

Storm Water Control Plan

Oasis Senior Center
700 Block of E. Clark Ave.
Orcutt, CA 93455

Date: 10/17/2016

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Attachments

1. *Stormwater Control Plan: Exhibit-1Pre-Development*
2. *Stormwater Control Plan: Exhibit-2 Post-Development*

Appendices

- A. *Stormwater Control Measure Sizing Calculator: Treatment*
- B. *Stormwater Control Measure Sizing Calculator: Retention*
- C. *Detention Basin: Peak Flow Mitigation (SBUH method)*
- D. *Soils Data & Percolation Test*

I. Project Data

Table 1: Project Data

Project Name/Number	Oasis Senior Center
Application Submittal Date	
Project Location	APN 105-020-063 (700 Block of E. Clark Ave., Orcutt, CA 93455)
Project Phase No.	Senior Center Phase
Project Type and Description	Senior center facility with parking and exterior patio areas
Total Project Site Area (acres)	233,109 sf (5.35 acres)
Total New Impervious Surface Area	69,619-sf
Total Replaced Impervious Surface Area	0-sf
Total Pre-Project Impervious Surface Area	0-sf
Total Post-Project Impervious Surface Area	69,619-sf
Net Impervious Area	69,619-sf
Watershed Management Zone	WMZ-1

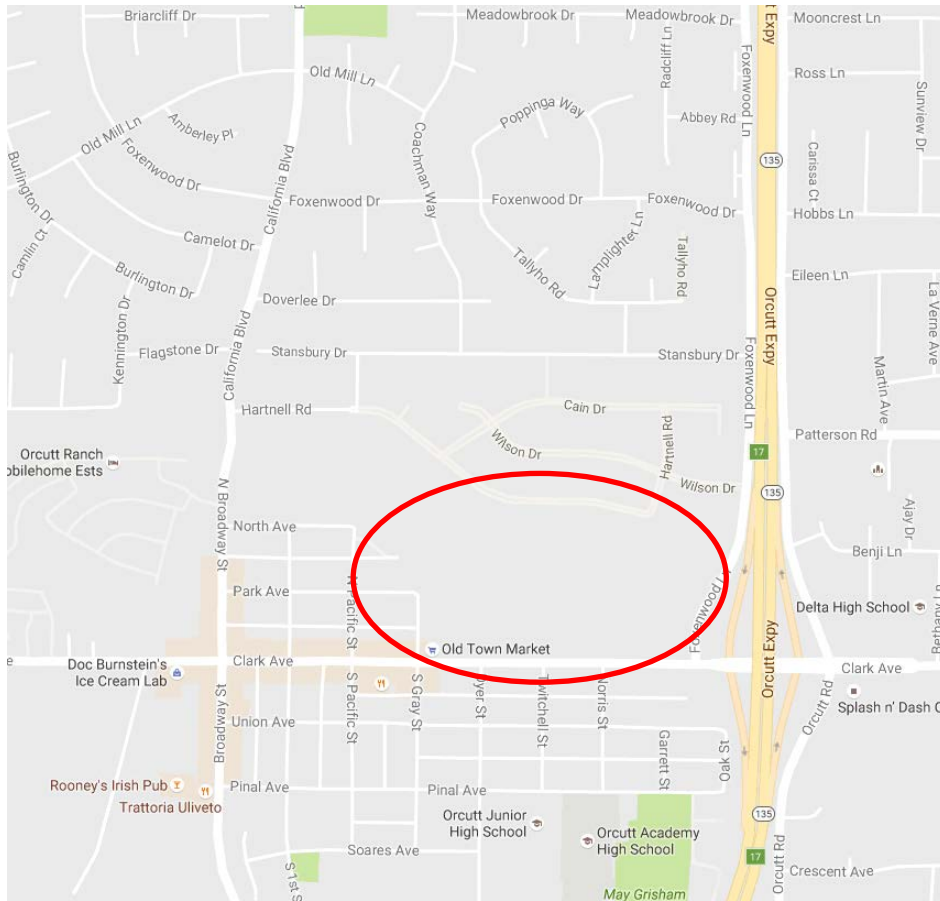


Figure 1: Santa Maria Vicinity Map

II. Setting

Project Location and Description

The project site is to be located along the 700 block of E. Clark Avenue in Orcutt, California and is a total of 233,109 square feet in size. Minimum setbacks of 5 feet from the property line have been taken into account and the buildings have been placed accordingly.

The existing site consisted of mostly vegetation which included scattered trees and native grasses and bushes. It sits at a lower elevation compared to the surrounding properties and frontage streets and drains towards Orcutt creek located at the North end of the site and continues towards the Northwest. The proposed improvements includes a 14,000 square foot main building that will serve as the senior center, a 1,600 square foot building located to the East of the main building, and roughly 82,800 square feet of concrete walkways and parking areas.

In order to reduce the amount of impervious area, the site was designed to incorporate two parking areas comprised of decomposed granite rather than an asphaltic surface. The site will also be designed to reduce the amount of surface area that will contribute to the sizing of the detention basin that will be located at the Northwest end of the project site. This will be achieved by placing a swale, or valley gutter, along the Southern property line so as to disconnect the run-on generated by the adjacent hillside and properties.

Existing Site Features and Conditions

The existing site comprises of native grasses and bushes in addition to several scattered trees which make up the majority of the 233,109 square foot site. The major portion of the site has an average existing slope is between 1% to 2% whereas the hillside lining almost the entire South property line slopes at a 2:1 average slope. Existing drainage patterns begin at the Southeast and drain to the Northwest where it eventually discharges into Orcutt creek.

The existing hydraulic soil group of the site is made up of Corralitos loamy sand. Corralitos loamy sand has an A rating meaning that the soil properties allow for a high infiltration rate and consists of well drained sands and/or gravelly sands.

Opportunities and Constraints for Stormwater Control

Due to the overall size and location of the proposed site improvements, there was enough area in which to place elements that can serve as a place of treatment as well as retention in addition to a completely separate area that can be used for a detention basin.

Within the three rows of parking located at the East end of the property, there are two islands located between the parking isles. Both of these islands provide an opportunity for bio-retention which will serve both as a place of treatment as well as a place for retention to promote natural infiltration back into the ground.

The same concept is applied to the run-off generated by the buildings and concrete walkways of the project area. In addition to the bio-retention areas, the main building will incorporate rain barrels that will be located at the bottom of each downspout.

Lastly, the landscape area located between the circular parking area near the West side of the property and the granite path provides just enough room to place the required detention basin.

III. Low Impact Development Design Strategies

Optimization of Site Layout

As discussed above, the proposed site improvements will not hinder the low impact development design strategies that will be implemented into the design while limiting the impact upon Orcutt creek which lies slightly beyond the entire North end of the site.

The bio-retention areas are spaced relatively far apart which proves to be difficult when designing the storm drain system. This storm drain system will assist in taking excess water stored within the rock voids during a larger storm than the volume was designed for.

Use of Permeable Pavements

The option of replacing proposed impervious areas with pervious areas, such as crushed gravel, have been implemented in two parking areas located on the site. These areas will not provide any surface area for treatment nor a place for storage.

Dispersal of Runoff to Pervious Areas

As discussed previously, the proposed site improvements concerning the new driveways and parking spaces will entail that the cross slopes convey additional runoff from East to West towards the bio-retention areas located within the landscape areas referred to earlier.

IV. Documentation of Drainage Design

Description of each Drainage Management Area (DMA)

With the proposed site improvements and additions, the site will generate a certain amount of storm water runoff based on the type of surface. The storm water runoff generated by each area will eventually need to be treated. The site's areas of concern are listed below in *Table 2* below.

Table 2: Drainage Management Areas

DMA Name	Area (square feet)	Surface Type
DMA-1A	9,842	Paving
DMA-1B	6,128	Gravel
DMA-2A	18,259	Paving
DMA-2B	1,717	Concrete
DMA-2C	3,400	Roof
DMA-3A	2,853	Gravel
DMA-3B	6,808	Pavement
DMA-3C	459	Concrete
DMA-3D	7,497	Roof
DMA-3E	2,828	Concrete
DMA-4A	3,151	Roof
DMA-4B	3,431	Concrete
DMA-4C	1,577	Roof
DMA-5A	6,850	Pavement
DMA-5B	2,405	Concrete
DMA-5C	18,255	Gravel

DMA-1A: Total contributing area is 9,842 square feet. This area is made up of the driveway entrance located at the East and drains to the bio-retention area, SCM-1, located in the East driveway island. See *Exhibit-2* attachment for visual references.

DMA-1B: Total contributing area is 6,128 square feet. This area is made up of the gravel parking area located at the East and drains to the bio-retention area, SCM-1, located in the East driveway island. See *Exhibit-2* attachment for visual references.

DMA-2A: Total contributing area is 18,259 square feet. This area is made up of the paving adjacent to the main building and the middle drive isle and drains to the bio-retention area, SCM-2, located in the West driveway island. See *Exhibit-2* attachment for visual references.

DMA-2B: Total contributing area is 1,717 square feet. This area is made up of the concrete flatwork adjacent to the main building and drains to the bio-retention area, SCM-2, located in the West driveway island. See *Exhibit-2* attachment for visual references.

DMA-2C: Total contributing area is 3,400 square feet. This area is made up of the Southeast corner of the main building and drains to the bio-retention area, SCM-2, located in the West driveway island. See *Exhibit-2* attachment for visual references.

DMA-3A: Total contributing area is 2,853 square feet. This area is made up of the gravel parking area located at the East and drains to the bio-retention area, SCM-3, located North of the main building. See *Exhibit-2* attachment for visual references.

DMA-3B: Total contributing area is 6,808 square feet. This area is made up of the paved parking area located Northeast of the main building and drains to the bio-retention area, SCM-3, located North of the main building. See *Exhibit-2* attachment for visual references.

- DMA-3C:* Total contributing area is 459 square feet. This area is made up of the concrete flatwork located along the ADA parking spaces Northeast of the main building and drains to the bio-retention area, SCM-3, located North of the main building. See *Exhibit-2* attachment for visual references.
- DMA-3D:* Total contributing area is 7,497 square feet. This area is made up of the North half roof of the main building and drains to the bio-retention area, SCM-3, located North of the main building. See *Exhibit-2* attachment for visual references.
- DMA-3E:* Total contributing area is 2,828 square feet. This area is made up of the concrete patio located West of the main building and drains to the bio-retention area, SCM-3, located North of the main building. See *Exhibit-2* attachment for visual references.
- DMA-4A:* Total contributing area is 3,151 square feet. This area is made up of the Southwest roof portion of the main building and drains to the bio-retention area, SCM-4, located North of the trash enclosure. See *Exhibit-2* attachment for visual references.
- DMA-4B:* Total contributing area is 3,431 square feet. This area is made up portion of the concrete flatwork located Southwest of the main building and drains to the bio-retention area, SCM-4, located North of the trash enclosure. See *Exhibit-2* attachment for visual references.
- DMA-4C:* Total contributing area is 1,577 square feet. This area is made up of the roof of the smaller building located West of the main building and drains to the bio-retention area, SCM-4, located North of the trash enclosure. See *Exhibit-2* attachment for visual references.
- DMA-5A:* Total contributing area is 6,850 square feet. This area is made up of the paved parking areas located Southwest of the main building and drains to the bio-retention area, SCM-5, located Northwest of the circular parking area. See *Exhibit-2* attachment for visual references.
- DMA-5B:* Total contributing area is 2,405 square feet. This area is made up of the concrete flatwork located South of the main building and drains to the bio-retention area, SCM-5, located Northwest of the circular parking area. See *Exhibit-2* attachment for visual references.
- DMA-5C:* Total contributing area is 18,255 square feet. This area is made up of the gravel parking area located Southwest of the main building and drains to the bio-retention area, SCM-5, located Northwest of the circular parking area. See *Exhibit-2* attachment for visual references.

Tabulation and Sizing Calculations

Table 3: Project information summary.

Total Project Area	233,109-sf
Total New Impervious Area	69,619-sf
Design Storm Depth	1.3in-1.4in
Applicable Requirements	Tier 2/Tier 3

Areas Draining to Bio-retention Facilities

By using the Central Coast Region 95th Percentile 24-hour Rainfall Depth map provided by the State Water Resources Control Board, the designated storm depth for the project is 1.4 inches. See Appendix A for the results given by the Stormwater Control Measure Sizing Calculator for each SCM treatment length requirement. See Appendix B for the results given by the Stormwater Control Measure Sizing Calculator for each SCM retention requirement listed in Table 4 below.

