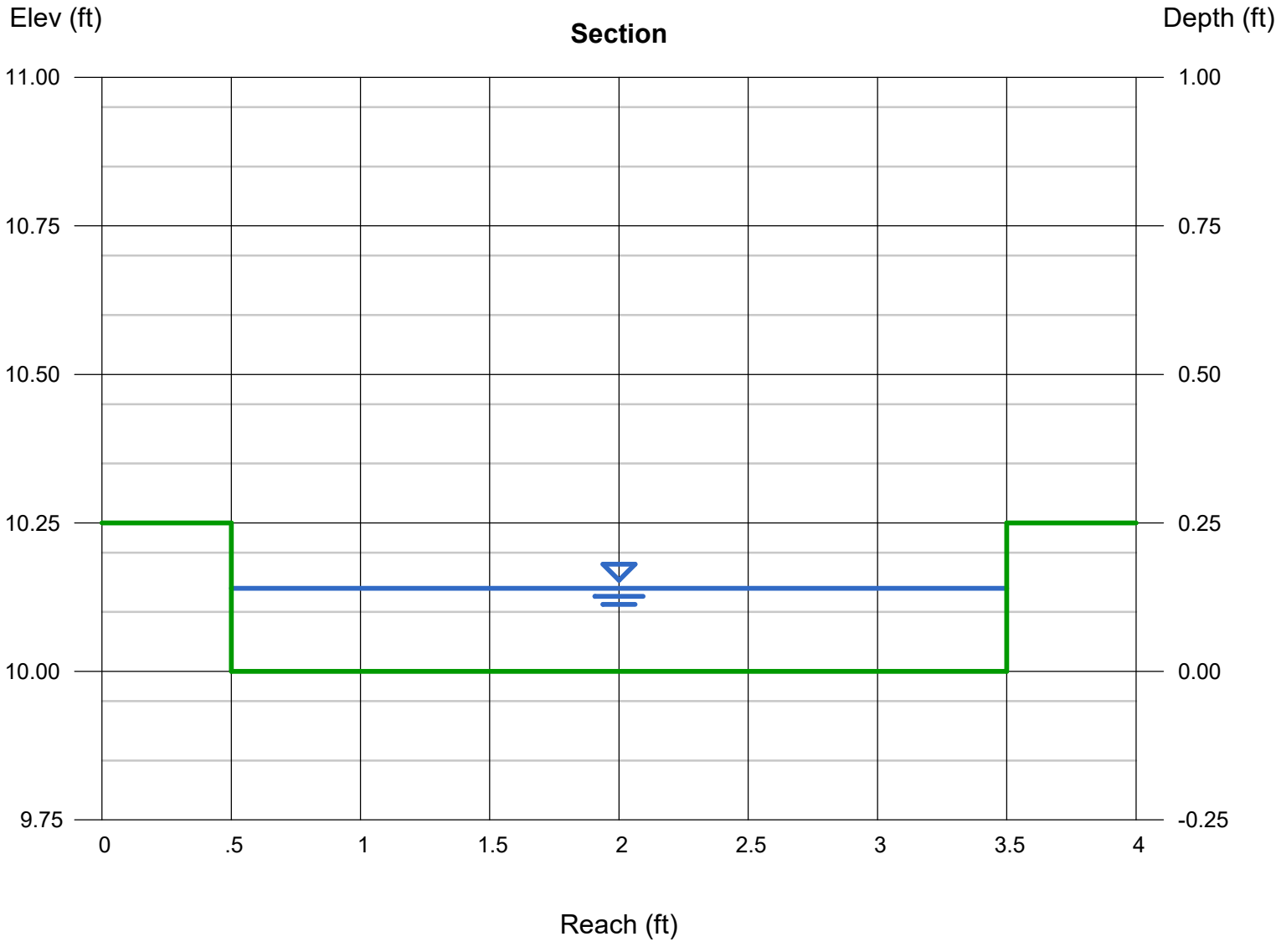
Bottom Width (ft)	= 3.00
Total Depth (ft)	= 0.25
Invert Elev (ft)	= 10.00
Slope (%)	= 1.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.40

Highlighted

Depth (ft)	= 0.14
Q (cfs)	= 1.400
Area (sqft)	= 0.42
Velocity (ft/s)	= 3.33
Wetted Perim (ft)	= 3.28
Crit Depth, Yc (ft)	= 0.19
Top Width (ft)	= 3.00
EGL (ft)	= 0.31



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 17 2022

Discharge Point 2 (2.1)- Ultimate Curb Outlet

Rectangular

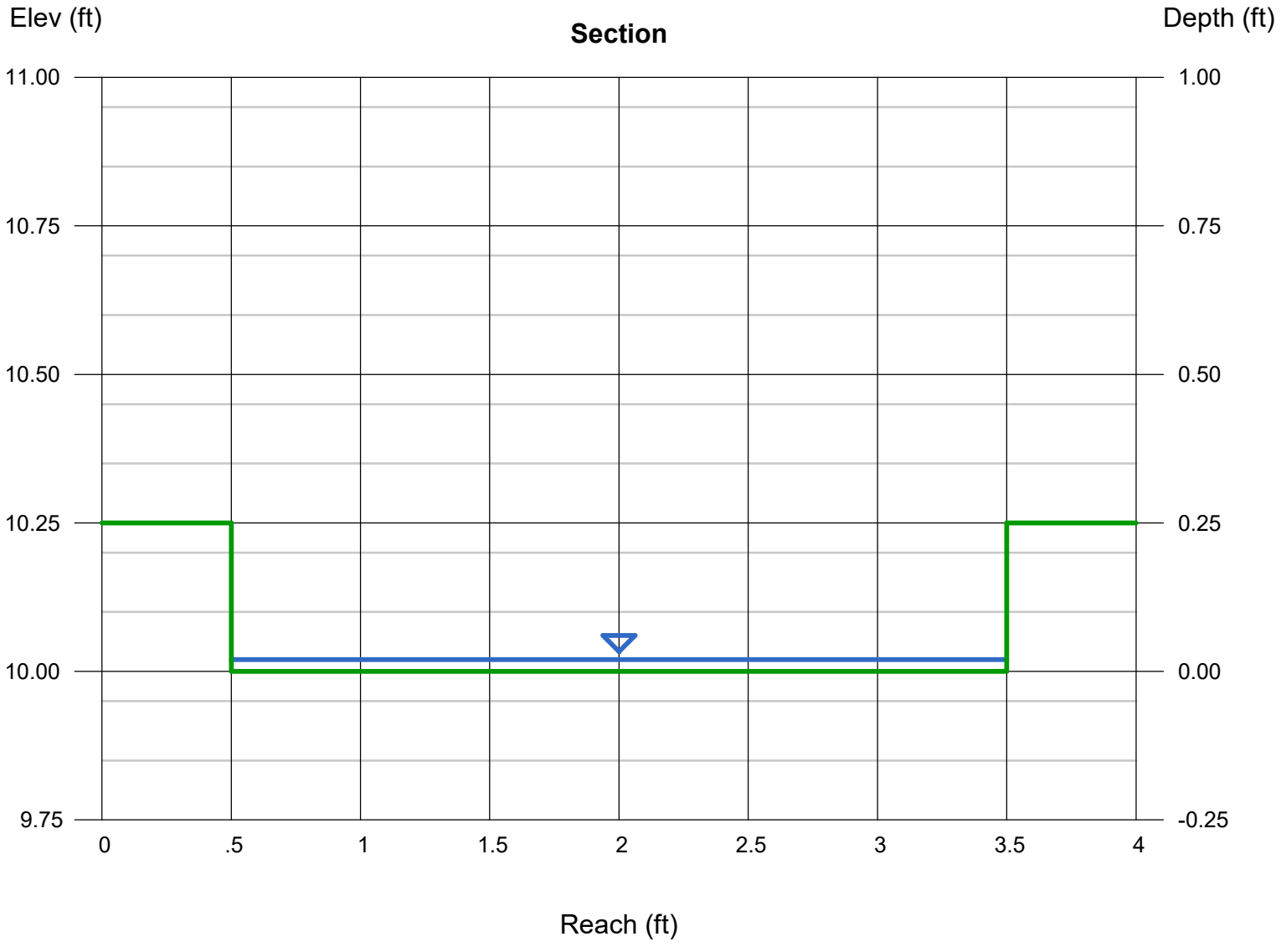
Bottom Width (ft)	= 3.00
Total Depth (ft)	= 0.25
Invert Elev (ft)	= 10.00
Slope (%)	= 1.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.03

Highlighted

Depth (ft)	= 0.02
Q (cfs)	= 0.030
Area (sqft)	= 0.06
Velocity (ft/s)	= 0.50
Wetted Perim (ft)	= 3.04
Crit Depth, Yc (ft)	= 0.02
Top Width (ft)	= 3.00
EGL (ft)	= 0.02



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 17 2022

Discharge Point 2 - Ultimate 18 inch SD

Circular

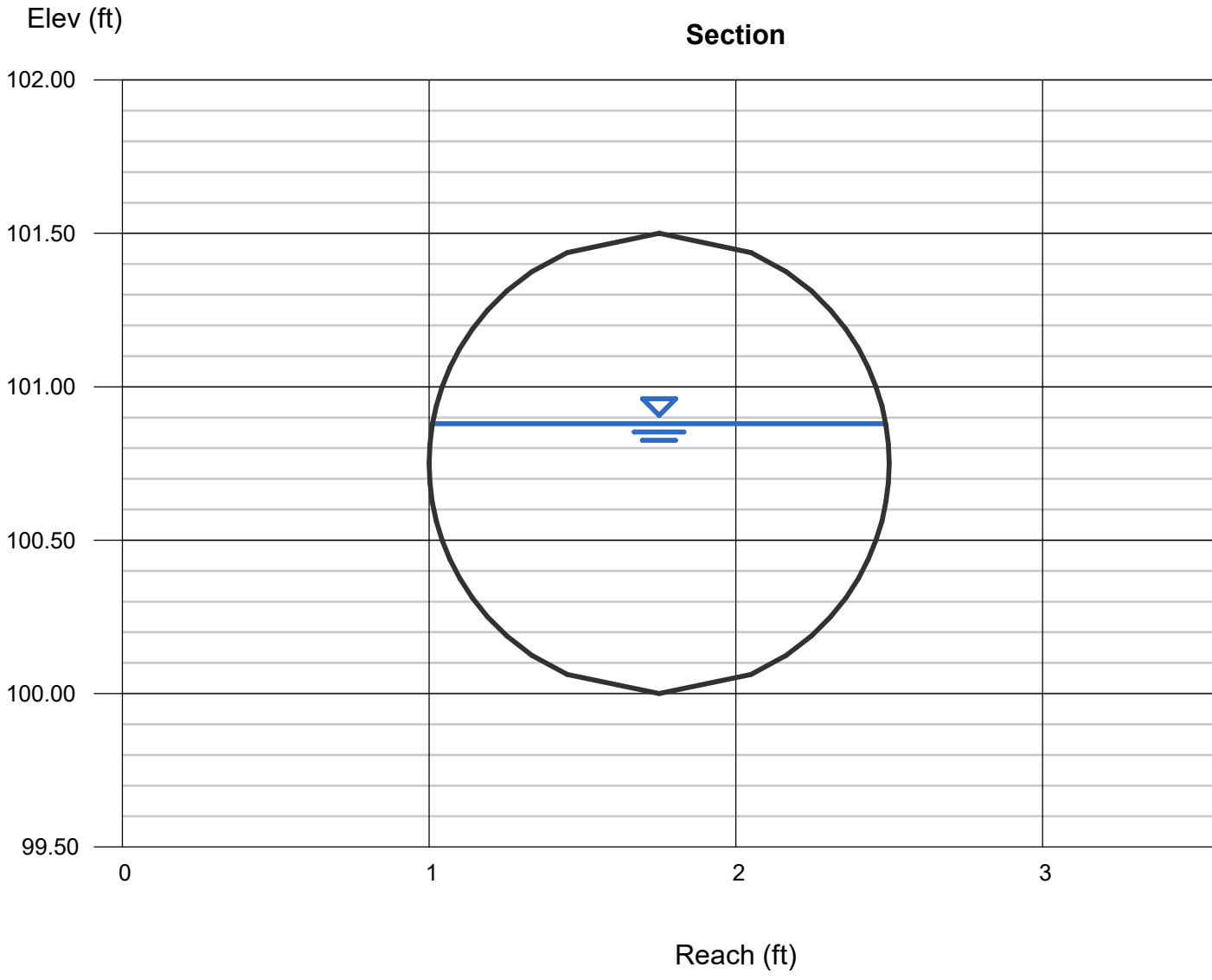
Diameter (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.22
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.13

Highlighted

Depth (ft)	= 0.88
Q (cfs)	= 8.130
Area (sqft)	= 1.08
Velocity (ft/s)	= 7.51
Wetted Perim (ft)	= 2.62
Crit Depth, Yc (ft)	= 1.11
Top Width (ft)	= 1.48
EGL (ft)	= 1.76



APPENDIX D:

Hydrologic Information

Chapter 2

Hydrology

The design discharge depends upon many variables. Some of the more important variables are duration and intensity of rainfall; storm frequency; ground cover; and the size, imperviousness, slope, and shape of the drainage area.

2.1. Discharge Flow Methods

The designer should check with Drainage and Flood Plain Management Section, Public Works Department, to determine if there are established storm discharge flows.

