Appendix F-2

Hydrology and Hydraulic Calculations
For Shiloh West Medical Center

Anacal Engineering

January 5, 2024

HYDROLOGY & HYDRAULIC CALCULATIONS

FOR

Shiloh West Medical Center

N.W. Corner of Palmdale Rd and Mesa Linda Avenue, Victorville, CA 92392
APN 3103-561-20

Prepared for:

Martinez + Okamoto Architects
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Prepared by:

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REGISTERED PROFESSIONAL ENGINEER
DAVID C. QUEYREL
No. 42812
Exp. 03/31/24
CIVIL
STATE OF CALIFORNIA

1-5-24

David C. Queyrel R.C.E. 42812 Date

TABLE OF CONTENTS

	Page No.
Introduction	2
Watershed Description	2
Methodology	2
Preliminary WQMP	3
Conclusion/Summary	3
Vicinity Map	4-5
Web Soil Survey	6-8
Point Precipitation Frequency	9
Hydrology	10– 19
Pond Analysis-10 yr Phase 1	20 –50
Pond Analysis-10 yr Phase 2	51 –80
Pond Analysis-100 yr Phase 1	81 –122
Pond Analysis-100 yr Phase 2	123-164

Exhibit A- **Existing Drainage Area Map**

Exhibit B- **Proposed Hydrology Map**

Exhibit C- **Victorville Master Drainage Plan**

Exhibit D- **FEMA Flood Map**

Introduction:

The purpose of this report is to provide an adequate drainage study based on the San Bernardino County and City of Victorville design criteria. The report is prepared for Shiloh Medical Center, Inc. for the development of a 2.90ac site. The development is to be phased into 2 phases with each involving the construction of buildings, sidewalks, parking and drive aisles along with landscaping planters. Each phase will consist or concrete gutters, catch basins, and an underground detention/infiltration system for storm water mitigation. The site is accessible through Palmdale Road.

The site is deemed as a "Priority Project" and will require a fully executed WQMP during the plan check process. The City of Victorville requires the preparation and implementation of post construction best management practices and low impact development methods to meet the county of San Bernardino Water Quality Management requirements and to maintain existing drainage patterns and to existing or proposed drainage facilities designed for the project area. The report is to compare pre and post development to determine requirements for the mitigation of the post construction condition. The 10 year 24 hour storm will be used to size storm water retention basin requirements for the difference between the pre and post condition.

Watershed & Site Discussion:

The property is located in an partially developed area of Victorville consisting of a few commercial properties nearby. To the north and east of the site lies undeveloped parcels while to the west lies a commercial plaza. To the far south lies a residential development. The site is part of the Mojave River Watershed.
The Victorville Master Plan of drainage for Victorville that is tributary to the Mojave River by Williams & Schmidt indicates that the subject site is located in drainage area tributary to planned drain E-01 which runs north from Palmdale Ave and drains to the Mojave River. No other Master Plan Strom Drains are planned adjacent to our site.
Currently, the site is relatively flat, having slopes ranging between 0-5% with cover being described as Barren with a HSG rating of A. The site sheet flows in a northern direction at a slope of 1.5% and drains in a natural direction along dirt channels until it reaches the Mojave River.

Methodology:

This report is to provide a run-off study to show effects of development on existing drainage facilities using design storm of 10 year and 100 year frequency. The report considers the 10 year 24 hr storms to evaluate the delta volume of runoff for hydromodification purposes and the 100 year 1 hour storm using rational peak proposed runoff to mitigate impact on drainage at release. With the use of underground infiltration chambers, the site will mitigate the 10 yr 24 hr storm

wile storing the addition runoff produced from the 100 yr 1 hr storm in such that the outflow from the proposed construction is less than the existing Q.

Preliminary WQMP

See the preliminary WQMP for post construction BMPs that will contain the difference between the existing 10 year 24hr storm and the proposed 10 year 24 hour storm along with the County Mojave River WQMP DCV which ever is greater. Underground Infiltration chambers are utilized to promote infiltration. Each of the 2 phases will have its own infiltration trench to capture the 10 yr 24hr strom. Additional storage has been provided to capture the 10yr 1-hr storm with outlets towards the north portion of the site via headwalls for overflow.

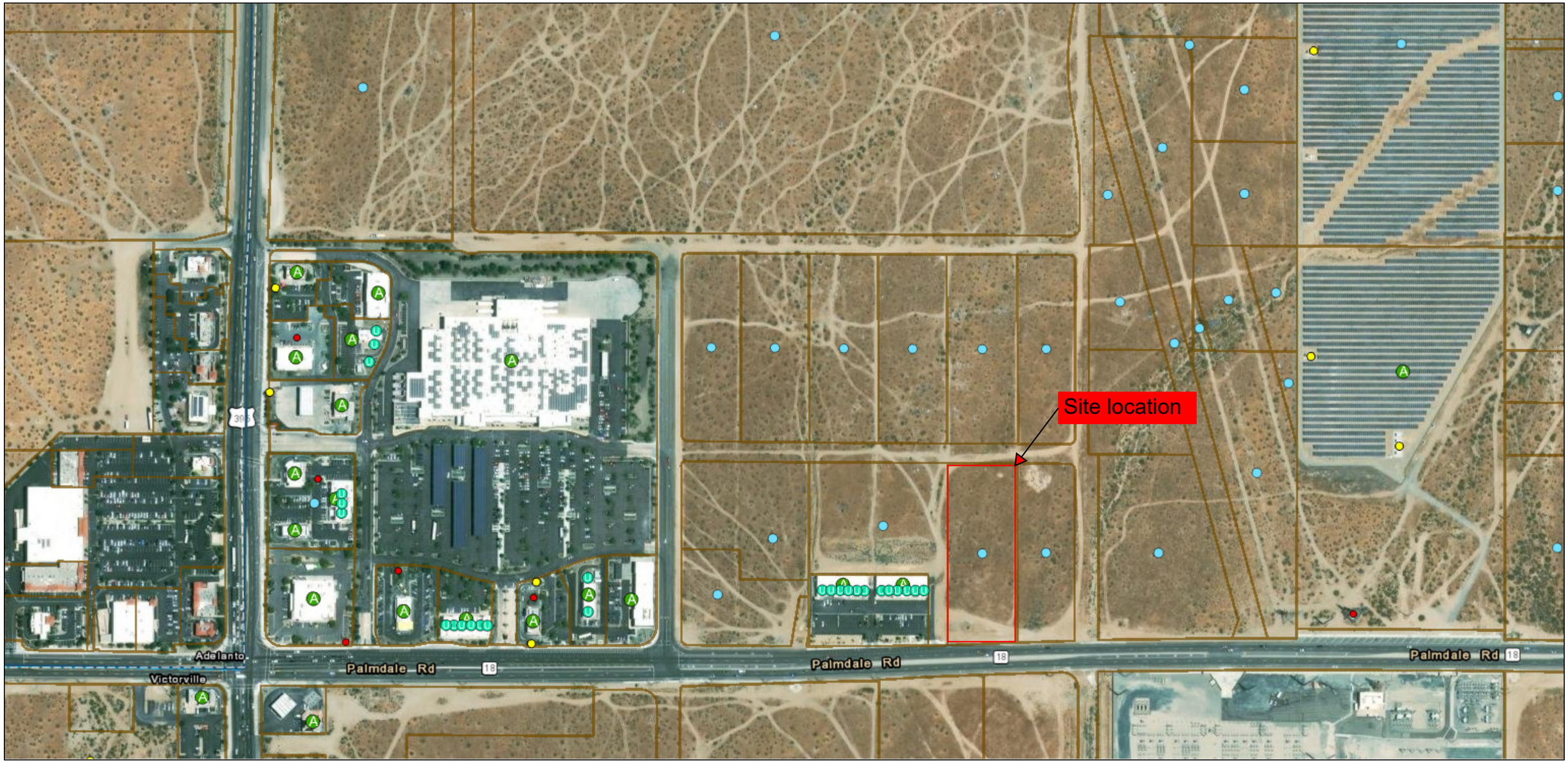
Summary/Conclusion:

The report was made to analyze the impact of the proposed development and maintain existing drainage patterns. The proposed 10-year pre and post 24 hr. runoff hydrograph is analyzed using PondPac software and using NOAA Atlas point precipitation data for the storm requirements. The 100 year peak runoff from the developed site is matched to the Rational Method peak runoff results. The data is then ran through a detention basins with the help of the routing software PondPac with the starting elevation set at DCV levels to ensure DCV capture prior to the peak flow mitigation. With those parameters set, the system has an added outlet which is expressed through the proposed curb drain. The values of the out-flows found during the peak storms are shown below. See PondPac computer analysis herein.
In conclusion, the site shows the water generated by the peak storms will not adversely affect the proposed structures as our peak migrated flow is significantly less than the existing condition with the help of the detention/infiltration chamber systems.

	Existing Peak Flow	**Developed Peak Flow**	**Mitigated Peak Flow**
Q_{10}	3.1 cfs	6.1 cfs	0.0 cfs page 10.09 of Pond Analysis
Q_{100}	5.5 cfs	9.3 cfs	3.55cfs page 10.09 of Pond Analysis

Overflow from higher storms are to outlet along the north portion of the site via headwall with rip rap. See detail on site plan.

Vicinity Map



1/5/2024, 10:45:43 AM

1:4,514

0 0.05 0.1 0.2 mi

0 0.075 0.15 0.3 km

COV Address Point

- Building
- Unit
- Parcel or Lot
- Power Pedestal
- Temporary Address
- Temporary Power Pole
- Other
- Victorville City Boundary
- Victorville Sphere of Influence
- County Boundary
- Medical Facilities
- Houses of Worship
- Education Facilities
- Recycling Facilities

City of Victorville Facilities

- Building 999
- City Facility Storage Yard
- Corporate Yard East (CYE)
- Industrial Waste Water Treatment Plant
- Public Works Yard (PW Yard)
- Records Center
- Southern California Logistics Airport (SCLA)
- Transportation Center
- Victorville City Hall
- Victorville Municipal Utility Services (VMUS)
- Victorville Water District Warehouse I
- Victorville Water District Warehouse II
- Fire Stations
- Police Stations
- Golf Courses
- Recreation Centers
- City Library
- City Museums

Esri, HERE, Garmin, (c) OpenStreetMap contributors
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

ArcGIS Web AppBuilder

Maxar | Esri, HERE, iPC | Published by the City of Victorville Administrative Services Department, Technology Division GIS Services. The Technology Division GIS Services can be reached at gis@victorvilleca.gov | Esri, HERE, Garmin, iPC |

The National Map Advanced Viewer

12/29/2023, 8:53:29 AM

Override 1

1:9,028

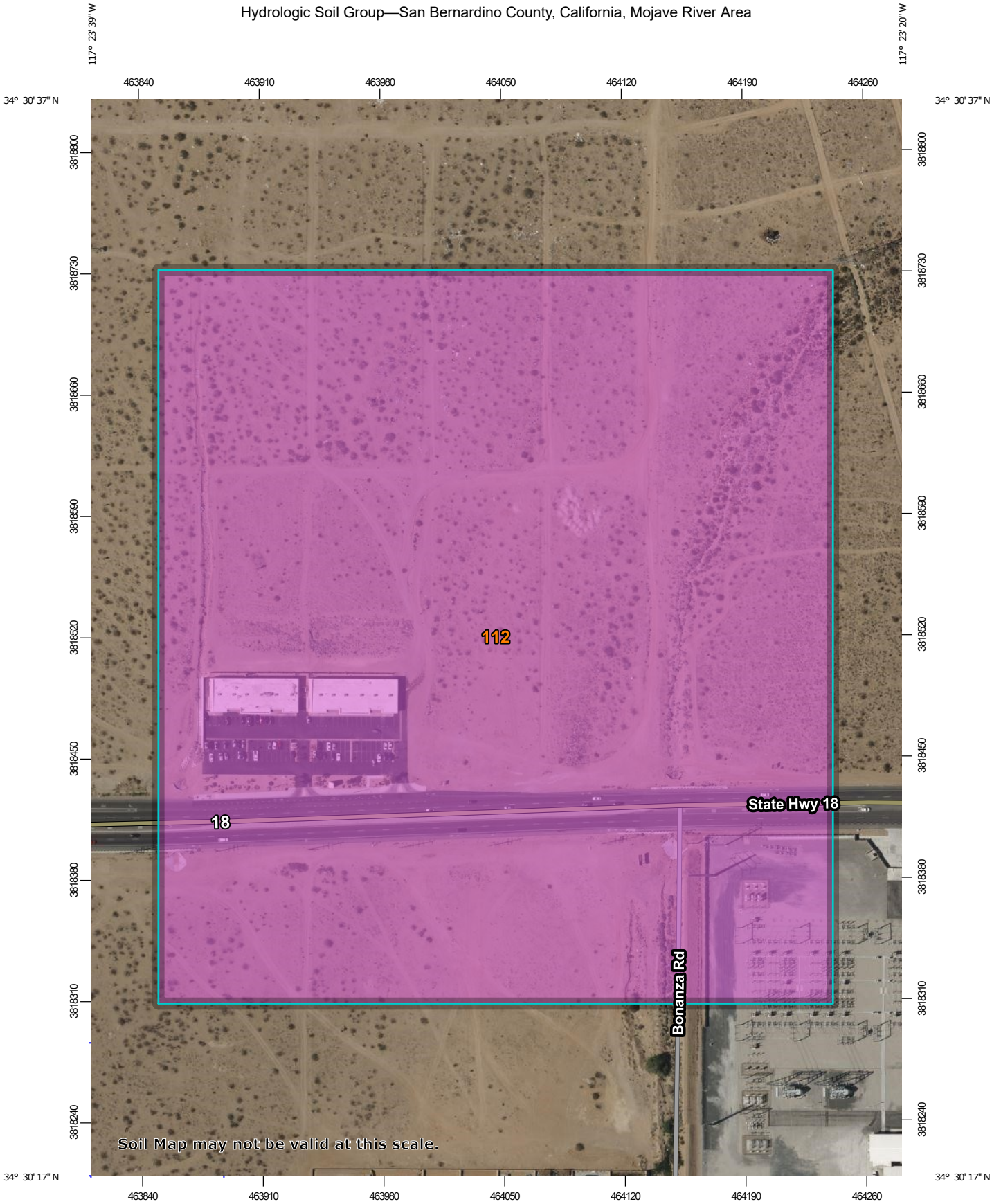
0 0.07 0.15 0.3 mi

0 0.13 0.25 0.5 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data;

USGS
2021 USGS

Hydrologic Soil Group—San Bernardino County, California, Mojave River Area



Map Scale: 1:3,030 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 14, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	41.1	100.0%
Totals for Area of Interest			**41.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.5071°, Longitude: -117.3965°
Elevation: 3124.23 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.080 (0.066-0.098)	0.114 (0.094-0.140)	0.160 (0.131-0.196)	0.197 (0.161-0.244)	0.249 (0.197-0.319)	0.290 (0.224-0.378)	0.331 (0.250-0.443)	0.375 (0.275-0.516)	0.434 (0.306-0.623)	0.481 (0.327-0.714)
10-min	0.114 (0.095-0.140)	0.163 (0.135-0.200)	0.229 (0.188-0.281)	0.283 (0.231-0.350)	0.357 (0.282-0.457)	0.415 (0.321-0.542)	0.475 (0.358-0.635)	0.537 (0.394-0.739)	0.622 (0.438-0.893)	0.689 (0.469-1.02)
15-min	0.138 (0.114-0.169)	0.198 (0.163-0.242)	0.277 (0.228-0.340)	0.342 (0.279-0.423)	0.432 (0.341-0.552)	0.502 (0.388-0.656)	0.574 (0.433-0.768)	0.649 (0.477-0.894)	0.753 (0.530-1.08)	0.833 (0.567-1.24)
30-min	0.203 (0.167-0.248)	0.289 (0.239-0.354)	0.405 (0.333-0.497)	0.500 (0.408-0.619)	0.632 (0.499-0.809)	0.735 (0.568-0.960)	0.841 (0.634-1.13)	0.951 (0.698-1.31)	1.10 (0.776-1.58)	1.22 (0.830-1.81)
60-min	0.264 (0.218-0.322)	0.377 (0.311-0.461)	0.527 (0.434-0.647)	0.651 (0.532-0.806)	0.823 (0.650-1.05)	0.956 (0.740-1.25)	1.09 (0.826-1.46)	1.24 (0.908-1.70)	1.43 (1.01-2.06)	1.59 (1.08-2.36)
2-hr	0.369 (0.305-0.451)	0.500 (0.413-0.612)	0.679 (0.559-0.834)	0.831 (0.678-1.03)	1.05 (0.826-1.34)	1.22 (0.942-1.59)	1.40 (1.06-1.87)	1.59 (1.17-2.19)	1.85 (1.31-2.66)	2.07 (1.41-3.07)
3-hr	0.458 (0.378-0.560)	0.611 (0.504-0.748)	0.823 (0.677-1.01)	1.00 (0.820-1.24)	1.26 (0.997-1.62)	1.47 (1.14-1.92)	1.70 (1.28-2.27)	1.93 (1.42-2.66)	2.27 (1.60-3.26)	2.54 (1.73-3.77)
6-hr	0.623 (0.514-0.761)	0.824 (0.680-1.01)	1.11 (0.911-1.36)	1.35 (1.10-1.67)	1.71 (1.35-2.18)	2.00 (1.54-2.61)	2.31 (1.74-3.09)	2.65 (1.94-3.64)	3.13 (2.21-4.49)	3.53 (2.40-5.24)
12-hr	0.776 (0.641-0.949)	1.06 (0.877-1.30)	1.47 (1.21-1.80)	1.81 (1.48-2.24)	2.31 (1.83-2.96)	2.73 (2.11-3.56)	3.17 (2.39-4.24)	3.64 (2.68-5.02)	4.33 (3.05-6.22)	4.90 (3.33-7.28)
24-hr	1.05 (0.929-1.21)	1.49 (1.32-1.72)	2.11 (1.87-2.44)	2.64 (2.32-3.08)	3.41 (2.89-4.11)	4.04 (3.35-4.96)	4.70 (3.81-5.93)	5.43 (4.28-7.03)	6.47 (4.89-8.74)	7.33 (5.35-10.2)
2-day	1.13 (1.00-1.30)	1.61 (1.43-1.86)	2.29 (2.02-2.64)	2.87 (2.51-3.34)	3.71 (3.15-4.47)	4.40 (3.65-5.41)	5.14 (4.17-6.48)	5.95 (4.69-7.71)	7.12 (5.38-9.61)	8.09 (5.91-11.3)
3-day	1.21 (1.07-1.39)	1.72 (1.52-1.98)	2.44 (2.15-2.81)	3.05 (2.68-3.56)	3.95 (3.35-4.76)	4.69 (3.89-5.76)	5.48 (4.44-6.90)	6.35 (5.00-8.22)	7.60 (5.75-10.3)	8.65 (6.32-12.1)
4-day	1.30 (1.15-1.49)	1.84 (1.63-2.12)	2.60 (2.30-3.01)	3.26 (2.86-3.80)	4.21 (3.57-5.07)	5.00 (4.15-6.14)	5.84 (4.73-7.36)	6.76 (5.32-8.75)	8.09 (6.12-10.9)	9.20 (6.72-12.9)
7-day	1.39 (1.24-1.60)	1.96 (1.74-2.26)	2.77 (2.44-3.20)	3.46 (3.03-4.03)	4.45 (3.77-5.36)	5.27 (4.37-6.47)	6.13 (4.97-7.72)	7.07 (5.57-9.15)	8.41 (6.36-11.4)	9.52 (6.95-13.3)
10-day	1.48 (1.31-1.71)	2.08 (1.84-2.40)	2.92 (2.58-3.38)	3.65 (3.20-4.25)	4.70 (3.98-5.66)	5.55 (4.60-6.82)	6.45 (5.22-8.12)	7.42 (5.84-9.61)	8.81 (6.66-11.9)	9.94 (7.26-13.9)
20-day	1.76 (1.56-2.02)	2.47 (2.19-2.85)	3.48 (3.07-4.02)	4.35 (3.81-5.07)	5.61 (4.75-6.75)	6.63 (5.51-8.15)	7.72 (6.25-9.73)	8.89 (7.00-11.5)	10.5 (7.96-14.2)	11.9 (8.66-16.6)
30-day	2.03 (1.80-2.34)	2.84 (2.52-3.27)	4.00 (3.53-4.62)	5.01 (4.39-5.84)	6.48 (5.49-7.80)	7.67 (6.37-9.44)	8.94 (7.24-11.3)	10.3 (8.11-13.3)	12.2 (9.23-16.5)	13.7 (10.0-19.2)
45-day	2.37 (2.10-2.73)	3.30 (2.92-3.80)	4.62 (4.08-5.34)	5.79 (5.07-6.75)	7.51 (6.36-9.04)	8.92 (7.40-11.0)	10.4 (8.43-13.1)	12.0 (9.46-15.6)	14.3 (10.8-19.3)	16.1 (11.7-22.5)
60-day	2.65 (2.35-3.05)	3.64 (3.23-4.20)	5.09 (4.50-5.88)	6.37 (5.58-7.42)	8.26 (7.00-9.95)	9.83 (8.16-12.1)	11.5 (9.32-14.5)	13.3 (10.5-17.2)	15.8 (12.0-21.3)	17.8 (13.0-24.9)