Table 4: SCM sizing requirements.

DMA Name	DMA Area (sf)	Post-Project Surface Type	Drains to SCM	SCM Area	Required Storage Volume
DMA-1A	9,842	Paving	SCM-1	394-sf	224-ft ³
DMA-1B	6,128	Gravel	SCM-1	394-sf	224-ft ³
DMA-2A	18,259	Paving	SCM-2	991-sf	793-ft ³
DMA-2B	1,717	Concrete	SCM-2	991-sf	793-ft ³
DMA-2C	3,400	Roof	SCM-2	991-sf	793-ft ³
DMA-3A	2,853	Gravel	SCM-3	704-sf	479-ft ³
DMA-3B	6,808	Pavement	SCM-3	704-sf	479-ft ³
DMA-3C	459	Concrete	SCM-3	704-sf	479-ft ³
DMA-3D	7,497	Roof	SCM-3	704-sf	479-ft ³
DMA-3E	2,828	Concrete	SCM-3	704-sf	479-ft ³
DMA-4A	3,151	Roof	SCM-4	326-sf	243-ft ³
DMA-4B	3,431	Concrete	SCM-4	326-sf	243-ft ³
DMA-4C	1,577	Roof	SCM-4	326-sf	243-ft ³
DMA-5A	6,850	Pavement	SCM-5	370-sf	312-ft ³
DMA-5B	2,405	Concrete	SCM-5	370-sf	312-ft ³
DMA-5C	18,255	Gravel	SCM-5	370-sf	312-ft ³

V. Source Control Measures

Descriptions of Each Source Control Measure (SCMs)

Based on the fact that the site falls under a Tier 3 requirement, the City of Santa Maria Community Development Department requires that the site incorporates a design that has the capacity to treat the storm water runoff produced by the 85th percentile and retain the storm water runoff produced by the 95th percentile, 24-hour rainfall event. To achieve these two requirements, the combination of four individual bio-retention areas and a detention basin will be implemented into the design.

Each bio-retention area will have a bio-media layer. This bio-media layer will treat the runoff produced by the designated DMA(s) as depicted in Exhibit-2. Located directly underneath the bio-media is the gravel layer. This gravel layer will meet the retention volume requirement listed above in Table 4 due to the void spaces created by the layering of the gravel itself and will also allow the water runoff to naturally infiltrate back into the soil. In the case a storm event produces excessive amounts of run-off, an overflow structure has been provided. Each overflow structure will then connect into the central storm drain line which eventually outlets into the detention basin located west of the circular parking area. In addition, to prevent standing water from occurring, a 4 inch perforated pipe will be located directly below the bottom of the bio-media layer. See Table 5 below for bio-retention area sizing summaries.

Table 5: Source Control Measures Bio-Retention

SCM Name	Type	Surface Area (ft ²)	Gravel Depth (ft)	Volume Capacity (ft ³)
SCM-1	Bio-retention Area	1,606	1.0	642
SCM-2	Bio-retention Area	1,888	1.25	944
SCM-3	Bio-retention Area	2,644	1.0	1,058
SCM-4	Bio-retention Area	998	1.0	399
SCM-5	Bio-retention Area	893	1.0	358

- SCM-1:* Located within the landscape area located within the East driveway island. The determination of the sizing and design of the bio-retention area can be seen in the Appendix A & B.
- SCM-2:* Located within the landscape area located within the West driveway island. The determination of the sizing and design of the bio-retention area can be seen in the Appendix A & B.
- SCM-3:* Located within the landscape area located North of the main building. The determination of the sizing and design of the bio-retention area can be seen in the Appendix A & B.
- SCM-4:* Located West of the circular parking area. The determination of the sizing and design of the bio-retention area can be seen in the Appendix A & B.

Description of Detention Basin

Based on the location of the site and the overall project area, the project is subject to flood control which requires a design of a detention basin that will be able to hold the equivalent run-off volume generated by a 100-year storm as well as mitigate the discharge rate from the basin to the calculated maximum 25-year, 24-hour storm event by only allowing 0.07 cubic feet per second per acre. The maximum 25-year, 24-hour storm event discharge rate was determined to be 0.30 cubic feet per second since the contributing acreage area is 4.32 acres.

As seen on the attached Figure 2 “FIRM Excerpt”, to the north of this parcel lies a 100-year floodplain. The floodplain only passes through this parcel at the extreme northeasterly corner. The proposed finished floor elevation of the primary build is 327.75 (see construction documents), and the 100-year water surface elevation at the upstream limits of the structure is approximately 323.0.

The Santa Barbara Urban Hydrograph runoff method was incorporated into the design through the AutoCAD Civil 3D program “Hydraflow Hydrograph.”. This software is also used for routing the peaks flows through the respective detention basin. The results and input data is included in Appendix C.

Per the Santa Barbara County Engineering Design Standards, Appendix B, key SBUH method variables/assumptions are shown in Table 6 below.

Table 6: Design Standards Variables

Run-off Method	Pond Routing Method	Rainfall Distribution	Antecedent Moisture Condition	Hydrograph ordinate Time Increment	Rainfall Amounts
SBUH	Storage Indication	SCS 24-hr, Type 1	AMC II	0.10-hr	24-hr totals

Additional design assumptions include:

- * Time of concentration = 10 minutes

The time of concentration value used for the site was based on the calculations presented in the Standard Conditions of Project Plan Approval document provided by Santa Barbara County Flood Control. The minimum time of concentration is equal to that of the “lot time” which is set to 10 minutes.

Through the use of AutCAD’s “Hydraflow Hydrograph” program, the detention basin peak flow discharge rates for each recurrence interval year have been rounded to the nearest hundredth of a cubic foot per second and have been tabulated in Table 7 below. As discussed above, the site is subject to flood control requirements which requires the peak flow discharge rate of the 25-year, 24-hour storm event not to exceed the determined rate of 0.30 cubic feet per second. With that said, the outlet structure’s orifices were sized and placed at invert elevations that resulted in the lowest peak flow discharge rates possible.

Table 7: Hydrograph results for pre-development versus post-development.

Recurrence Interval, yr	Peak Flows, cfs	
	Pre-development	Post-development
2	0.00	0.00
5	0.02	0.09
10	0.04	0.14
25	0.09	0.19
50	0.15	0.22
100	0.27	0.25

As seen above in Table 7, the 25-year, 24-hour storm event peak flow discharge rate of the detention basin is 0.19 cubic feet per second which is lower than the required 0.30 cubic feet per second limit based on the acreage of the contributing areas to the basin. In addition, both the 50-year & 100-year, 24-hour storm events have reduced discharge rates that are either below or close to pre-development rates.

The detention basin will provide the required detention (see Exhibit-2). In order to minimize the depth of the detention basin, the overall square footage was increased to incorporate most of the landscape area located west of the circular parking lot. In doing so, the depth of the detention basin was designed to be a total of 3.0 feet deep. The basin will contain a spillway located 6 inches below the ridge line and has been properly sized so as to provide enough surface area for the peak flow generated by the 100-year, 24-hour storm event. Located a foot below the spillway is the 100-year storm water line. The detention volume that has been accounted for within the “Hydraflow Hydrograph” calculations is the remaining foot between the 100-year storm water line and the bottom of the detention basin. With the basin bottom footprint approximately 11,640 square feet in size, the provided volume is roughly equal to 19,485 cubic feet.

VI. Certifications

The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water’s Stormwater Technical Guide and meet the requirements put forth by the City of Santa Maria Community Development Department: Storm Water Post-Construction Requirements.

APPENDIX A: Stormwater Control Measure Sizing Calculator: Treatment

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	Oasis Senior Center
Project location:	700 Block of E. Clark Ave.
Tier 2/Tier 3:	Tier 2 - Treatment
Design rainfall depth (in):	1.4
Total project area (ft2):	188,344
Total new impervious area (ft2):	69,619
Total replaced impervious in a USA (ft2):	
Total replaced impervious not in a USA (ft2):	
Total pervious/landscape area (ft2):	118,725

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA-1A	Drains to SCM	9,842	Concrete or asphalt	New	SCM-1
DMA-1B	Drains to SCM	6,128	Crushed aggregate	New	SCM-1
DMA-2A	Drains to SCM	19,654	Concrete or asphalt	New	SCM-2
DMA-2B	Drains to SCM	1,717	Concrete or asphalt	New	SCM-2
DMA-2C	Drains to SCM	3,400	Roof	New	SCM-2
DMA-3A	Drains to SCM	2,853	Crushed aggregate	New	SCM-3
DMA-3B	Drains to SCM	6,808	Concrete or asphalt	New	SCM-3
DMA-3C	Drains to SCM	459	Concrete or asphalt	New	SCM-3
DMA-3D	Drains to SCM	7,497	Roof	New	SCM-3
DMA-3E	Drains to SCM	2,828	Concrete or asphalt	New	SCM-3
DMA-4A	Drains to SCM	3,151	Roof	New	SCM-4
DMA-4B	Drains to SCM	3,431	Concrete or asphalt	New	SCM-4
DMA-4C	Drains to SCM	1,577	Roof	New	SCM-4
DMA-5A	Drains to SCM	6,850	Concrete or asphalt	New	SCM-5
DMA-5B	Drains to SCM	2,405	Concrete or asphalt	New	SCM-5
DMA-5C	Drains to SCM	18,255	Crushed aggregate	New	SCM-5

DMA Summary Area

Total project impervious area (ft2):	69619
New impervious area (ft2):	69619
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	27236

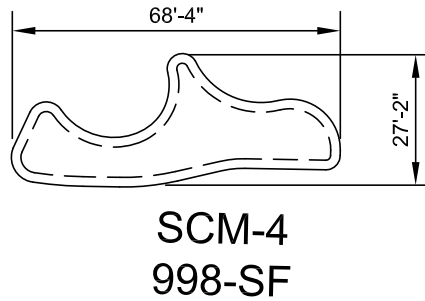
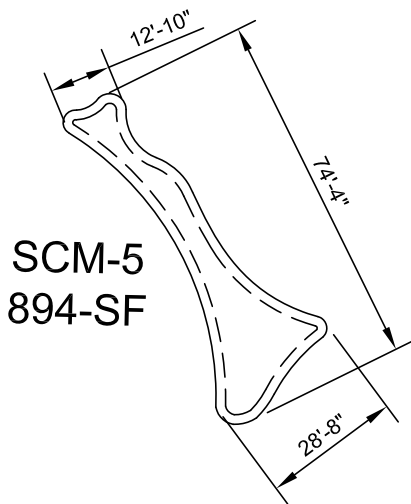
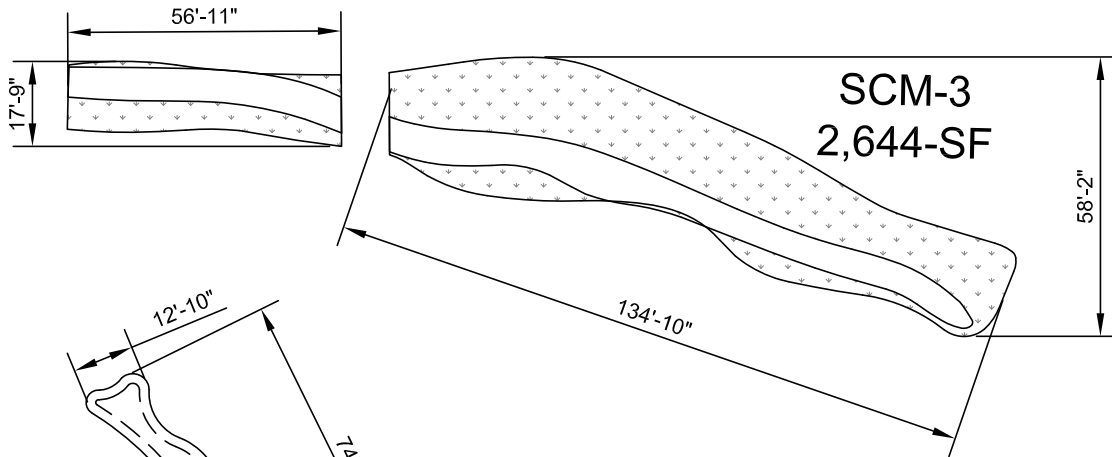
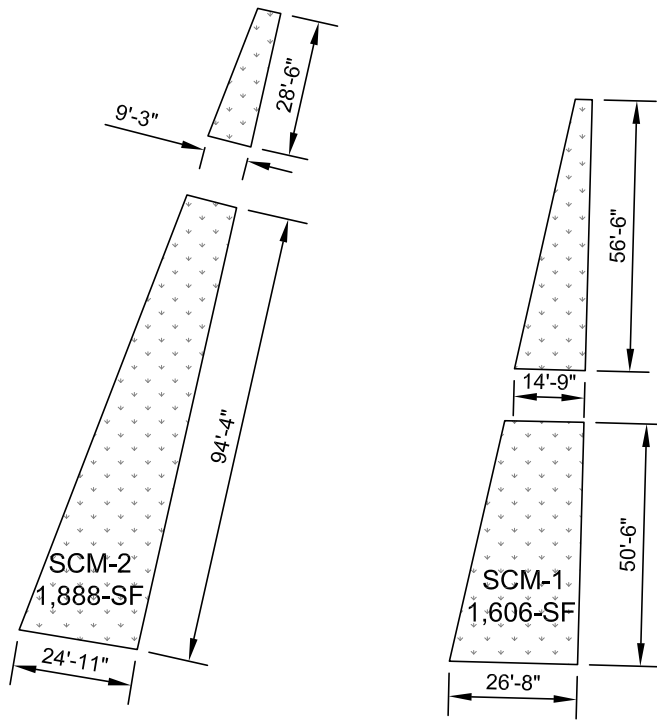
3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infiltr. Rate (in/hr)	Area (ft2)
SCM-1	Bioretention	1	HSG A/B	0.75	1606
SCM-2	Bioretention	1	HSG A/B	0.75	1888
SCM-3	Bioretention	1	HSG A/B	0.75	2644
SCM-4	Bioretention	1	HSG A/B	0.75	998
SCM-5	Bioretention	1	HSG A/B	0.75	893