If the project involves a watershed of major size or importance, flood flows may already be established through one or more of the following activities:

1. Master Plan Developments in the City and/or County
2. Studies for Development and Road Projects near the proposed project
3. Flood Insurance Studies prepared by FEMA based on existing land use at the time the study was completed. Urbanization may have caused increased flows. FEMA maps can be viewed at the SanGIS web site (www.sangis.org).
4. Recorded flows may be available from the United States Geological Survey (USGS) or the County of San Diego

If no established storm discharge flows are available, the applicable methods are:

1. Rational Method for watersheds less than 0.5 square miles – See Appendix A
2. Modified Rational Method for watersheds between 0.5 and 1.0 square miles – See Appendix A; or,
3. Natural Resources Conservation Service (NRCS) Method (formally called Soil Conservation Service (SCS) Method) for watersheds greater than 1.0 square miles – See Appendix B; or
4. Hydrologic Engineering Center (HEC) computer method.

2.2. Design Storm Frequency

Design storm frequency shall be based upon the following criteria:

1. Within floodplain and floodplain fringe areas as defined by FEMA, the runoff criteria shall be based upon a 100-year frequency storm.

2. For all drainage channels and storm water conveyance systems, which will convey drainage from a tributary area equal to or greater than one (1) square mile, the runoff criteria, shall be based upon a 100-year frequency storm.
3. For tributary areas under one (1) square mile:
   a. The storm water conveyance system shall be designed so that the combination of storm drain system capacity and overflow (streets and gutter) will be able to carry the 100-year frequency storm without damage to or flooding of adjacent existing buildings or potential building sites.
   b. The runoff criteria for the underground storm drain system shall be based upon a 50-year frequency storm.

2.3. Soil Type

For storm drain, culverts, channels, and all associated structures, Type D soil shall be used for all areas.

2.4. Other Requirements

1. Design runoff for drainage and flood control facilities within the City shall be based upon full development of the watershed area in accordance with the land uses shown on the City of San Diego, Progress Guide and General Plan.
2. When determining criteria for floodplain management and flood proofing, design runoff within the City shall be based upon existing conditions in accordance with the City Floodplain Management Requirements and FEMA Regulations.
3. Under City requirements, the minimum elevation of the finished, first floor elevation of any building is 2 feet above the 100-year frequency flood elevation.

2.5. Water Quality Considerations

Requirements for hydrologic studies specific to the design of pollution prevention controls and hydromodification management controls are detailed in the Storm Water Standards. Where the Storm Water Standards specify modifications to the guidelines stated herein on discharge flow methods, design storm frequency, or soil type, the modifications shall supersede these but only for the purposes stated in the Storm Water Standards. Where the Storm Water Standards does not specify a modification, the guidance found here in Chapter 2 shall apply.

Chapter 4

Storm Drains

Underground conduits operate in conjunction with surface drainage to maintain public safety and manage flooding during storm events. The entire storm water conveyance system (underground conduits and street surface improvements) must have the capacity to convey the peak discharge from a 100-year design event without affecting property located adjacent to the right-of-way. Street drainage systems shall meet the criteria regarding the maximum flow width, depth, and velocity as described in Chapter 3 of this Manual. To satisfy these criteria, it is often necessary to supplement surface drainage with underground conveyance. This chapter summarizes the general design criteria for underground drainage conduits in the City of San Diego and describes the methods to apply when designing these systems.

4.1. Design Criteria

4.1.1 Hydraulic Capacity

Storm drains shall have the capacity to convey the discharge from the Design Storm Frequency as defined in Section 2.2.

The conduit shall convey the design flow with the hydraulic grade line (HGL) maintaining a minimum freeboard of 1 foot below the ground surface or gutter flow line during the design event.

Storm drains draining the public right-of-way shall not be less than 18 inches in diameter. The cross-sectional area of the pipe shall not decrease when proceeding down gradient within the storm drain system. Diversion of drainage is not allowed (i.e., the discharge point and all inlets of a storm drain system shall be within the same watershed).

This Manual references its design criteria and procedures to storm drain conduit with a circular cross-section. These criteria and procedures can be adapted to other cross-section shapes (e.g., arches, other non-circular or non-rectangular shapes) by comparing their section factor ($AR^{2/3}$).

4.1.2 Manning Roughness Coefficient

Appendix C provides a table of recommended Manning Roughness Coefficients for underground conduits.

4.1.3 Alignment and Curvature

4.1.3.1 Horizontal Alignment

Storm drains shall adhere to a straight alignment or a circular curve of uniform radius within the same run of pipe (i.e., from one clean-out, inlet, or other drainage structure to another). If curved, the storm drain shall follow the alignment of overlying streets whenever reasonable. All storm drains within a slope shall be aligned perpendicular to the slope contours. Provide a flat access area over all public storm drains.

The horizontal alignment of a storm drain system shall maintain a minimum horizontal clearance of no less than ten feet (10') (outside diameter to outside diameter) from sanitary sewer lines and five feet (5') (outside diameter to outside diameter) from potable water mains, reclaimed water mains, and other storm drains unless prior approval from the City is obtained.

The material type, length of pipe segments, and bevel of joints limit the curvature of the storm drain. Appendix D presents additional information on pipe alignment based on pipe characteristics.

When designing the junction of two storm drains, priority shall be given to the larger of the connecting storm drains. Flow from the smaller storm drain shall not oppose the flow in the main line without prior approval from the City. Specifically, when the angle of confluence (φ) is measured from the centerline of the main line, the angle of confluence shall be less than or equal to 90 degrees at all times. Figure 4–1 illustrates the definition of angle of confluence used in this Manual. The angle of confluence shall be further limited to 60 degrees or less in cases where:

1. The smaller pipe is 36 inches in diameter or larger; or
2. The flow from the smaller pipe is greater than or equal to 10 percent of the main-line flow.

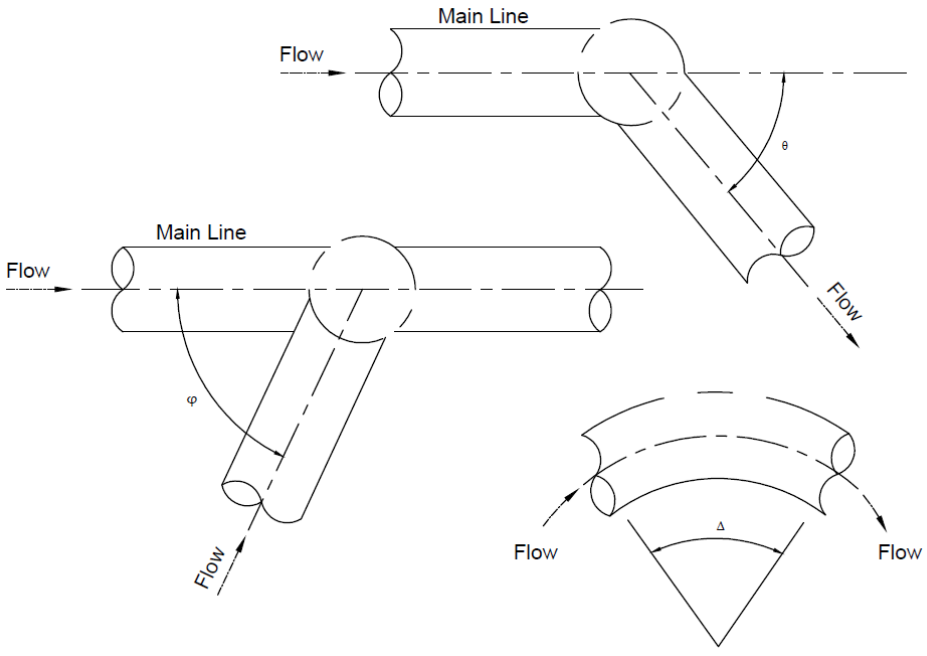


Figure 4-1. Definition Sketch for Angle of Deflection (θ), Angle of Confluence (φ), and Bend Radius (Δ)

dictate the type and degree of protection required. When protection is warranted, the invert of the pipe (i.e., the lower 90 degrees of the pipe) shall be protected on all straight-aways and the invert and walls (i.e., the lower 180 degrees of the pipe) shall be protected on all curves.

Additional conduit thickness shall be considered sacrificial and shall not be included in a structural analysis.

4.1.10 Storm Drain Plans

Storm drain plans shall provide a minimum amount of information regarding storm drain design and construction, including **all** of the following:

1. Plan and profile for all public storm drains showing all cleanouts, inlets, and catch basins with their respective invert elevations, rim elevations, type, and station; and
2. Stationing, which shall increase in the up-grade direction from the lower end of the storm drain; and
3. Hydraulic Grade Line (HGL) of the flow within the pipe, including hydraulic jumps; and
4. Design flow and velocity (50-year, or 100-year, as appropriate); and
5. Pipe design load rating or equivalent information (depending on pipe material, this might include pipe gauge or wall thickness); and
6. Flow and velocity at the outfall of the pipe; and
7. Flow capacity of the pipe (Q_{pipe}); and
8. Length, material, and diameter of all storm drains; and
9. Property lines, right-of-way limits, street names and widths, finished grade; and
10. Conflicting underground utilities; and
11. Drawing numbers for related easements and existing structures; and
12. Delineation of the drainage basin for the storm drain that includes area calculation.

4.2. Hydraulic Design of Storm Drains

This section presents general procedures for hydraulic design and evaluation of storm drains.

4.2.1 Minimum Gradient

The minimum pipe gradient shall be 0.5 percent grade or the pipe shall have a minimum velocity of four feet per second (fps) with the pipe flowing one quarter full. Flatter grades may be approved where no other practical solution is available. Pipes shall be designed to flow full and free of pressure heads except for short runs where the grade changes and a small pressure head cannot be avoided. Where it is necessary to design for a pressure head in a system and it is approved by the City Engineer, pressure pipe with water-tight joints shall be used.

National Flood Hazard Layer FIRMette

FEMA

117°9'36"W 32°48'13"N

117°8'58"W 32°47'42"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

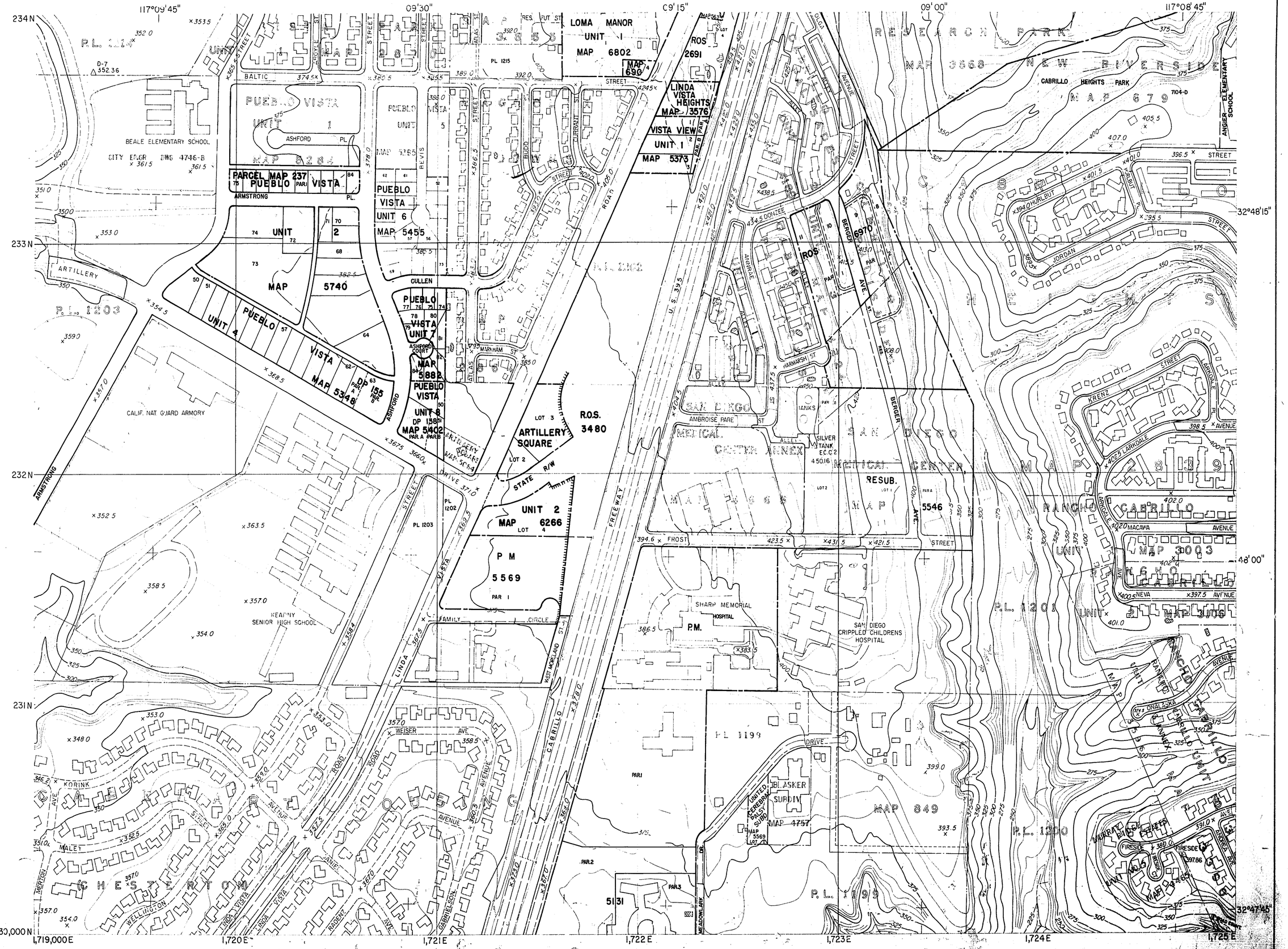
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/13/2021 at 8:26 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

HISTORIC DRAINAGE PATTERN

CITY OF SAN DIEGO

METROPOLITAN TOPOGRAPHIC SURVEY



Compiled by
AMERICAN AERIAL SURVEYS, INC.
Covina, California
by stereophotogrammetric methods, under the direction of the City Engineer of the City of San Diego, California
Photography by A.A.S. dated July 7, 1963
Control by U.S.C. & G.S., U.S.G.S. and the City of San Diego
North American Datum 1927

BASE MAP	
DRAWN:	
REVISED:	
11-17-77	
TP	

SCALE 1:2400
200 0 200 400 600 800 1000 Feet

DATUM IS MEAN SEA LEVEL CONTOUR INTERVAL 5 FEET

ONE THOUSAND FOOT CALIFORNIA RECTANGULAR GRID, (ZONE 6)
THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

NOTE: THE RECTANGULAR COORDINATE VALUES ARE SHOWN ON THE SOUTH AND WEST MARGINS
THE GEOGRAPHIC VALUES ARE SHOWN ON THE EAST AND NORTH MARGINS

	234-1719	
230-1713		230-1725
	226-1719	

SAN DIEGO
SAN DIEGO COUNTY
CALIFORNIA
PHOTOGRAPHIC INDEX
SHEET NUMBER

230-1719

56

FR

394.6 × FROST

423.5 ×

×431 5

×421.5

STREET

425

430

405

395

420

SHARP MEMORIAL

HOSPITAL

P.M.