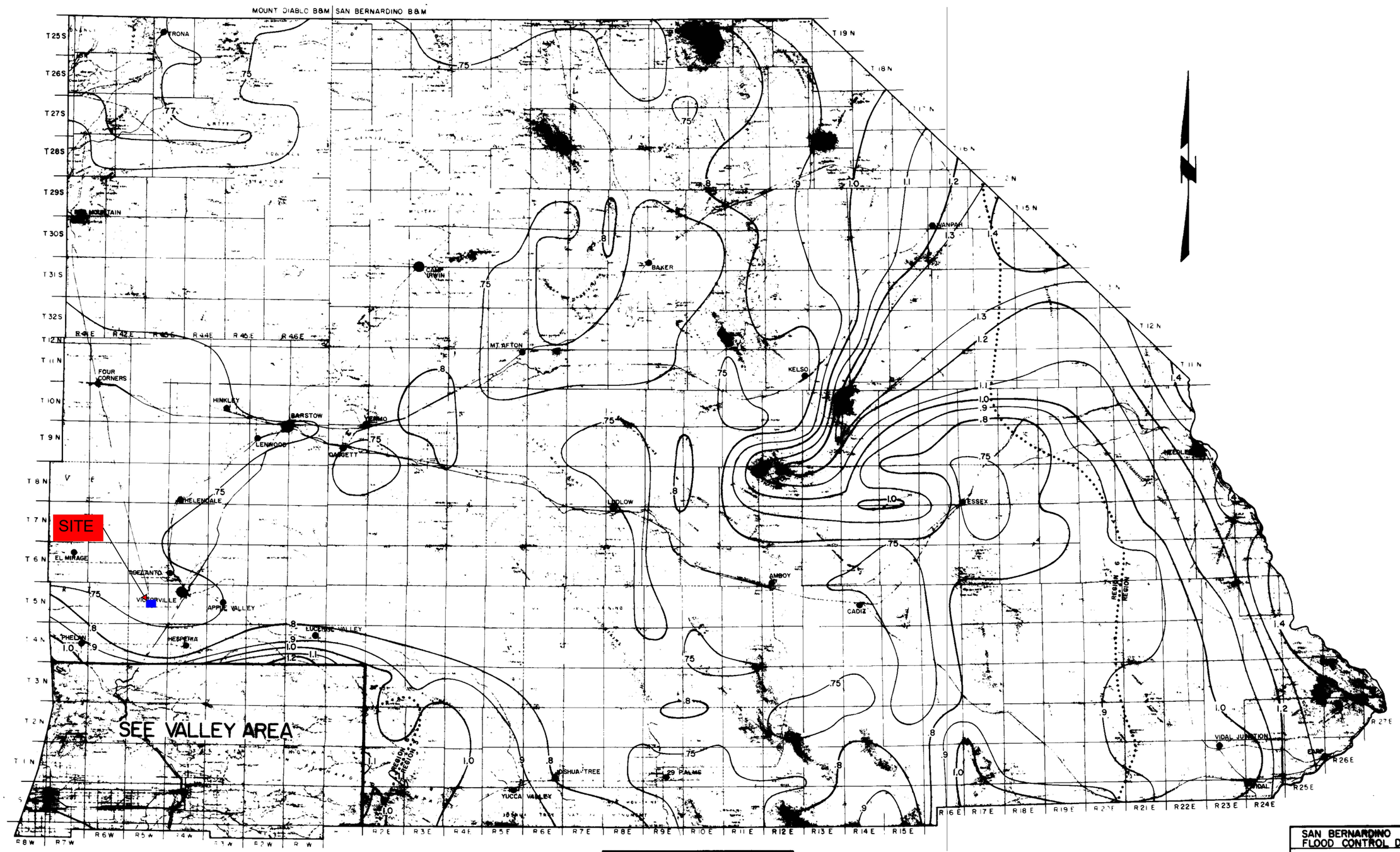
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



REDUCED DRAWING

0 1 2 3

3 INCHES ON ORIGINAL

LEGEND:

3.5 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

DESERT AREA

ISOHYETALS

Y_{10} - 10 YEAR 1 HOUR

BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY

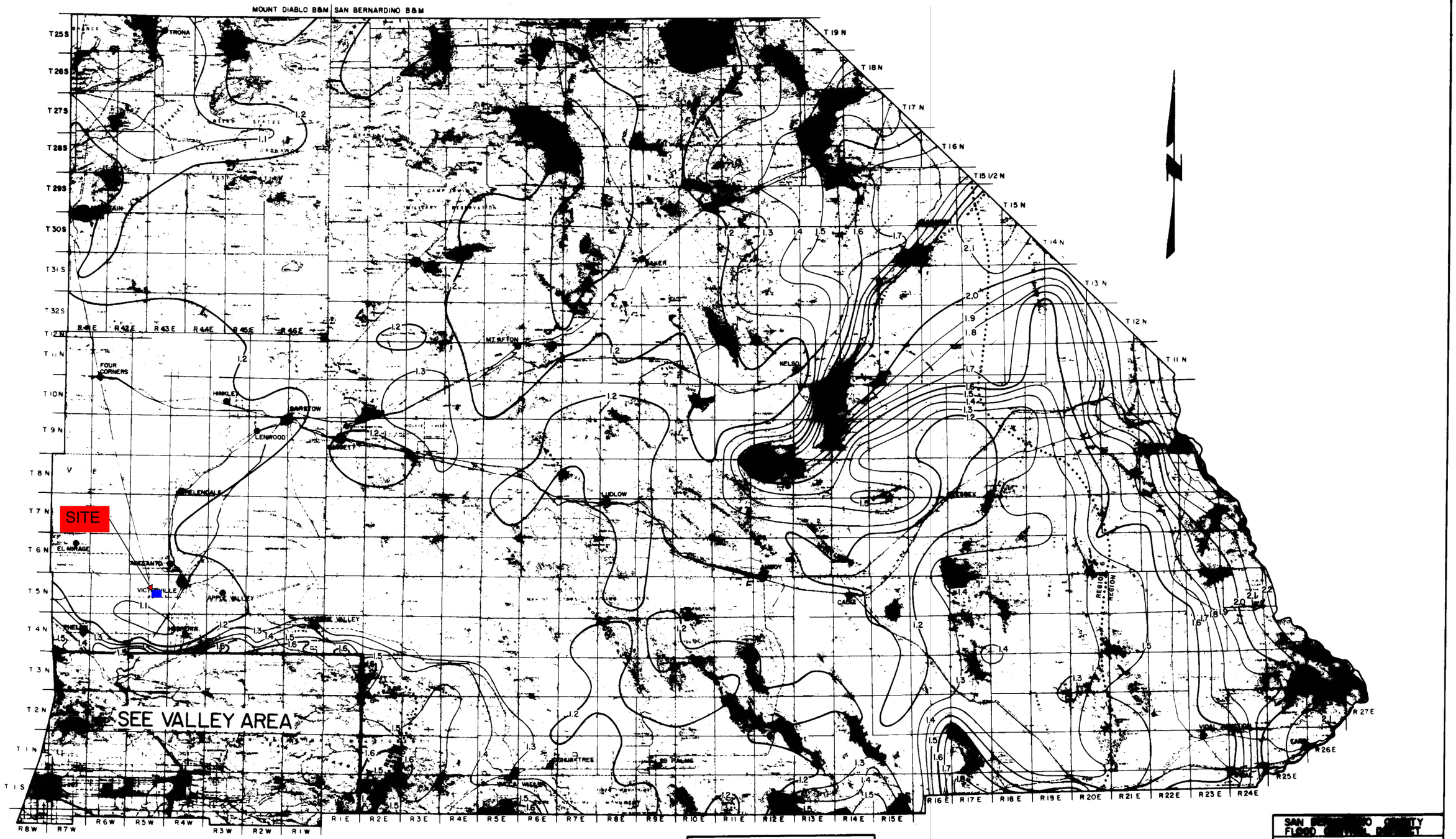
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1" = 6 MI.	WRD-1	9 of 12

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

FIGURE B-9



REDUCED DRAWING

0 1 2 3

3 INCHES ON ORIGINAL

LEGEND:

1.2 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

DESERT AREA

ISOHYETALS

Y_{100}-100 YEAR 1 HOUR

BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY

DATE 1982

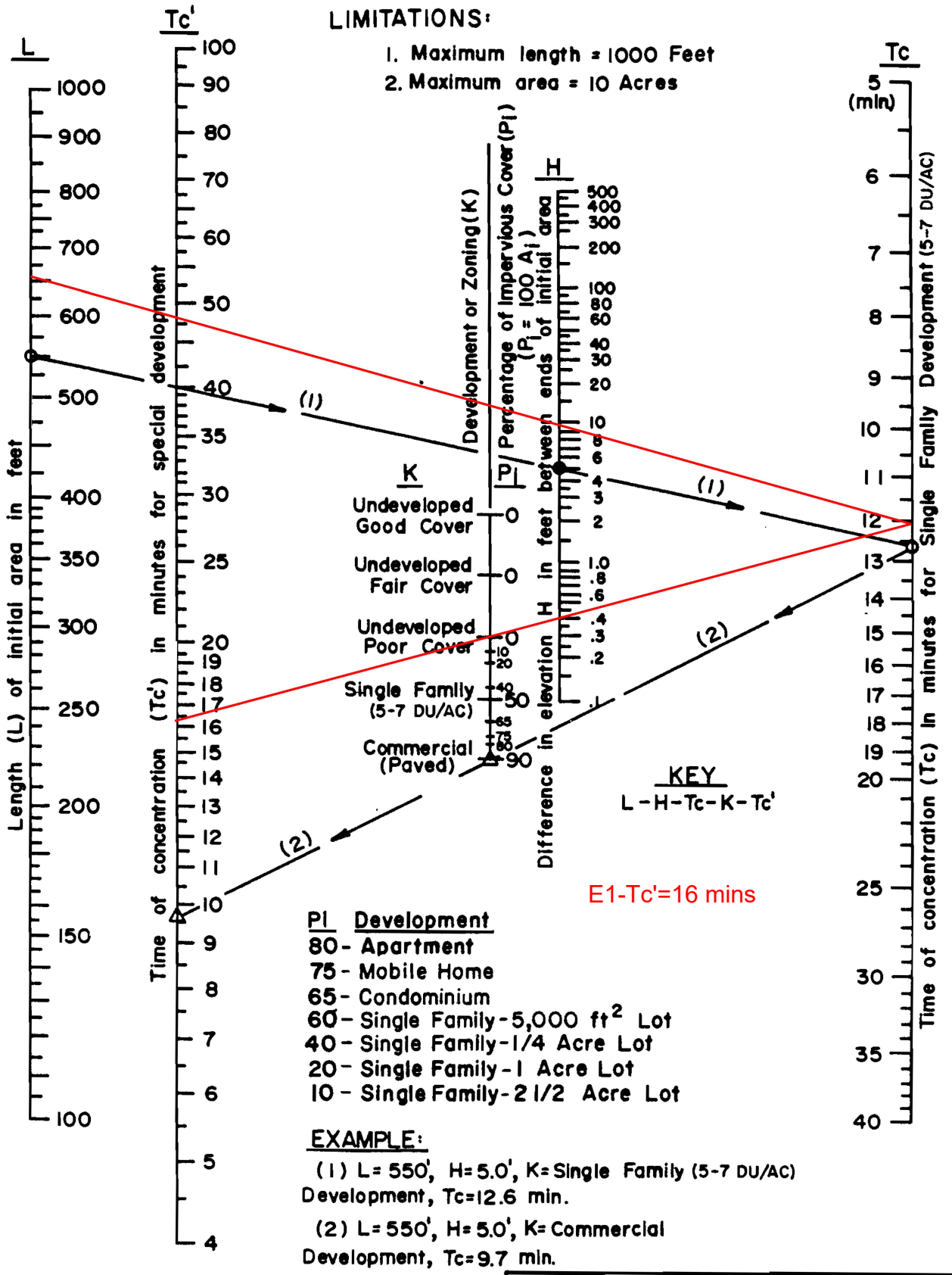
SCALE

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

FIGURE B-10

Existing Condition

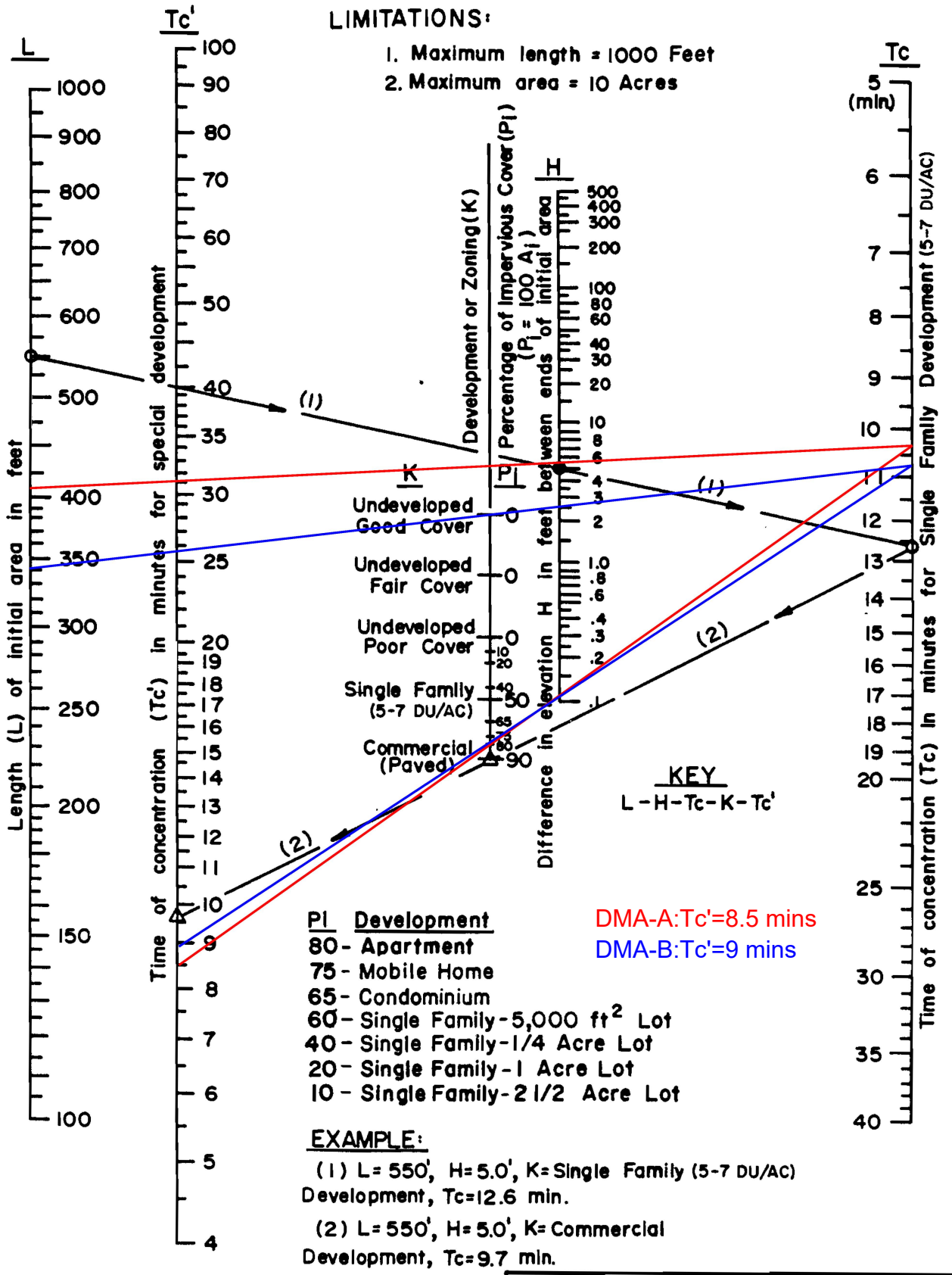


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

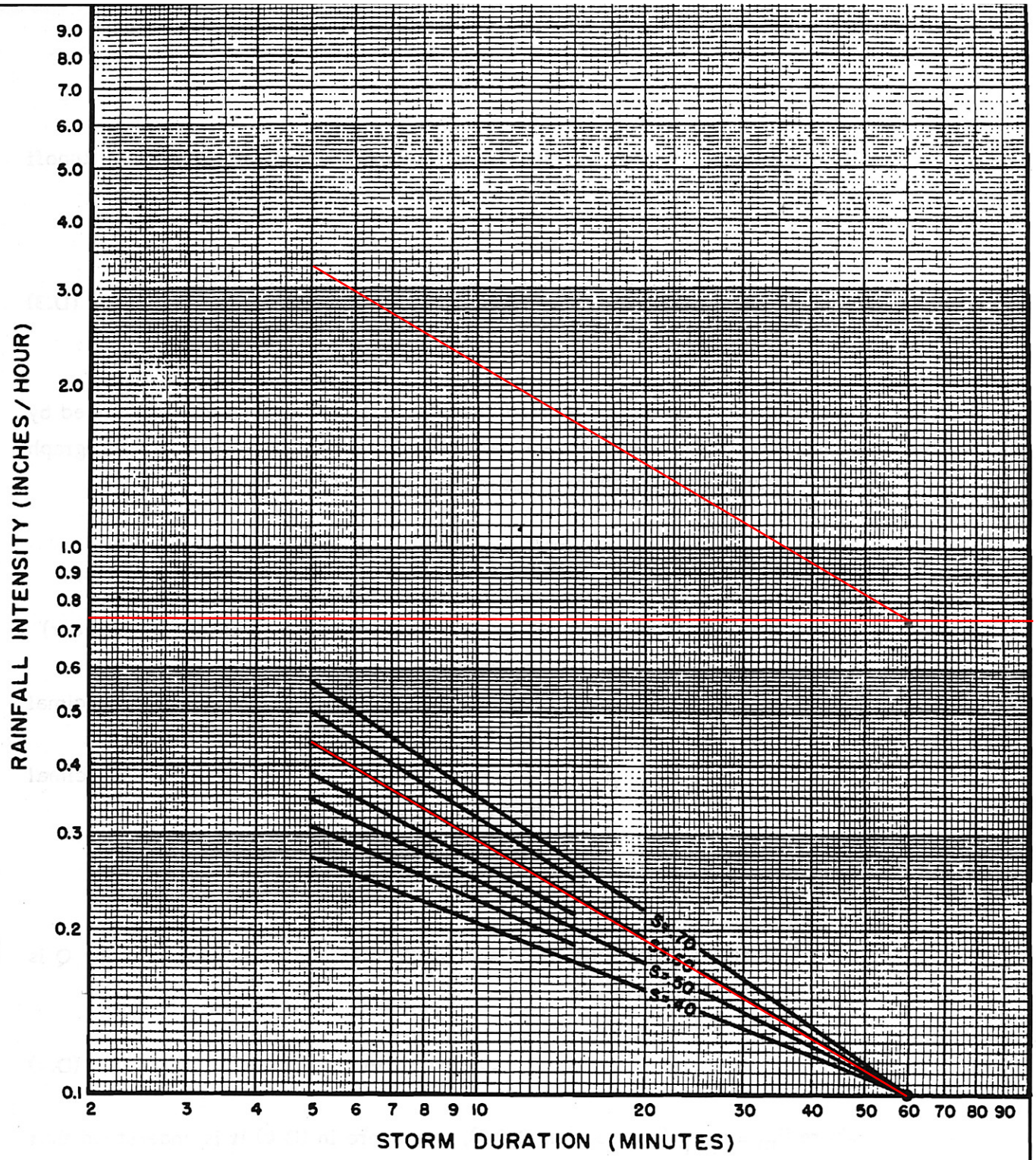
Proposed Condition



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1



DESIGN STORM FREQUENCY = 10 YEARS

ONE HOUR POINT RAINFALL = 0.74 INCHES

LOG-LOG SLOPE = 0.60

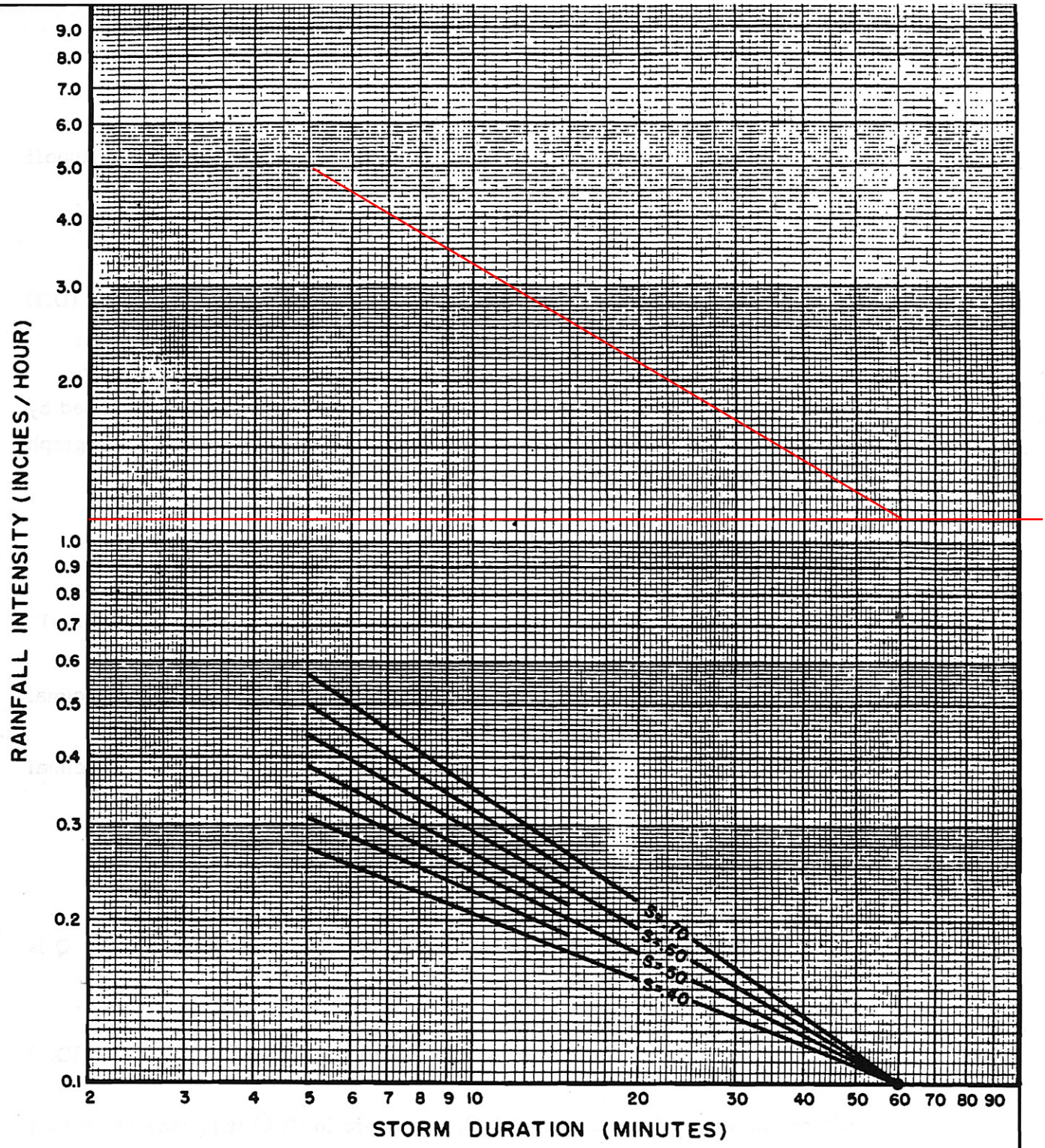
PROJECT LOCATION = Victorville

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.1 INCHES

LOG-LOG SLOPE = 0.60

PROJECT LOCATION = Victorville

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

SAN BERNARDINO CO
HYDROLOGY MANUAL

STUDY NAME: **Shiloh West Medical-Existing**

10 - YEAR STORM RATIONAL METHOD STUDY

Calculated by: D.C.Q. Date 2/10/2021

Checked by: D.C.Q. Date 2/10/2021

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	F_m in/hr	F_m avg.	Q total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
E1	**2.90**	**2.90**	**A**	UND		**16.0**	**1.60**	**0.41**	**0.41**	**3.1**	657	0.015		INITIAL AREA
														3.1 CFS to NW corner of site