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Minimum SCM Area (ft ²)		
SCM-1	394		
SCM-2	991		
SCM-3	704		
SCM-4	326		
SCM-5	370		



NOTE:
ALL STORMWATER CONTROL MEASURES (SCMs) ARE DESIGNED TO HAVE A 12" ROCK STORAGE DEPTH WITH THE EXCEPTION OF SCM-2 WHICH WILL HAVE A 15" ROCK STORAGE DEPTH.

APPENDIX B: Stormwater Control Measures Sizing Requirement: Retention

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	Oasis Senior Center
Project location:	700 Block of E. Clark Ave.
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	1.4
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Total replaced impervious in a USA (ft2):	
Total replaced impervious not in a USA (ft2):	
Total pervious/landscape area (ft2):	118,725

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA-1A	Drains to SCM	9,842	Concrete or asphalt	New	SCM-1
DMA-1B	Drains to SCM	6,128	Crushed aggregate	New	SCM-1
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DMA Summary Area

Total project impervious area (ft2):	69619
New impervious area (ft2):	69619
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	27236

3. SCM Characterization

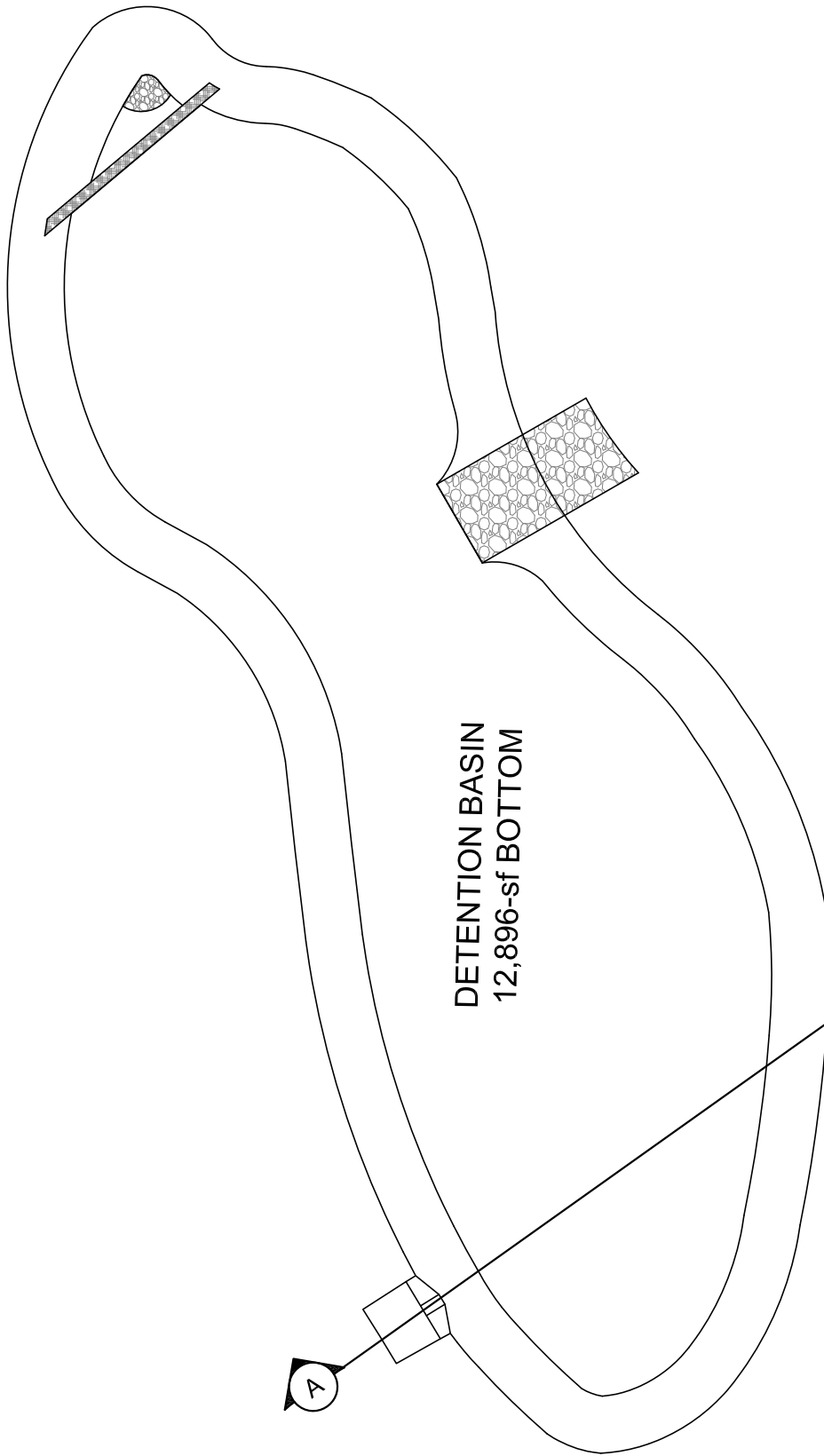
Name	SCM Type	Safety Factor	SCM Soil Type	Infiltr. Rate (in/hr)	Area (ft2)
SCM-1	Bioretention	1	HSG A/B	0.75	1606
SCM-2	Bioretention	1	HSG A/B	0.75	1888
SCM-3	Bioretention	1	HSG A/B	0.75	2644
SCM-4	Bioretention	1	HSG A/B	0.75	998
SCM-5	Bioretention	1	HSG A/B	0.75	893

4. Run SBUH Model

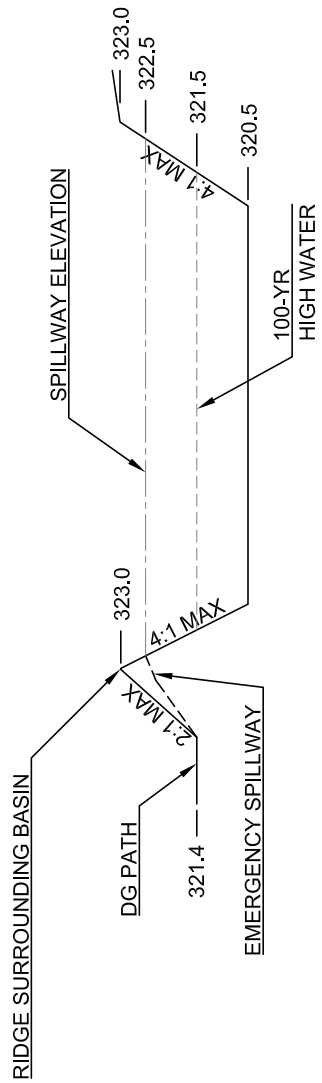
5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
SCM-1	258	0.40	0.0
SCM-2	946	1.25	4.1
SCM-3	479	0.45	0.0
SCM-4	243	0.61	0.0
SCM-5	312	0.87	0.3

APPENDIX C: Detention Basin: Peak Flow Mitigation (SBUH Method)



DETENTION BASIN
12,896-sf BOTTOM



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.000	6	n/a	0	-----	-----	-----	Pre-Development
2	SBUH Runoff	0.089	6	624	3,046	-----	-----	-----	Post-Development
3	Reservoir	0.039	6	1422	2,775	2	320.65	1,887	Basin-Discharge

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

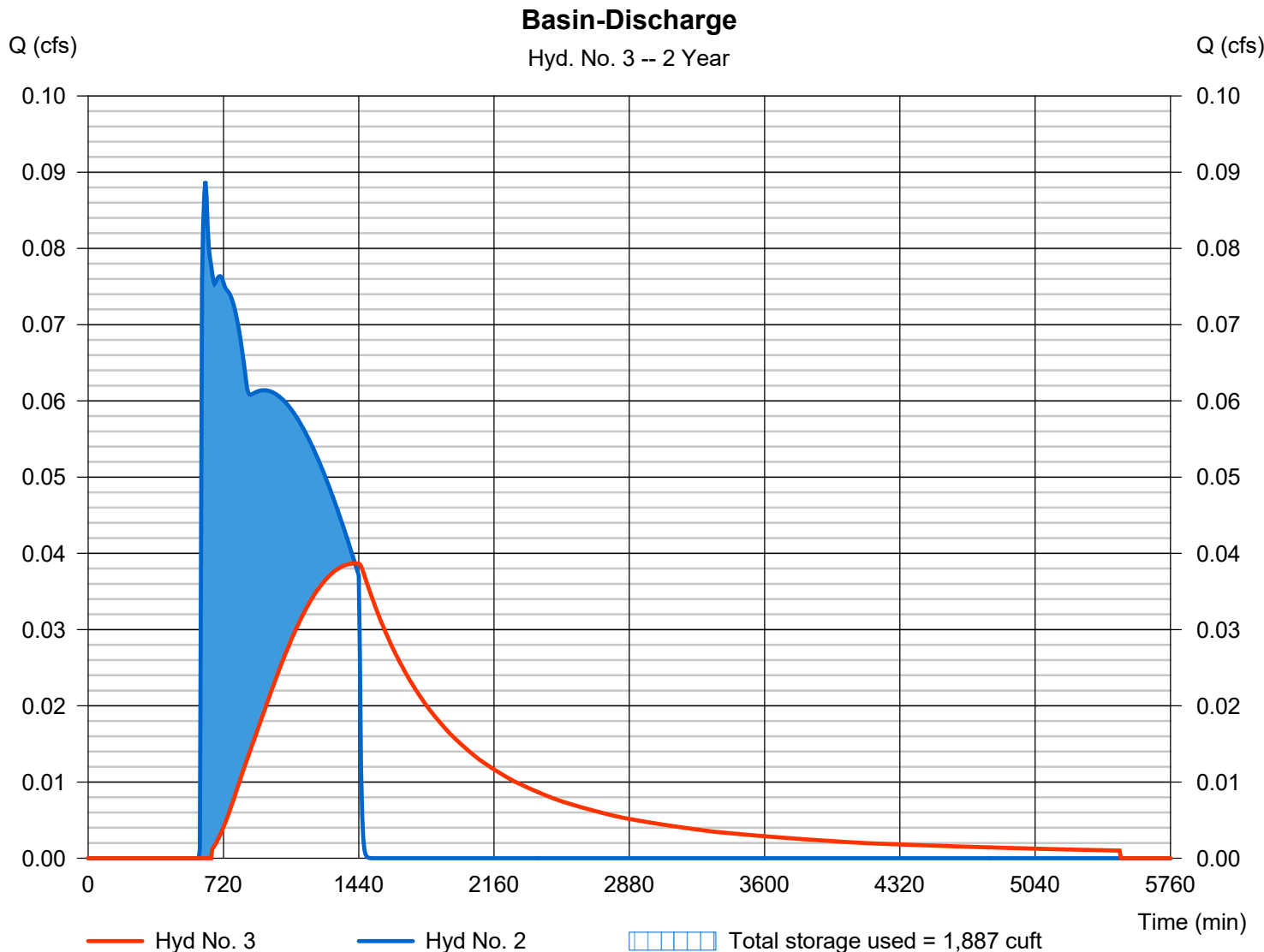
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.039 cfs
Storm frequency	= 2 yrs	Time to peak	= 1422 min
Time interval	= 6 min	Hyd. volume	= 2,775 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 320.65 ft
Reservoir name	= Detention-Basin	Max. Storage	= 1,887 cuft

Storage Indication method used.