386.5 ×

SAN DIEGO
CRIPPLED CHILDRENS
HOSPITAL

45

390

395 ×383.5

410

400

405

400

375

350

390

395

PL 1199

DRIVE

57

LAND

ILLO

×3780

ADDENDUM #1
FOR
MASTER DRAINAGE STUDY
for

SHARP MMC CAMPUS REDEVELOPMENT

PACKAGE 1A UTILITY RE-ROUTE
PACKAGE 3A MARY BIRCH EXPANSION
PACKAGE 4 ED EXPANSION
PACKAGE 5A NEW CEP
PACKAGE 7A NEW TOWER
PACKAGE 8 CONCOURSE ADDITION

Prepared By:

BWE

STRUCTURAL ENGINEERING • CIVIL ENGINEERING • SURVEYING • LAND PLANNING

9449 Balboa Avenue, Suite 270
San Diego, CA 92123
BWE Project: 9545U.10.00

Date: August, 2022

DECLARATION OF RESPONSIBLE CHARGE

I, HEREBY DECLARE THAT I AM THE CIVIL 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 DESIGN.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWING AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

August 26, 2022

MICHAEL A. SLAWSON
R.C.E. # 56127
EXP. 12/31/2022

DATE:

Addendum #1

Original Master Drainage Report dated July, 2022 was prepared for the SHARP MMC Campus Redevelopment project. This report was approved by the City under Package 5A (PTS # 0694839) of the master redevelopment project. This addendum is made to address minor comments to the master drainage study submitted under Package 4 (PTS-0694841) of the SHARP MMC Campus Redevelopment project.

Addendum #1 is prepared to revise and replace the following sections/tables from the approved master drainage report dated July, 2022.

1) Table 7-1 Summary of Areas and footnote for Discharge Point #3

	Area (Acres)			**Percent Impervious Area**	**Percent Pervious Area**
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	2.46	1.96	0.50	79.7%	20.3%
Proposed	2.46	1.98	0.48	80.5%	19.5%
Percentage Change		**1.0%**	**-4.0%**		

The increase in impervious area in the proposed condition is minimal. This is because majority of the redevelopment is occurring in an area which was already paved in the existing condition.

2) Table 7-3 Existing and Proposed Conditions Peak Flow Rates Summary for Discharge Point #3 (unmitigated condition)

Drainage Area (acres)		**100 Yr Flow (cfs)**		
Existing Condition	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
2.46	2.46	8.27	8.60	**3.99%**

3) Table 7-4 Detention Summary Table for Discharge Point #3

		100-yr Detention Flow Rate (cfs)			Detention Volume Provided (cf)
		Inflow	Outflow	Detained	
Discharge Location 2	**BMP #3**	9.40	1.48	7.92	16,910
Discharge Location 2	**BMP #4**	2.85	2.30	0.55	5,453
Discharge Location 2	**BMP #10**	2.00	0.34	1.66	3,496
Discharge Location 3	**BMP #5**	3.92	3.20	0.72	5,093
Discharge Location 4	**BMP #12**	3.55	2.00	1.55	4,679
Discharge Location 5	**BMP #8**	6.45	4.30	2.15	9,652
	Total	28.17	13.62	14.55	45,857

4) Table 7-5 Existing and Proposed Conditions Peak Flow Rates Summary for Discharge Point #3 (mitigated condition)

100 Yr Flow (cfs)			
Existing Condition	**Proposed Condition (Unmitigated)**	**Proposed Condition (Mitigated)**	**% Change from Existing Condition**
8.27	8.60	7.88	**-4.72%**

In the proposed condition the mitigated peak flow rate due to the 100-year storm event can be expected to be reduced by 0.39 (=8.27-7.88) cfs from existing condition. Detention of peak flow rate is achieved by routing flow via BMP #5.

5) Appendix B: Replace existing condition hydrology analysis (CivilD results).
6) Appendix B: Add existing condition pervious/impervious areas exhibit.
7) Appendix B: Replace existing condition drainage exhibit.
8) Appendix C: Add proposed condition pervious/impervious areas exhibit.
9) Appendix C: Replace proposed condition drainage exhibit.
10) Appendix C: Replace detention analysis for BMP #5.

9. Conclusion: Total peak 100 year flow rates in the existing and proposed conditions are 36.64 cfs and 37.65 cfs respectively. But, the mitigated condition peak flow rate from the site is 23.10 cfs.

All other information in the Master Drainage Report remains unchanged.

Appendix B

Existing Condition Hydrology Analysis
Pervious/Impervious Areas Exhibit (Existing Condition)
Existing Condition Hydrology Map

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 09/14/22

Existing Condition Hydrology Analysis
Analysis Point 3
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   300.000 to Point/Station   301.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.850 given for subarea
Initial subarea flow distance =   58.000(Ft.)
Highest elevation = 407.240(Ft.)
Lowest elevation = 402.000(Ft.)
Elevation difference =   5.240(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   1.65 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8500)*(58.000^.5)/(9.034^(1/3)]=   1.65
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850

```
Subarea runoff =      0.149(CFS)
Total initial stream area =        0.040(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.746(CFS)
Depth of flow =   0.091(Ft.), Average velocity =   2.154(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             20.00              0.24
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      0.746(CFS)
  '     '        flow top width =      7.586(Ft.)
  '     '    velocity=    2.154(Ft/s)
  '     '        area =      0.346(Sq.Ft)
  '     '        Froude number =     1.777

Upstream point elevation =   402.000(Ft.)
Downstream point elevation =   396.790(Ft.)
Flow length =   156.000(Ft.)
Travel time  =    1.21 min.
Time of concentration =    6.21 min.
Depth of flow =   0.091(Ft.)
Average velocity =   2.154(Ft/s)
Total irregular channel flow =     0.746(CFS)
Irregular channel normal depth above invert elev. =   0.091(Ft.)
Average velocity of channel(s) =   2.154(Ft/s)

Sub-Channel No. 1 Critical depth =      0.115(Ft.)
  '     '       '     Critical flow top width =      9.573(Ft.)
  '     '       '     Critical flow velocity=    1.353(Ft/s)
  '     '       '     Critical flow area =      0.552(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.850 given for subarea
Rainfall intensity =      4.027(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.095(CFS) for    0.320(Ac.)
Total runoff =      1.245(CFS)  Total area =        0.36(Ac.)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Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.21 min.
Rainfall intensity =      4.027(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.198(CFS) for    0.350(Ac.)
Total runoff =      2.443(CFS)  Total area =        0.71(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.21 min.
Rainfall intensity =      4.027(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.985(CFS) for    0.580(Ac.)
Total runoff =      4.428(CFS)  Total area =        1.29(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   396.790(Ft.)
Downstream point/station elevation =   393.400(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.428(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.428(CFS)
Normal flow depth in pipe =    6.31(In.)
Flow top width inside pipe =   11.98(In.)
Critical Depth =   10.58(In.)
Pipe flow velocity =     10.58(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     6.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.31 min.
Rainfall intensity =      4.002(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.952(CFS) for    0.280(Ac.)
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Total runoff =      5.381(CFS)  Total area =        1.57(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   393.400(Ft.)
Downstream point/station elevation =   392.300(Ft.)
Pipe length  =   137.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.381(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.381(CFS)
Normal flow depth in pipe =   11.44(In.)
Flow top width inside pipe =   12.77(In.)
Critical Depth =   11.29(In.)
Pipe flow velocity =      5.36(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =     6.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      304.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     6.74 min.
Rainfall intensity =      3.903(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.663(CFS) for    0.200(Ac.)
Total runoff =      6.044(CFS)  Total area =        1.77(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   392.300(Ft.)
Downstream point/station elevation =   390.840(Ft.)
Pipe length  =   175.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.044(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.044(CFS)
Normal flow depth in pipe =   10.36(In.)
Flow top width inside pipe =   17.79(In.)
Critical Depth =   11.40(In.)
Pipe flow velocity =      5.74(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =     7.24 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      305.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     7.24 min.
Rainfall intensity =      3.797(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      0.549(CFS) for    0.170(Ac.)
Total runoff =      6.593(CFS)  Total area =        1.94(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      305.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.850 given for subarea
Time of concentration =     7.24 min.
Rainfall intensity =      3.797(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.850
Subarea runoff =      1.678(CFS) for    0.520(Ac.)
Total runoff =      8.271(CFS)  Total area =        2.46(Ac.)
End of computations, total study area =           2.460 (Ac.)
```

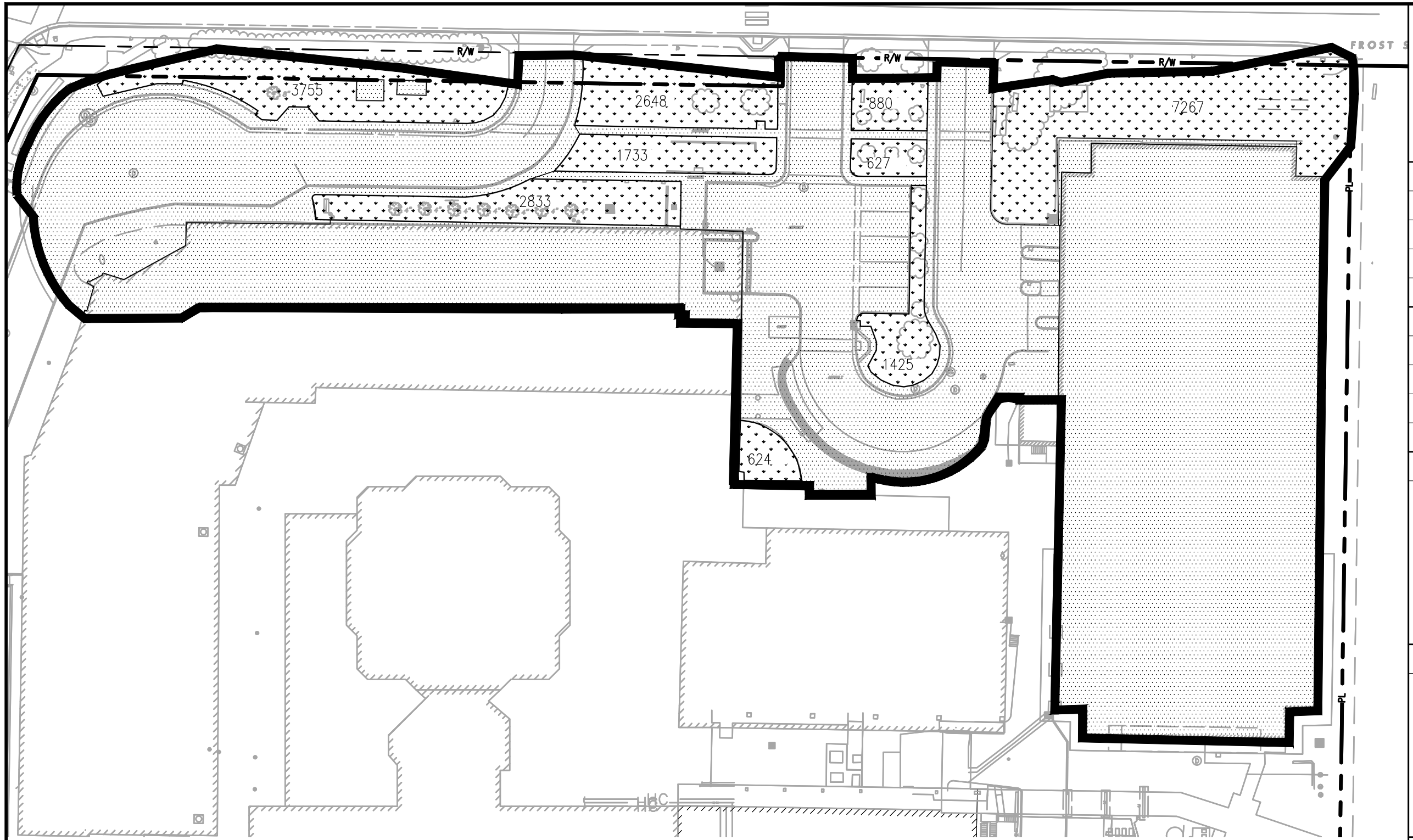

PERVIOUS/IMPERVIOUS AREA SUMMARY

TOTAL SITE AREA = 2.46 AC
IMPERVIOUS AREA = 1.96 AC
IMPERVIOUS % = 79.7

PERVIOUS AREA = 0.50 AC
PERVIOUS % = 20.3

LEGEND

		SYMBOL
OUTER DRAINAGE BOUNDARY		
PERVIOUS AREA	LANDSCAPE/DIRT AREA	
IMPERVIOUS AREA	CONCRETE/ASPHALT DRIVEWAY	

25 0 50 100
SCALE IN FEET
1 inch = 50 ft.