SAN BERNARDINO CO
HYDROLOGY MANUAL

STUDY NAME: **Shiloh West Medical-Existing**

100 - YEAR STORM RATIONAL METHOD STUDY

Calculated by: J.M. Date 1/23/2023

Checked by: D.C.Q. Date 1/23/2023

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	F_m in/hr	F_m avg.	Q total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
E1	**2.90**	**2.90**	**A**	UND		**16.0**	**2.50**	**0.41**	**0.41**	**5.5**	657	0.015		INITIAL AREA
														5.5 CFS to NW corner of site

SAN BERNARDINO CO
HYDROLOGY MANUAL

STUDY NAME: **Shiloh West Medical-Proposed**

10 - YEAR STORM RATIONAL METHOD STUDY

Calculated by: J.M. Date 1/23/2023

Checked by: D.C.Q. Date 1/23/2023

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	F_m in/hr	F_m avg.	Q total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
A1	**1.57**	**1.57**	**A**	Mixed Com.		**8.5**	**2.40**	**0.01**	**0.01**	**3.4**	417	0.013		INITIAL AREA
														3.4 CFS to underground Chambers
A2	**1.33**	**1.33**	**A**	Mixed Com.		**9.0**	**2.30**	**0.02**	**0.02**	**2.7**	342	0.0075		INITIAL AREA
														2.7 CFS to underground Chambers

SAN BERNARDINO CO
HYDROLOGY MANUAL

STUDY NAME: **Shiloh West Medical-Proposed**

100 - YEAR STORM RATIONAL METHOD STUDY

Calculated by: J.M. Date 1/23/2023

Checked by: D.C.Q. Date 1/23/2023

Concentration Point	Area (Acres) Subarea	Area (Acres) Total	Soil Type	Dev. Type	T_t min.	T_c min.	I in/hr	F_m in/hr	F_m avg.	Q total	Flow Path Length ft.	Slope ft./ft.	V ft./sec.	Hydraulics and Notes
A1	**1.57**	**1.57**	**A**	UND		**8.5**	**3.60**	**0.01**	**0.01**	**5.1**	417	0.013		INITIAL AREA
														5.1 CFS to underground Chambers
A2	**1.33**	**1.33**	**A**	Mixed Com.		**9.0**	**3.50**	**0.02**	**0.02**	**4.2**	342	0.0075		INITIAL AREA
														4.2 CFS to underground Chambers

Pond Analysis

Proposed 10 yr-A1

Shilo West Medical Center
Site: Palmdale & Mesa Linda Rd.

JOB TITLE

Project Date: 1/24/2023
Project Engineer: DAVID C. QUEYREL
Project Title: Shiloh West Medical
Project Comments:
ANALYSIS USING 24 HOUR 10YR HYDROGRAPH WITH PEAK RUNOFF ADDED PER
1 HOUR 100 YR RATIONAL METHOD PER SAN BERNARDINO HYDROLOGY
HYDROGRAPGH TO DETERMINE DETENTION OF PEAK STORM RUNOFF BELOW
EXISTING AMOUNT.

********** WARNING MSG **********

WARNING..... WARNING MESSAGES 1.01

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 2.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... A1
Executive Summary (Nodes) 3.01
Executive Summary (Links) 3.02
Network Calcs Sequence 3.03

********** RUNOFF HYDROGRAPHS **********

AREA-A..... A1
Read HYG 4.01

********** HYG ADDITION **********

POINT B-4..... A1
Node: Addition Summary 5.01

********** TIME VS.ELEV **********

POND 10..... A1
Time-Elev 6.01

********** TIME VS.VOL **********

POND 10..... A1
Time vs. Volume 7.01

********** POND VOLUMES **********

POND 10..... Vol: Elev-Volume 8.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 9.01
Individual Outlet Curves 9.04
Composite Rating Curve 9.08

********** POND ROUTING **********

POND 10..... Pond Infiltration Calcs 10.01
Pond E-V-Q Table 10.03

POND 10 IN A1
Node: Pond Inflow Summary 10.06

POND 10 INF A1
Pond Infiltration HYG 10.08

POND 10 OUT A1
Pond Routing Summary 10.09
Detention Time 10.10
Pond Routing Calcs (Total Out) 10.11
Pond Routed HYG (total out) 10.15

ROUTE 10..... A1
Diverted Hydrograph 10.16

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
AREA-A		HYG	A1	.276	L	16.5000	2.06		
*POINT B-4		JCT	A1	.000		.2000	.00		
POND 10	IN	POND	A1	.274	L	16.4000	1.92		
POND 10	OUT	POND	A1	.000		.2000	.00	104.06	.031

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	AREA-A		HYG	.276	L	16.5000	2.06	
Outfall	POINT B-4		JCT	.000		.2000	.00	
	POND 10	IN	POND	.274	L	16.4000	1.92	
	POND 10	OUT	POND	.000		.2000	.00	104.06

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADDLINK 20	ADD	UN	.276	L	16.5000	2.06	AREA-A	
		DL	.276	L	16.5000	2.06		
		DN	.274	L	16.4000	1.92	POND 10	IN
ROUTE 10	PONDrt	UN	.274	L	16.4000	1.92	POND 10	IN
ROUTE 10			.000		.2000	.00	POND 10	OUT
		DL	.000		.2000	.00		
		DN	.000		.2000	.00	POINT B-4	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGAREA-A	HYG Qin AREA-A	Add Hyd AREA-A

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd ADDLINK 20	HYG Qin AREA-A			Pond	POND 10	IN
POND ROUTE INFILTRATION AND TOTAL OUTFLOW...						
Infiltration	Pond	POND 10	IN	Infilt.	POND 10	INF
Total Pond Outflow	Pond	POND 10	IN	Outflow	POND 10	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 10	Outflow	POND 10	OUT	Jct	POINT B-4	

HYG file =
HYG ID = HYG-10YR
HYG Tag = A1

Peak Discharge =	2.06	cfs
Time to Peak =	16.5000	hrs
HYG Volume =	.276	ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2500 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.02	.05	.05	.05	.05
1.2500	.05	.05	.05	.05	.05
2.5000	.05	.06	.06	.06	.06
3.7500	.06	.06	.06	.06	.06
5.0000	.06	.06	.06	.06	.07
6.2500	.07	.07	.07	.07	.07
7.5000	.07	.07	.07	.08	.08
8.7500	.08	.08	.08	.08	.09
10.0000	.09	.09	.09	.10	.10
11.2500	.10	.11	.11	.11	.12
12.5000	.12	.12	.13	.13	.14
13.7500	.15	.16	.17	.19	.20
15.0000	.23	.26	.29	.33	.56
16.2500	1.70	2.06	.40	.23	.18
17.5000	.16	.14	.13	.12	.11
18.7500	.10	.10	.09	.09	.08
20.0000	.08	.08	.07	.04	.07
21.2500	.07	.06	.06	.06	.06
22.5000	.06	.06	.06	.05	.05
23.7500	.05	.00			

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
102.35	.000
102.85	.009
103.35	.018
103.85	.027
104.35	.036
104.85	.045
105.35	.055
105.50	.057
107.50	.058

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 102.35 ft
Increment = .10 ft
Max. Elev.= 107.50 ft

```
**********************************************
                OUTLET CONNECTIVITY
**********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	CO	--->	TW	106.330	107.500
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CO
Structure Type    = Culvert-Circular
-----------------------------------
No. Barrels       =         1
Barrel Diameter   =     .6600 ft
Upstream Invert   =    106.33 ft
Dnstream Invert   =    104.70 ft
Horiz. Length     =    325.00 ft
Barrel Length     =    325.00 ft
Barrel Slope      =    .00502 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .054423  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0610
Inlet Control M   =     .7500
Inlet Control c   =    .04230
Inlet Control Y   =     .8200
T1 ratio (HW/D)   =      .000
T2 ratio (HW/D)   =     1.494
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    106.33 ft  --->  Flow =       .97 cfs
At T2 Elev =    107.32 ft  --->  Flow =      1.11 cfs
```

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .01 cfs
Max. Q tolerance = .01 cfs

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (8.0000 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
102.35	.0000	.00
102.45	.0022	.02
102.55	.0087	.07
102.65	.0197	.16
102.75	.0349	.28
102.85	.0546	.44
102.95	.0640	.52
103.05	.0742	.60
103.15	.0851	.69
103.25	.0968	.78
103.35	.1092	.88
103.45	.1192	.96
103.55	.1297	1.05
103.65	.1406	1.13
103.75	.1520	1.23
103.85	.1638	1.32
103.95	.1740	1.40
104.05	.1846	1.49
104.15	.1955	1.58
104.25	.2068	1.67
104.35	.2183	1.76
104.45	.2287	1.85
104.55	.2394	1.93
104.65	.2503	2.02
104.75	.2614	2.11
104.85	.2728	2.20
104.95	.2833	2.29
105.05	.2940	2.37
105.15	.3049	2.46
105.25	.3160	2.55
105.35	.3273	2.64
105.45	.3631	2.93
105.55	.3831	3.09
105.65	.3857	3.11
105.75	.3884	3.13
105.85	.3911	3.15
105.95	.3937	3.18
106.05	.3964	3.20
106.15	.3991	3.22
106.25	.4018	3.24
106.33	.4040	3.26
106.35	.4045	3.26

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (8.0000 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
106.45	.4073	3.29
106.55	.4100	3.31
106.65	.4127	3.33
106.75	.4155	3.35
106.85	.4182	3.37
106.95	.4210	3.40
107.05	.4238	3.42
107.15	.4266	3.44
107.25	.4294	3.46
107.35	.4322	3.49
107.45	.4350	3.51
107.50	.4364	3.52

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
102.35	.00	.000	.0000	.00	.00	.00
102.45	.00	.002	.0022	.02	.02	.24
102.55	.00	.004	.0087	.07	.07	.51
102.65	.00	.005	.0197	.16	.16	.82
102.75	.00	.007	.0349	.28	.28	1.16
102.85	.00	.009	.0546	.44	.44	1.54
102.95	.00	.011	.0640	.52	.52	1.84
103.05	.00	.013	.0742	.60	.60	2.14
103.15	.00	.015	.0851	.69	.69	2.45
103.25	.00	.016	.0968	.78	.78	2.76
103.35	.00	.018	.1092	.88	.88	3.08
103.45	.00	.020	.1192	.96	.96	3.38
103.55	.00	.022	.1297	1.05	1.05	3.69
103.65	.00	.024	.1406	1.13	1.13	4.00
103.75	.00	.025	.1520	1.23	1.23	4.31
103.85	.00	.027	.1638	1.32	1.32	4.62
103.95	.00	.029	.1740	1.40	1.40	4.93
104.05	.00	.031	.1846	1.49	1.49	5.23
104.15	.00	.033	.1955	1.58	1.58	5.54
104.25	.00	.035	.2068	1.67	1.67	5.85

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
104.35	.00	.036	.2183	1.76	1.76	6.16
104.45	.00	.038	.2287	1.85	1.85	6.47
104.55	.00	.040	.2394	1.93	1.93	6.77
104.65	.00	.042	.2503	2.02	2.02	7.08
104.75	.00	.044	.2614	2.11	2.11	7.39
104.85	.00	.045	.2728	2.20	2.20	7.70
104.95	.00	.047	.2833	2.29	2.29	8.01
105.05	.00	.049	.2940	2.37	2.37	8.31
105.15	.00	.051	.3049	2.46	2.46	8.62
105.25	.00	.053	.3160	2.55	2.55	8.93
105.35	.00	.055	.3273	2.64	2.64	9.24
105.45	.00	.056	.3631	2.93	2.93	9.75
105.55	.00	.057	.3831	3.09	3.09	10.02
105.65	.00	.057	.3857	3.11	3.11	10.05
105.75	.00	.057	.3884	3.13	3.13	10.07
105.85	.00	.057	.3911	3.15	3.15	10.10
105.95	.00	.057	.3937	3.18	3.18	10.12
106.05	.00	.057	.3964	3.20	3.20	10.14
106.15	.00	.057	.3991	3.22	3.22	10.17
106.25	.00	.057	.4018	3.24	3.24	10.19

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
106.33	.00	.057	.4040	3.26	3.26	10.21
106.35	.00	.057	.4045	3.26	3.26	10.22
106.45	.03	.057	.4073	3.29	3.31	10.27
106.55	.10	.058	.4100	3.31	3.41	10.37
106.65	.21	.058	.4127	3.33	3.54	10.50
106.75	.34	.058	.4155	3.35	3.69	10.66
106.85	.50	.058	.4182	3.37	3.87	10.84
106.95	.66	.058	.4210	3.40	4.06	11.03
107.05	.83	.058	.4238	3.42	4.25	11.22
107.15	.91	.058	.4266	3.44	4.35	11.32
107.25	.92	.058	.4294	3.46	4.38	11.36
107.35	.93	.058	.4322	3.49	4.41	11.39
107.45	.94	.058	.4350	3.51	4.45	11.43
107.50	.95	.058	.4364	3.52	4.47	11.45

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POND 10 IN

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Adding in hydrograph that is truncated on left...				
WARNING: Missed peak when adding hydrograph...				
ADDLINK 20	AREA-A		HYG-10YR	A1

INFLOWS TO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	HYG-10YR	A1	.276	16.5000	2.06

TOTAL FLOW INTO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POND 10 IN	A1	.274	16.4000	1.92

TOTAL NODE INFLOW...
HYG file =
HYG ID = POND 10 IN
HYG Tag = A1

Peak Discharge = 1.92 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .274 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.02	.04	.05	.05	.05
1.0000	.05	.05	.05	.05	.05
2.0000	.05	.05	.05	.05	.06
3.0000	.06	.06	.06	.06	.06
4.0000	.06	.06	.06	.06	.06
5.0000	.06	.06	.06	.06	.06
6.0000	.07	.07	.07	.07	.07
7.0000	.07	.07	.07	.07	.07
8.0000	.07	.08	.08	.08	.08
9.0000	.08	.08	.08	.09	.09
10.0000	.09	.09	.09	.10	.10
11.0000	.10	.10	.10	.11	.11
12.0000	.11	.12	.12	.12	.12
13.0000	.13	.13	.14	.15	.15
14.0000	.16	.17	.18	.19	.21
15.0000	.23	.25	.28	.30	.37
16.0000	.56	1.47	1.92	1.40	.37
17.0000	.23	.19	.17	.15	.14
18.0000	.13	.12	.11	.11	.10
19.0000	.10	.09	.09	.09	.08
20.0000	.08	.08	.07	.06	.04
21.0000	.07	.07	.06	.06	.06
22.0000	.06	.06	.06	.06	.06
23.0000	.06	.05	.05	.05	.04
24.0000	.00				

```
HYG file =
HYG ID   = POND 10      INF
HYG Tag  = A1
-----------------------------------
Peak Discharge =         1.50 cfs
Time to Peak   =      16.6000 hrs
HYG Volume     =         .274 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.01	.02	.03
1.0000	.04	.04	.05	.05	.05
2.0000	.05	.05	.05	.05	.05
3.0000	.05	.06	.06	.06	.06
4.0000	.06	.06	.06	.06	.06
5.0000	.06	.06	.06	.06	.06
6.0000	.06	.06	.07	.07	.07
7.0000	.07	.07	.07	.07	.07
8.0000	.07	.07	.08	.08	.08
9.0000	.08	.08	.08	.08	.09
10.0000	.09	.09	.09	.09	.09
11.0000	.10	.10	.10	.10	.11
12.0000	.11	.11	.12	.12	.12
13.0000	.12	.13	.13	.14	.14
14.0000	.15	.16	.17	.18	.20
15.0000	.21	.23	.26	.28	.33
16.0000	.44	.76	1.30	1.50	1.15
17.0000	.66	.40	.23	.18	.16
18.0000	.14	.13	.12	.11	.11
19.0000	.10	.10	.09	.09	.09
20.0000	.08	.08	.08	.07	.06
21.0000	.06	.06	.06	.06	.06
22.0000	.06	.06	.06	.06	.06
23.0000	.06	.06	.06	.05	.05
24.0000	.04	.02	.02	.01	.01
25.0000	.01	.01	.01	.01	.01
26.0000	.00	.00	.00	.00	

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A1
Outflow HYG file = NONE STORED - POND 10      OUT A1

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   8.0000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   102.35 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      1.92 cfs    at   16.4000 hrs
Peak Outflow      =       .00 cfs    at     .2000 hrs
Peak Infiltration =      1.50 cfs    at   16.6000 hrs
-----------------------------------------------------
Peak Elevation    =    104.06 ft
Peak Storage =           .031 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =        .274
- Infiltration =        .274
- HYG Vol OUT  =        .000
- Retained Vol =        .000
                   ----------
Unrouted Vol =        .000 ac-ft  (.000% of Inflow Volume)


WARNING: Inflow hydrograph truncated on left side.
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A1
Outflow HYG file = NONE STORED - POND 10      OUT A1

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   8.0000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------

Weighted Avg. Plug Time =     .4378 hrs
Max.Plug Vol. Plug Time =     .2345 hrs
Max.Inflow Plug Volume  =      .028 ac-ft   (From 16.2000 to 16.4000 hrs)
--------------------------------------
```

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
.0000	.02	.00	.00	.00	.00	.000	102.35
.2000	.04	.05	.06	.00	.00	.000	102.37
.4000	.05	.12	.14	.01	.00	.001	102.41
.6000	.05	.19	.22	.02	.00	.002	102.44
.8000	.05	.23	.29	.03	.00	.002	102.47
1.0000	.05	.26	.33	.04	.00	.002	102.48
1.2000	.05	.28	.36	.04	.00	.003	102.50
1.4000	.05	.29	.38	.05	.00	.003	102.50
1.6000	.05	.30	.39	.05	.00	.003	102.51
1.8000	.05	.30	.40	.05	.00	.003	102.51
2.0000	.05	.31	.41	.05	.00	.003	102.51
2.2000	.05	.31	.41	.05	.00	.003	102.51
2.4000	.05	.31	.42	.05	.00	.003	102.52
2.6000	.05	.32	.42	.05	.00	.003	102.52
2.8000	.06	.32	.43	.05	.00	.003	102.52
3.0000	.06	.32	.43	.05	.00	.003	102.52
3.2000	.06	.32	.43	.06	.00	.003	102.52
3.4000	.06	.32	.44	.06	.00	.003	102.52
3.6000	.06	.33	.44	.06	.00	.003	102.52
3.8000	.06	.33	.44	.06	.00	.003	102.52
4.0000	.06	.33	.44	.06	.00	.003	102.53
4.2000	.06	.33	.45	.06	.00	.003	102.53
4.4000	.06	.33	.45	.06	.00	.003	102.53
4.6000	.06	.33	.45	.06	.00	.003	102.53
4.8000	.06	.33	.45	.06	.00	.003	102.53
5.0000	.06	.34	.46	.06	.00	.003	102.53
5.2000	.06	.34	.46	.06	.00	.003	102.53
5.4000	.06	.34	.47	.06	.00	.003	102.53
5.6000	.06	.35	.47	.06	.00	.003	102.54
5.8000	.06	.35	.47	.06	.00	.003	102.54
6.0000	.07	.35	.48	.06	.00	.003	102.54
6.2000	.07	.35	.48	.06	.00	.003	102.54
6.4000	.07	.35	.48	.07	.00	.003	102.54
6.6000	.07	.36	.49	.07	.00	.003	102.54
6.8000	.07	.36	.49	.07	.00	.004	102.54
7.0000	.07	.36	.50	.07	.00	.004	102.54
7.2000	.07	.36	.50	.07	.00	.004	102.55
7.4000	.07	.37	.51	.07	.00	.004	102.55
7.6000	.07	.37	.51	.07	.00	.004	102.55
7.8000	.07	.37	.52	.07	.00	.004	102.55
8.0000	.07	.37	.52	.07	.00	.004	102.55
8.2000	.08	.38	.52	.07	.00	.004	102.55