Pond No. 1 - Detention-Basin

Pond Data

Trapezoid -Bottom L x W = 128.0 x 100.0 ft, Side slope = 4.00:1, Bottom elev. = 320.50 ft, Depth = 1.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.50	12,800	0	0
0.10	320.60	12,983	1,289	1,289
0.20	320.70	13,167	1,308	2,597
0.30	320.80	13,353	1,326	3,923
0.40	320.90	13,540	1,345	5,267
0.50	321.00	13,728	1,363	6,631
0.60	321.10	13,917	1,382	8,013
0.70	321.20	14,108	1,401	9,414
0.80	321.30	14,300	1,420	10,835
0.90	321.40	14,493	1,440	12,274
1.00	321.50	14,688	1,459	13,733

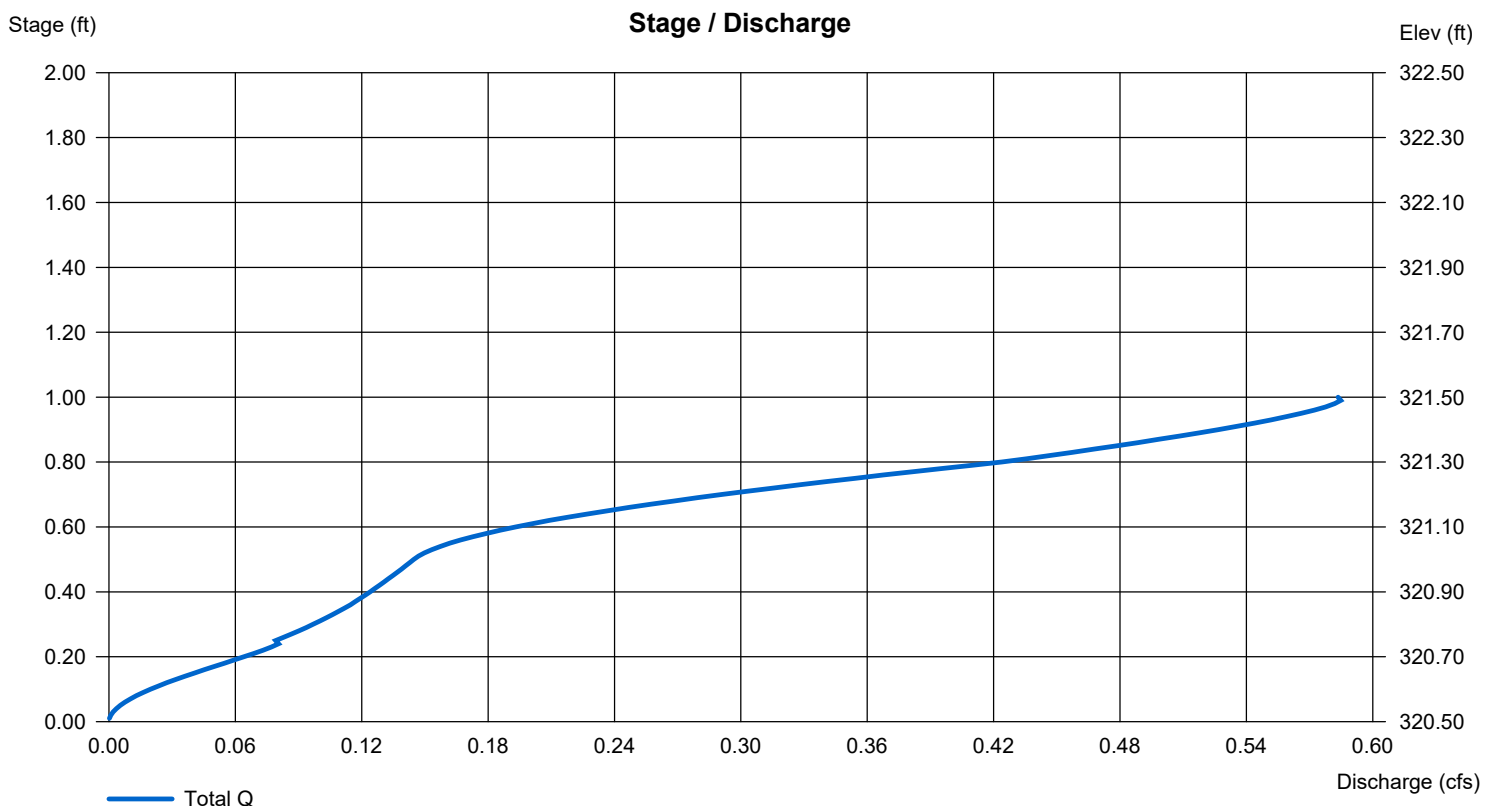
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 3.00	6.00	Inactive	0.00
Span (in)	= 3.00	6.00	3.00	0.00
No. Barrels	= 1	1	2	0
Invert El. (ft)	= 320.50	321.00	321.20	0.00
Length (ft)	= 5.00	5.00	5.00	0.00
Slope (%)	= 2.00	2.00	2.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	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).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SBUH Runoff	0.016	6	1284	415	----	----	----	Pre-Development	
2	SBUH Runoff	0.817	6	600	8,659	----	----	----	Post-Development	
3	Reservoir	0.106	6	1284	8,389	2	320.83	4,314	Basin-Discharge	
Chambers.gpw					Return Period: 5 Year			Wednesday, 09 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

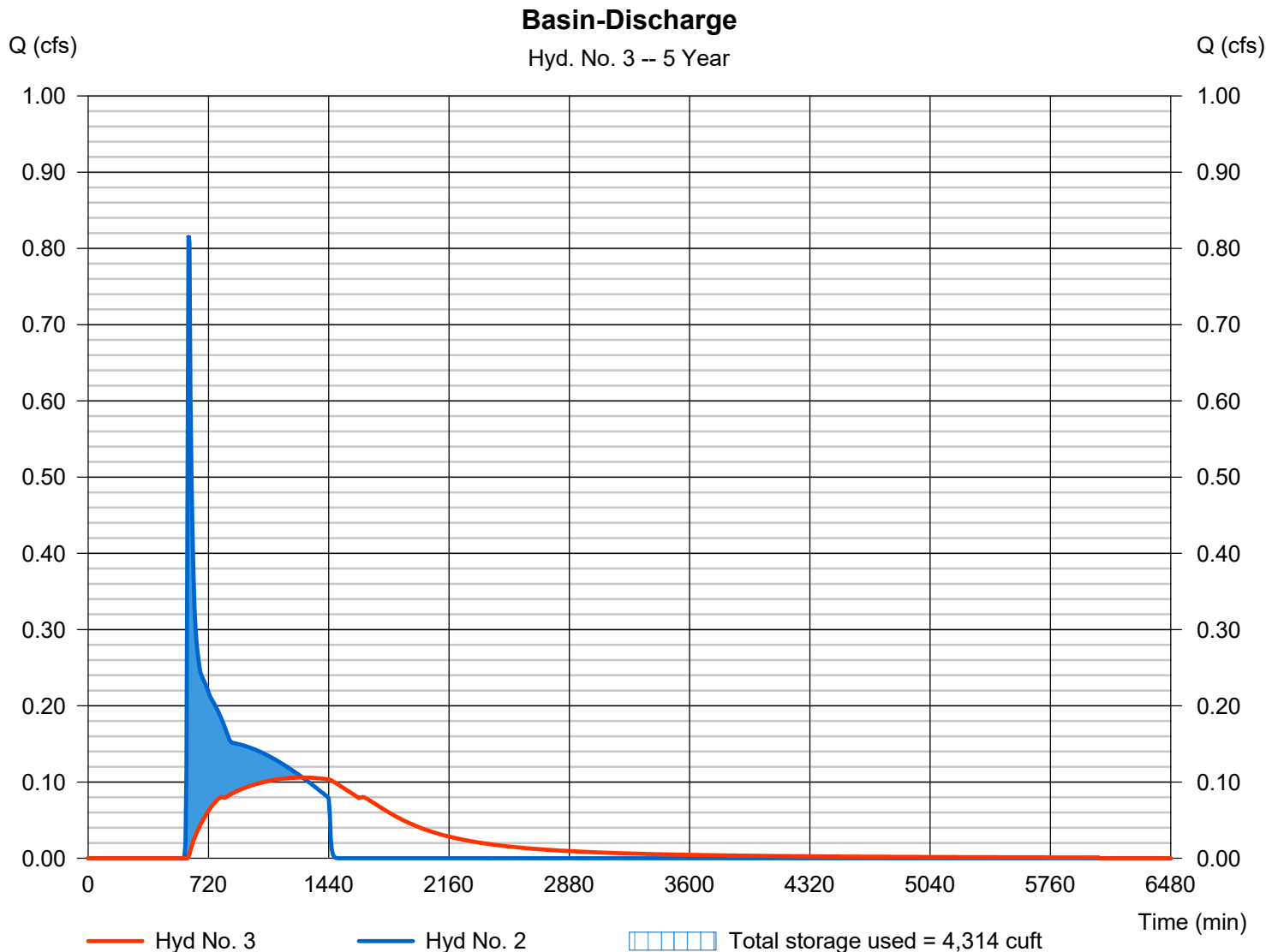
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.106 cfs
Storm frequency	= 5 yrs	Time to peak	= 1284 min
Time interval	= 6 min	Hyd. volume	= 8,389 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 320.83 ft
Reservoir name	= Detention-Basin	Max. Storage	= 4,314 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SBUH Runoff	0.043	6	1140	1,560	-----	-----	-----	Pre-Development	
2	SBUH Runoff	1.599	6	600	13,301	-----	-----	-----	Post-Development	
3	Reservoir	0.148	6	1278	13,030	2	321.01	6,827	Basin-Discharge	
Chambers.gpw					Return Period: 10 Year			Wednesday, 09 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