BWE
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE:	
DRAWN BY:	
CHECKED BY:	
B&W JOB NUMBER:	
CLIENT JOB NUMBER:	

PROJECT

SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE

PERVIOUS/IMPERVIOUS AREAS EXISTING CONDITION

SHEET OF

PACKAGE-4

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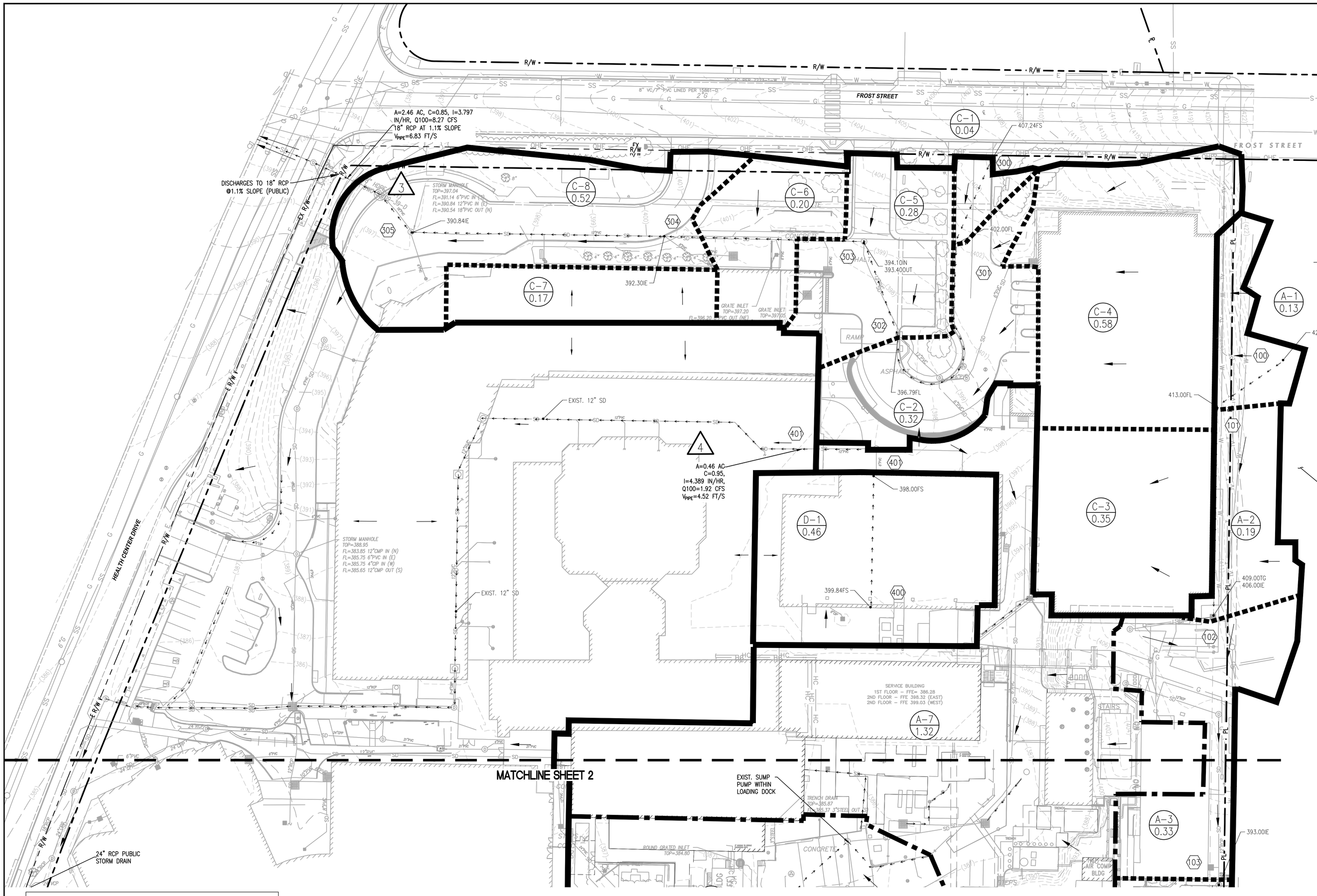

LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	306.43TG 301.33IE
HYDROLOGY NODE	200
ANALYSIS/DISCHARGE POINT	1
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX

NOTES:
1) 5 MAJOR POINT OF COMPLIANCES (POCs) HAVE BEEN IDENTIFIED BASED ON THE EXISTING DRAINAGE PATTERN OF THE SITE.
2) PEAK FLOW RATES ARE CALCULATED UTILIZING 100-YEAR DESIGN STORM EVENT AND CITY OF SAN DIEGO NOMOGRAPH METHOD.

ASSESSOR'S PARCEL NUMBER

427-530-02

BRIEF LEGAL DESCRIPTION

PARCEL 1 OF PARCEL MAP 5131 IN THE CITY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY SEPTEMBER 24, 1976.

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
A-1	0.13	0.96	4.389	0.55
A-2	0.19	0.96	4.236	0.77
A-7	1.32	0.96	4.907	4.91
C-1	0.04	0.85	4.389	0.15
C-2	0.32	0.85	4.027	1.10
C-3	0.35	0.85	4.027	1.20
C-4	0.58	0.85	4.027	1.99
C-5	0.28	0.85	4.002	0.95
C-6	0.20	0.85	3.903	0.67
C-7	0.17	0.85	3.797	0.55
C-8	0.52	0.85	3.797	1.68
D-1	0.46	0.95	4.389	1.92

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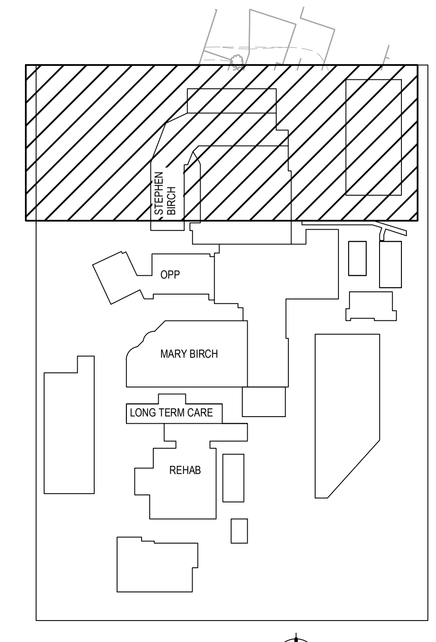

KEY PLAN

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:
ISSUE DATE: 09/17/2021
DRAWN BY: MDS
CHECKED BY: MSC
BWE JOB NUMBER: 9545.10.00
CLIENT JOB NUMBER:

PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
EXISTING CONDITION HYDOLOGY EXHIBIT

SHEET 1 OF 3

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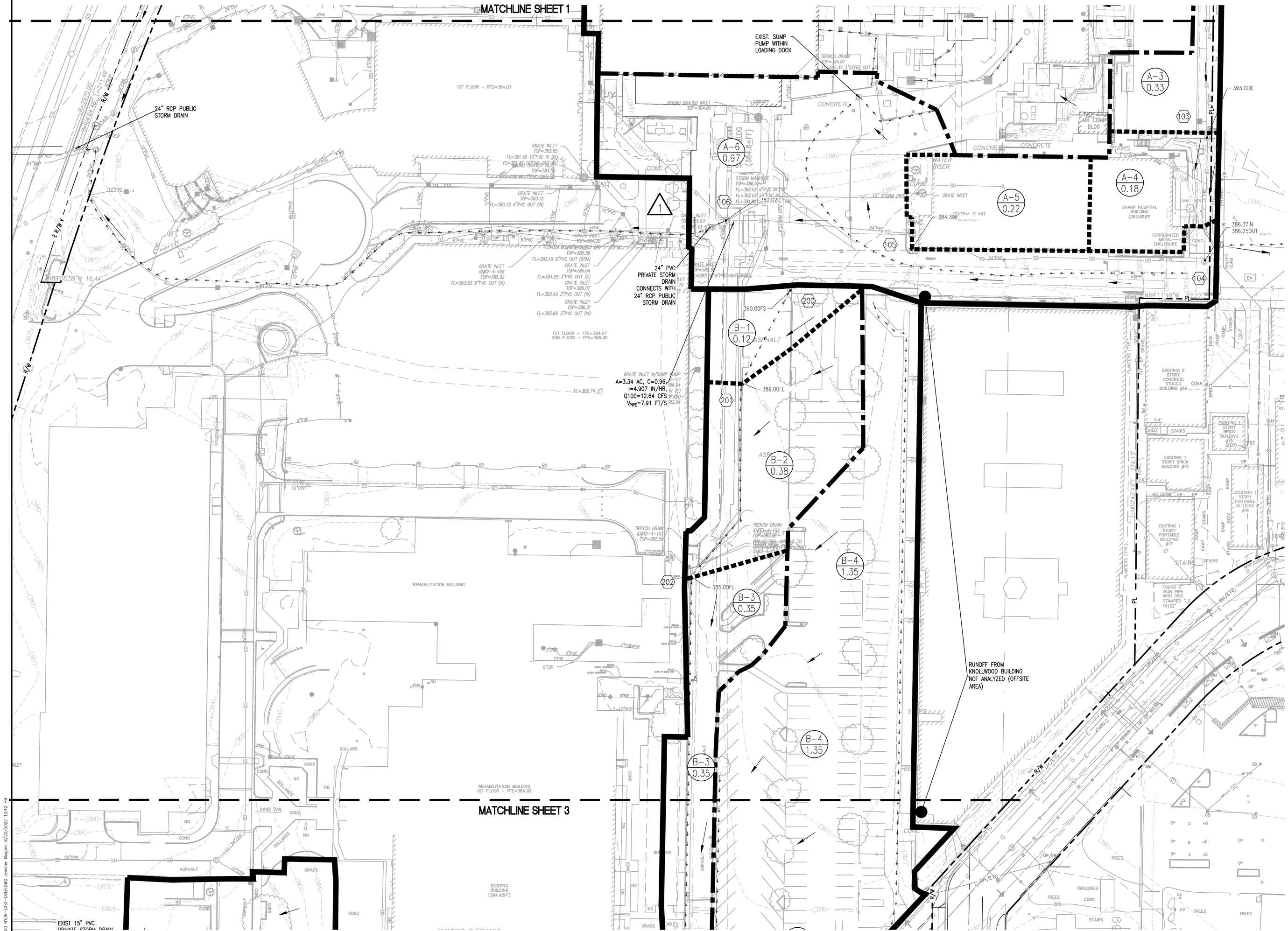


LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	306.43TG 301.33IE
HYDROLOGY NODE	200
ANALYSIS/DISCHARGE POINT	
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
A-3	0.33	0.96	4.079	1.29
A-4	0.18	0.96	4.042	0.70
A-5	0.22	0.96	3.872	0.82
A-6	0.97	0.96	3.872	3.61
B-1	0.40	0.85	4.389	0.45
B-2	0.35	0.85	4.067	1.31

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
B-3	0.35	0.85	3.415	1.02
B-4	1.35	0.85	3.415	3.92