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
8.4000	.08	.38	.53	.08	.00	.004	102.56
8.6000	.08	.38	.53	.08	.00	.004	102.56
8.8000	.08	.38	.54	.08	.00	.004	102.56
9.0000	.08	.38	.54	.08	.00	.004	102.56
9.2000	.08	.39	.55	.08	.00	.004	102.56
9.4000	.08	.39	.55	.08	.00	.004	102.56
9.6000	.09	.39	.56	.08	.00	.004	102.56
9.8000	.09	.39	.56	.09	.00	.004	102.57
10.0000	.09	.39	.57	.09	.00	.004	102.57
10.2000	.09	.40	.57	.09	.00	.004	102.57
10.4000	.09	.40	.58	.09	.00	.004	102.57
10.6000	.10	.40	.59	.09	.00	.004	102.58
10.8000	.10	.41	.60	.09	.00	.004	102.58
11.0000	.10	.41	.60	.10	.00	.004	102.58
11.2000	.10	.41	.61	.10	.00	.004	102.58
11.4000	.10	.42	.62	.10	.00	.004	102.59
11.6000	.11	.42	.63	.10	.00	.004	102.59
11.8000	.11	.42	.64	.11	.00	.004	102.59
12.0000	.11	.43	.65	.11	.00	.004	102.59
12.2000	.12	.43	.66	.11	.00	.005	102.60
12.4000	.12	.44	.67	.12	.00	.005	102.60
12.6000	.12	.44	.68	.12	.00	.005	102.61
12.8000	.12	.45	.69	.12	.00	.005	102.61
13.0000	.13	.45	.70	.12	.00	.005	102.61
13.2000	.13	.46	.71	.13	.00	.005	102.62
13.4000	.14	.46	.73	.13	.00	.005	102.62
13.6000	.15	.47	.75	.14	.00	.005	102.63
13.8000	.15	.48	.77	.14	.00	.005	102.63
14.0000	.16	.49	.79	.15	.00	.005	102.64
14.2000	.17	.50	.82	.16	.00	.005	102.65
14.4000	.18	.51	.85	.17	.00	.006	102.66
14.6000	.19	.52	.89	.18	.00	.006	102.67
14.8000	.21	.53	.92	.20	.00	.006	102.68
15.0000	.23	.54	.97	.21	.00	.006	102.69
15.2000	.25	.56	1.02	.23	.00	.007	102.71
15.4000	.28	.58	1.09	.26	.00	.007	102.73
15.6000	.30	.60	1.16	.28	.00	.007	102.75
15.8000	.37	.62	1.28	.33	.00	.008	102.78
16.0000	.56	.67	1.55	.44	.00	.009	102.85
16.2000	1.47	1.17	2.70	.76	.00	.016	103.23
16.4000	1.92	1.96	4.56	1.30	.00	.027	103.83
16.6000	1.40	2.27	5.27	1.50	.00	.031	104.06

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
16.8000	.37	1.74	4.03	1.15	.00	.024	103.66
17.0000	.23	1.03	2.34	.66	.00	.014	103.11
17.2000	.19	.65	1.45	.40	.00	.009	102.83
17.4000	.17	.56	1.01	.23	.00	.006	102.71
17.6000	.15	.52	.88	.18	.00	.006	102.67
17.8000	.14	.50	.81	.16	.00	.005	102.65
18.0000	.13	.48	.76	.14	.00	.005	102.63
18.2000	.12	.46	.73	.13	.00	.005	102.62
18.4000	.11	.45	.69	.12	.00	.005	102.61
18.6000	.11	.44	.67	.11	.00	.005	102.60
18.8000	.10	.43	.64	.11	.00	.004	102.59
19.0000	.10	.42	.62	.10	.00	.004	102.59
19.2000	.09	.41	.61	.10	.00	.004	102.58
19.4000	.09	.40	.59	.09	.00	.004	102.58
19.6000	.09	.40	.58	.09	.00	.004	102.57
19.8000	.08	.39	.57	.09	.00	.004	102.57
20.0000	.08	.39	.56	.08	.00	.004	102.56
20.2000	.08	.38	.54	.08	.00	.004	102.56
20.4000	.07	.38	.54	.08	.00	.004	102.56
20.6000	.06	.37	.51	.07	.00	.004	102.55
20.8000	.04	.35	.48	.06	.00	.003	102.54
21.0000	.07	.34	.46	.06	.00	.003	102.53
21.2000	.07	.35	.47	.06	.00	.003	102.54
21.4000	.06	.35	.48	.06	.00	.003	102.54
21.6000	.06	.35	.48	.06	.00	.003	102.54
21.8000	.06	.35	.48	.06	.00	.003	102.54
22.0000	.06	.35	.47	.06	.00	.003	102.54
22.2000	.06	.34	.47	.06	.00	.003	102.53
22.4000	.06	.34	.46	.06	.00	.003	102.53
22.6000	.06	.34	.45	.06	.00	.003	102.53
22.8000	.06	.33	.45	.06	.00	.003	102.53
23.0000	.06	.33	.44	.06	.00	.003	102.53
23.2000	.05	.33	.44	.06	.00	.003	102.52
23.4000	.05	.32	.43	.06	.00	.003	102.52
23.6000	.05	.32	.43	.05	.00	.003	102.52
23.8000	.04	.31	.41	.05	.00	.003	102.51
24.0000	.00	.27	.35	.04	.00	.003	102.49
24.2000	.00	.22	.27	.02	.00	.002	102.46
24.4000	.00	.19	.22	.02	.00	.002	102.44
24.6000	.00	.16	.19	.01	.00	.001	102.43
24.8000	.00	.14	.16	.01	.00	.001	102.42
25.0000	.00	.12	.14	.01	.00	.001	102.41

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
25.2000	.00	.10	.12	.01	.00	.001	102.40
25.4000	.00	.09	.10	.01	.00	.001	102.39
25.6000	.00	.07	.09	.01	.00	.001	102.39
25.8000	.00	.06	.07	.01	.00	.001	102.38
26.0000	.00	.05	.06	.00	.00	.000	102.38
26.2000	.00	.04	.05	.00	.00	.000	102.37
26.4000	.00	.04	.04	.00	.00	.000	102.37
26.6000	.00	.03	.04	.00	.00	.000	102.37

POND ROUTED TOTAL OUTFLOW HYG...
HYG file =
HYG ID = POND 10 OUT
HYG Tag = A1

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.00	.00	.00
1.0000	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
5.0000	.00	.00	.00	.00	.00
6.0000	.00	.00	.00	.00	.00
7.0000	.00	.00	.00	.00	.00
8.0000	.00	.00	.00	.00	.00
9.0000	.00	.00	.00	.00	.00
10.0000	.00	.00	.00	.00	.00
11.0000	.00	.00	.00	.00	.00
12.0000	.00	.00	.00	.00	.00
13.0000	.00	.00	.00	.00	.00
14.0000	.00	.00	.00	.00	.00
15.0000	.00	.00	.00	.00	.00
16.0000	.00	.00	.00	.00	.00
17.0000	.00	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
20.0000	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
24.0000	.00	.00	.00	.00	.00
25.0000	.00	.00	.00	.00	.00
26.0000	.00	.00	.00	.00	

```
            DIVERTED HYDROGRAPH...
            HYG file =
            HYG ID   = ROUTE 10
            HYG Tag  = A1
            -----------------------------------
            -----------------------------------

                           HYDROGRAPH ORDINATES (cfs)
    Time  |                Output Time increment = .2000 hrs
    hrs   |    Time on left represents time for first value in each row.
 ---------|-------------------------------------------------------------
    .0000 |         .00         .00         .00
```

Index of Starting Page Numbers for ID Names

----- A -----
AREA-A A1... 4.01

----- O -----
Outlet 1... 9.01, 9.04, 9.08

----- P -----
POINT B-4 A1... 5.01
POND 10... 8.01, 10.01, 10.03, 6.01,
7.01
POND 10 IN A1... 10.06
POND 10 INF A1... 10.08
POND 10 OUT A1... 10.09, 10.10,
10.11, 10.15

----- R -----
ROUTE 10 A1... 10.16

----- W -----
WARNING... 1.01
Watershed... 2.01, 3.01, 3.02, 3.03

Pond Analysis

Proposed 10 yr-A2

Shilo West Medical Center
Site: Palmdale & Mesa Linda Rd.

JOB TITLE

Project Date: 1/24/2023
Project Engineer: DAVID C. QUEYREL
Project Title: Shiloh West Medical
Project Comments:
ANALYSIS USING 24 HOUR 10YR HYDROGRAPH WITH PEAK RUNOFF ADDED PER
1 HOUR 100 YR RATIONAL METHOD PER SAN BERNARDINO HYDROLOGY
HYDROGRAPGH TO DETERMINE DETENTION OF PEAK STORM RUNOFF BELOW
EXISTING AMOUNT.

********** WARNING MSG **********

WARNING..... WARNING MESSAGES 1.01

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 2.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... A2
Executive Summary (Nodes) 3.01
Executive Summary (Links) 3.02
Network Calcs Sequence 3.03

********** RUNOFF HYDROGRAPHS **********

AREA-A..... A2
Read HYG 4.01

********** HYG ADDITION **********

POINT B-4..... A2
Node: Addition Summary 5.01

********** TIME VS.ELEV **********

POND 10..... A2
Time-Elev 6.01

Table of Contents (continued)

********** TIME VS.VOL **********

POND 10..... A2
Time vs. Volume 7.01

********** POND VOLUMES **********

POND 10..... Vol: Elev-Volume 8.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 9.01
Individual Outlet Curves 9.04
Composite Rating Curve 9.07

********** POND ROUTING **********

POND 10..... Pond Infiltration Calcs 10.01
Pond E-V-Q Table 10.03

POND 10 IN A2
Node: Pond Inflow Summary 10.06

POND 10 INF A2
Pond Infiltration HYG 10.08

POND 10 OUT A2
Pond Routing Summary 10.09
Detention Time 10.10
Pond Routing Calcs (Total Out) 10.11
Pond Routed HYG (total out) 10.15

ROUTE 10..... A2
Diverted Hydrograph 10.16

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
AREA-A		HYG	A2	.220	L	16.5000	1.64		
*POINT B-4		JCT	A2	.000		.2000	.00		
POND 10	IN	POND	A2	.218	L	16.4000	1.53		
POND 10	OUT	POND	A2	.000		.2000	.00	103.91	.056

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADDLINK 20	ADD	UN	.220	L	16.5000	1.64	AREA-A	
		DL	.220	L	16.5000	1.64		
		DN	.218	L	16.4000	1.53	POND 10	IN
ROUTE 10	PONDrt	UN	.218	L	16.4000	1.53	POND 10	IN
ROUTE 10			.000		.2000	.00	POND 10	OUT
		DL	.000		.2000	.00		
		DN	.000		.2000	.00	POINT B-4	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGAREA-A	HYG Qin AREA-A	Add Hyd AREA-A

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd ADDLINK 20	HYG Qin AREA-A			Pond	POND 10	IN
POND ROUTE INFILTRATION AND TOTAL OUTFLOW...						
Infiltration	Pond	POND 10	IN	Infilt.	POND 10	INF
Total Pond Outflow	Pond	POND 10	IN	Outflow	POND 10	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 10	Outflow	POND 10	OUT	Jct	POINT B-4	

HYG file =
HYG ID = 10 YR
HYG Tag = A2

Peak Discharge =	1.64	cfs
Time to Peak =	16.5000	hrs
HYG Volume =	.220	ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2500 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.01	.04	.04	.04	.04
1.2500	.04	.04	.04	.04	.04
2.5000	.04	.04	.04	.05	.05
3.7500	.05	.05	.05	.05	.05
5.0000	.05	.05	.05	.05	.05
6.2500	.05	.05	.05	.06	.06
7.5000	.06	.06	.06	.06	.06
8.7500	.06	.07	.07	.07	.07
10.0000	.07	.07	.08	.08	.08
11.2500	.08	.08	.09	.09	.09
12.5000	.10	.10	.10	.11	.11
13.7500	.12	.13	.14	.15	.16
15.0000	.18	.21	.23	.26	.45
16.2500	1.35	1.64	.32	.18	.15
17.5000	.13	.11	.10	.09	.09
18.7500	.08	.08	.07	.07	.07
20.0000	.06	.06	.06	.03	.05
21.2500	.05	.05	.05	.05	.05
22.5000	.05	.05	.04	.04	.04
23.7500	.04	.00			

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
101.23	.000
101.50	.006
102.00	.016
102.50	.026
103.00	.037
103.50	.047
104.00	.057
104.50	.068
105.00	.078
105.50	.089

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 101.23 ft
Increment = .10 ft
Max. Elev.= 105.50 ft

```
*********************************************
                OUTLET CONNECTIVITY
*********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	CO	--->	TW	104.300	105.500
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CO
Structure Type    = Culvert-Circular
------------------------------------
No. Barrels       =         1
Barrel Diameter   =    1.0000 ft
Upstream Invert   =    104.30 ft
Dnstream Invert   =    104.00 ft
Horiz. Length     =     51.00 ft
Barrel Length     =     51.00 ft
Barrel Slope      =    .00588 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .031274  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0610
Inlet Control M   =     .7500
Inlet Control c   =    .04230
Inlet Control Y   =     .8200
T1 ratio (HW/D)   =     1.193
T2 ratio (HW/D)   =     1.494
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    105.49 ft  --->  Flow =      2.75 cfs
At T2 Elev =    105.79 ft  --->  Flow =      3.14 cfs
```

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = TW
Structure Type    = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .01 cfs
Max.  Q tolerance =    .01 cfs
```

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (1.7140 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
101.23	.0000	.00
101.33	.0085	.01
101.43	.0341	.06
101.53	.0652	.11
101.63	.0762	.13
101.73	.0880	.15
101.83	.1007	.17
101.93	.1143	.20
102.03	.1276	.22
102.13	.1390	.24
102.23	.1509	.26
102.33	.1634	.28
102.43	.1763	.30
102.53	.1891	.33
102.63	.2007	.35
102.73	.2128	.37
102.83	.2251	.39
102.93	.2379	.41
103.03	.2504	.43
103.13	.2621	.45
103.23	.2741	.47
103.33	.2863	.49
103.43	.2988	.52
103.53	.3111	.54
103.63	.3229	.56
103.73	.3349	.58
103.83	.3471	.60
103.93	.3595	.62
104.03	.3718	.64
104.13	.3836	.66
104.23	.3956	.68
104.30	.4041	.70
104.33	.4078	.70
104.43	.4202	.73
104.53	.4325	.75
104.63	.4443	.77
104.73	.4564	.79
104.83	.4685	.81
104.93	.4809	.83
105.03	.4931	.85
105.13	.5050	.87
105.23	.5171	.89

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (1.7140 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
105.33	.5292	.91
105.43	.5415	.94
105.50	.5503	.95

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 1.7140 in/hr

INITIAL CONDITIONS

Starting WS Elev = 101.23 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
101.23	.00	.000	.0000	.00	.00	.00
101.33	.00	.002	.0085	.01	.01	.27
101.43	.00	.004	.0341	.06	.06	.56
101.53	.00	.006	.0652	.11	.11	.86
101.63	.00	.008	.0762	.13	.13	1.13
101.73	.00	.010	.0880	.15	.15	1.41
101.83	.00	.012	.1007	.17	.17	1.68
101.93	.00	.015	.1143	.20	.20	1.95
102.03	.00	.017	.1276	.22	.22	2.23
102.13	.00	.019	.1390	.24	.24	2.49
102.23	.00	.021	.1509	.26	.26	2.76
102.33	.00	.023	.1634	.28	.28	3.03
102.43	.00	.025	.1763	.30	.30	3.30
102.53	.00	.027	.1891	.33	.33	3.57
102.63	.00	.029	.2007	.35	.35	3.85
102.73	.00	.031	.2128	.37	.37	4.12
102.83	.00	.033	.2251	.39	.39	4.40
102.93	.00	.035	.2379	.41	.41	4.67
103.03	.00	.037	.2504	.43	.43	4.95
103.13	.00	.039	.2621	.45	.45	5.22

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 1.7140 in/hr

INITIAL CONDITIONS

Starting WS Elev = 101.23 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
103.23	.00	.041	.2741	.47	.47	5.49
103.33	.00	.044	.2863	.49	.49	5.76
103.43	.00	.046	.2988	.52	.52	6.03
103.53	.00	.048	.3111	.54	.54	6.31
103.63	.00	.050	.3229	.56	.56	6.58
103.73	.00	.052	.3349	.58	.58	6.85
103.83	.00	.054	.3471	.60	.60	7.12
103.93	.00	.056	.3595	.62	.62	7.39
104.03	.00	.058	.3718	.64	.64	7.67
104.13	.00	.060	.3836	.66	.66	7.94
104.23	.00	.062	.3956	.68	.68	8.21
104.30	.00	.064	.4041	.70	.70	8.40
104.33	.00	.064	.4078	.70	.70	8.48
104.43	.04	.066	.4202	.73	.77	8.80
104.53	.13	.068	.4325	.75	.88	9.16
104.63	.27	.070	.4443	.77	1.04	9.57
104.73	.46	.073	.4564	.79	1.24	10.02
104.83	.67	.075	.4685	.81	1.48	10.51
104.93	.93	.077	.4809	.83	1.76	11.04
105.03	1.21	.079	.4931	.85	2.06	11.59

LEVEL POOL ROUTING DATA

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   101.23 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
105.13	1.52	.081	.5050	.87	2.39	12.17
105.23	1.85	.083	.5171	.89	2.74	12.78
105.33	2.18	.085	.5292	.91	3.09	13.38
105.43	2.53	.087	.5415	.94	3.46	14.00
105.50	2.76	.089	.5503	.95	3.71	14.42

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POND 10 IN

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Adding in hydrograph that is truncated on left...				
WARNING: Missed peak when adding hydrograph...				
ADDLINK 20	AREA-A		10 YR	A2

INFLOWS TO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	10 YR	A2	.220	16.5000	1.64

TOTAL FLOW INTO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POND 10 IN	A2	.218	16.4000	1.53

```
TOTAL NODE INFLOW...
HYG file =
HYG ID   = POND 10      IN
HYG Tag  = A2
-----------------------------------
Peak Discharge =         1.53 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .218 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.01	.03	.04	.04	.04
1.0000	.04	.04	.04	.04	.04
2.0000	.04	.04	.04	.04	.04
3.0000	.04	.05	.05	.05	.05
4.0000	.05	.05	.05	.05	.05
5.0000	.05	.05	.05	.05	.05
6.0000	.05	.05	.05	.05	.05
7.0000	.06	.06	.06	.06	.06
8.0000	.06	.06	.06	.06	.06
9.0000	.07	.07	.07	.07	.07
10.0000	.07	.07	.07	.08	.08
11.0000	.08	.08	.08	.09	.09
12.0000	.09	.09	.10	.10	.10
13.0000	.10	.11	.11	.12	.12
14.0000	.13	.13	.14	.15	.17
15.0000	.18	.20	.22	.24	.30
16.0000	.45	1.17	1.53	1.11	.29
17.0000	.18	.15	.14	.12	.11
18.0000	.10	.10	.09	.08	.08
19.0000	.08	.07	.07	.07	.07
20.0000	.06	.06	.06	.05	.04
21.0000	.05	.05	.05	.05	.05
22.0000	.05	.05	.05	.05	.05
23.0000	.04	.04	.04	.04	.03
24.0000	.00				

```
HYG file =
HYG ID   = POND 10      INF
HYG Tag  = A2
-----------------------------------
Peak Discharge =          .62 cfs
Time to Peak   =      16.8000 hrs
HYG Volume     =         .218 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.01	.01	.01
1.0000	.02	.03	.03	.03	.04
2.0000	.04	.04	.04	.04	.04
3.0000	.04	.04	.04	.04	.04
4.0000	.05	.05	.05	.05	.05
5.0000	.05	.05	.05	.05	.05
6.0000	.05	.05	.05	.05	.05
7.0000	.05	.05	.05	.06	.06
8.0000	.06	.06	.06	.06	.06
9.0000	.06	.06	.06	.07	.07
10.0000	.07	.07	.07	.07	.07
11.0000	.08	.08	.08	.08	.08
12.0000	.08	.09	.09	.09	.09
13.0000	.10	.10	.10	.11	.11
14.0000	.11	.12	.12	.12	.13
15.0000	.14	.14	.15	.17	.18
16.0000	.22	.31	.47	.60	.62
17.0000	.56	.50	.44	.39	.35
18.0000	.31	.28	.25	.22	.20
19.0000	.18	.16	.15	.14	.13
20.0000	.12	.11	.09	.08	.06
21.0000	.06	.06	.06	.05	.05
22.0000	.05	.05	.05	.05	.05
23.0000	.05	.05	.04	.04	.04
24.0000	.03	.02	.02	.01	.01
25.0000	.01	.01	.01	.01	.01
26.0000	.01	.01	.00	.00	.00
27.0000	.00	.00			

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   101.23 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      1.53 cfs    at   16.4000 hrs
Peak Outflow      =       .00 cfs    at     .2000 hrs
Peak Infiltration =       .62 cfs    at   16.8000 hrs
-----------------------------------------------------
Peak Elevation    =    103.91 ft
Peak Storage =           .056 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =        .218
- Infiltration =        .218
- HYG Vol OUT  =        .000
- Retained Vol =        .000
                   ----------
Unrouted Vol =       -.000 ac-ft  (.000% of Inflow Volume)


WARNING: Inflow hydrograph truncated on left side.
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------

Weighted Avg. Plug Time =     .9715 hrs
Max.Plug Vol. Plug Time =     .8949 hrs
Max.Inflow Plug Volume  =      .022 ac-ft   (From 16.2000 to 16.4000 hrs)
--------------------------------------
```