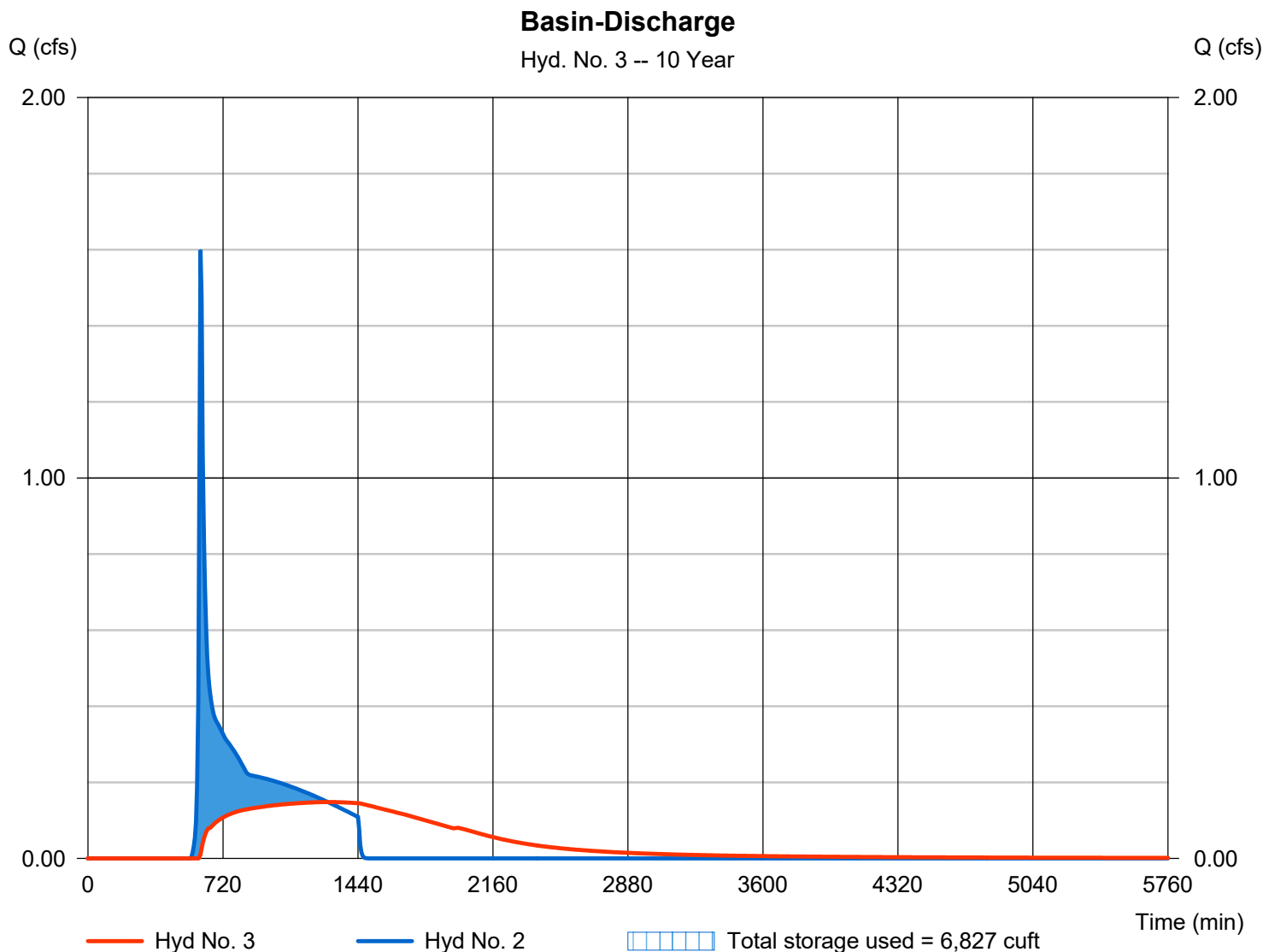
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.148 cfs
Storm frequency	= 10 yrs	Time to peak	= 1278 min
Time interval	= 6 min	Hyd. volume	= 13,030 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 321.01 ft
Reservoir name	= Detention-Basin	Max. Storage	= 6,827 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SBUH Runoff	0.088	6	780	3,860	-----	-----	-----	Pre-Development	
2	SBUH Runoff	2.725	6	600	19,849	-----	-----	-----	Post-Development	
3	Reservoir	0.269	6	1050	19,579	2	321.18	9,146	Basin-Discharge	
Chambers.gpw					Return Period: 25 Year			Wednesday, 09 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

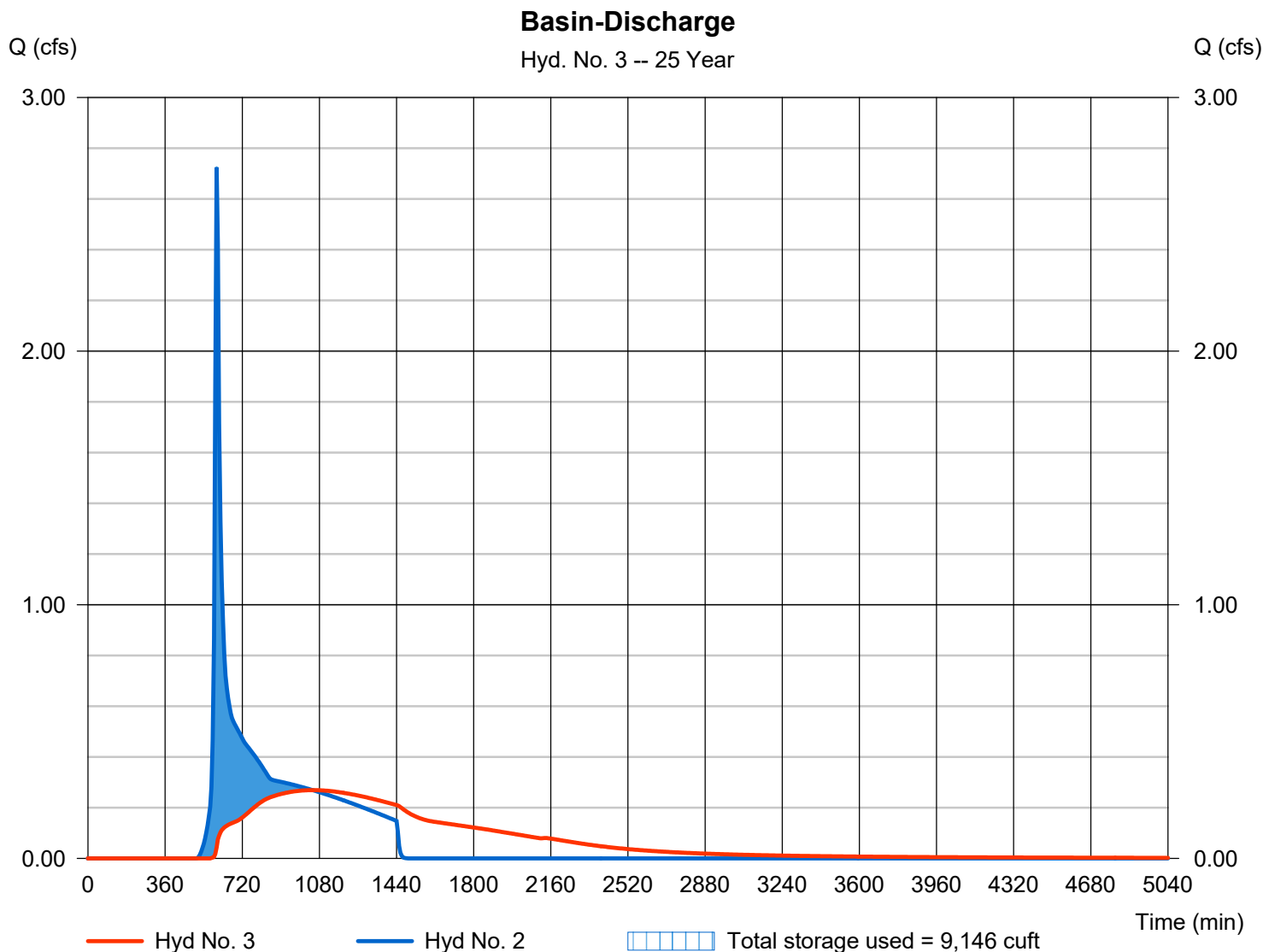
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.269 cfs
Storm frequency	= 25 yrs	Time to peak	= 1050 min
Time interval	= 6 min	Hyd. volume	= 19,579 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 321.18 ft
Reservoir name	= Detention-Basin	Max. Storage	= 9,146 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SBUH Runoff	0.145	6	750	6,062	-----	-----	-----	Pre-Development	
2	SBUH Runoff	3.625	6	600	25,029	-----	-----	-----	Post-Development	
3	Reservoir	0.387	6	846	24,758	2	321.27	10,470	Basin-Discharge	
Chambers.gpw					Return Period: 50 Year			Wednesday, 09 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

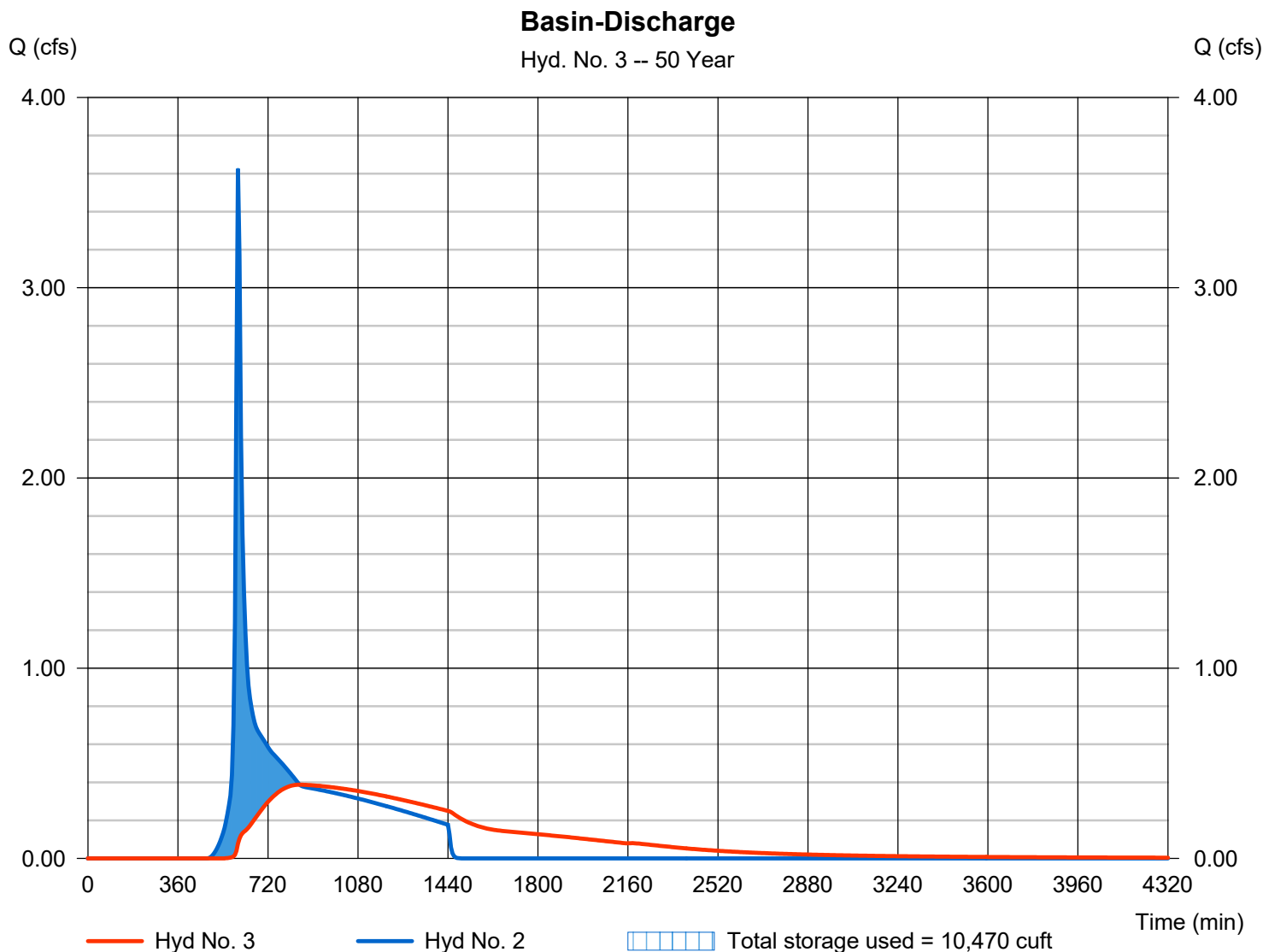
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.387 cfs
Storm frequency	= 50 yrs	Time to peak	= 846 min
Time interval	= 6 min	Hyd. volume	= 24,758 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 321.27 ft
Reservoir name	= Detention-Basin	Max. Storage	= 10,470 cuft

Storage Indication method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SBUH Runoff	0.279	6	618	8,596	-----	-----	-----	Pre-Development	
2	SBUH Runoff	4.560	6	600	30,372	-----	-----	-----	Post-Development	
3	Reservoir	0.511	6	816	30,102	2	321.38	12,036	Basin-Discharge	
Chambers.gpw					Return Period: 100 Year			Wednesday, 09 / 28 / 2016		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