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

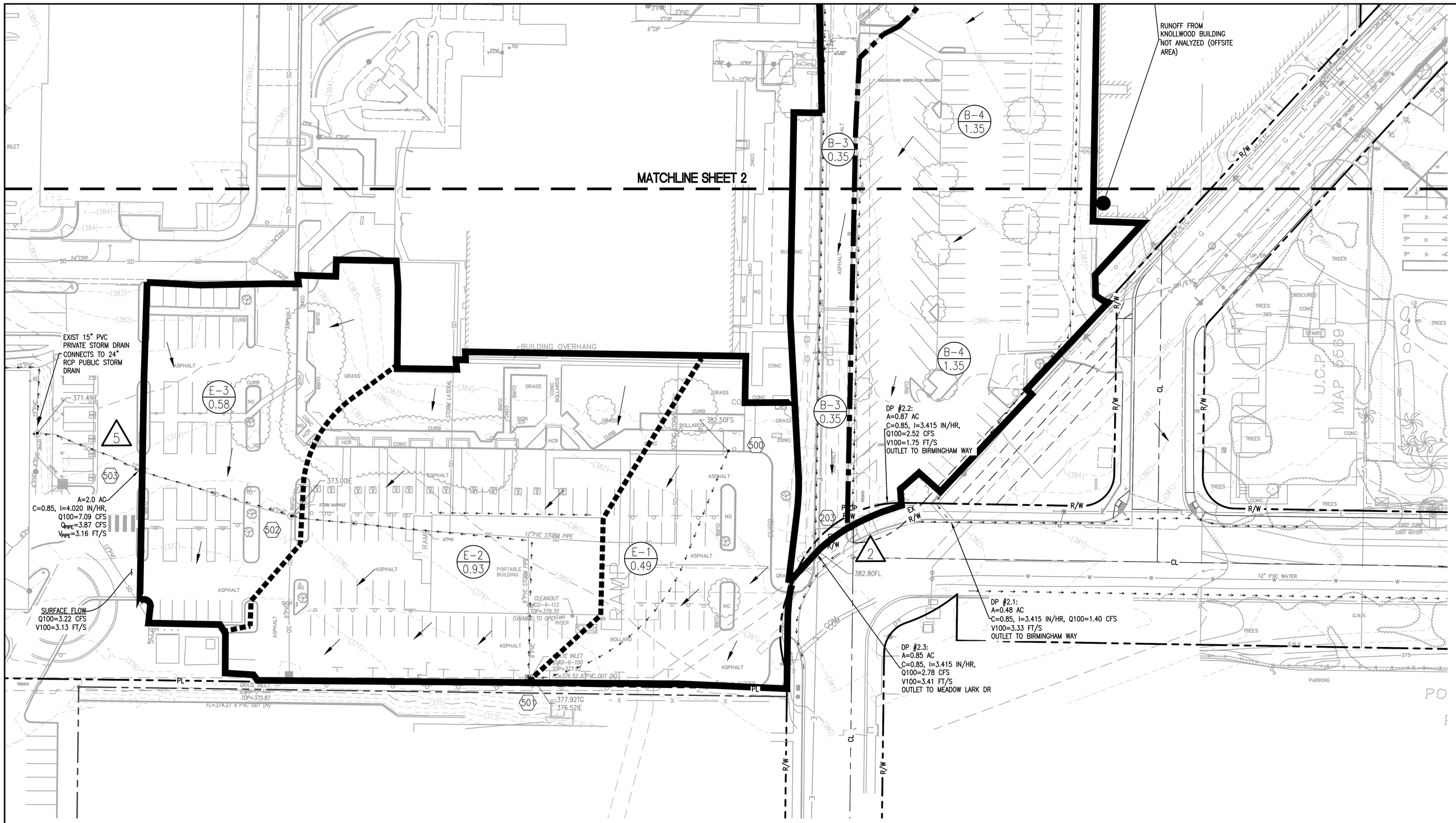
BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MCC
B&W JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
EXISTING CONDITION HYDOLOGY EXHIBIT

SHEET 2 OF 3

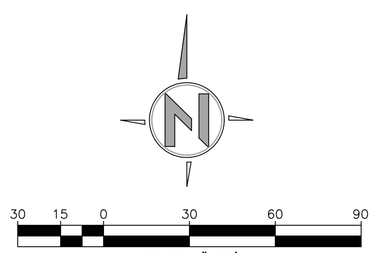


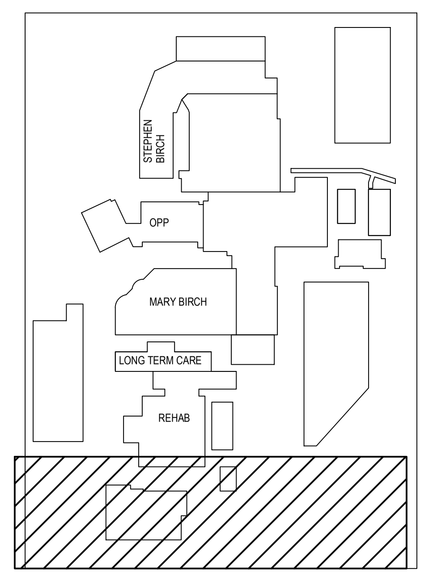
LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
EXISTING CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	306.43TG 301.33IE
HYDROLOGY NODE	200
ANALYSIS/DISCHARGE POINT	
DRAINAGE BASIN MARKER & AREA (AC)	A-3 X.XX

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN Q100 PEAK FLOW RATE (CFS)
E-1	0.49	0.85	4.389	1.83
E-2	0.93	0.85	4.148	3.28
E-3	0.58	0.85	4.020	1.98





KEY PLAN

BVE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MCC
BVE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT

SHARP MMC CAMPUS REDEVELOPMENT

7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE

EXISTING CONDITION HYDOLOGY EXHIBIT

SHEET 3 OF 3

Appendix C

Pervious/Impervious Areas Exhibit (Proposed Condition)
Proposed Condition Hydrology Analysis
Detention Analysis
Proposed Condition Hydrology Map

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study   Date: 09/16/22

Proposed Condition Hydrology Analysis
Analysis Point 3
100 yr Storm Event
City of San Diego

 *********   Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station   300.000 to Point/Station   301.000
**** INITIAL AREA EVALUATION ****
_____
User specified 'C' value of 0.860 given for subarea
Initial subarea flow distance = 144.000(Ft.)
Highest elevation = 403.840(Ft.)
Lowest elevation = 397.730(Ft.)
Elevation difference =   6.110(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =   3.20 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8600)*(144.000^.5)/(4.243^(1/3)]=   3.20
Setting time of concentration to 5 minutes
Rainfall intensity (I) =   4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860

```
Subarea runoff =      1.510(CFS)
Total initial stream area =        0.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   395.140(Ft.)
Downstream point/station elevation =   394.420(Ft.)
Pipe length  =   138.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.510(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.510(CFS)
Normal flow depth in pipe =    6.61(In.)
Flow top width inside pipe =   11.94(In.)
Critical Depth =    6.25(In.)
Pipe flow velocity =      3.41(Ft/s)
Travel time through pipe =    0.68 min.
Time of concentration (TC) =     5.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   394.420(Ft.)
Downstream point/station elevation =   393.360(Ft.)
Pipe length  =   203.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.510(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.510(CFS)
Normal flow depth in pipe =    6.60(In.)
Flow top width inside pipe =   11.94(In.)
Critical Depth =    6.25(In.)
Pipe flow velocity =      3.41(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =     6.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      303.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     6.67 min.
Rainfall intensity =      3.918(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      1.752(CFS) for    0.520(Ac.)
Total runoff =      3.262(CFS)  Total area =        0.92(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   393.360(Ft.)
Downstream point/station elevation =   392.820(Ft.)
Pipe length  =    92.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.262(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.262(CFS)
Normal flow depth in pipe =    8.89(In.)
Flow top width inside pipe =   14.74(In.)
Critical Depth =    8.73(In.)
Pipe flow velocity =      4.31(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     7.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      309.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     7.02 min.
Rainfall intensity =      3.841(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      0.661(CFS) for    0.200(Ac.)
Total runoff =      3.923(CFS)  Total area =        1.12(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      309.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.120(Ac.)
Runoff from this stream =      3.923(CFS)
Time of concentration =    7.02 min.
Rainfall intensity =     3.841(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      306.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Initial subarea flow distance  =   58.000(Ft.)
Highest elevation =  407.240(Ft.)
```

```
Lowest elevation =  402.000(Ft.)
Elevation difference =    5.240(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     1.58 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8600)*(  58.000^.5)/(   9.034^(1/3)]=   1.58
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff =      0.189(CFS)
Total initial stream area =        0.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      306.000 to Point/Station      307.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.472(CFS)
Depth of flow =   0.095(Ft.), Average velocity =   2.124(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              0.12              0.00
        3             10.00              0.20
Manning's 'N' friction factor =   0.016
------------------------------------------------------------------
Sub-Channel flow  =      0.472(CFS)
  '     '        flow top width =      4.696(Ft.)
  '     '    velocity=    2.125(Ft/s)
  '     '        area =      0.222(Sq.Ft)
  '     '        Froude number =     1.722

Upstream point elevation =   402.000(Ft.)
Downstream point elevation =   400.500(Ft.)
Flow length =    48.000(Ft.)
Travel time  =    0.38 min.
Time of concentration =    5.38 min.
Depth of flow =   0.095(Ft.)
Average velocity =   2.124(Ft/s)
Total irregular channel flow =     0.472(CFS)
Irregular channel normal depth above invert elev. =   0.095(Ft.)
Average velocity of channel(s) =   2.124(Ft/s)

Sub-Channel No. 1 Critical depth =      0.117(Ft.)
  '     '       '     Critical flow top width =      5.817(Ft.)
  '     '       '     Critical flow velocity=    1.384(Ft/s)
  '     '       '     Critical flow area =      0.341(Sq.Ft)
```

```
 Adding area flow to channel
User specified 'C' value of 0.860 given for subarea
Rainfall intensity =      4.262(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      0.550(CFS) for    0.150(Ac.)
Total runoff =      0.738(CFS)  Total area =        0.20(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      307.000 to Point/Station      308.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   397.000(Ft.)
Downstream point/station elevation =   394.450(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.738(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.738(CFS)
Normal flow depth in pipe =    3.05(In.)
Flow top width inside pipe =    6.00(In.)
Critical Depth =    5.17(In.)
Pipe flow velocity =      7.36(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     5.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      308.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     5.46 min.
Rainfall intensity =      4.234(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      1.274(CFS) for    0.350(Ac.)
Total runoff =      2.013(CFS)  Total area =        0.55(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      308.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     5.46 min.
Rainfall intensity =      4.234(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      2.112(CFS) for    0.580(Ac.)
Total runoff =      4.125(CFS)  Total area =        1.13(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   394.450(Ft.)
Downstream point/station elevation =   390.250(Ft.)
Pipe length  =   445.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.125(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.125(CFS)
Normal flow depth in pipe =    8.87(In.)
Flow top width inside pipe =   14.75(In.)
Critical Depth =    9.87(In.)
Pipe flow velocity =      5.46(Ft/s)
Travel time through pipe =    1.36 min.
Time of concentration (TC) =     6.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      309.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
User specified 'C' value of 0.860 given for subarea
Time of concentration =     6.82 min.
Rainfall intensity =      3.884(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.860
Subarea runoff =      0.701(CFS) for    0.210(Ac.)
Total runoff =      4.826(CFS)  Total area =        1.34(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      310.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.340(Ac.)
Runoff from this stream =      4.826(CFS)
Time of concentration =    6.82 min.
Rainfall intensity =     3.884(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        3.923      7.02                3.841
2        4.826      6.82                3.884
Qmax(1) =
           1.000 *    1.000 *     3.923) +
           0.989 *    1.000 *     4.826) + =       8.696
```

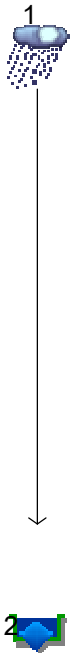
```
Qmax(2) =
          1.000 *    0.972 *     3.923) +
          1.000 *    1.000 *     4.826) + =       8.637

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.923       4.826
Maximum flow rates at confluence using above data:
        8.696        8.637
Area of streams before confluence:
        1.120        1.340
Results of confluence:
Total flow rate =      8.696(CFS)
Time of concentration =     7.024 min.
Effective stream area after confluence =      2.460(Ac.)
End of computations, total study area =           2.460 (Ac.)
```

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 9/19/2022
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.5 INCHES
BASIN AREA 1.12 ACRES
RUNOFF COEFFICIENT 0.86
PEAK DISCHARGE 3.92 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 0.1
TIME (MIN) = 14	DISCHARGE (CFS) = 0.1
TIME (MIN) = 21	DISCHARGE (CFS) = 0.2
TIME (MIN) = 28	DISCHARGE (CFS) = 0.2
TIME (MIN) = 35	DISCHARGE (CFS) = 0.2
TIME (MIN) = 42	DISCHARGE (CFS) = 0.2
TIME (MIN) = 49	DISCHARGE (CFS) = 0.2
TIME (MIN) = 56	DISCHARGE (CFS) = 0.2
TIME (MIN) = 63	DISCHARGE (CFS) = 0.2
TIME (MIN) = 70	DISCHARGE (CFS) = 0.2
TIME (MIN) = 77	DISCHARGE (CFS) = 0.2
TIME (MIN) = 84	DISCHARGE (CFS) = 0.2
TIME (MIN) = 91	DISCHARGE (CFS) = 0.2
TIME (MIN) = 98	DISCHARGE (CFS) = 0.2
TIME (MIN) = 105	DISCHARGE (CFS) = 0.2
TIME (MIN) = 112	DISCHARGE (CFS) = 0.2
TIME (MIN) = 119	DISCHARGE (CFS) = 0.2
TIME (MIN) = 126	DISCHARGE (CFS) = 0.2
TIME (MIN) = 133	DISCHARGE (CFS) = 0.2
TIME (MIN) = 140	DISCHARGE (CFS) = 0.2
TIME (MIN) = 147	DISCHARGE (CFS) = 0.3
TIME (MIN) = 154	DISCHARGE (CFS) = 0.3
TIME (MIN) = 161	DISCHARGE (CFS) = 0.3
TIME (MIN) = 168	DISCHARGE (CFS) = 0.3
TIME (MIN) = 175	DISCHARGE (CFS) = 0.3
TIME (MIN) = 182	DISCHARGE (CFS) = 0.3
TIME (MIN) = 189	DISCHARGE (CFS) = 0.4
TIME (MIN) = 196	DISCHARGE (CFS) = 0.4
TIME (MIN) = 203	DISCHARGE (CFS) = 0.5
TIME (MIN) = 210	DISCHARGE (CFS) = 0.5
TIME (MIN) = 217	DISCHARGE (CFS) = 0.6
TIME (MIN) = 224	DISCHARGE (CFS) = 0.7
TIME (MIN) = 231	DISCHARGE (CFS) = 1
TIME (MIN) = 238	DISCHARGE (CFS) = 2.6
TIME (MIN) = 245	DISCHARGE (CFS) = 3.92
TIME (MIN) = 252	DISCHARGE (CFS) = 0.8
TIME (MIN) = 259	DISCHARGE (CFS) = 0.5
TIME (MIN) = 266	DISCHARGE (CFS) = 0.4
TIME (MIN) = 273	DISCHARGE (CFS) = 0.4
TIME (MIN) = 280	DISCHARGE (CFS) = 0.3
TIME (MIN) = 287	DISCHARGE (CFS) = 0.3
TIME (MIN) = 294	DISCHARGE (CFS) = 0.3
TIME (MIN) = 301	DISCHARGE (CFS) = 0.2
TIME (MIN) = 308	DISCHARGE (CFS) = 0.2
TIME (MIN) = 315	DISCHARGE (CFS) = 0.2
TIME (MIN) = 322	DISCHARGE (CFS) = 0.2
TIME (MIN) = 329	DISCHARGE (CFS) = 0.2
TIME (MIN) = 336	DISCHARGE (CFS) = 0.2
TIME (MIN) = 343	DISCHARGE (CFS) = 0.2
TIME (MIN) = 350	DISCHARGE (CFS) = 0.2
TIME (MIN) = 357	DISCHARGE (CFS) = 0.1
TIME (MIN) = 364	DISCHARGE (CFS) = 0