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
.0000	.01	.00	.00	.00	.00	.000	101.23
.2000	.03	.04	.05	.00	.00	.000	101.25
.4000	.04	.10	.11	.01	.00	.001	101.27
.6000	.04	.16	.18	.01	.00	.001	101.30
.8000	.04	.21	.24	.01	.00	.002	101.32
1.0000	.04	.25	.29	.02	.00	.002	101.34
1.2000	.04	.29	.34	.03	.00	.003	101.35
1.4000	.04	.31	.37	.03	.00	.003	101.36
1.6000	.04	.32	.39	.03	.00	.003	101.37
1.8000	.04	.33	.41	.04	.00	.003	101.38
2.0000	.04	.34	.42	.04	.00	.003	101.38
2.2000	.04	.35	.43	.04	.00	.003	101.38
2.4000	.04	.35	.44	.04	.00	.003	101.39
2.6000	.04	.36	.44	.04	.00	.003	101.39
2.8000	.04	.36	.45	.04	.00	.003	101.39
3.0000	.04	.37	.45	.04	.00	.003	101.39
3.2000	.05	.37	.46	.04	.00	.003	101.39
3.4000	.05	.37	.46	.04	.00	.003	101.40
3.6000	.05	.37	.46	.04	.00	.003	101.40
3.8000	.05	.38	.47	.04	.00	.003	101.40
4.0000	.05	.38	.47	.05	.00	.003	101.40
4.2000	.05	.38	.47	.05	.00	.004	101.40
4.4000	.05	.38	.47	.05	.00	.004	101.40
4.6000	.05	.38	.48	.05	.00	.004	101.40
4.8000	.05	.39	.48	.05	.00	.004	101.40
5.0000	.05	.39	.48	.05	.00	.004	101.40
5.2000	.05	.39	.49	.05	.00	.004	101.41
5.4000	.05	.40	.49	.05	.00	.004	101.41
5.6000	.05	.40	.50	.05	.00	.004	101.41
5.8000	.05	.40	.50	.05	.00	.004	101.41
6.0000	.05	.40	.50	.05	.00	.004	101.41
6.2000	.05	.40	.51	.05	.00	.004	101.41
6.4000	.05	.41	.51	.05	.00	.004	101.41
6.6000	.05	.41	.51	.05	.00	.004	101.41
6.8000	.05	.41	.52	.05	.00	.004	101.42
7.0000	.06	.42	.52	.05	.00	.004	101.42
7.2000	.06	.42	.53	.05	.00	.004	101.42
7.4000	.06	.42	.53	.05	.00	.004	101.42
7.6000	.06	.43	.54	.06	.00	.004	101.42
7.8000	.06	.43	.54	.06	.00	.004	101.42
8.0000	.06	.43	.55	.06	.00	.004	101.43
8.2000	.06	.44	.55	.06	.00	.004	101.43

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
8.4000	.06	.44	.56	.06	.00	.004	101.43
8.6000	.06	.45	.57	.06	.00	.004	101.43
8.8000	.06	.45	.57	.06	.00	.004	101.43
9.0000	.07	.45	.58	.06	.00	.004	101.44
9.2000	.07	.46	.58	.06	.00	.004	101.44
9.4000	.07	.46	.59	.06	.00	.004	101.44
9.6000	.07	.47	.60	.07	.00	.004	101.44
9.8000	.07	.47	.60	.07	.00	.004	101.44
10.0000	.07	.48	.61	.07	.00	.004	101.45
10.2000	.07	.48	.62	.07	.00	.005	101.45
10.4000	.07	.48	.63	.07	.00	.005	101.45
10.6000	.08	.49	.64	.07	.00	.005	101.45
10.8000	.08	.50	.64	.07	.00	.005	101.46
11.0000	.08	.50	.65	.08	.00	.005	101.46
11.2000	.08	.51	.66	.08	.00	.005	101.46
11.4000	.08	.52	.67	.08	.00	.005	101.47
11.6000	.09	.52	.68	.08	.00	.005	101.47
11.8000	.09	.53	.69	.08	.00	.005	101.47
12.0000	.09	.54	.71	.08	.00	.005	101.48
12.2000	.09	.55	.72	.09	.00	.005	101.48
12.4000	.10	.56	.73	.09	.00	.005	101.49
12.6000	.10	.56	.75	.09	.00	.005	101.49
12.8000	.10	.57	.76	.09	.00	.006	101.50
13.0000	.10	.58	.77	.10	.00	.006	101.50
13.2000	.11	.59	.79	.10	.00	.006	101.51
13.4000	.11	.60	.81	.10	.00	.006	101.51
13.6000	.12	.62	.83	.11	.00	.006	101.52
13.8000	.12	.63	.85	.11	.00	.006	101.53
14.0000	.13	.65	.88	.11	.00	.006	101.54
14.2000	.13	.68	.92	.12	.00	.007	101.55
14.4000	.14	.72	.96	.12	.00	.007	101.57
14.6000	.15	.77	1.02	.12	.00	.007	101.59
14.8000	.17	.84	1.09	.13	.00	.008	101.62
15.0000	.18	.91	1.18	.14	.00	.009	101.65
15.2000	.20	1.01	1.29	.14	.00	.010	101.69
15.4000	.22	1.12	1.43	.15	.00	.011	101.74
15.6000	.24	1.25	1.58	.17	.00	.012	101.79
15.8000	.30	1.42	1.79	.18	.00	.013	101.87
16.0000	.45	1.74	2.17	.22	.00	.016	102.01
16.2000	1.17	2.74	3.35	.31	.00	.025	102.45
16.4000	1.53	4.50	5.43	.47	.00	.041	103.21
16.6000	1.11	5.93	7.13	.60	.00	.054	103.83

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
16.8000	.29	6.10	7.34	.62	.00	.056	103.91
17.0000	.18	5.46	6.58	.56	.00	.050	103.63
17.2000	.15	4.80	5.79	.50	.00	.044	103.34
17.4000	.14	4.20	5.09	.44	.00	.038	103.08
17.6000	.12	3.67	4.46	.39	.00	.034	102.85
17.8000	.11	3.20	3.90	.35	.00	.029	102.65
18.0000	.10	2.78	3.41	.31	.00	.026	102.47
18.2000	.10	2.42	2.98	.28	.00	.022	102.31
18.4000	.09	2.11	2.61	.25	.00	.019	102.17
18.6000	.08	1.83	2.28	.22	.00	.017	102.05
18.8000	.08	1.60	2.00	.20	.00	.015	101.95
19.0000	.08	1.39	1.75	.18	.00	.013	101.86
19.2000	.07	1.22	1.54	.16	.00	.011	101.78
19.4000	.07	1.06	1.36	.15	.00	.010	101.71
19.6000	.07	.93	1.20	.14	.00	.009	101.65
19.8000	.07	.81	1.06	.13	.00	.008	101.60
20.0000	.06	.70	.94	.12	.00	.007	101.56
20.2000	.06	.61	.83	.11	.00	.006	101.52
20.4000	.06	.55	.73	.09	.00	.005	101.49
20.6000	.05	.51	.66	.08	.00	.005	101.46
20.8000	.04	.46	.59	.06	.00	.004	101.44
21.0000	.05	.44	.55	.06	.00	.004	101.43
21.2000	.05	.43	.54	.06	.00	.004	101.42
21.4000	.05	.42	.53	.06	.00	.004	101.42
21.6000	.05	.42	.53	.05	.00	.004	101.42
21.8000	.05	.41	.52	.05	.00	.004	101.42
22.0000	.05	.41	.51	.05	.00	.004	101.41
22.2000	.05	.40	.50	.05	.00	.004	101.41
22.4000	.05	.40	.50	.05	.00	.004	101.41
22.6000	.05	.39	.49	.05	.00	.004	101.41
22.8000	.05	.39	.48	.05	.00	.004	101.40
23.0000	.04	.38	.48	.05	.00	.004	101.40
23.2000	.04	.38	.47	.05	.00	.004	101.40
23.4000	.04	.38	.47	.04	.00	.003	101.40
23.6000	.04	.37	.46	.04	.00	.003	101.40
23.8000	.03	.36	.45	.04	.00	.003	101.39
24.0000	.00	.33	.40	.03	.00	.003	101.37
24.2000	.00	.28	.33	.02	.00	.003	101.35
24.4000	.00	.25	.28	.02	.00	.002	101.33
24.6000	.00	.22	.25	.01	.00	.002	101.32
24.8000	.00	.19	.22	.01	.00	.002	101.31
25.0000	.00	.17	.19	.01	.00	.002	101.30

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
25.2000	.00	.15	.17	.01	.00	.001	101.30
25.4000	.00	.14	.15	.01	.00	.001	101.29
25.6000	.00	.12	.14	.01	.00	.001	101.28
25.8000	.00	.11	.12	.01	.00	.001	101.28
26.0000	.00	.10	.11	.01	.00	.001	101.27
26.2000	.00	.09	.10	.01	.00	.001	101.27
26.4000	.00	.08	.09	.00	.00	.001	101.26
26.6000	.00	.07	.08	.00	.00	.001	101.26
26.8000	.00	.06	.07	.00	.00	.001	101.26
27.0000	.00	.05	.06	.00	.00	.000	101.25
27.2000	.00	.05	.05	.00	.00	.000	101.25

POND ROUTED TOTAL OUTFLOW HYG...
HYG file =
HYG ID = POND 10 OUT
HYG Tag = A2

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.00	.00	.00
1.0000	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
5.0000	.00	.00	.00	.00	.00
6.0000	.00	.00	.00	.00	.00
7.0000	.00	.00	.00	.00	.00
8.0000	.00	.00	.00	.00	.00
9.0000	.00	.00	.00	.00	.00
10.0000	.00	.00	.00	.00	.00
11.0000	.00	.00	.00	.00	.00
12.0000	.00	.00	.00	.00	.00
13.0000	.00	.00	.00	.00	.00
14.0000	.00	.00	.00	.00	.00
15.0000	.00	.00	.00	.00	.00
16.0000	.00	.00	.00	.00	.00
17.0000	.00	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
20.0000	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
24.0000	.00	.00	.00	.00	.00
25.0000	.00	.00	.00	.00	.00
26.0000	.00	.00	.00	.00	.00
27.0000	.00	.00			

```
            DIVERTED HYDROGRAPH...
            HYG file =
            HYG ID   = ROUTE 10
            HYG Tag  = A2
            -----------------------------------
            -----------------------------------

                           HYDROGRAPH ORDINATES (cfs)
    Time  |                Output Time increment = .2000 hrs
    hrs   |    Time on left represents time for first value in each row.
 ---------|-------------------------------------------------------------
    .0000 |         .00         .00         .00
```

Index of Starting Page Numbers for ID Names

----- A -----
AREA-A A2... 4.01

----- O -----
Outlet 1... 9.01, 9.04, 9.07

----- P -----
POINT B-4 A2... 5.01
POND 10... 8.01, 10.01, 10.03, 6.01,
7.01
POND 10 IN A2... 10.06
POND 10 INF A2... 10.08
POND 10 OUT A2... 10.09, 10.10,
10.11, 10.15

----- R -----
ROUTE 10 A2... 10.16

----- W -----
WARNING... 1.01
Watershed... 2.01, 3.01, 3.02, 3.03

Pond Analysis

Proposed 100 yr-A1

Shilo West Medical Center
Site: Palmdale & Mesa Linda Rd.

JOB TITLE

Project Date: 1/24/2023
Project Engineer: DAVID C. QUEYREL
Project Title: Shiloh West Medical
Project Comments:
ANALYSIS USING 24 HOUR 10YR HYDROGRAPH WITH PEAK RUNOFF ADDED PER
1 HOUR 100 YR RATIONAL METHOD PER SAN BERNARDINO HYDROLOGY
HYDROGRAPGH TO DETERMINE DETENTION OF PEAK STORM RUNOFF BELOW
EXISTING AMOUNT.

********** WARNING MSG **********

WARNING..... WARNING MESSAGES 1.01

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 2.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... A1
Executive Summary (Nodes) 3.01
Executive Summary (Links) 3.02
Network Calcs Sequence 3.03

********** RUNOFF HYDROGRAPHS **********

AREA-A..... A1
Read HYG 4.01

********** HYG ADDITION **********

POINT B-4..... A1
Node: Addition Summary 5.01

********** TIME VS.ELEV **********

POND 10..... A1
Time-Elev 6.01

********** TIME VS.VOL **********

POND 10..... A1
Time vs. Volume 7.01

********** POND VOLUMES **********

POND 10..... Vol: Elev-Volume 8.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 9.01
Individual Outlet Curves 9.04
Composite Rating Curve 9.08

********** POND ROUTING **********

POND 10..... Pond Infiltration Calcs 10.01
Pond E-V-Q Table 10.03

POND 10 IN A1
Node: Pond Inflow Summary 10.06

POND 10 INF A1
Pond Infiltration HYG 10.08

POND 10 OUT A1
Pond Routing Summary 10.09
Detention Time 10.10
Pond Routing Calcs (Total Out) 10.11
Pond Routed HYG (total out) 10.15

ROUTE 10..... A1
Diverted Hydrograph 10.16

```
WARNING: Adding in hydrograph that is truncated on left...
Check output for: Node: Pond Inflow Summary  POND 10      IN

WARNING: Missed peak when adding hydrograph...
Check output for: Node: Pond Inflow Summary  POND 10      IN

WARNING: Inflow hydrograph truncated on left side.
Check output for: Pond Routing Summary  POND 10      OUT  A1
```

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
AREA-A		HYG	A1	.684	L	16.5000	5.10		
*POINT B-4		JCT	A1	.023		16.4000	.82		
POND 10	IN	POND	A1	.678	L	16.4000	4.74		
POND 10	OUT	POND	A1	.023		16.4000	.82	107.04	.058

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	AREA-A		HYG	.684	L	16.5000	5.10	
Outfall	POINT B-4		JCT	.023		16.4000	.82	
	POND 10	IN	POND	.678	L	16.4000	4.74	
	POND 10	OUT	POND	.023		16.4000	.82	107.04

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADDLINK 20	ADD	UN	.684	L	16.5000	5.10	AREA-A	
		DL	.684	L	16.5000	5.10		
		DN	.678	L	16.4000	4.74	POND 10	IN
ROUTE 10	PONDrt	UN	.678	L	16.4000	4.74	POND 10	IN
ROUTE 10			.023		16.4000	.82	POND 10	OUT
		DL	.023		16.4000	.82		
		DN	.023		16.4000	.82	POINT B-4	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGAREA-A	HYG Qin AREA-A	Add Hyd AREA-A

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd ADDLINK 20	HYG Qin AREA-A			Pond	POND 10	IN
POND ROUTE INFILTRATION AND TOTAL OUTFLOW...						
Infiltration	Pond	POND 10	IN	Infilt.	POND 10	INF
Total Pond Outflow	Pond	POND 10	IN	Outflow	POND 10	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 10	Outflow	POND 10	OUT	Jct	POINT B-4	

```
HYG file =
HYG ID   = HYG 1PROP
HYG Tag  = A1
-----------------------------------
Peak Discharge =         5.10 cfs
Time to Peak   =      16.5000 hrs
HYG Volume     =         .684 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2500 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.04	.12	.12	.12	.13
1.2500	.13	.13	.13	.13	.13
2.5000	.13	.14	.14	.14	.14
3.7500	.14	.14	.15	.15	.15
5.0000	.16	.16	.16	.16	.16
6.2500	.16	.17	.17	.17	.18
7.5000	.18	.18	.18	.19	.19
8.7500	.20	.20	.21	.21	.22
10.0000	.22	.23	.23	.24	.25
11.2500	.26	.26	.27	.28	.29
12.5000	.30	.30	.32	.33	.35
13.7500	.37	.40	.43	.46	.50
15.0000	.56	.64	.71	.81	1.39
16.2500	4.21	5.10	1.00	.56	.46
17.5000	.40	.35	.32	.29	.27
18.7500	.25	.24	.23	.22	.21
20.0000	.20	.19	.18	.10	.17
21.2500	.16	.16	.16	.15	.15
22.5000	.14	.14	.14	.13	.13
23.7500	.13	.00			

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POINT B-4

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ROUTE 10	POND 10	IN	ROUTE 10	A1

INFLOWS TO: POINT B-4

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	ROUTE 10	A1	.023	16.4000	.82

TOTAL FLOW INTO: POINT B-4

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POINT B-4	A1	.023	16.4000	.82

```
TOTAL NODE INFLOW...
HYG file =
HYG ID   = POINT B-4
HYG Tag  = A1
-----------------------------------
Peak Discharge =          .82 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .023 ac-ft
-----------------------------------
```

```
                        HYDROGRAPH ORDINATES (cfs)
   Time  |              Output Time increment = .2000 hrs
   hrs   |    Time on left represents time for first value in each row.
---------|------------------------------------------------------------
 16.2000 |         .00         .82         .59         .00
```

TIME vs. ELEVATION (ft)

Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	102.35	102.41	102.49	102.55	102.58
1.0000	102.60	102.61	102.61	102.61	102.62
2.0000	102.62	102.62	102.62	102.62	102.62
3.0000	102.63	102.63	102.63	102.63	102.63
4.0000	102.63	102.63	102.63	102.64	102.64
5.0000	102.64	102.64	102.65	102.65	102.65
6.0000	102.65	102.65	102.65	102.66	102.66
7.0000	102.66	102.66	102.66	102.67	102.67
8.0000	102.67	102.67	102.67	102.68	102.68
9.0000	102.68	102.69	102.69	102.69	102.69
10.0000	102.70	102.70	102.70	102.71	102.71
11.0000	102.72	102.72	102.73	102.73	102.74
12.0000	102.74	102.75	102.76	102.76	102.76
13.0000	102.77	102.78	102.78	102.79	102.80
14.0000	102.81	102.83	102.84	102.86	102.90
15.0000	102.94	103.00	103.06	103.13	103.24
16.0000	103.49	104.48	107.04	106.91	104.74
17.0000	103.85	103.33	103.07	102.93	102.84
18.0000	102.79	102.77	102.76	102.74	102.73
19.0000	102.72	102.71	102.71	102.70	102.69
20.0000	102.69	102.68	102.67	102.66	102.63
21.0000	102.63	102.65	102.65	102.65	102.65
22.0000	102.64	102.64	102.64	102.64	102.63
23.0000	102.63	102.63	102.62	102.62	102.61
24.0000	102.56	102.50	102.47	102.45	102.43
25.0000	102.42	102.41	102.40	102.39	102.39
26.0000	102.38	102.38	102.37	102.37	102.37
27.0000	102.36				

TIME vs. VOLUME (ac-ft)

Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.000	.001	.003	.004	.004
1.0000	.005	.005	.005	.005	.005
2.0000	.005	.005	.005	.005	.005
3.0000	.005	.005	.005	.005	.005
4.0000	.005	.005	.005	.005	.005
5.0000	.005	.005	.005	.005	.005
6.0000	.005	.006	.006	.006	.006
7.0000	.006	.006	.006	.006	.006
8.0000	.006	.006	.006	.006	.006
9.0000	.006	.006	.006	.006	.006
10.0000	.006	.006	.006	.007	.007
11.0000	.007	.007	.007	.007	.007
12.0000	.007	.007	.007	.007	.008
13.0000	.008	.008	.008	.008	.008
14.0000	.008	.009	.009	.009	.010
15.0000	.011	.012	.013	.014	.016
16.0000	.021	.039	.058	.058	.043
17.0000	.027	.018	.013	.010	.009
18.0000	.008	.008	.007	.007	.007
19.0000	.007	.007	.006	.006	.006
20.0000	.006	.006	.006	.006	.005
21.0000	.005	.005	.005	.005	.005
22.0000	.005	.005	.005	.005	.005
23.0000	.005	.005	.005	.005	.005
24.0000	.004	.003	.002	.002	.002
25.0000	.001	.001	.001	.001	.001
26.0000	.001	.001	.000	.000	.000
27.0000	.000				

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
102.35	.000
102.85	.009
103.35	.018
103.85	.027
104.35	.036
104.85	.045
105.35	.055
105.50	.057
107.50	.058

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 102.35 ft
Increment = .10 ft
Max. Elev.= 107.50 ft