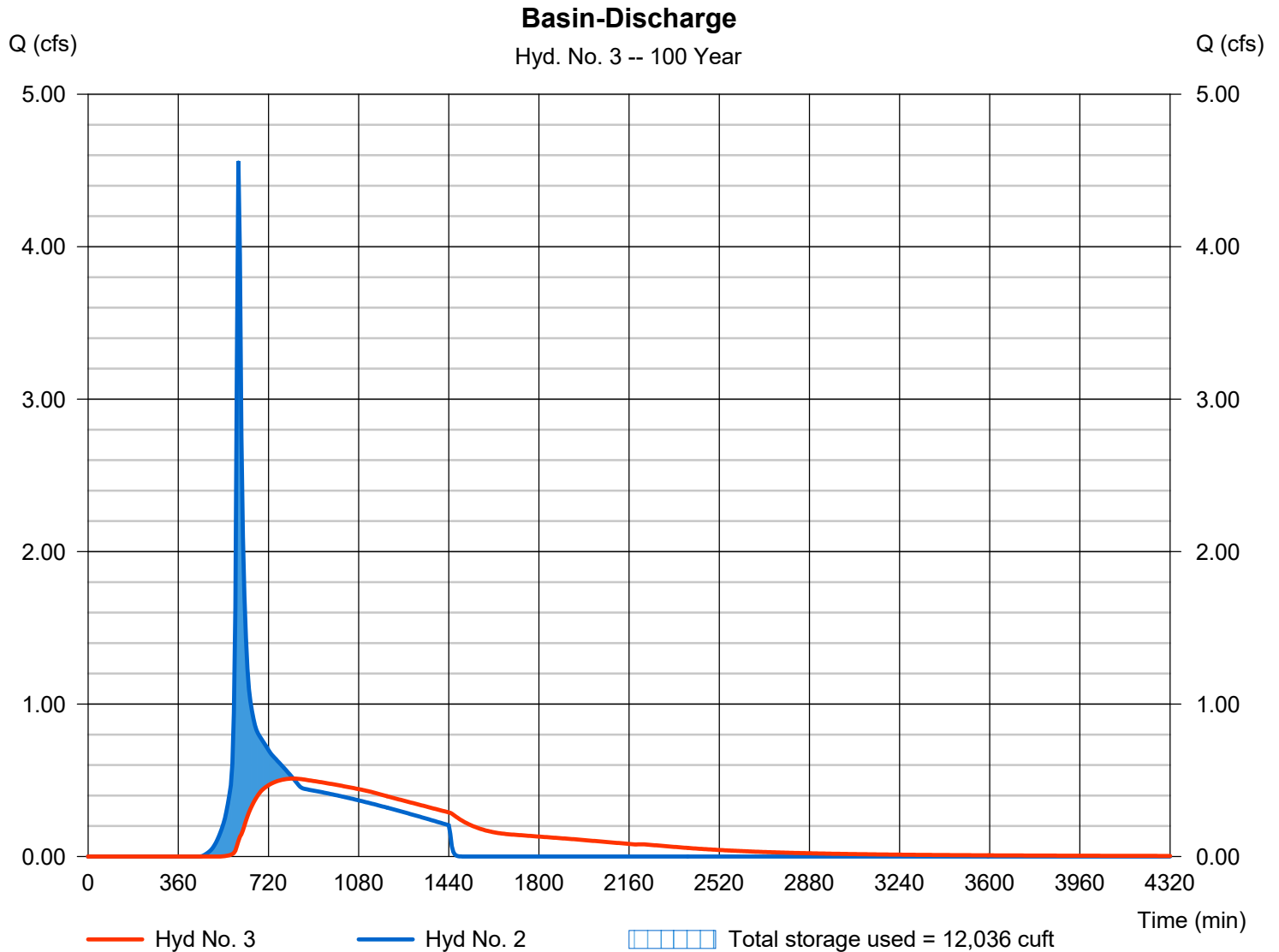
Wednesday, 09 / 28 / 2016

Hyd. No. 3

Basin-Discharge

Hydrograph type	= Reservoir	Peak discharge	= 0.511 cfs
Storm frequency	= 100 yrs	Time to peak	= 816 min
Time interval	= 6 min	Hyd. volume	= 30,102 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 321.38 ft
Reservoir name	= Detention-Basin	Max. Storage	= 12,036 cuft

Storage Indication method used.



Culvert Report

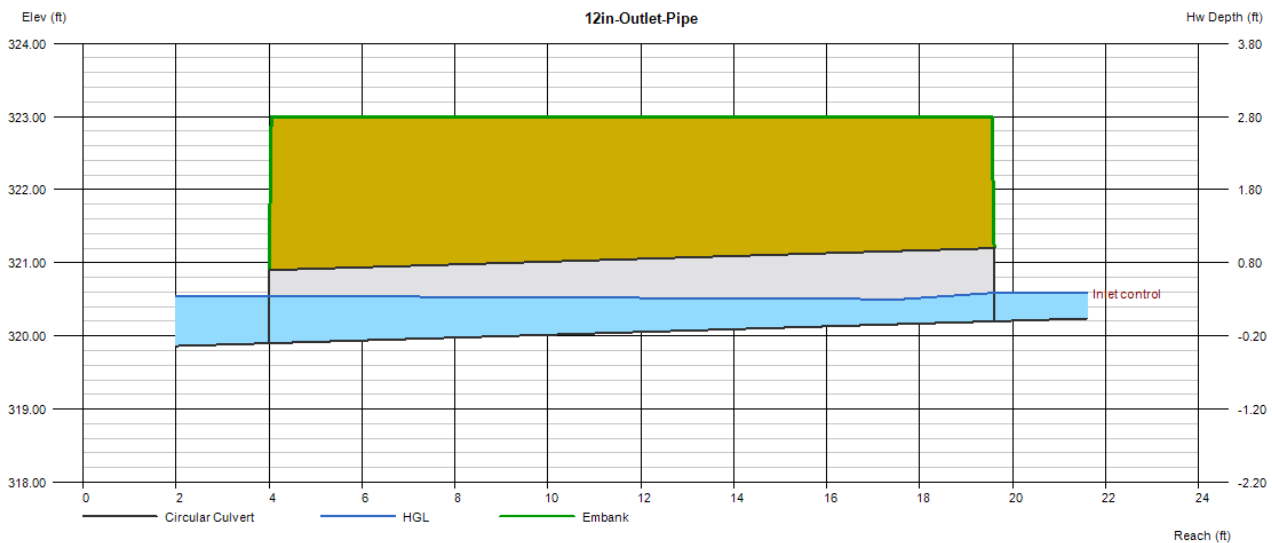
12in-Outlet-Pipe

Invert Elev Dn (ft)	= 319.90
Pipe Length (ft)	= 15.60
Slope (%)	= 1.92
Invert Elev Up (ft)	= 320.20
Rise (in)	= 12.0
Shape	= Circular
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Pipe, Beveled Ring Entrance
Culvert Entrance	= 45D bevels
Coeff. K,M,c,Y,k	= 0.0018, 2.5, 0.03, 0.74, 0.2

Embankment	
Top Elevation (ft)	= 323.00
Top Width (ft)	= 15.50
Crest Width (ft)	= 0.00

Calculations	
Qmin (cfs)	= 0.50
Qmax (cfs)	= 0.50
Tailwater Elev (ft)	= (dc+D)/2

Highlighted	
Qtotal (cfs)	= 0.50
Qpipe (cfs)	= 0.50
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.93
Veloc Up (ft/s)	= 2.58
HGL Dn (ft)	= 320.55
HGL Up (ft)	= 320.50
Hw Elev (ft)	= 320.59
Hw/D (ft)	= 0.39
Flow Regime	= Inlet Control



Culvert Report

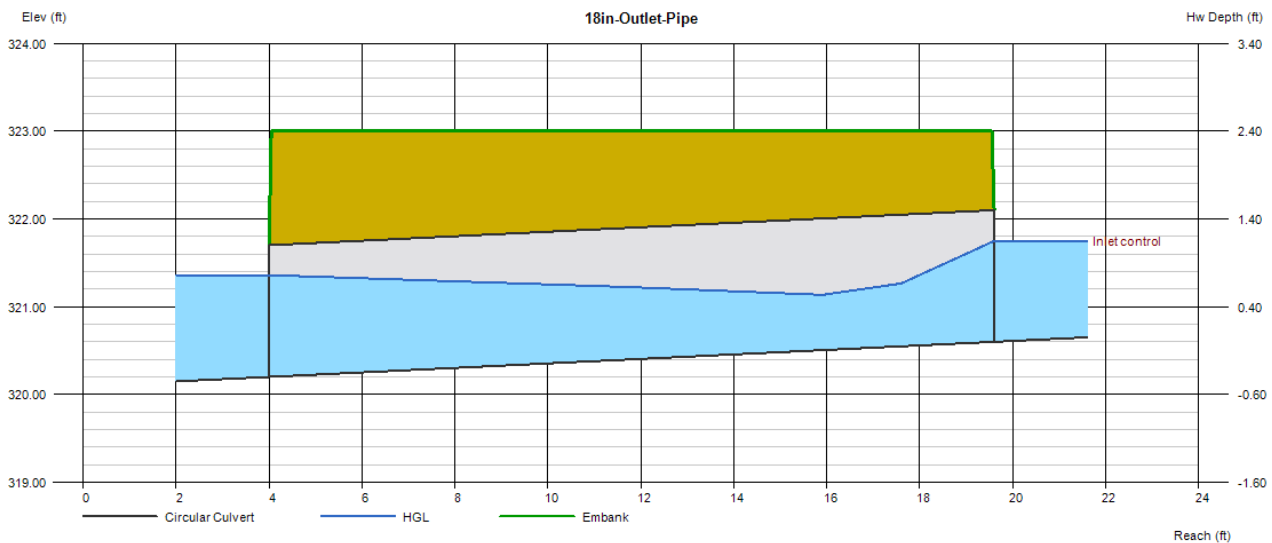
18in-Outlet-Pipe

Invert Elev Dn (ft)	=	320.20
Pipe Length (ft)	=	15.60
Slope (%)	=	2.56
Invert Elev Up (ft)	=	320.60
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Pipe, Beveled Ring Entrance
Culvert Entrance	=	45D bevels
Coeff. K,M,c,Y,k	=	0.0018, 2.5, 0.03, 0.74, 0.2

Embankment	
Top Elevation (ft)	= 323.00
Top Width (ft)	= 15.50
Crest Width (ft)	= 0.00

Calculations	
Qmin (cfs)	= 4.56
Qmax (cfs)	= 4.56
Tailwater Elev (ft)	= (dc+D)/2

Highlighted	
Qtotal (cfs)	= 4.56
Qpipe (cfs)	= 4.56
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 3.11
Veloc Up (ft/s)	= 4.62
HGL Dn (ft)	= 321.36
HGL Up (ft)	= 321.42
Hw Elev (ft)	= 321.75
Hw/D (ft)	= 0.77
Flow Regime	= Inlet Control