Watershed Model Schematic



Legend

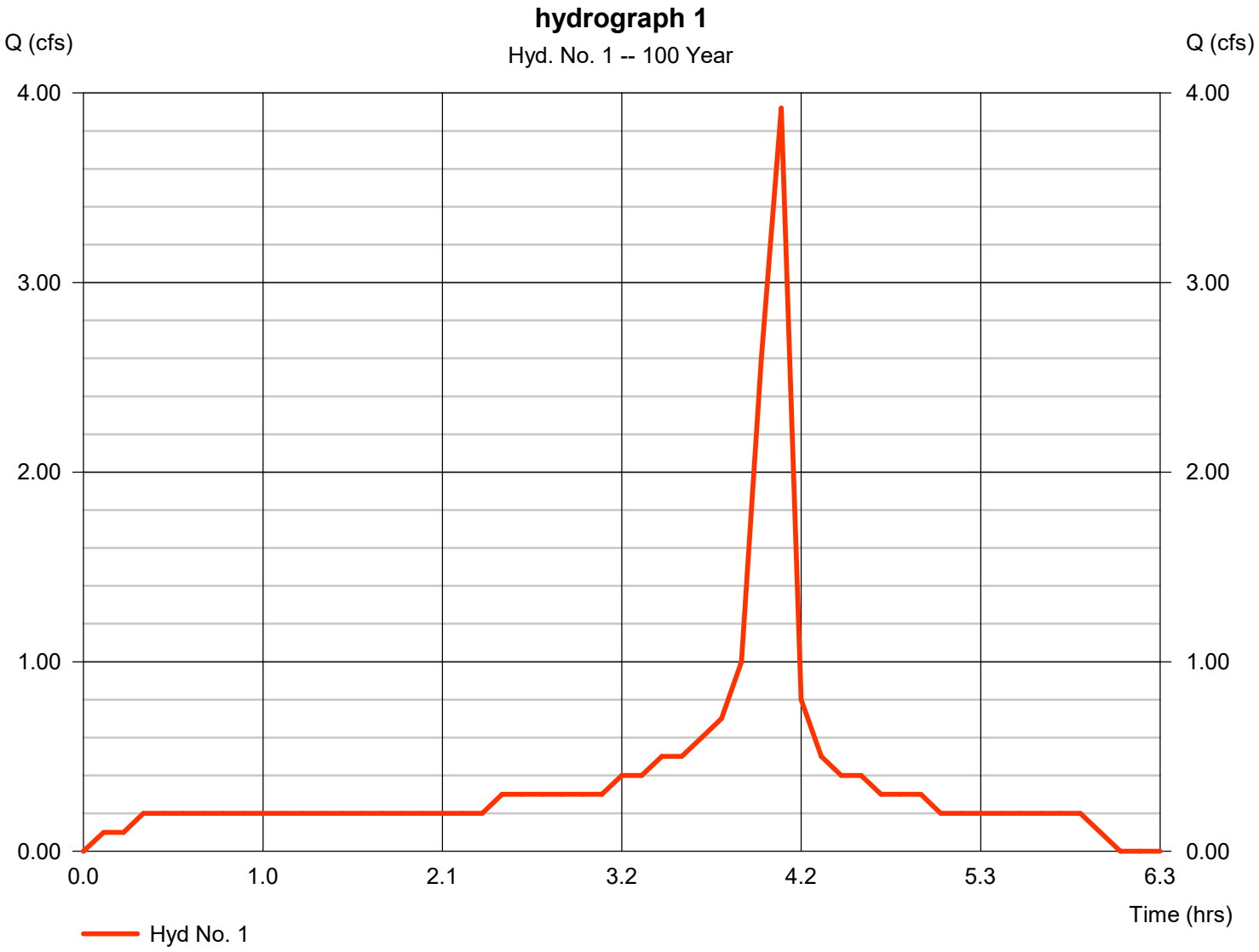
Hyd.	Origin	Description
1	Manual	hydrograph 1
2	Reservoir	Detention 1

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 3.920 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.08 hrs
Time interval	= 7 min	Hyd. volume	= 8,786 cuft



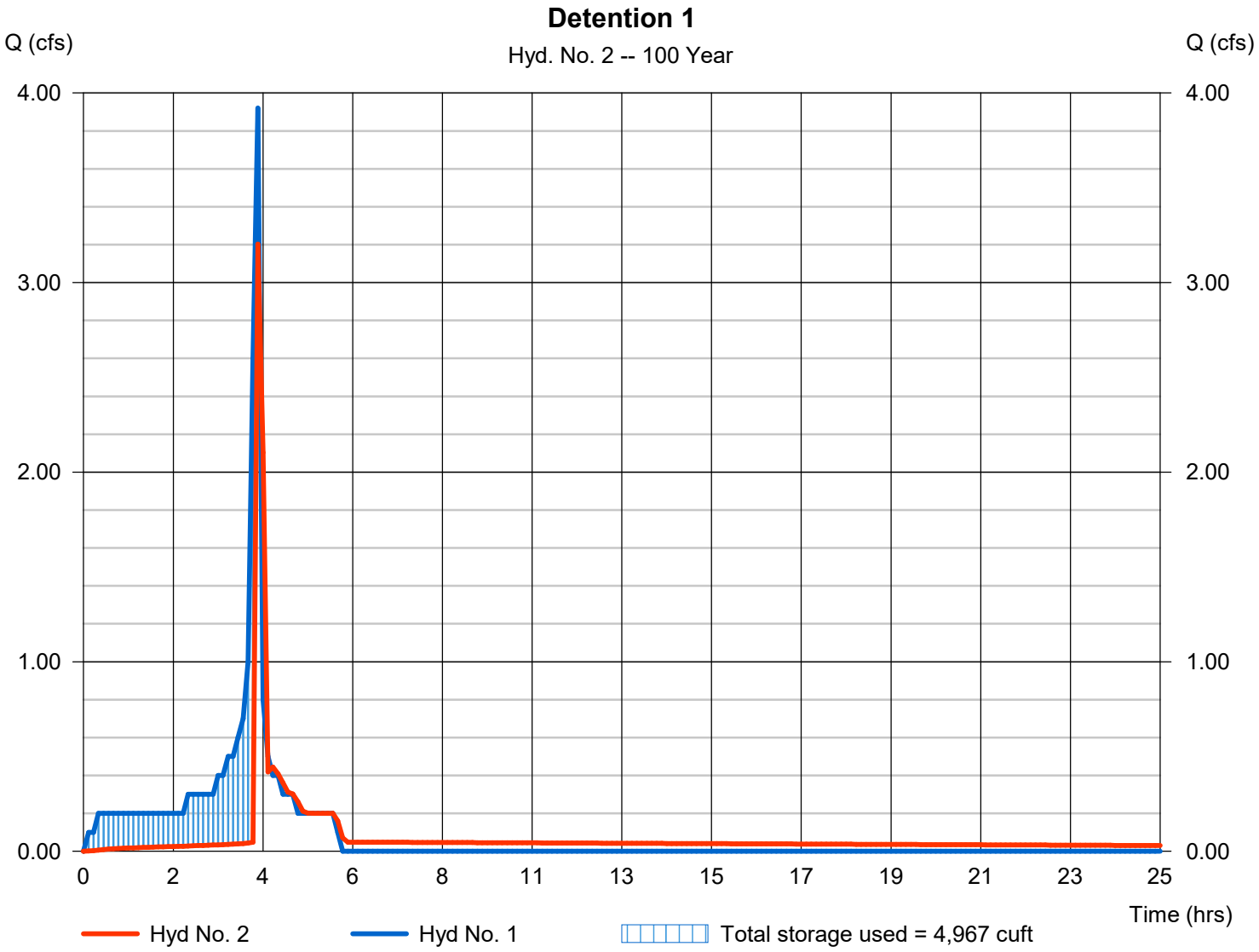
Hydrograph Report

Hyd. No. 2

Detention 1

Hydrograph type	=	Reservoir	Peak discharge	=	3.202 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.08 hrs
Time interval	=	7 min	Hyd. volume	=	8,766 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	103.89 ft
Reservoir name	=	Det-SBA pk4-BMP 5	Max. Storage	=	4,967 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Det-SBA pk4-BMP 5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 100.00 ft. Voids = 95.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	1,345	0	0
1.00	101.00	1,345	1,278	1,278
2.00	102.00	1,345	1,278	2,556
3.00	103.00	1,345	1,278	3,833
4.00	104.00	1,345	1,278	5,111

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.00	Inactive	Inactive
Span (in)	= 18.00	1.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.93	Inactive	Inactive	Inactive
Crest El. (ft)	= 103.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

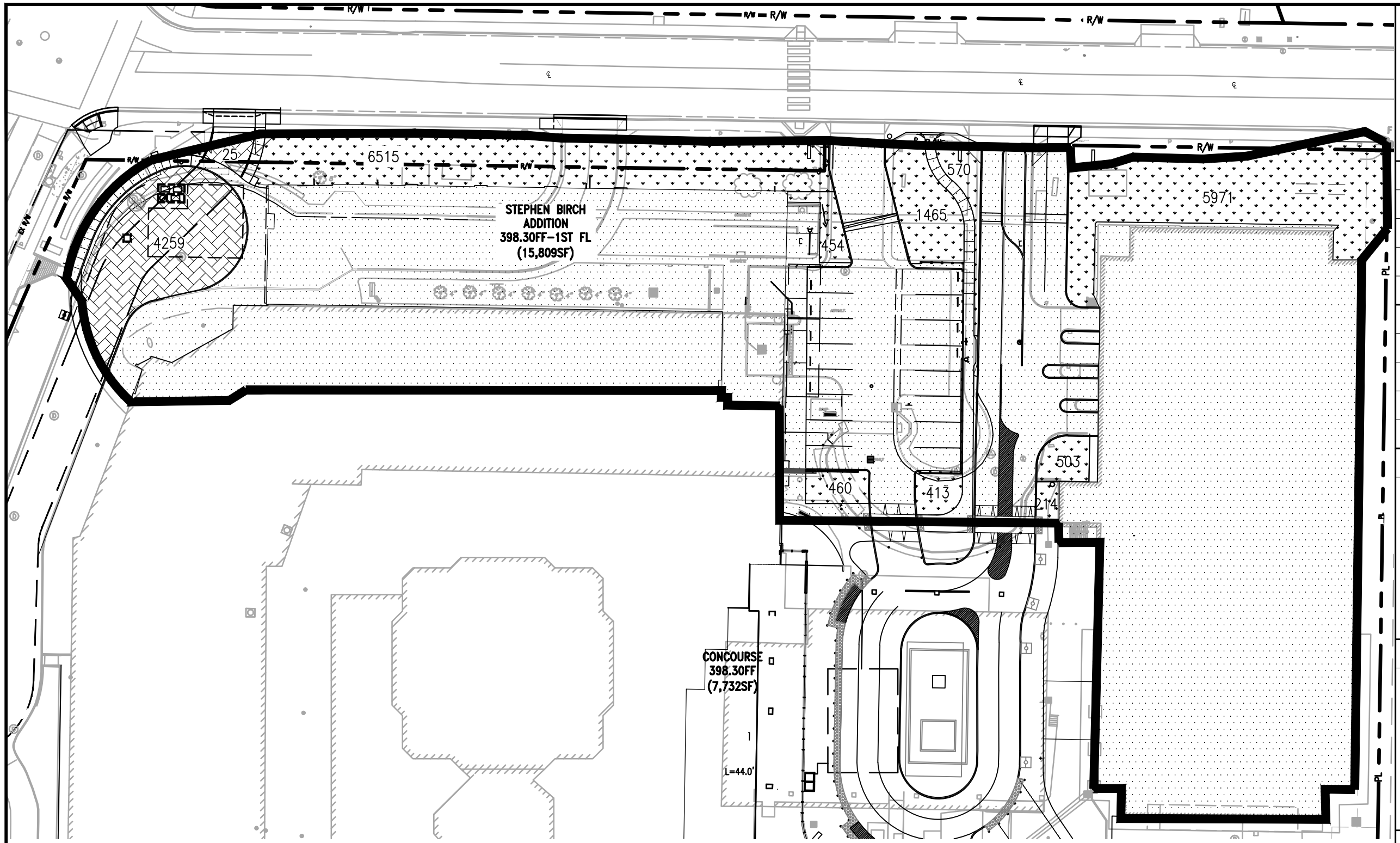
Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
1.00	1,278	101.00	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.025
2.00	2,556	102.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.036
3.00	3,833	103.00	0.05 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.045
4.00	5,111	104.00	4.67 oc	0.04 ic	---	---	4.63	---	---	---	---	---	4.668