```
**********************************************
               OUTLET CONNECTIVITY
**********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	CO	--->	TW	106.330	107.500
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CO
Structure Type    = Culvert-Circular
------------------------------------
No. Barrels       =         1
Barrel Diameter   =     .6600 ft
Upstream Invert   =    106.33 ft
Dnstream Invert   =    104.70 ft
Horiz. Length     =    325.00 ft
Barrel Length     =    325.00 ft
Barrel Slope      =    .00502 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .054423  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0610
Inlet Control M   =     .7500
Inlet Control c   =    .04230
Inlet Control Y   =     .8200
T1 ratio (HW/D)   =      .000
T2 ratio (HW/D)   =     1.494
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    106.33 ft  --->  Flow =       .97 cfs
At T2 Elev =    107.32 ft  --->  Flow =      1.11 cfs
```

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .01 cfs
Max. Q tolerance = .01 cfs

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: .90 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
102.35	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.45	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.55	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.65	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.75	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.85	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.95	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.05	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.15	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.25	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.35	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.45	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.55	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.65	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.75	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.85	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.95	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: .90 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
104.05	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.15	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.25	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.35	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.45	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.55	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.65	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.75	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.85	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.95	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.05	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.15	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.25	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.35	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.45	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.55	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.65	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: .90 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
105.75	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.85	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
105.95	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
106.05	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
106.15	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
106.25	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
106.33	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
106.35	.00	Free Outfall		CRIT.DEPTH CONTROL Vh= .014ft Dcr= .041ft CRIT.DEPTH Hev= .00ft
106.45	.03	Free Outfall		BACKWATER CONTROL.. Vh= .018ft hwDi= .077ft Lbw= 325.0ft Hev= .00ft
106.55	.10	Free Outfall		BACKWATER CONTROL.. Vh= .043ft hwDi= .156ft Lbw= 325.0ft Hev= .00ft
106.65	.21	Free Outfall		BACKWATER CONTROL.. Vh= .064ft hwDi= .225ft Lbw= 325.0ft Hev= .00ft
106.75	.34	Free Outfall		INLET CONTROL... Transition: HW =.42
106.85	.50	Free Outfall		BACKWATER CONTROL.. Vh= .101ft hwDi= .368ft Lbw= 325.0ft Hev= .00ft
106.95	.66	Free Outfall		INLET CONTROL... Transition: HW =.62
107.05	.83	Free Outfall		BACKWATER CONTROL.. Vh= .120ft hwDi= .540ft Lbw= 325.0ft Hev= .00ft
107.15	.91	Free Outfall		BACKWATER CONTROL.. Vh= .110ft hwDi= .655ft Lbw= 325.0ft Hev= .00ft
107.25	.92	Free Outfall		FULL FLOW...Lfull=86.98ft Vh=.112ft HL=.696ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: .90 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
107.35	.93	Free Outfall		
		FULL FLOW...Lfull=155.86ft		Vh=.114ft HL=1.142ft Hev= .00ft
107.45	.94	Free Outfall		
		FULL FLOW...Lfull=200.57ft		Vh=.118ft HL=1.465ft Hev= .00ft
107.50	.95	Free Outfall		
		FULL FLOW...Lfull=217.08ft		Vh=.120ft HL=1.598ft Hev= .00ft

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
102.35	.00	Free Outfall		None contributing
102.45	.00	Free Outfall		None contributing
102.55	.00	Free Outfall		None contributing
102.65	.00	Free Outfall		None contributing
102.75	.00	Free Outfall		None contributing
102.85	.00	Free Outfall		None contributing
102.95	.00	Free Outfall		None contributing
103.05	.00	Free Outfall		None contributing
103.15	.00	Free Outfall		None contributing
103.25	.00	Free Outfall		None contributing
103.35	.00	Free Outfall		None contributing
103.45	.00	Free Outfall		None contributing
103.55	.00	Free Outfall		None contributing
103.65	.00	Free Outfall		None contributing
103.75	.00	Free Outfall		None contributing
103.85	.00	Free Outfall		None contributing
103.95	.00	Free Outfall		None contributing
104.05	.00	Free Outfall		None contributing
104.15	.00	Free Outfall		None contributing
104.25	.00	Free Outfall		None contributing
104.35	.00	Free Outfall		None contributing
104.45	.00	Free Outfall		None contributing
104.55	.00	Free Outfall		None contributing
104.65	.00	Free Outfall		None contributing
104.75	.00	Free Outfall		None contributing
104.85	.00	Free Outfall		None contributing
104.95	.00	Free Outfall		None contributing
105.05	.00	Free Outfall		None contributing
105.15	.00	Free Outfall		None contributing
105.25	.00	Free Outfall		None contributing
105.35	.00	Free Outfall		None contributing
105.45	.00	Free Outfall		None contributing
105.55	.00	Free Outfall		None contributing
105.65	.00	Free Outfall		None contributing
105.75	.00	Free Outfall		None contributing
105.85	.00	Free Outfall		None contributing
105.95	.00	Free Outfall		None contributing
106.05	.00	Free Outfall		None contributing

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
106.15	.00	Free Outfall		None contributing
106.25	.00	Free Outfall		None contributing
106.33	.00	Free Outfall		None contributing
106.35	.00	Free Outfall		CO
106.45	.03	Free Outfall		CO
106.55	.10	Free Outfall		CO
106.65	.21	Free Outfall		CO
106.75	.34	Free Outfall		CO
106.85	.50	Free Outfall		CO
106.95	.66	Free Outfall		CO
107.05	.83	Free Outfall		CO
107.15	.91	Free Outfall		CO
107.25	.92	Free Outfall		CO
107.35	.93	Free Outfall		CO
107.45	.94	Free Outfall		CO
107.50	.95	Free Outfall		CO

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (8.0000 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
102.35	.0000	.00
102.45	.0022	.02
102.55	.0087	.07
102.65	.0197	.16
102.75	.0349	.28
102.85	.0546	.44
102.95	.0640	.52
103.05	.0742	.60
103.15	.0851	.69
103.25	.0968	.78
103.35	.1092	.88
103.45	.1192	.96
103.55	.1297	1.05
103.65	.1406	1.13
103.75	.1520	1.23
103.85	.1638	1.32
103.95	.1740	1.40
104.05	.1846	1.49
104.15	.1955	1.58
104.25	.2068	1.67
104.35	.2183	1.76
104.45	.2287	1.85
104.55	.2394	1.93
104.65	.2503	2.02
104.75	.2614	2.11
104.85	.2728	2.20
104.95	.2833	2.29
105.05	.2940	2.37
105.15	.3049	2.46
105.25	.3160	2.55
105.35	.3273	2.64
105.45	.3631	2.93
105.55	.3831	3.09
105.65	.3857	3.11
105.75	.3884	3.13
105.85	.3911	3.15
105.95	.3937	3.18
106.05	.3964	3.20
106.15	.3991	3.22
106.25	.4018	3.24
106.33	.4040	3.26
106.35	.4045	3.26

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (8.0000 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
106.45	.4073	3.29
106.55	.4100	3.31
106.65	.4127	3.33
106.75	.4155	3.35
106.85	.4182	3.37
106.95	.4210	3.40
107.05	.4238	3.42
107.15	.4266	3.44
107.25	.4294	3.46
107.35	.4322	3.49
107.45	.4350	3.51
107.50	.4364	3.52

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
102.35	.00	.000	.0000	.00	.00	.00
102.45	.00	.002	.0022	.02	.02	.24
102.55	.00	.004	.0087	.07	.07	.51
102.65	.00	.005	.0197	.16	.16	.82
102.75	.00	.007	.0349	.28	.28	1.16
102.85	.00	.009	.0546	.44	.44	1.54
102.95	.00	.011	.0640	.52	.52	1.84
103.05	.00	.013	.0742	.60	.60	2.14
103.15	.00	.015	.0851	.69	.69	2.45
103.25	.00	.016	.0968	.78	.78	2.76
103.35	.00	.018	.1092	.88	.88	3.08
103.45	.00	.020	.1192	.96	.96	3.38
103.55	.00	.022	.1297	1.05	1.05	3.69
103.65	.00	.024	.1406	1.13	1.13	4.00
103.75	.00	.025	.1520	1.23	1.23	4.31
103.85	.00	.027	.1638	1.32	1.32	4.62
103.95	.00	.029	.1740	1.40	1.40	4.93
104.05	.00	.031	.1846	1.49	1.49	5.23
104.15	.00	.033	.1955	1.58	1.58	5.54
104.25	.00	.035	.2068	1.67	1.67	5.85

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
104.35	.00	.036	.2183	1.76	1.76	6.16
104.45	.00	.038	.2287	1.85	1.85	6.47
104.55	.00	.040	.2394	1.93	1.93	6.77
104.65	.00	.042	.2503	2.02	2.02	7.08
104.75	.00	.044	.2614	2.11	2.11	7.39
104.85	.00	.045	.2728	2.20	2.20	7.70
104.95	.00	.047	.2833	2.29	2.29	8.01
105.05	.00	.049	.2940	2.37	2.37	8.31
105.15	.00	.051	.3049	2.46	2.46	8.62
105.25	.00	.053	.3160	2.55	2.55	8.93
105.35	.00	.055	.3273	2.64	2.64	9.24
105.45	.00	.056	.3631	2.93	2.93	9.75
105.55	.00	.057	.3831	3.09	3.09	10.02
105.65	.00	.057	.3857	3.11	3.11	10.05
105.75	.00	.057	.3884	3.13	3.13	10.07
105.85	.00	.057	.3911	3.15	3.15	10.10
105.95	.00	.057	.3937	3.18	3.18	10.12
106.05	.00	.057	.3964	3.20	3.20	10.14
106.15	.00	.057	.3991	3.22	3.22	10.17
106.25	.00	.057	.4018	3.24	3.24	10.19

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 8.0000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 102.35 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
106.33	.00	.057	.4040	3.26	3.26	10.21
106.35	.00	.057	.4045	3.26	3.26	10.22
106.45	.03	.057	.4073	3.29	3.31	10.27
106.55	.10	.058	.4100	3.31	3.41	10.37
106.65	.21	.058	.4127	3.33	3.54	10.50
106.75	.34	.058	.4155	3.35	3.69	10.66
106.85	.50	.058	.4182	3.37	3.87	10.84
106.95	.66	.058	.4210	3.40	4.06	11.03
107.05	.83	.058	.4238	3.42	4.25	11.22
107.15	.91	.058	.4266	3.44	4.35	11.32
107.25	.92	.058	.4294	3.46	4.38	11.36
107.35	.93	.058	.4322	3.49	4.41	11.39
107.45	.94	.058	.4350	3.51	4.45	11.43
107.50	.95	.058	.4364	3.52	4.47	11.45

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POND 10 IN

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Adding in hydrograph that is truncated on left...				
WARNING: Missed peak when adding hydrograph...				
ADDLINK 20	AREA-A		HYG 1PROP	A1

INFLOWS TO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	HYG 1PROP	A1	.684	16.5000	5.10

TOTAL FLOW INTO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POND 10 IN	A1	.678	16.4000	4.74

TOTAL NODE INFLOW...
HYG file =
HYG ID = POND 10 IN
HYG Tag = A1

Peak Discharge = 4.74 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .678 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.04	.10	.12	.12	.12
1.0000	.13	.13	.13	.13	.13
2.0000	.13	.13	.13	.14	.14
3.0000	.14	.14	.14	.14	.14
4.0000	.14	.15	.15	.15	.15
5.0000	.16	.16	.16	.16	.16
6.0000	.16	.16	.17	.17	.17
7.0000	.17	.18	.18	.18	.18
8.0000	.18	.19	.19	.19	.20
9.0000	.20	.20	.21	.21	.22
10.0000	.22	.22	.23	.24	.24
11.0000	.25	.25	.26	.26	.27
12.0000	.28	.29	.30	.30	.31
13.0000	.32	.33	.35	.36	.38
14.0000	.40	.42	.45	.48	.52
15.0000	.56	.63	.68	.75	.93
16.0000	1.39	3.65	4.74	3.46	.91
17.0000	.56	.48	.42	.38	.34
18.0000	.32	.30	.28	.26	.25
19.0000	.24	.23	.22	.21	.20
20.0000	.20	.19	.18	.15	.11
21.0000	.17	.16	.16	.16	.15
22.0000	.15	.15	.14	.14	.14
23.0000	.14	.14	.13	.13	.10
24.0000	.00				

HYG file =
HYG ID = POND 10 INF
HYG Tag = A1

Peak Discharge = 3.42 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .655 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.01	.04	.07	.10
1.0000	.11	.12	.12	.13	.13
2.0000	.13	.13	.13	.13	.14
3.0000	.14	.14	.14	.14	.14
4.0000	.14	.14	.15	.15	.15
5.0000	.15	.15	.16	.16	.16
6.0000	.16	.16	.16	.17	.17
7.0000	.17	.17	.18	.18	.18
8.0000	.18	.18	.19	.19	.19
9.0000	.20	.20	.20	.21	.21
10.0000	.22	.22	.23	.23	.24
11.0000	.24	.25	.25	.26	.27
12.0000	.27	.28	.29	.30	.31
13.0000	.31	.32	.33	.35	.37
14.0000	.38	.41	.43	.45	.48
15.0000	.51	.55	.61	.67	.77
16.0000	.99	1.87	3.42	3.39	2.10
17.0000	1.32	.86	.62	.50	.42
18.0000	.34	.31	.29	.27	.26
19.0000	.25	.24	.23	.22	.21
20.0000	.20	.20	.19	.17	.14
21.0000	.14	.16	.16	.16	.16
22.0000	.15	.15	.15	.15	.14
23.0000	.14	.14	.14	.13	.12
24.0000	.08	.05	.03	.02	.01
25.0000	.01	.01	.01	.01	.01
26.0000	.01	.00	.00	.00	.00
27.0000	.00				

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A1
Outflow HYG file = NONE STORED - POND 10      OUT A1

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   8.0000 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   102.35 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      4.74 cfs    at   16.4000 hrs
Peak Outflow      =       .82 cfs    at   16.4000 hrs
Peak Infiltration =      3.42 cfs    at   16.4000 hrs
-----------------------------------------------------
Peak Elevation    =    107.04 ft
Peak Storage =           .058 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =        .678
- Infiltration =        .655
- HYG Vol OUT  =        .023
- Retained Vol =        .000
                   ----------
Unrouted Vol =       -.000 ac-ft  (.000% of Inflow Volume)


WARNING: Inflow hydrograph truncated on left side.
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A1
Outflow HYG file = NONE STORED - POND 10      OUT A1

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   8.0000 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------

Weighted Avg. Plug Time =     .3056 hrs
Max.Plug Vol. Plug Time =     .1699 hrs
Max.Inflow Plug Volume  =      .069 ac-ft   (From 16.2000 to 16.4000 hrs)
--------------------------------------
```

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
.0000	.04	.00	.00	.00	.00	.000	102.35
.2000	.10	.12	.15	.01	.00	.001	102.41
.4000	.12	.27	.35	.04	.00	.003	102.49
.6000	.12	.37	.51	.07	.00	.004	102.55
.8000	.12	.42	.62	.10	.00	.004	102.58
1.0000	.13	.44	.67	.11	.00	.005	102.60
1.2000	.13	.45	.69	.12	.00	.005	102.61
1.4000	.13	.45	.70	.12	.00	.005	102.61
1.6000	.13	.45	.71	.13	.00	.005	102.61
1.8000	.13	.46	.71	.13	.00	.005	102.62
2.0000	.13	.46	.71	.13	.00	.005	102.62
2.2000	.13	.46	.72	.13	.00	.005	102.62
2.4000	.13	.46	.73	.13	.00	.005	102.62
2.6000	.14	.47	.73	.13	.00	.005	102.62
2.8000	.14	.47	.74	.14	.00	.005	102.62
3.0000	.14	.47	.74	.14	.00	.005	102.63
3.2000	.14	.47	.75	.14	.00	.005	102.63
3.4000	.14	.47	.75	.14	.00	.005	102.63
3.6000	.14	.47	.76	.14	.00	.005	102.63
3.8000	.14	.48	.76	.14	.00	.005	102.63
4.0000	.14	.48	.76	.14	.00	.005	102.63
4.2000	.15	.48	.77	.14	.00	.005	102.63
4.4000	.15	.48	.77	.15	.00	.005	102.63
4.6000	.15	.48	.78	.15	.00	.005	102.64
4.8000	.15	.49	.78	.15	.00	.005	102.64
5.0000	.16	.49	.79	.15	.00	.005	102.64
5.2000	.16	.49	.80	.15	.00	.005	102.64
5.4000	.16	.50	.81	.16	.00	.005	102.65
5.6000	.16	.50	.81	.16	.00	.005	102.65
5.8000	.16	.50	.82	.16	.00	.005	102.65
6.0000	.16	.50	.82	.16	.00	.005	102.65
6.2000	.16	.50	.83	.16	.00	.006	102.65
6.4000	.17	.51	.83	.16	.00	.006	102.65
6.6000	.17	.51	.84	.17	.00	.006	102.66
6.8000	.17	.51	.84	.17	.00	.006	102.66
7.0000	.17	.51	.85	.17	.00	.006	102.66
7.2000	.18	.51	.86	.17	.00	.006	102.66
7.4000	.18	.52	.87	.18	.00	.006	102.66
7.6000	.18	.52	.87	.18	.00	.006	102.67
7.8000	.18	.52	.88	.18	.00	.006	102.67
8.0000	.18	.52	.89	.18	.00	.006	102.67
8.2000	.19	.52	.89	.18	.00	.006	102.67

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
8.4000	.19	.53	.90	.19	.00	.006	102.67
8.6000	.19	.53	.91	.19	.00	.006	102.68
8.8000	.20	.53	.92	.19	.00	.006	102.68
9.0000	.20	.53	.93	.20	.00	.006	102.68
9.2000	.20	.54	.94	.20	.00	.006	102.69
9.4000	.21	.54	.95	.20	.00	.006	102.69
9.6000	.21	.54	.96	.21	.00	.006	102.69
9.8000	.22	.54	.97	.21	.00	.006	102.69
10.0000	.22	.55	.98	.22	.00	.006	102.70
10.2000	.22	.55	.99	.22	.00	.006	102.70
10.4000	.23	.55	1.01	.23	.00	.006	102.70
10.6000	.24	.56	1.02	.23	.00	.007	102.71
10.8000	.24	.56	1.04	.24	.00	.007	102.71
11.0000	.25	.57	1.05	.24	.00	.007	102.72
11.2000	.25	.57	1.07	.25	.00	.007	102.72
11.4000	.26	.58	1.08	.25	.00	.007	102.73
11.6000	.26	.58	1.10	.26	.00	.007	102.73
11.8000	.27	.59	1.12	.27	.00	.007	102.74
12.0000	.28	.59	1.14	.27	.00	.007	102.74
12.2000	.29	.60	1.16	.28	.00	.007	102.75
12.4000	.30	.60	1.19	.29	.00	.007	102.76
12.6000	.30	.61	1.21	.30	.00	.007	102.76
12.8000	.31	.61	1.22	.31	.00	.008	102.76
13.0000	.32	.61	1.24	.31	.00	.008	102.77
13.2000	.33	.61	1.26	.32	.00	.008	102.78
13.4000	.35	.62	1.29	.33	.00	.008	102.78
13.6000	.36	.63	1.33	.35	.00	.008	102.79
13.8000	.38	.63	1.36	.37	.00	.008	102.80
14.0000	.40	.64	1.41	.38	.00	.008	102.81
14.2000	.42	.65	1.46	.41	.00	.009	102.83
14.4000	.45	.66	1.51	.43	.00	.009	102.84
14.6000	.48	.68	1.58	.45	.00	.009	102.86
14.8000	.52	.73	1.68	.48	.00	.010	102.90
15.0000	.56	.79	1.80	.51	.00	.011	102.94
15.2000	.63	.87	1.98	.55	.00	.012	103.00
15.4000	.68	.96	2.18	.61	.00	.013	103.06
15.6000	.75	1.05	2.40	.67	.00	.014	103.13
15.8000	.93	1.19	2.73	.77	.00	.016	103.24
16.0000	1.39	1.51	3.50	.99	.00	.021	103.49
16.2000	3.65	2.81	6.54	1.87	.00	.039	104.48
16.4000	4.74	2.74	11.20	3.42	.82	.058	107.04
16.6000	3.46	2.99	10.94	3.39	.59	.058	106.91

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
16.8000	.91	3.16	7.36	2.10	.00	.043	104.74
17.0000	.56	1.99	4.63	1.32	.00	.027	103.85
17.2000	.48	1.30	3.03	.86	.00	.018	103.33
17.4000	.42	.97	2.20	.62	.00	.013	103.07
17.6000	.38	.77	1.76	.50	.00	.010	102.93
17.8000	.34	.65	1.49	.42	.00	.009	102.84
18.0000	.32	.62	1.31	.34	.00	.008	102.79
18.2000	.30	.61	1.24	.31	.00	.008	102.77
18.4000	.28	.60	1.18	.29	.00	.007	102.76
18.6000	.26	.59	1.14	.27	.00	.007	102.74
18.8000	.25	.58	1.11	.26	.00	.007	102.73
19.0000	.24	.57	1.07	.25	.00	.007	102.72
19.2000	.23	.56	1.04	.24	.00	.007	102.71
19.4000	.22	.56	1.01	.23	.00	.006	102.71
19.6000	.21	.55	.99	.22	.00	.006	102.70
19.8000	.20	.54	.97	.21	.00	.006	102.69
20.0000	.20	.54	.94	.20	.00	.006	102.69
20.2000	.19	.53	.92	.20	.00	.006	102.68
20.4000	.18	.53	.90	.19	.00	.006	102.67
20.6000	.15	.51	.86	.17	.00	.006	102.66
20.8000	.11	.48	.77	.14	.00	.005	102.63
21.0000	.17	.48	.76	.14	.00	.005	102.63
21.2000	.16	.50	.81	.16	.00	.005	102.65
21.4000	.16	.50	.82	.16	.00	.005	102.65
21.6000	.16	.50	.82	.16	.00	.005	102.65
21.8000	.15	.50	.81	.16	.00	.005	102.65
22.0000	.15	.50	.80	.15	.00	.005	102.64
22.2000	.15	.49	.79	.15	.00	.005	102.64
22.4000	.14	.49	.78	.15	.00	.005	102.64
22.6000	.14	.48	.77	.15	.00	.005	102.64
22.8000	.14	.48	.77	.14	.00	.005	102.63
23.0000	.14	.48	.76	.14	.00	.005	102.63
23.2000	.14	.47	.75	.14	.00	.005	102.63
23.4000	.13	.47	.74	.14	.00	.005	102.62
23.6000	.13	.46	.73	.13	.00	.005	102.62
23.8000	.10	.45	.69	.12	.00	.005	102.61
24.0000	.00	.39	.55	.08	.00	.004	102.56
24.2000	.00	.29	.39	.05	.00	.003	102.50
24.4000	.00	.24	.29	.03	.00	.002	102.47
24.6000	.00	.20	.24	.02	.00	.002	102.45
24.8000	.00	.17	.20	.01	.00	.002	102.43
25.0000	.00	.15	.17	.01	.00	.001	102.42

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A1
Outflow HYG file = NONE STORED - POND 10 OUT A1