Channel Report

Basin-Spillway

Trapezoidal

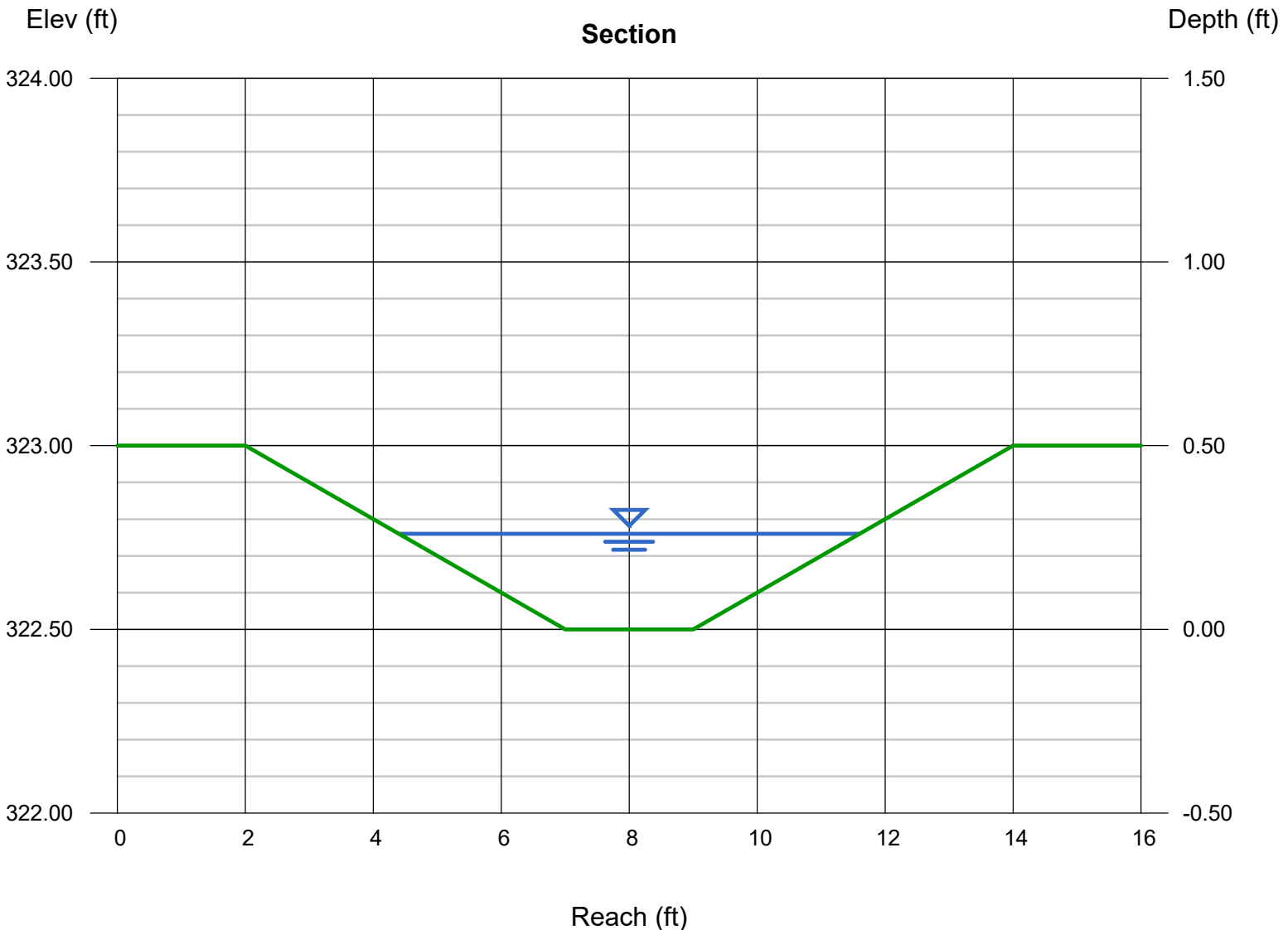
Bottom Width (ft) = 2.00
Side Slopes (z:1) = 10.00, 10.00
Total Depth (ft) = 0.50
Invert Elev (ft) = 322.50
Slope (%) = 5.00
N-Value = 0.025

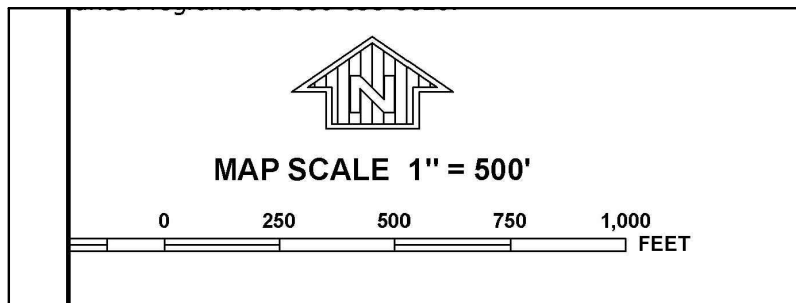
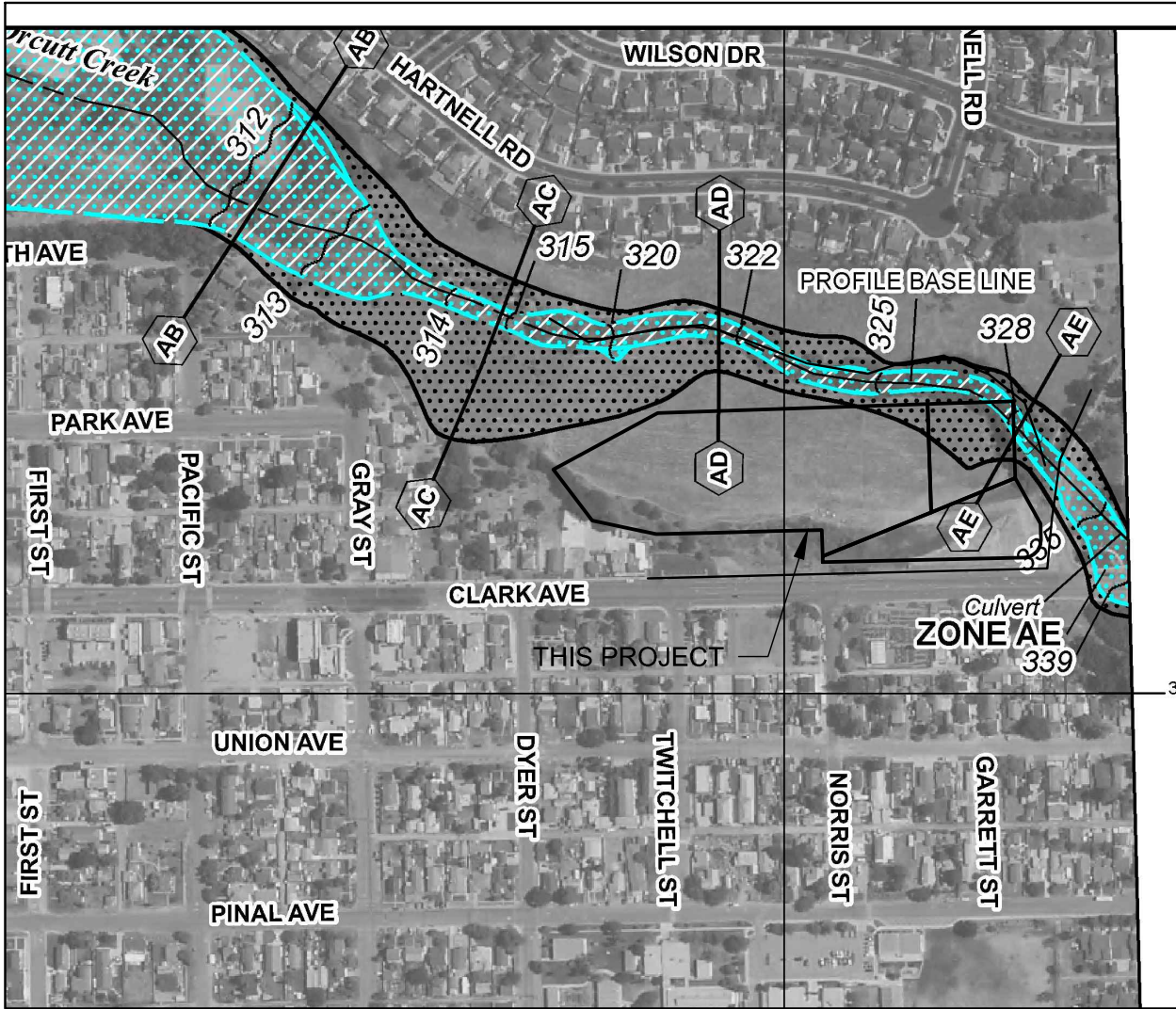
Highlighted

Depth (ft) = 0.26
Q (cfs) = 4.600
Area (sqft) = 1.20
Velocity (ft/s) = 3.85
Wetted Perim (ft) = 7.23
Crit Depth, Yc (ft) = 0.34
Top Width (ft) = 7.20
EGL (ft) = 0.49

Calculations

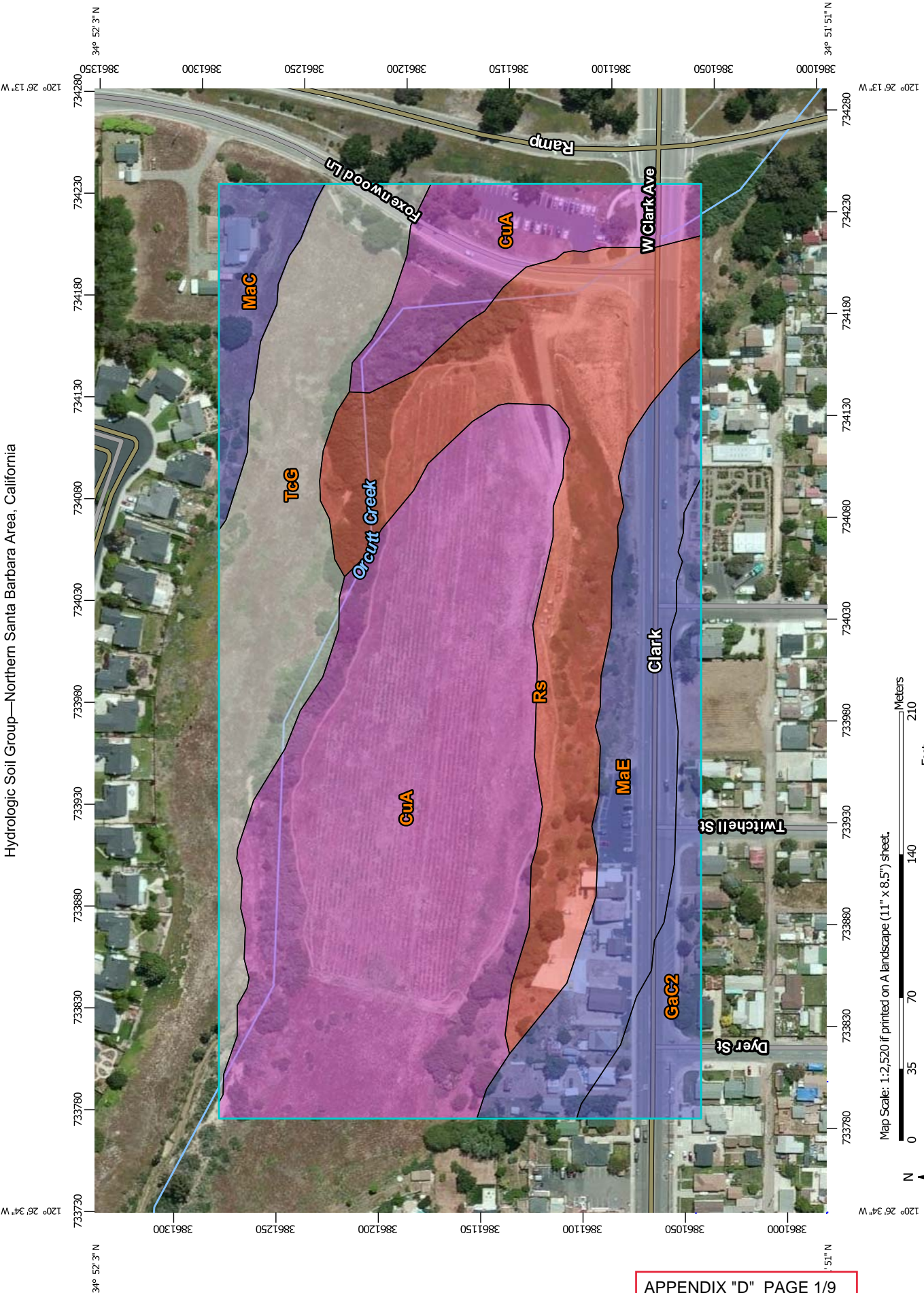
Compute by: Known Q
Known Q (cfs) = 4.60





FIRM EXCERPT

FIGURE 2



APPENDIX "D" PAGE 1/9

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Northern Santa Barbara Area, California (CA672)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CuA	Corralitos loamy sand, 0 to 2 percent slopes	A	11.6	43.4%
GaC2	Garey sandy loam, 2 to 9 percent slopes, eroded	B	1.5	5.7%
MaC	Marina sand, 2 to 9 percent slopes	B	1.0	3.6%
MaE	Marina sand, 9 to 30 percent slopes	B	3.4	12.5%
Rs	Riverwash	D	5.4	20.0%
TcG	Terrace escarpments, sandy		4.0	14.7%
Totals for Area of Interest			26.8	100.0%

May 27, 2016
Project 16-7382



GSI SOILS INC.

524 East Chapel Street
Santa Maria, CA 93454
Tel: (805) 349-0140
Fax: (805) 349-8861

Doug Dougherty
Oasis Center
195 South Broadway
Santa Maria, CA 93455

Subject: Percolation Testing
Oasis Center Meeting Facility
Clark Avenue & Foxenwood Lane
Orcutt, California

Reference: Geotechnical Investigation, Oasis Center Meeting Facility, East Clark Avenue & Foxenwood Lane, Orcutt, California, by GSI Soils Inc. dated May 16, 2016, Project No. 16-7382.

Dear Doug:

As requested, percolation testing has been performed at the above referenced site.