PERVIOUS/IMPERVIOUS AREA SUMMARY

TOTAL SITE AREA = 2.46 AC
IMPERVIOUS AREA = 1.98 AC
IMPERVIOUS % = 80.5
PERVIOUS AREA = 0.48 AC
PERVIOUS % = 19.5

LEGEND

		SYMBOL
OUTER DRAINAGE BOUNDARY		
PERVIOUS AREA	LANDSCAPE/DIRT AREA	
IMPERVIOUS AREA	CONCRETE/ASPHALT DRIVEWAY	
PERVIOUS AREA	PERVIOUS PAVERS	

BWE
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

ISSUE DATE:	
DRAWN BY:	
CHECKED BY:	
B&W JOB NUMBER:	
CLIENT JOB NUMBER:	

PROJECT

SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

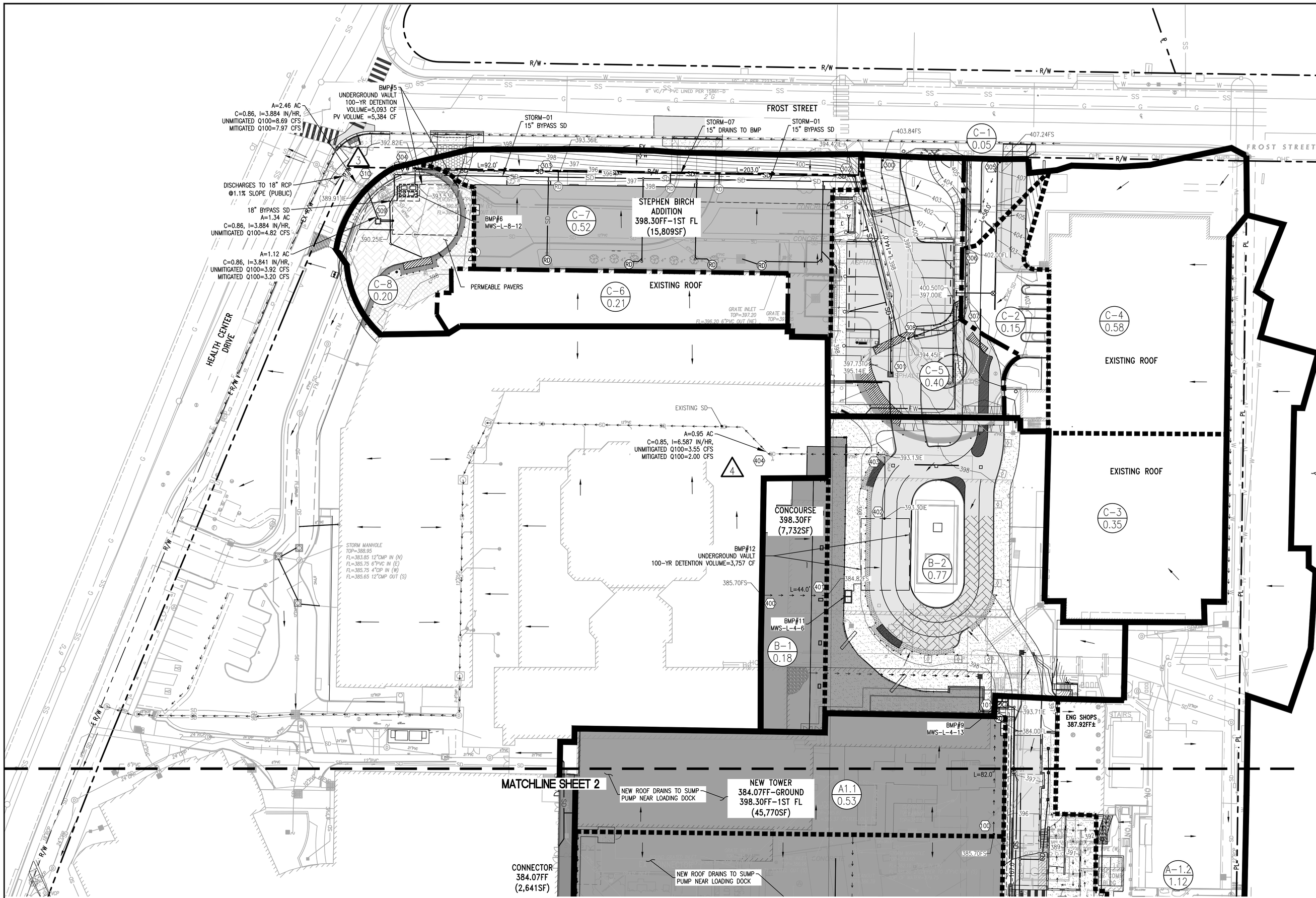
SHEET TITLE

PERVIOUS/IMPERVIOUS AREAS PROPOSED CONDITION

SHEET OF

PACKAGE-4

PLOT: M:\PROJECTS\9500\9545U.10.00 SHARP MMC\DWGS\EXHIBITS\DRAINAGE\9545U.10.00 PERV-IMP-PROP-PK-4.DWG Min GC 9/19/2022 10:09 AM



LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING STORM DRAIN	SD
NEW STORM DRAIN	SD
EXISTING CONTOUR	XXX
NEW CONTOUR	XXX
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR-ELEVATION	307.85FL 304.35IE
HYDROLOGY NODE	200
ANALYSIS/EXIT POINT	1
DRAINAGE BASIN MARKER & AREA (AC)	B-X X.XX

NOTES:

1) PEAK FLOW RATES ARE CALCULATED UTILIZING CITY OF SD DRAINAGE DESIGN MANUAL. THE CITY OF SAN DIEGO NOMOGRAPH METHOD WAS USED TO CALCULATED FLOW RATES.
2) DRAINAGE AREA DIVERSION IS ANTICIPATED IN THE PROPOSED CONDITION BASED ON THE EXISTING CONDITION DRAINAGE PATTERN. BUT, HISTORIC DRAINAGE PATTERN IS MAINTAINED TO THE MAXIMUM EXTENT TECHNICALLY FEASIBLE.
3) STORM DRAIN SYSTEM IS DESIGNED TO CONVEY RUNOFF DUE TO 50-YR STORM EVENT.
4) AN ONSITE OVERLAND RELEASE WILL BE PROVIDED TO CONVEY EXCESS RUNOFF DUE TO 50 YEAR OR LARGER FREQUENCY STORM EVENTS.
5) PUMP IS REQUIRED TO DISCHARGE RUNOFF FROM LOADING DOCK AREA.
6) RUNOFF ORIGINATING FROM THE ADJACENT KNOOLWOOD BUILDING ROOF NEEDS TO BYPASS THE PROPOSED BMPS.

DRAINAGE BASIN DETAILS

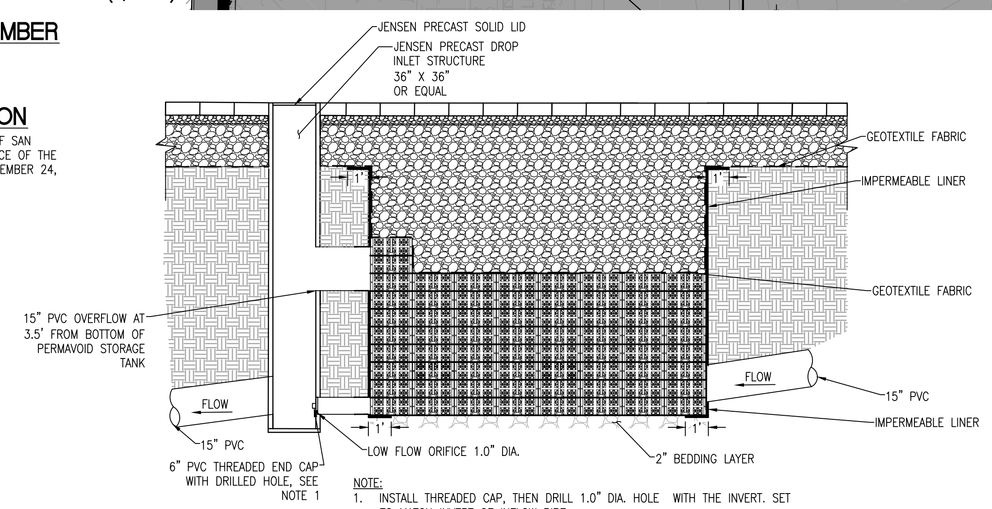
DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
B-1	0.18	0.85	4.389	0.67
B-2	0.77	0.85	4.389	2.87
C-1	0.05	0.86	4.389	0.19
C-2	0.15	0.86	4.262	0.55
C-3	0.35	0.86	4.234	1.27
C-4	0.58	0.86	4.234	2.11
C-5	0.40	0.86	4.389	1.51
C-6	0.21	0.86	3.884	0.70
C-7	0.52	0.86	3.918	1.75
C-8	0.20	0.86	3.841	0.66

ASSESSOR'S PARCEL NUMBER

427-530-02

BRIEF LEGAL DESCRIPTION

PARCEL 1 OF PARCEL MAP 5131 IN THE CITY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY SEPTEMBER 24, 1976.

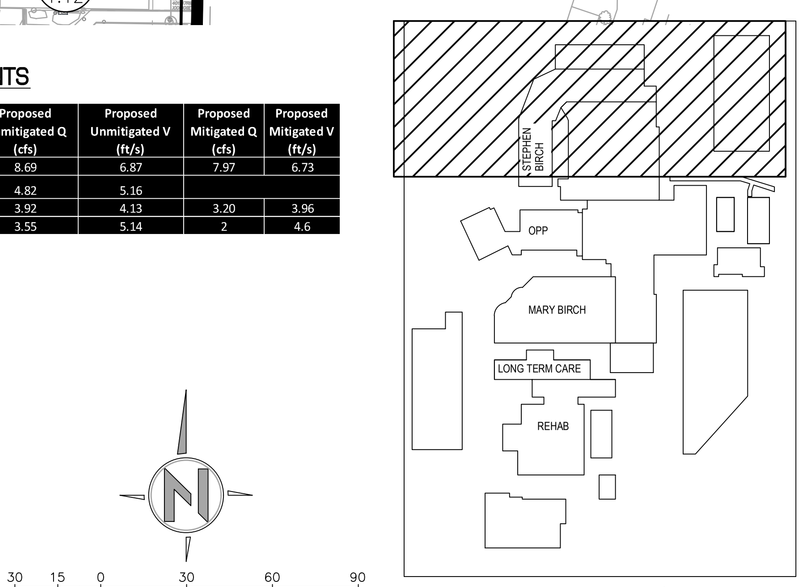


NOTE:
1. INSTALL THREADED CAP, THEN DRILL 1.0" DIA. HOLE WITH THE INVERT. SET TO MATCH INVERT OF INFLOW PIPE.

PERMAVOID UNDERGROUND STORAGE (PVT) BMP #5
NO SCALE

Q AND V AT DISCHARGE POINTS

Discharge Point #	Type of Discharge	Discharge Location	Proposed Unmitigated Q (cfs)	Proposed Unmitigated V (ft/s)	Proposed Mitigated Q (cfs)	Proposed Mitigated V (ft/s)
3	Pipe	18" PIPE @1.1%	8.69	6.87	7.97	6.73
		18" Bypass @ 0.76%	4.82	5.16		
		15" Outlet @ 0.5%	3.92	4.13	3.20	3.96
4	Pipe	12" PIPE @1.00%	3.55	5.14	2	4.6



KEY PLAN

30 15 0 30 60 90
SCALE: 1"=30'

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MSC
BWE JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

PROJECT

SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE

PROPOSED CONDITION
HYDOLOGY EXHIBIT

SHEET 1 OF 3

PLOT: M:\PROJECTS\9500\9545U.10.00 SHARP MMC\DWGS\EXHIBITS\DRAINAGE\9545U.10.00 HYDR-PROP-OVER.DWG Jennifer Bogarin 8/22/2022 11:56 AM

DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
A-1.1	0.53	0.86	4.389	2.00
A-1.2	1.12	0.86	4.218	4.06
A-1.3	1.04	0.86	3.840	3.43
A-1.4	1.25	0.86	3.840	4.13
A-1.5	0.54	0.86	3.840	1.78

15" PVC PRIVATE STORM DRAIN CONNECTS TO 24" RCP PUBLIC STORM DRAIN

RUN-ON #2 A=0.20 AC Q=0.80 CFS

RUN-ON #1 A=0.20 AC Q=0.80 CFS

A=0.10 AC

MATCHLINE SHEET 3

MATCHLINE SHEET 1

REHAB 384.92FF

WASTE STORAGE 384.5FF (6,250SF)

EXISTING INLET

SD LINE-05

E-7 0.19

A-1.6 0.87

A-1.5 0.54

A-1.4 1.25

A-1.3 1.04

A-1.2 1.12

A1.1 0.53

EX CONNECTOR (385.03)FF

EX CONNECTOR

REHAB (384.92)FF

NEW CONNECTOR

EX MARY BIRCH (384.07)FF

EX CONNECTOR 384.07FF

CONNECTOR 384.07FF (2,641SF)

24" PVC STORM

MARY BIRCH ADDITION 398.30FF-1ST FL 384.07FF-GROUND (21,346SF)

NEW TOWER 384.07FF-GROUND 398.30FF-1ST FL (45,770SF)

LOADING DOCK 384.07FF

6" PVC LOADING DOCK PAVEMENT

8" PVC

15" PVC

L=454.0'

L=82.0'

L=167.0'

KNOLLWOOD BLDG (389.80±)FF

SHOPS BLDG (384.84FF)

NEW ROOF DRAINS TO SUMP PUMP NEAR LOADING DOCK

BNP#1 BIOFILTRATION BASIN BOTTOM AREA=404SF

BMP#10 UNDERGROUND VAULT VOLUME=3,496 CF 100-YR DETENTION VOLUME=3,080 CF

PUMP LOCATION #1 A=1.79 AC Q2=4.50 CFS Q10=7.1 CFS Q50=9.0 CFS Q100=10.6 CFS

SD LINE #02

REROUTE/BYPASS ROOF RUNOF FROM KNOLLWOOD BUILDING TO BIRMINGHAM WAY.