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
25.2000	.00	.12	.15	.01	.00	.001	102.41
25.4000	.00	.11	.12	.01	.00	.001	102.40
25.6000	.00	.09	.11	.01	.00	.001	102.39
25.8000	.00	.08	.09	.01	.00	.001	102.39
26.0000	.00	.07	.08	.01	.00	.001	102.38
26.2000	.00	.06	.07	.00	.00	.001	102.38
26.4000	.00	.05	.06	.00	.00	.000	102.37
26.6000	.00	.04	.05	.00	.00	.000	102.37
26.8000	.00	.03	.04	.00	.00	.000	102.37
27.0000	.00	.03	.03	.00	.00	.000	102.36

POND ROUTED TOTAL OUTFLOW HYG...
HYG file =
HYG ID = POND 10 OUT
HYG Tag = A1

Peak Discharge = .82 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .023 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.00	.00	.00
1.0000	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
5.0000	.00	.00	.00	.00	.00
6.0000	.00	.00	.00	.00	.00
7.0000	.00	.00	.00	.00	.00
8.0000	.00	.00	.00	.00	.00
9.0000	.00	.00	.00	.00	.00
10.0000	.00	.00	.00	.00	.00
11.0000	.00	.00	.00	.00	.00
12.0000	.00	.00	.00	.00	.00
13.0000	.00	.00	.00	.00	.00
14.0000	.00	.00	.00	.00	.00
15.0000	.00	.00	.00	.00	.00
16.0000	.00	.00	.82	.59	.00
17.0000	.00	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
20.0000	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
24.0000	.00	.00	.00	.00	.00
25.0000	.00	.00	.00	.00	.00
26.0000	.00	.00	.00	.00	.00
27.0000	.00				

```
DIVERTED HYDROGRAPH...
HYG file =
HYG ID   = ROUTE 10
HYG Tag  = A1
-----------------------------------
Peak Discharge =          .82 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .023 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs				
16.2000	.00	.82	.59	.00

Index of Starting Page Numbers for ID Names

----- A -----
AREA-A A1... 4.01

----- O -----
Outlet 1... 9.01, 9.04, 9.08

----- P -----
POINT B-4 A1... 5.01
POND 10... 8.01, 10.01, 10.03, 6.01,
7.01
POND 10 IN A1... 10.06
POND 10 INF A1... 10.08
POND 10 OUT A1... 10.09, 10.10,
10.11, 10.15

----- R -----
ROUTE 10 A1... 10.16

----- W -----
WARNING... 1.01
Watershed... 2.01, 3.01, 3.02, 3.03

Pond Analysis

Proposed 100 yr-A2

Shiloh West Medical Center
Site: Palmdale & Mesa Linda Rd.

JOB TITLE

Project Date: 1/24/2023
Project Engineer: DAVID C. QUEYREL
Project Title: Shiloh West Medical
Project Comments:
ANALYSIS USING 24 HOUR 10YR HYDROGRAPH WITH PEAK RUNOFF ADDED PER
1 HOUR 100 YR RATIONAL METHOD PER SAN BERNARDINO HYDROLOGY
HYDROGRAPGH TO DETERMINE DETENTION OF PEAK STORM RUNOFF BELOW
EXISTING AMOUNT.

********** WARNING MSG **********

WARNING..... WARNING MESSAGES 1.01

********** MASTER SUMMARY **********

Watershed..... Master Network Summary 2.01

********** NETWORK SUMMARIES (DETAILED) **********

Watershed..... A2
Executive Summary (Nodes) 3.01
Executive Summary (Links) 3.02
Network Calcs Sequence 3.03

********** RUNOFF HYDROGRAPHS **********

AREA-A..... A2
Read HYG 4.01

********** HYG ADDITION **********

POINT B-4..... A2
Node: Addition Summary 5.01

********** TIME VS.ELEV **********

POND 10..... A2
Time-Elev 6.01

Table of Contents (continued)

********** TIME VS.VOL **********

POND 10..... A2
Time vs. Volume 7.01

********** POND VOLUMES **********

POND 10..... Vol: Elev-Volume 8.01

********** OUTLET STRUCTURES **********

Outlet 1..... Outlet Input Data 9.01
Individual Outlet Curves 9.04
Composite Rating Curve 9.07

********** POND ROUTING **********

POND 10..... Pond Infiltration Calcs 10.01
Pond E-V-Q Table 10.03

POND 10 IN A2
Node: Pond Inflow Summary 10.06

POND 10 INF A2
Pond Infiltration HYG 10.08

POND 10 OUT A2
Pond Routing Summary 10.09
Detention Time 10.10
Pond Routing Calcs (Total Out) 10.11
Pond Routed HYG (total out) 10.15

ROUTE 10..... A2
Diverted Hydrograph 10.16

```
WARNING: Flow direction set to forward and reverse for ID: CO outlet:Outlet 1
To eliminate this warning, edit outlet data and select forward only.
If reverse flow analysis is required, then the tailwater conditions
(accessed via TW button), must be set to interconnected pond.
Check data for..... Type: Outlet Input Data   Name: Outlet 1

WARNING: Adding in hydrograph that is truncated on left...
Check output for: Node: Pond Inflow Summary  POND 10      IN

WARNING: Missed peak when adding hydrograph...
Check output for: Node: Pond Inflow Summary  POND 10      IN

WARNING: Inflow hydrograph truncated on left side.
Check output for: Pond Routing Summary  POND 10      OUT  A2
```

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
AREA-A		HYG	A2	.563	L	16.5000	4.20		
*POINT B-4		JCT	A2	.102		16.4000	2.73		
POND 10	IN	POND	A2	.559	L	16.4000	3.91		
POND 10	OUT	POND	A2	.102		16.4000	2.73	105.49	.088

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

	Node ID		Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	AREA-A		HYG	.563	L	16.5000	4.20	
Outfall	POINT B-4		JCT	.102		16.4000	2.73	
	POND 10	IN	POND	.559	L	16.4000	3.91	
	POND 10	OUT	POND	.102		16.4000	2.73	105.49

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points	
ADDLINK 20	ADD	UN	.563	L	16.5000	4.20	AREA-A	
		DL	.563	L	16.5000	4.20		
		DN	.559	L	16.4000	3.91	POND 10	IN
ROUTE 10	PONDrt	UN	.559	L	16.4000	3.91	POND 10	IN
ROUTE 10			.102		16.4000	2.73	POND 10	OUT
		DL	.102		16.4000	2.73		
		DN	.102		16.4000	2.73	POINT B-4	

NETWORK RUNOFF NODE SEQUENCE

Runoff Data	Apply to Node	Receiving Link
Read HYGAREA-A	HYG Qin AREA-A	Add Hyd AREA-A

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node			DNstream Node		
Add Hyd ADDLINK 20	HYG Qin AREA-A			Pond	POND 10	IN
POND ROUTE INFILTRATION AND TOTAL OUTFLOW...						
Infiltration	Pond	POND 10	IN	Infilt.	POND 10	INF
Total Pond Outflow	Pond	POND 10	IN	Outflow	POND 10	OUT
SET POND ROUTING LINK TO TOTAL POND OUTFLOW...						
Outlet ROUTE 10	Outflow	POND 10	OUT	Jct	POINT B-4	

HYG file =
HYG ID = HYG 1PROP
HYG Tag = A2

Peak Discharge =	4.20	cfs
Time to Peak =	16.5000	hrs
HYG Volume =	.563	ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2500 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.04	.10	.10	.10	.10
1.2500	.10	.11	.11	.11	.11
2.5000	.11	.11	.11	.12	.12
3.7500	.12	.12	.12	.12	.12
5.0000	.13	.13	.13	.13	.13
6.2500	.14	.14	.14	.14	.14
7.5000	.15	.15	.15	.15	.16
8.7500	.16	.17	.17	.17	.18
10.0000	.18	.19	.19	.20	.20
11.2500	.21	.21	.22	.23	.24
12.5000	.25	.25	.26	.27	.29
13.7500	.31	.33	.35	.38	.42
15.0000	.46	.53	.59	.67	1.14
16.2500	3.47	4.20	.82	.46	.38
17.5000	.33	.29	.26	.24	.22
18.7500	.21	.20	.19	.18	.17
20.0000	.16	.15	.15	.08	.14
21.2500	.14	.13	.13	.12	.12
22.5000	.12	.12	.11	.11	.11
23.7500	.10	.00			

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POINT B-4

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ROUTE 10	POND 10	IN	ROUTE 10	A2

INFLOWS TO: POINT B-4

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	ROUTE 10	A2	.102	16.4000	2.73

TOTAL FLOW INTO: POINT B-4

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POINT B-4	A2	.102	16.4000	2.73

```
TOTAL NODE INFLOW...
HYG file =
HYG ID   = POINT B-4
HYG Tag  = A2
-----------------------------------
Peak Discharge =         2.73 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .102 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
16.0000	.00	.22	2.73	2.40	.77
17.0000	.04	.00			

TIME vs. ELEVATION (ft)

Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	101.23	101.28	101.34	101.39	101.43
1.0000	101.46	101.48	101.49	101.50	101.51
2.0000	101.51	101.51	101.52	101.52	101.52
3.0000	101.53	101.53	101.53	101.53	101.54
4.0000	101.54	101.54	101.55	101.55	101.56
5.0000	101.56	101.57	101.58	101.58	101.59
6.0000	101.59	101.60	101.61	101.61	101.62
7.0000	101.63	101.64	101.65	101.66	101.66
8.0000	101.67	101.68	101.69	101.70	101.71
9.0000	101.73	101.74	101.75	101.76	101.77
10.0000	101.79	101.80	101.82	101.83	101.85
11.0000	101.86	101.88	101.90	101.92	101.94
12.0000	101.96	101.98	102.00	102.03	102.05
13.0000	102.08	102.11	102.14	102.17	102.21
14.0000	102.26	102.31	102.37	102.44	102.51
15.0000	102.60	102.71	102.84	102.98	103.18
16.0000	103.54	104.59	105.49	105.39	104.87
17.0000	104.42	104.19	103.96	103.74	103.53
18.0000	103.34	103.16	102.99	102.85	102.71
19.0000	102.59	102.49	102.39	102.30	102.22
20.0000	102.15	102.09	102.03	101.97	101.90
21.0000	101.84	101.81	101.79	101.76	101.74
22.0000	101.72	101.70	101.68	101.66	101.64
23.0000	101.63	101.62	101.60	101.59	101.57
24.0000	101.51	101.44	101.40	101.37	101.35
25.0000	101.33	101.32	101.31	101.30	101.29
26.0000	101.29	101.28	101.27	101.27	101.27
27.0000	101.26	101.26	101.25	101.25	101.25

TIME vs. VOLUME (ac-ft)

Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.000	.001	.002	.003	.004
1.0000	.005	.005	.005	.006	.006
2.0000	.006	.006	.006	.006	.006
3.0000	.006	.006	.006	.006	.006
4.0000	.006	.006	.007	.007	.007
5.0000	.007	.007	.007	.007	.007
6.0000	.008	.008	.008	.008	.008
7.0000	.008	.008	.009	.009	.009
8.0000	.009	.009	.010	.010	.010
9.0000	.010	.011	.011	.011	.011
10.0000	.012	.012	.012	.012	.013
11.0000	.013	.013	.014	.014	.015
12.0000	.015	.016	.016	.017	.017
13.0000	.018	.018	.019	.020	.020
14.0000	.021	.022	.024	.025	.026
15.0000	.028	.031	.033	.036	.040
16.0000	.048	.070	.088	.086	.075
17.0000	.066	.061	.057	.052	.048
18.0000	.044	.040	.037	.033	.031
19.0000	.028	.026	.024	.022	.021
20.0000	.019	.018	.017	.015	.014
21.0000	.013	.012	.011	.011	.011
22.0000	.010	.010	.009	.009	.009
23.0000	.008	.008	.008	.007	.007
24.0000	.006	.004	.004	.003	.002
25.0000	.002	.002	.002	.001	.001
26.0000	.001	.001	.001	.001	.001
27.0000	.001	.001	.001	.000	.000

USER DEFINED VOLUME RATING TABLE

Elevation (ft)	Volume (ac-ft)
101.23	.000
101.50	.006
102.00	.016
102.50	.026
103.00	.037
103.50	.047
104.00	.057
104.50	.068
105.00	.078
105.50	.089

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 101.23 ft
Increment = .10 ft
Max. Elev.= 105.50 ft

```
*********************************************
                OUTLET CONNECTIVITY
*********************************************

 ---> Forward Flow Only (UpStream to DnStream)
<---  Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed
```

Structure	No.		Outfall	E1, ft	E2, ft
Culvert-Circular	CO	--->	TW	104.300	105.500
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID      = CO
Structure Type    = Culvert-Circular
------------------------------------
No. Barrels       =         1
Barrel Diameter   =    1.0000 ft
Upstream Invert   =    104.30 ft
Dnstream Invert   =    104.00 ft
Horiz. Length     =     51.00 ft
Barrel Length     =     51.00 ft
Barrel Slope      =    .00588 ft/ft

OUTLET CONTROL DATA...
Mannings n        =     .0130
Ke                =     .5000  (forward entrance loss)
Kb                =   .031274  (per ft of full flow)
Kr                =     .2000  (reverse entrance loss)
HW Convergence    =      .001  +/- ft

INLET CONTROL DATA...
Equation form     =         1
Inlet Control K   =     .0610
Inlet Control M   =     .7500
Inlet Control c   =    .04230
Inlet Control Y   =     .8200
T1 ratio (HW/D)   =     1.193
T2 ratio (HW/D)   =     1.494
Slope Factor      =     -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use   submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev =    105.49 ft  --->  Flow =      2.75 cfs
At T2 Elev =    105.79 ft  --->  Flow =      3.14 cfs
```

OUTLET STRUCTURE INPUT DATA

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .01 cfs
Max. Q tolerance = .01 cfs

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: 2.94 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
101.23	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.33	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.43	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.53	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.63	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.73	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.83	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
101.93	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.03	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.13	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.23	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.33	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.43	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.53	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.63	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.73	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
102.83	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: 2.94 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
102.93	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.03	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.13	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.23	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.33	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.43	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.53	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.63	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.73	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.83	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
103.93	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.03	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.13	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.23	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.30	.00	Free Outfall		Upstream HW & DNstream TW < Inv.El
104.33	.00	Free Outfall		CRIT.DEPTH CONTROL Vh= .010ft Dcr= .031ft CRIT.DEPTH Hev= .00ft
104.43	.04	Free Outfall		BACKWATER CONTROL.. Vh= .025ft hwDi= .089ft Lbw= 51.0ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = CO (Culvert-Circular)

Mannings open channel maximum capacity: 2.94 cfs
Upstream ID = (Pond Water Surface)
DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
104.53	.13	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .054ft Dcr= .156ft CRIT.DEPTH Hev= .00ft
104.63	.27	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .074ft Dcr= .211ft H.JUMP IN PIPE Hev= .00ft
104.73	.46	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .099ft Dcr= .277ft CRIT.DEPTH Hev= .00ft
104.83	.67	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .126ft Dcr= .344ft CRIT.DEPTH Hev= .00ft
104.93	.93	Free Outfall		
		CRIT.DEPTH CONTROL		Vh= .151ft Dcr= .402ft CRIT.DEPTH Hev= .00ft
105.03	1.21	Free Outfall		
		BACKWATER CONTROL..		Vh= .169ft hwDi= .472ft Lbw= 51.0ft Hev= .00ft
105.13	1.52	Free Outfall		
		BACKWATER CONTROL..		Vh= .200ft hwDi= .530ft Lbw= 51.0ft Hev= .00ft
105.23	1.85	Free Outfall		
		INLET CONTROL...		Equ.1: HW =.93 dc=.578 Ac=.4702
105.33	2.18	Free Outfall		
		INLET CONTROL...		Equ.1: HW =1.03 dc=.631 Ac=.5217
105.43	2.53	Free Outfall		
		INLET CONTROL...		Equ.1: HW =1.13 dc=.681 Ac=.5699
105.50	2.76	Free Outfall		
		INLET CONTROL...		Transition: HW =1.20

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
101.23	.00	Free Outfall		None contributing
101.33	.00	Free Outfall		None contributing
101.43	.00	Free Outfall		None contributing
101.53	.00	Free Outfall		None contributing
101.63	.00	Free Outfall		None contributing
101.73	.00	Free Outfall		None contributing
101.83	.00	Free Outfall		None contributing
101.93	.00	Free Outfall		None contributing
102.03	.00	Free Outfall		None contributing
102.13	.00	Free Outfall		None contributing
102.23	.00	Free Outfall		None contributing
102.33	.00	Free Outfall		None contributing
102.43	.00	Free Outfall		None contributing
102.53	.00	Free Outfall		None contributing
102.63	.00	Free Outfall		None contributing
102.73	.00	Free Outfall		None contributing
102.83	.00	Free Outfall		None contributing
102.93	.00	Free Outfall		None contributing
103.03	.00	Free Outfall		None contributing
103.13	.00	Free Outfall		None contributing
103.23	.00	Free Outfall		None contributing
103.33	.00	Free Outfall		None contributing
103.43	.00	Free Outfall		None contributing
103.53	.00	Free Outfall		None contributing
103.63	.00	Free Outfall		None contributing
103.73	.00	Free Outfall		None contributing
103.83	.00	Free Outfall		None contributing
103.93	.00	Free Outfall		None contributing
104.03	.00	Free Outfall		None contributing
104.13	.00	Free Outfall		None contributing
104.23	.00	Free Outfall		None contributing
104.30	.00	Free Outfall		None contributing
104.33	.00	Free Outfall		CO
104.43	.04	Free Outfall		CO
104.53	.13	Free Outfall		CO
104.63	.27	Free Outfall		CO
104.73	.46	Free Outfall		CO
104.83	.67	Free Outfall		CO

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
104.93	.93	Free Outfall		CO
105.03	1.21	Free Outfall		CO
105.13	1.52	Free Outfall		CO
105.23	1.85	Free Outfall		CO
105.33	2.18	Free Outfall		CO
105.43	2.53	Free Outfall		CO
105.50	2.76	Free Outfall		CO

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (1.7140 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
No storage at this elevation... infiltration set to zero.		
101.23	.0000	.00
101.33	.0085	.01
101.43	.0341	.06
101.53	.0652	.11
101.63	.0762	.13
101.73	.0880	.15
101.83	.1007	.17
101.93	.1143	.20
102.03	.1276	.22
102.13	.1390	.24
102.23	.1509	.26
102.33	.1634	.28
102.43	.1763	.30
102.53	.1891	.33
102.63	.2007	.35
102.73	.2128	.37
102.83	.2251	.39
102.93	.2379	.41
103.03	.2504	.43
103.13	.2621	.45
103.23	.2741	.47
103.33	.2863	.49
103.43	.2988	.52
103.53	.3111	.54
103.63	.3229	.56
103.73	.3349	.58
103.83	.3471	.60
103.93	.3595	.62
104.03	.3718	.64
104.13	.3836	.66
104.23	.3956	.68
104.30	.4041	.70
104.33	.4078	.70
104.43	.4202	.73
104.53	.4325	.75
104.63	.4443	.77
104.73	.4564	.79
104.83	.4685	.81
104.93	.4809	.83
105.03	.4931	.85
105.13	.5050	.87
105.23	.5171	.89

INFILTRATION RATING TABLE CALCULATIONS

Infilt.(cfs) = (1.7140 (in/hr) * Area) * Ku
Where: Ku = units conversion factor

W.S.Elev ft	Total Area acres	Infilt. cfs
105.33	.5292	.91
105.43	.5415	.94
105.50	.5503	.95

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 1.7140 in/hr

INITIAL CONDITIONS

Starting WS Elev = 101.23 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
101.23	.00	.000	.0000	.00	.00	.00
101.33	.00	.002	.0085	.01	.01	.27
101.43	.00	.004	.0341	.06	.06	.56
101.53	.00	.006	.0652	.11	.11	.86
101.63	.00	.008	.0762	.13	.13	1.13
101.73	.00	.010	.0880	.15	.15	1.41
101.83	.00	.012	.1007	.17	.17	1.68
101.93	.00	.015	.1143	.20	.20	1.95
102.03	.00	.017	.1276	.22	.22	2.23
102.13	.00	.019	.1390	.24	.24	2.49
102.23	.00	.021	.1509	.26	.26	2.76
102.33	.00	.023	.1634	.28	.28	3.03
102.43	.00	.025	.1763	.30	.30	3.30
102.53	.00	.027	.1891	.33	.33	3.57
102.63	.00	.029	.2007	.35	.35	3.85
102.73	.00	.031	.2128	.37	.37	4.12
102.83	.00	.033	.2251	.39	.39	4.40
102.93	.00	.035	.2379	.41	.41	4.67
103.03	.00	.037	.2504	.43	.43	4.95
103.13	.00	.039	.2621	.45	.45	5.22

LEVEL POOL ROUTING DATA

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Pond Node Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration = 1.7140 in/hr

INITIAL CONDITIONS

Starting WS Elev = 101.23 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .2000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
103.23	.00	.041	.2741	.47	.47	5.49
103.33	.00	.044	.2863	.49	.49	5.76
103.43	.00	.046	.2988	.52	.52	6.03
103.53	.00	.048	.3111	.54	.54	6.31
103.63	.00	.050	.3229	.56	.56	6.58
103.73	.00	.052	.3349	.58	.58	6.85
103.83	.00	.054	.3471	.60	.60	7.12
103.93	.00	.056	.3595	.62	.62	7.39
104.03	.00	.058	.3718	.64	.64	7.67
104.13	.00	.060	.3836	.66	.66	7.94
104.23	.00	.062	.3956	.68	.68	8.21
104.30	.00	.064	.4041	.70	.70	8.40
104.33	.00	.064	.4078	.70	.70	8.48
104.43	.04	.066	.4202	.73	.77	8.80
104.53	.13	.068	.4325	.75	.88	9.16
104.63	.27	.070	.4443	.77	1.04	9.57
104.73	.46	.073	.4564	.79	1.24	10.02
104.83	.67	.075	.4685	.81	1.48	10.51
104.93	.93	.077	.4809	.83	1.76	11.04
105.03	1.21	.079	.4931	.85	2.06	11.59

LEVEL POOL ROUTING DATA

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   101.23 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs
```