SITE DESCRIPTION:

The property is bounded by East Clark Avenue to the south, Foxenwood Lane to the east, Orcutt Creek to the north and vacant land to the west. The majority of the site is relatively level with an average elevation of approximately 330 feet above mean sea level (MSL). The percolation tests were performed to the west and east of the proposed building. At the time of drilling these areas were covered with native grasses and weeds.

EXPLORATORY SOIL BORING:

Two (2) percolation test holes were drilled in the general areas proposed for storm water runoff disposal. The locations of our percolation borings are shown on the Site Plan, Figure 2. The test holes were presoaked and percolation tests performed in conformance with the requirements of the Santa Barbara County Environmental Health Department. The soil types encountered were classified according to the Unified Soil Classification System. In general, silty sands (SM) and sands (SP) were encountered (see attached boring logs).

PERCOLATION TEST RESULTS:

The results of the percolation tests (final 30 minutes) are presented on the following Table.

Percolation Test Results			
Location	Depth (ft)	Soil Description	Average Percolation Rate
P-1	15	Sand (SP)	3 min/in
P-2	15	Silty Sand (SM)	8 min/in

May 27, 2016

Project 16-7382

Free groundwater was not encountered to a depth of 15 feet below existing grade. As indicated in the reference report, free groundwater was encountered at a depth of 35 feet and is expected to rise to at least 30 feet below existing grades in wet winter years.

SUMMARY

This report has been prepared in accordance with generally accepted practice. No warranties either express or implied are made as to the testing provided in this report.

The percolation test results are based upon the assumption that the soil conditions do not deviate from those disclosed in this study. Should any variations or undesirable conditions be encountered GSI Soils, Inc., will provide supplemental testing as dictated by the field conditions.

As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur. Legislation or the broadening of knowledge may result in changes in applicable standards. Therefore, this report should not be relied upon after a period of one (1) year without our review nor should it be used or is it applicable for any properties other than those studied.

Thank you for the opportunity to have been of service. If you have any questions or require additional assistance, please contact the undersigned at (805) 349-0140.

Sincerely,

GSI SOILS INC.

Rick Armero
Project Manager



Ron Church
GE 2184



Cc Vivek Harris - Architect



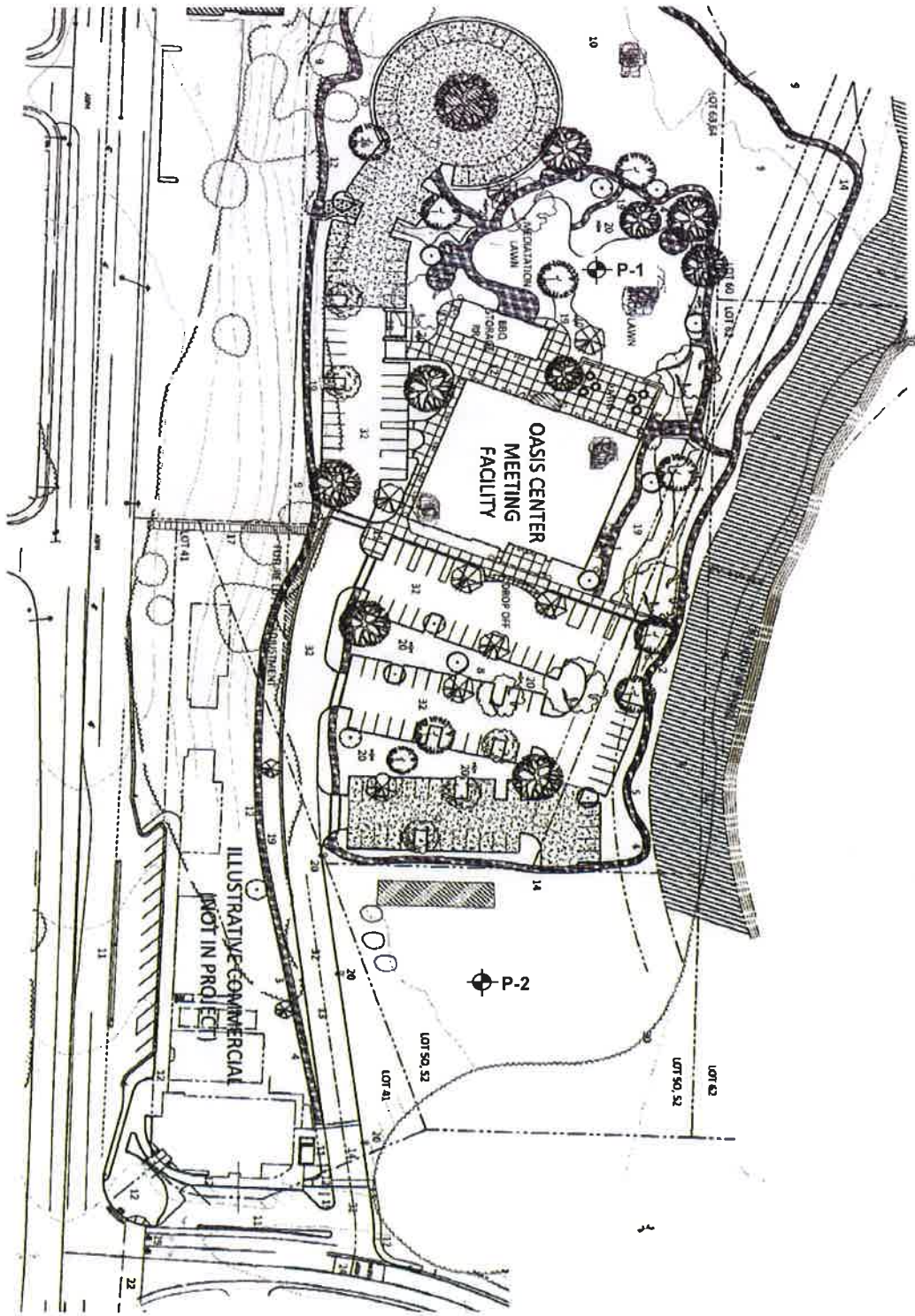
SITE MAP
OASIS CENTER MEETING FACILITY
CLARK AVENUE & FOXENWOOD LANE
ORCUTT, CALIFORNIA


Project No.

Figure No.

16-7382

1




 Boring Location



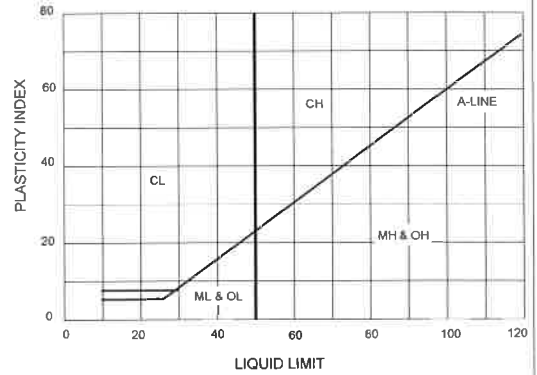
SITE PLAN
OASIS CENTER MEETING FACILITY
CLARK AVENUE & FOXENWOOD LANE
ORCUTT, CALIFORNIA

Project No.	Figure No.
16-7382	2

UNIFIED SOIL CLASSIFICATION SYSTEMS

MAJOR DIVISION		SYMBOLS	TYPICAL NAMES	
COARSE GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES	
		GRAVELS WITH OVER 12% FINES	GP POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES	
			GM SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES	
		GC CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES		
	SANDS Over 50% < #4 sieve	CLEAN SANDS WITH LITTLE OR NO FINES	SW WELL GRADED SANDS, GRAVELLY SANDS	
		SANDS WITH OVER 12% FINES	SP POORLY GRADED SANDS, GRAVELLY SANDS	
			SM SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES	
		SC CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES		
		FINE GRAINED SOILS Over 50% < #200 sieve	SILTS AND CLAYS Liquid limit < 50	ML INORGANIC SILTS, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS
OL ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY				
SILTS AND CLAYS Liquid limit > 50	MH INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS			
	CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS			
OH ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS				
HIGHLY ORGANIC CLAYS	Pt PEAT AND OTHER HIGHLY ORGANIC SOILS			

PLASTICITY CHART USED FOR CLASSIFICATION OF FINE GRAINED SOILS



SOIL GRAIN SIZE

		U.S. STANDARD SIEVE								
		6"	3"	3/4"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL			SAND			SILT	CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE				
150	75	19	4.75	2.0	0.425	0.075	0.002			
SOIL GRAIN SIZE IN MILLIMETERS										

SAMPLE DRIVING RECORD

BLOWS PER FOOT	DESCRIPTION
25	25 BLOWS DROVE SAMPLER 12 INCHES, AFTER INITIAL 6 INCHES OF SEATING
50/7"	50 BLOWS DROVE SAMPLER 7 INCHES, AFTER INITIAL 6 INCHES OF SEATING
Ref/3"	50 BLOWS DROVE SAMPLER 3 INCHES DURING OR AFTER INITIAL 6 INCHES OF SEATING

NOTE: TO AVOID DAMAGE TO SAMPLING TOOLS, DRIVING IS LIMITED TO 50 BLOWS PER 6 INCHES DURING OR AFTER SEATING INTERVAL

KEY TO TEST DATA

B	Bag Sample	CONS	Consolidation (ASTM D2435)
	Drive, No Sample Collected	DS	Cons. Drained Direct Shear (ASTM D3080)
	2 1/2" O.D. Mod. California Sampler, Not Tested	PP	Pocket Penetrometer
	2 1/2" O.D. Mod. California Sampler, Tested	GSD	Grain Size Distribution (ASTM D422)
	Standard Penetration Test	CP	Compaction Test (ASTM D1557)
	Sample Attempted with No Recovery	EI	Expansion Index (ASTM D4829)
	Water Level at Time of Drilling	LL	Liquid Limit (in percent)
	Water Level after Drilling	PI	Plasticity Index

RELATIVE DENSITY

SANDS, GRAVELS, AND NON PLASTIC SILTS	BLOWS/FOOT
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

CLAYS AND PLASTIC SILTS	STRENGTH	BLOWS/FOOT
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32



PROJECT NO.: 16-7382
DATE DRILLED: 5/24/2016

SOIL CLASSIFICATION CHART AND BORING LOG LEGEND

**OASIS CENTER
ORCUTT, CALIFORNIA**

FIGURE NO.
A-1

LOGGED BY: **DG** DRILL RIG: **Simco 2400** BORING NO.: **P-1**

ELEVATION: **330'** BORING DIAMETER (INCH): **5** DATE DRILLED: **24 May 2016**

GROUNDWATER DEPTH (FT):

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
329	1		Silty Sand: dark yellowish brown, dry to slightly moist, fine to medium grained, some clay, loose	SM-SC	B		2.7					
328	2											
327	3											
326	4		slightly moist									
325	5											
324	6											
323	7		Sand: brown, slightly moist, fine to medium grained, some silt, trace clay, medium dense	SP	B							
322	8											
321	9											
320	10		Boring terminated at 15 feet									
319	11											
318	12											
317	13											
316	14											
315	15											
314	16											
313	17											
312	18											
311	19											
310	20											

EXPLORATORY BORING LOGS



**OASIS CENTER MEETING FACILITY
CLARK AVENUE & FOXENWOOD LANE**

PROJECT NO. 16-7382	DATE May-16	FIGURE NO. A-2
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LOGGED BY: **DG** DRILL RIG: **Simco 2400** BORING NO.: **P-2**

ELEVATION: **330'** BORING DIAMETER (INCH): **5** DATE DRILLED: **24 May 2016**

GROUNDWATER DEPTH (FT):

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
329	1		Silty Sand: dark yellowish brown, dry to slightly moist, fine to medium grained, loose	SM-SC								
328	2				B		2.7					
327	3											
326	4											
325	5			slightly moist		B		3.8				
324	6			brown, mostly fine sands, increasing silt								
323	7											
322	8											
321	9					B		4.9				
320	10											
319	11											
318	12											
317	13											
316	14			moist		B		7.1				
315	15			Boring terminated at 15 feet								
314	16											
313	17											
312	18											
311	19											
310	20											

EXPLORATORY BORING LOGS



**OASIS CENTER MEETING FACILITY
CLARK AVENUE & FOXENWOOD LANE**

PROJECT NO. 16-7382	DATE May-16	FIGURE NO. A-3
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