BMP#3 UNDERGROUND VAULT PROVIDED VOLUME=16,910 CF 100-YR DETENTION VOLUME=17,054 CF

BMP#2 BIOFILTRATION BASIN PROVIDED BOTTOM AREA=3,362SF REQUIRED BOTTOM AREA=3,362SF BYPASS ALL FLOW TO UG VAULT

DISCHARGE POINT #2 A=5.35 AC C=0.86, I = 3,814 IN/HR

EXIST INLET 10" OUT EAST

N89°08'59"W 10.44'

R=2970.00' D=04°04'48" L=211.49'

N89°11'48"W 52.27'

N00°43'43"E 274.13'

KEY PLAN

STEPHEN BIRCH; OPP; MARY BIRCH; LONG TERM CARE; REHAB

SCALE: 1"=30'

LEGEND

SYMBOL

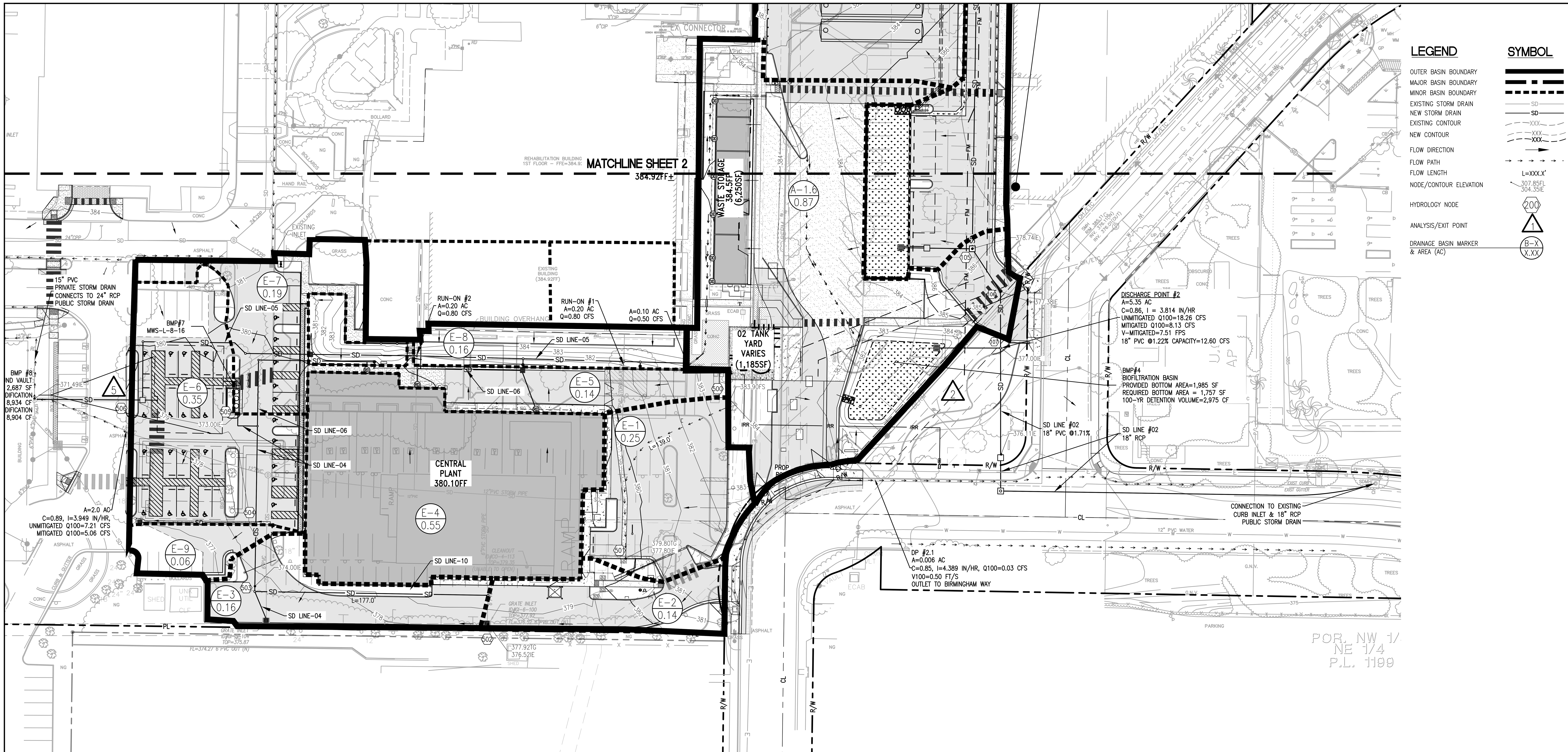
- OUTER BASIN BOUNDARY
- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY
- EXISTING STORM DRAIN
- NEW STORM DRAIN
- EXISTING CONTOUR
- NEW CONTOUR
- FLOW DIRECTION
- FLOW PATH
- FLOW LENGTH
- NODE/CONTOUR ELEVATION
- HYDROLOGY NODE
- ANALYSIS/EXIT POINT
- DRAINAGE BASIN MARKER & AREA (AC)

SHEET	SHEET TITLE	PROJECT
SHEET 2 OF 3	PROPOSED CONDITION HYDOLOGY EXHIBIT	SHARP MMC CAMPUS REDEVELOPMENT 7901 FROST STREET SAN DIEGO, CA 92123

BENCHMARK:	
ISSUE DATE:	09/17/2021
DRAWN BY:	MDS
CHECKED BY:	MGC
B&W JOB NUMBER:	9545.10.00
CLIENT JOB NUMBER:	

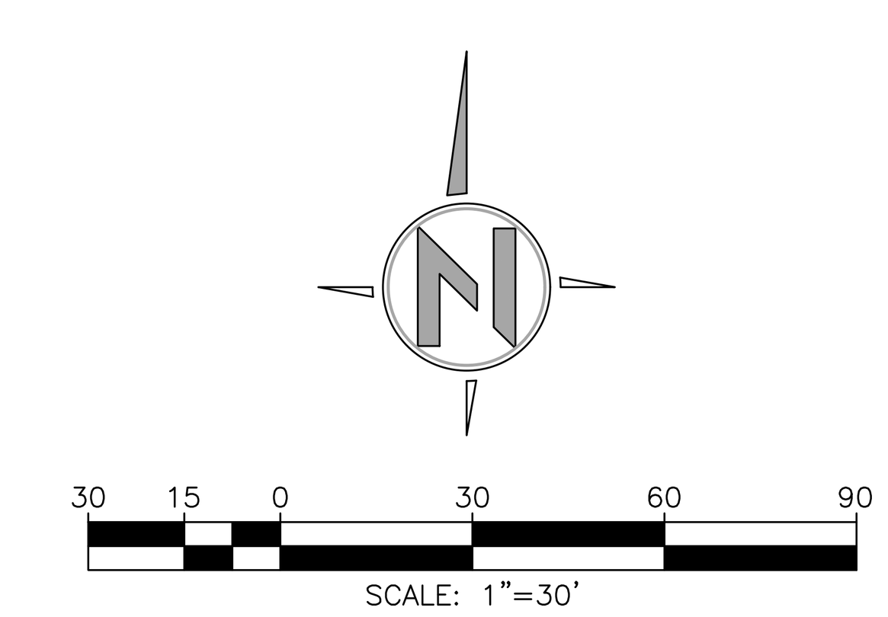
SYM	DESCRIPTION	DATE	APPR

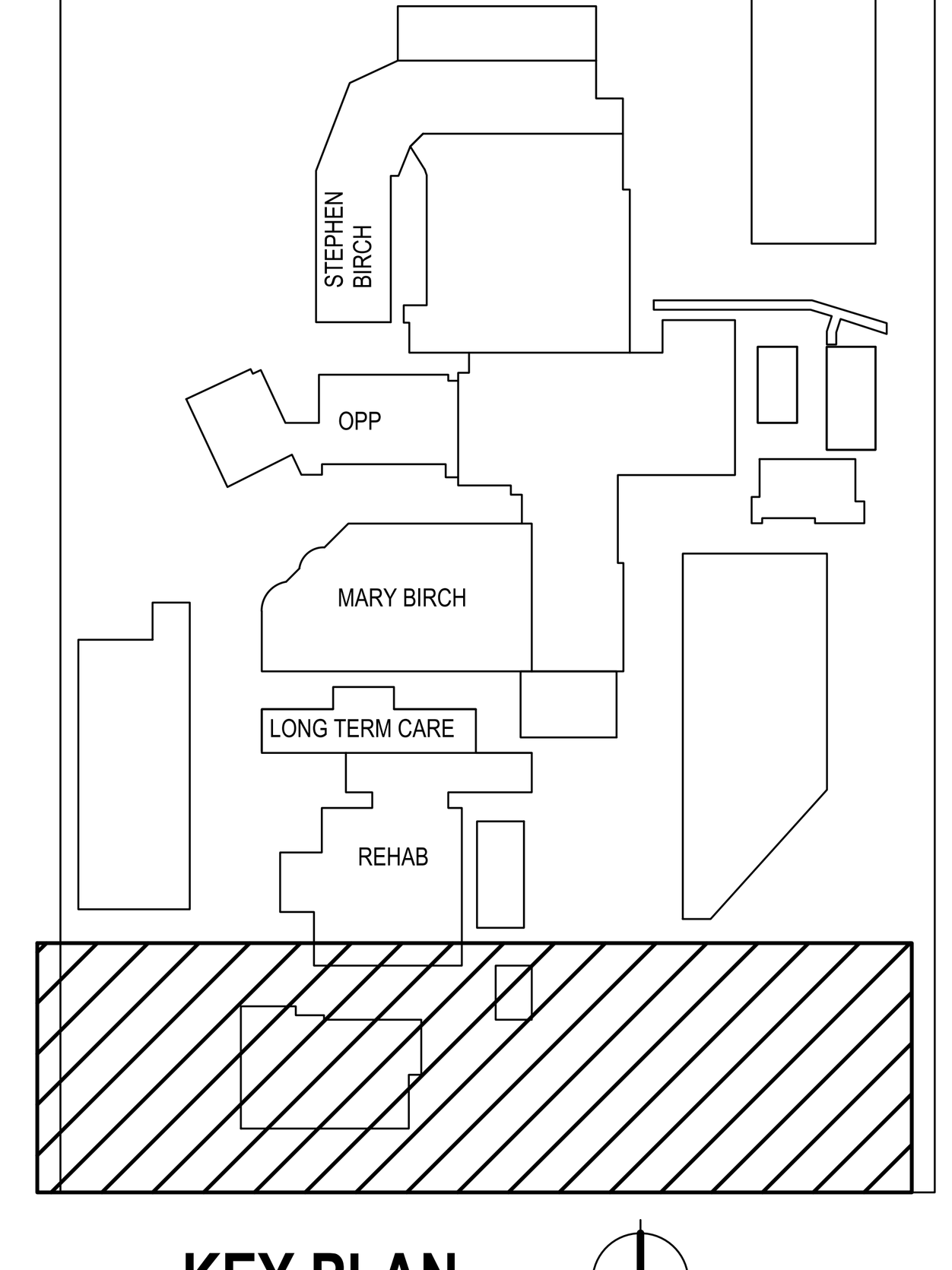
BWE
CIVIL • STRUCTURAL • SURVEY • PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550



DRAINAGE BASIN DETAILS

DRAINAGE BASIN	BASIN AREA (AC)	BASIN RUNOFF COEFFICIENT	BASIN RAINFALL INTENSITY (IN/HR)	BASIN UNMITIGATED Q100 PEAK FLOW RATE (CFS)
A-1.6	0.87	0.86	3.814	2.85
E-1	0.25	0.89	4.389	0.98
E-2	0.14	0.89	4.258	0.53
E-3	0.16	0.89	4.084	0.58
E-4	0.55	0.89	3.949	1.93
E-5	0.14	0.89	3.949	0.49
E-6	0.35	0.89	4.033	1.26
E-7	0.19	0.89	3.949	0.69
E-8	0.16	0.89	3.949	0.56
E-9	0.06	0.89	3.949	0.21





KEY PLAN

BWE
CIVIL-STRUCTURAL-SURVEY-PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123
619.299.5550

BENCHMARK:
ISSUE DATE: 09/17/2021
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PROJECT
SHARP MMC CAMPUS REDEVELOPMENT
7901 FROST STREET
SAN DIEGO, CA 92123

SHEET TITLE
PROPOSED CONDITION
HYDROLOGY EXHIBIT