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
105.13	1.52	.081	.5050	.87	2.39	12.17
105.23	1.85	.083	.5171	.89	2.74	12.78
105.33	2.18	.085	.5292	.91	3.09	13.38
105.43	2.53	.087	.5415	.94	3.46	14.00
105.50	2.76	.089	.5503	.95	3.71	14.42

SUMMARY FOR HYDROGRAPH ADDITION
at Node: POND 10 IN

HYG Directory: C:\Program Files\Haestad\PPKW\Sample\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
WARNING: Adding in hydrograph that is truncated on left...				
WARNING: Missed peak when adding hydrograph...				
ADDLINK 20	AREA-A		HYG 1PROP	A2

INFLOWS TO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	HYG 1PROP	A2	.563	16.5000	4.20

TOTAL FLOW INTO: POND 10 IN

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	POND 10 IN	A2	.559	16.4000	3.91

TOTAL NODE INFLOW...
HYG file =
HYG ID = POND 10 IN
HYG Tag = A2

Peak Discharge = 3.91 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .559 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.04	.08	.10	.10	.10
1.0000	.10	.10	.11	.11	.11
2.0000	.11	.11	.11	.11	.11
3.0000	.11	.12	.12	.12	.12
4.0000	.12	.12	.12	.12	.12
5.0000	.13	.13	.13	.13	.13
6.0000	.13	.13	.14	.14	.14
7.0000	.14	.14	.15	.15	.15
8.0000	.15	.15	.16	.16	.16
9.0000	.17	.17	.17	.17	.18
10.0000	.18	.18	.19	.20	.20
11.0000	.20	.21	.21	.22	.22
12.0000	.23	.24	.25	.25	.25
13.0000	.26	.27	.28	.30	.31
14.0000	.33	.35	.37	.39	.42
15.0000	.46	.52	.56	.62	.76
16.0000	1.14	3.00	3.91	2.85	.75
17.0000	.46	.39	.35	.31	.28
18.0000	.26	.24	.23	.22	.21
19.0000	.20	.19	.18	.17	.17
20.0000	.16	.16	.15	.12	.09
21.0000	.14	.14	.13	.13	.13
22.0000	.12	.12	.12	.12	.12
23.0000	.11	.11	.11	.11	.08
24.0000	.00				

```
HYG file =
HYG ID   = POND 10      INF
HYG Tag  = A2
-----------------------------------
Peak Discharge =          .95 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .457 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.01	.02	.04	.06
1.0000	.08	.09	.09	.10	.10
2.0000	.10	.10	.11	.11	.11
3.0000	.11	.11	.11	.11	.11
4.0000	.11	.12	.12	.12	.12
5.0000	.12	.12	.12	.12	.12
6.0000	.12	.13	.13	.13	.13
7.0000	.13	.13	.14	.14	.14
8.0000	.14	.14	.14	.15	.15
9.0000	.15	.15	.16	.16	.16
10.0000	.16	.17	.17	.17	.18
11.0000	.18	.19	.19	.19	.20
12.0000	.20	.21	.21	.22	.23
13.0000	.23	.24	.24	.25	.26
14.0000	.27	.28	.29	.31	.32
15.0000	.34	.36	.39	.42	.46
16.0000	.54	.76	.95	.93	.82
17.0000	.72	.67	.63	.58	.54
18.0000	.50	.46	.42	.39	.36
19.0000	.34	.32	.30	.28	.26
20.0000	.24	.23	.22	.21	.19
21.0000	.18	.17	.16	.16	.15
22.0000	.15	.15	.14	.14	.13
23.0000	.13	.13	.13	.12	.12
24.0000	.10	.07	.05	.03	.02
25.0000	.02	.01	.01	.01	.01
26.0000	.01	.01	.01	.01	.01
27.0000	.00	.00	.00	.00	.00

LEVEL POOL ROUTING SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

INITIAL CONDITIONS
----------------------------------
Starting WS Elev   =   101.23 ft
Starting Volume    =     .000 ac-ft
Starting Outflow   =      .00 cfs
Starting Infiltr.  =      .00 cfs
Starting Total Qout=      .00 cfs
Time Increment     =    .2000 hrs


INFLOW/OUTFLOW HYDROGRAPH SUMMARY
=====================================================
Peak Inflow       =      3.91 cfs    at   16.4000 hrs
Peak Outflow      =      2.73 cfs    at   16.4000 hrs
Peak Infiltration =       .95 cfs    at   16.4000 hrs
-----------------------------------------------------
Peak Elevation    =    105.49 ft
Peak Storage =           .088 ac-ft
=====================================================


MASS BALANCE (ac-ft)
---------------------------
+ Initial Vol  =        .000
+ HYG Vol IN   =        .559
- Infiltration =        .457
- HYG Vol OUT  =        .102
- Retained Vol =        .000
                   ----------
Unrouted Vol =        .000 ac-ft  (.000% of Inflow Volume)


WARNING: Inflow hydrograph truncated on left side.
```

DETENTION TIMES SUMMARY

```
HYG Dir          = C:\Program Files\Haestad\PPKW\Sample\
Inflow  HYG file = NONE STORED - POND 10      IN  A2
Outflow HYG file = NONE STORED - POND 10      OUT A2

Pond Node   Data = POND 10
Pond Volume Data = POND 10
Pond Outlet Data = Outlet 1

Infiltration =   1.7140 in/hr

APPROXIMATE DETENTION TIME
--------------------------------------

Weighted Avg. Plug Time =     .8202 hrs
Max.Plug Vol. Plug Time =     .3500 hrs
Max.Inflow Plug Volume  =      .057 ac-ft   (From 16.2000 to 16.4000 hrs)
--------------------------------------
```

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
.0000	.04	.00	.00	.00	.00	.000	101.23
.2000	.08	.11	.12	.01	.00	.001	101.28
.4000	.10	.25	.29	.02	.00	.002	101.34
.6000	.10	.37	.45	.04	.00	.003	101.39
.8000	.10	.45	.57	.06	.00	.004	101.43
1.0000	.10	.50	.66	.08	.00	.005	101.46
1.2000	.10	.54	.71	.09	.00	.005	101.48
1.4000	.11	.56	.75	.09	.00	.005	101.49
1.6000	.11	.58	.78	.10	.00	.006	101.50
1.8000	.11	.59	.79	.10	.00	.006	101.51
2.0000	.11	.60	.81	.10	.00	.006	101.51
2.2000	.11	.61	.82	.10	.00	.006	101.51
2.4000	.11	.62	.83	.11	.00	.006	101.52
2.6000	.11	.62	.84	.11	.00	.006	101.52
2.8000	.11	.63	.85	.11	.00	.006	101.52
3.0000	.11	.63	.86	.11	.00	.006	101.53
3.2000	.12	.64	.86	.11	.00	.006	101.53
3.4000	.12	.64	.87	.11	.00	.006	101.53
3.6000	.12	.65	.88	.11	.00	.006	101.53
3.8000	.12	.66	.88	.11	.00	.006	101.54
4.0000	.12	.66	.89	.11	.00	.006	101.54
4.2000	.12	.67	.90	.12	.00	.006	101.54
4.4000	.12	.68	.91	.12	.00	.007	101.55
4.6000	.12	.69	.92	.12	.00	.007	101.55
4.8000	.12	.70	.93	.12	.00	.007	101.56
5.0000	.13	.71	.95	.12	.00	.007	101.56
5.2000	.13	.73	.97	.12	.00	.007	101.57
5.4000	.13	.74	.99	.12	.00	.007	101.58
5.6000	.13	.76	1.00	.12	.00	.007	101.58
5.8000	.13	.77	1.02	.12	.00	.007	101.59
6.0000	.13	.79	1.04	.12	.00	.008	101.59
6.2000	.13	.80	1.05	.13	.00	.008	101.60
6.4000	.14	.82	1.07	.13	.00	.008	101.61
6.6000	.14	.83	1.09	.13	.00	.008	101.61
6.8000	.14	.85	1.11	.13	.00	.008	101.62
7.0000	.14	.87	1.13	.13	.00	.008	101.63
7.2000	.14	.89	1.16	.13	.00	.008	101.64
7.4000	.15	.91	1.18	.14	.00	.009	101.65
7.6000	.15	.93	1.20	.14	.00	.009	101.66
7.8000	.15	.95	1.23	.14	.00	.009	101.66
8.0000	.15	.97	1.25	.14	.00	.009	101.67
8.2000	.15	.99	1.28	.14	.00	.009	101.68

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
8.4000	.16	1.01	1.30	.14	.00	.010	101.69
8.6000	.16	1.04	1.33	.15	.00	.010	101.70
8.8000	.16	1.06	1.36	.15	.00	.010	101.71
9.0000	.17	1.09	1.39	.15	.00	.010	101.73
9.2000	.17	1.12	1.43	.15	.00	.011	101.74
9.4000	.17	1.14	1.46	.16	.00	.011	101.75
9.6000	.17	1.17	1.49	.16	.00	.011	101.76
9.8000	.18	1.20	1.52	.16	.00	.011	101.77
10.0000	.18	1.23	1.56	.16	.00	.012	101.79
10.2000	.18	1.26	1.60	.17	.00	.012	101.80
10.4000	.19	1.30	1.64	.17	.00	.012	101.82
10.6000	.20	1.33	1.68	.17	.00	.012	101.83
10.8000	.20	1.37	1.73	.18	.00	.013	101.85
11.0000	.20	1.41	1.77	.18	.00	.013	101.86
11.2000	.21	1.45	1.82	.19	.00	.013	101.88
11.4000	.21	1.49	1.87	.19	.00	.014	101.90
11.6000	.22	1.53	1.92	.19	.00	.014	101.92
11.8000	.22	1.57	1.97	.20	.00	.015	101.94
12.0000	.23	1.62	2.03	.20	.00	.015	101.96
12.2000	.24	1.67	2.09	.21	.00	.016	101.98
12.4000	.25	1.73	2.16	.21	.00	.016	102.00
12.6000	.25	1.78	2.22	.22	.00	.017	102.03
12.8000	.25	1.84	2.29	.23	.00	.017	102.05
13.0000	.26	1.89	2.35	.23	.00	.018	102.08
13.2000	.27	1.96	2.43	.24	.00	.018	102.11
13.4000	.28	2.03	2.51	.24	.00	.019	102.14
13.6000	.30	2.11	2.61	.25	.00	.020	102.17
13.8000	.31	2.21	2.72	.26	.00	.020	102.21
14.0000	.33	2.31	2.84	.27	.00	.021	102.26
14.2000	.35	2.43	2.98	.28	.00	.022	102.31
14.4000	.37	2.56	3.14	.29	.00	.024	102.37
14.6000	.39	2.71	3.32	.31	.00	.025	102.44
14.8000	.42	2.88	3.53	.32	.00	.026	102.51
15.0000	.46	3.09	3.77	.34	.00	.028	102.60
15.2000	.52	3.34	4.07	.36	.00	.031	102.71
15.4000	.56	3.64	4.42	.39	.00	.033	102.84
15.6000	.62	3.97	4.82	.42	.00	.036	102.98
15.8000	.76	4.43	5.36	.46	.00	.040	103.18
16.0000	1.14	5.25	6.33	.54	.00	.048	103.54
16.2000	3.00	7.45	9.40	.76	.22	.070	104.59
16.4000	3.91	7.01	14.36	.95	2.73	.088	105.49
16.6000	2.85	7.12	13.77	.93	2.40	.086	105.39

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
16.8000	.75	7.54	10.71	.82	.77	.075	104.87
17.0000	.46	7.23	8.75	.72	.04	.066	104.42
17.2000	.39	6.74	8.09	.67	.00	.061	104.19
17.4000	.35	6.22	7.48	.63	.00	.057	103.96
17.6000	.31	5.72	6.88	.58	.00	.052	103.74
17.8000	.28	5.23	6.31	.54	.00	.048	103.53
18.0000	.26	4.78	5.78	.50	.00	.044	103.34
18.2000	.24	4.37	5.29	.46	.00	.040	103.16
18.4000	.23	3.99	4.84	.42	.00	.037	102.99
18.6000	.22	3.65	4.44	.39	.00	.033	102.85
18.8000	.21	3.35	4.08	.36	.00	.031	102.71
19.0000	.20	3.07	3.75	.34	.00	.028	102.59
19.2000	.19	2.82	3.45	.32	.00	.026	102.49
19.4000	.18	2.60	3.19	.30	.00	.024	102.39
19.6000	.17	2.40	2.95	.28	.00	.022	102.30
19.8000	.17	2.22	2.74	.26	.00	.021	102.22
20.0000	.16	2.06	2.55	.24	.00	.019	102.15
20.2000	.16	1.92	2.38	.23	.00	.018	102.09
20.4000	.15	1.78	2.22	.22	.00	.017	102.03
20.6000	.12	1.64	2.06	.21	.00	.015	101.97
20.8000	.09	1.48	1.86	.19	.00	.014	101.90
21.0000	.14	1.35	1.71	.18	.00	.013	101.84
21.2000	.14	1.29	1.63	.17	.00	.012	101.81
21.4000	.13	1.23	1.56	.16	.00	.011	101.79
21.6000	.13	1.17	1.49	.16	.00	.011	101.76
21.8000	.13	1.12	1.43	.15	.00	.011	101.74
22.0000	.12	1.07	1.37	.15	.00	.010	101.72
22.2000	.12	1.02	1.31	.15	.00	.010	101.70
22.4000	.12	.98	1.26	.14	.00	.009	101.68
22.6000	.12	.94	1.22	.14	.00	.009	101.66
22.8000	.12	.91	1.17	.13	.00	.009	101.64
23.0000	.11	.87	1.13	.13	.00	.008	101.63
23.2000	.11	.84	1.10	.13	.00	.008	101.62
23.4000	.11	.80	1.06	.13	.00	.008	101.60
23.6000	.11	.77	1.02	.12	.00	.007	101.59
23.8000	.08	.72	.96	.12	.00	.007	101.57
24.0000	.00	.60	.81	.10	.00	.006	101.51
24.2000	.00	.47	.60	.07	.00	.004	101.44
24.4000	.00	.38	.47	.05	.00	.004	101.40
24.6000	.00	.32	.38	.03	.00	.003	101.37
24.8000	.00	.27	.32	.02	.00	.002	101.35
25.0000	.00	.24	.27	.02	.00	.002	101.33

LEVEL POOL ROUTING CALCULATIONS

HYG Dir = C:\Program Files\Haestad\PPKW\Sample\
Inflow HYG file = NONE STORED - POND 10 IN A2
Outflow HYG file = NONE STORED - POND 10 OUT A2

Time hrs	Inflow cfs	2S/t - O cfs	2S/t + O cfs	Infilt. cfs	Outflow cfs	Storage ac-ft	Elev. ft
25.2000	.00	.21	.24	.01	.00	.002	101.32
25.4000	.00	.19	.21	.01	.00	.002	101.31
25.6000	.00	.17	.19	.01	.00	.001	101.30
25.8000	.00	.15	.17	.01	.00	.001	101.29
26.0000	.00	.13	.15	.01	.00	.001	101.29
26.2000	.00	.12	.13	.01	.00	.001	101.28
26.4000	.00	.11	.12	.01	.00	.001	101.27
26.6000	.00	.09	.11	.01	.00	.001	101.27
26.8000	.00	.08	.09	.01	.00	.001	101.27
27.0000	.00	.07	.08	.00	.00	.001	101.26
27.2000	.00	.07	.07	.00	.00	.001	101.26
27.4000	.00	.06	.07	.00	.00	.001	101.25
27.6000	.00	.05	.06	.00	.00	.000	101.25
27.8000	.00	.05	.05	.00	.00	.000	101.25

POND ROUTED TOTAL OUTFLOW HYG...
HYG file =
HYG ID = POND 10 OUT
HYG Tag = A2

Peak Discharge = 2.73 cfs
Time to Peak = 16.4000 hrs
HYG Volume = .102 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.00	.00	.00	.00	.00
1.0000	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
5.0000	.00	.00	.00	.00	.00
6.0000	.00	.00	.00	.00	.00
7.0000	.00	.00	.00	.00	.00
8.0000	.00	.00	.00	.00	.00
9.0000	.00	.00	.00	.00	.00
10.0000	.00	.00	.00	.00	.00
11.0000	.00	.00	.00	.00	.00
12.0000	.00	.00	.00	.00	.00
13.0000	.00	.00	.00	.00	.00
14.0000	.00	.00	.00	.00	.00
15.0000	.00	.00	.00	.00	.00
16.0000	.00	.22	2.73	2.40	.77
17.0000	.04	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
20.0000	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
24.0000	.00	.00	.00	.00	.00
25.0000	.00	.00	.00	.00	.00
26.0000	.00	.00	.00	.00	.00
27.0000	.00	.00	.00	.00	.00

```
DIVERTED HYDROGRAPH...
HYG file =
HYG ID   = ROUTE 10
HYG Tag  = A2
-----------------------------------
Peak Discharge =         2.73 cfs
Time to Peak   =      16.4000 hrs
HYG Volume     =         .102 ac-ft
-----------------------------------
```

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .2000 hrs
Time on left represents time for first value in each row.

Time hrs					
16.0000	.00	.22	2.73	2.40	.77
17.0000	.04	.00			

Index of Starting Page Numbers for ID Names

----- A -----
AREA-A A2... 4.01

----- O -----
Outlet 1... 9.01, 9.04, 9.07

----- P -----
POINT B-4 A2... 5.01
POND 10... 8.01, 10.01, 10.03, 6.01,
7.01
POND 10 IN A2... 10.06
POND 10 INF A2... 10.08
POND 10 OUT A2... 10.09, 10.10,
10.11, 10.15

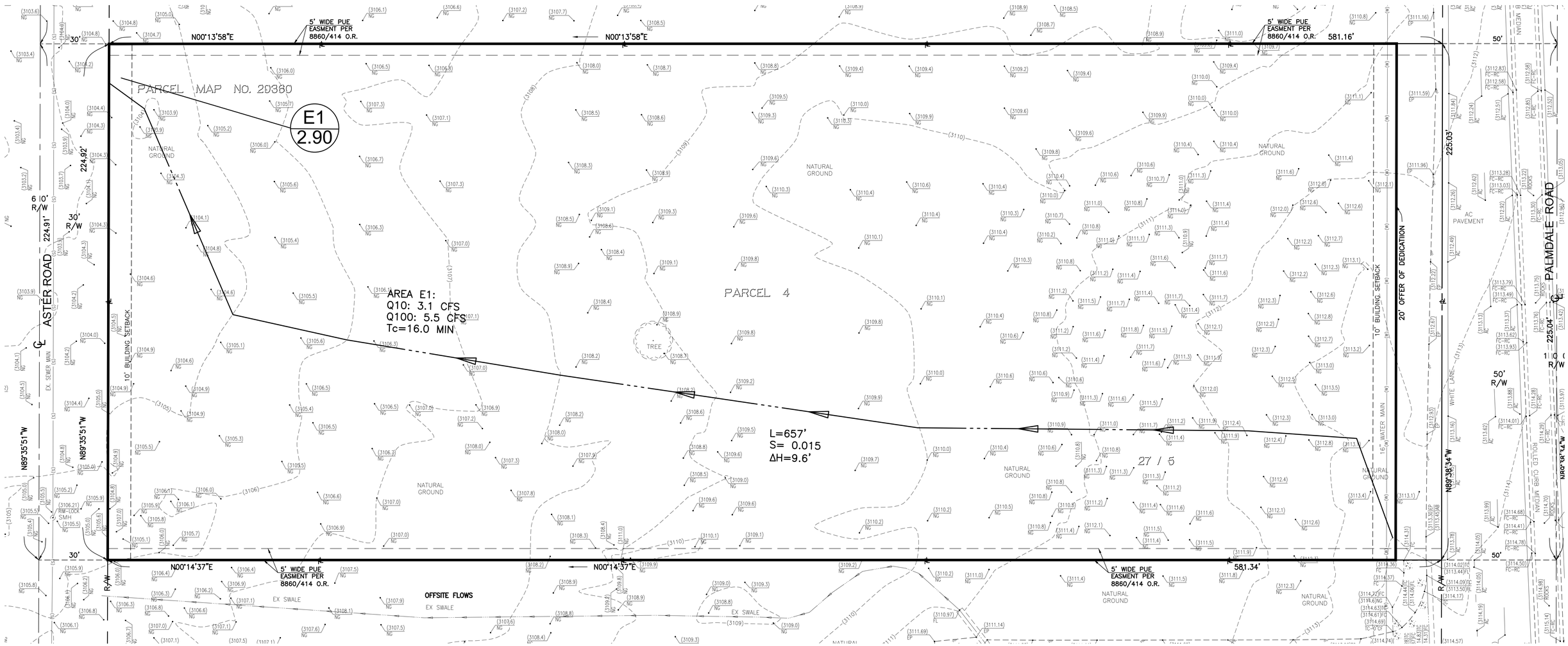
----- R -----
ROUTE 10 A2... 10.16

----- W -----
WARNING... 1.01
Watershed... 2.01, 3.01, 3.02, 3.03

Exhibit A

Existing Hydrology Map

Shiloh West Medical Center
Site: Palmdale & Mesa Linda Rd.



AREA CALCULATIONS

TOTAL AREA: 126,260 S.F. (2.90 AC)

LEGEND

— DRAINAGE PATH

— DRAINAGE BOUNDARY

E1 / 1.36 — AREA DESIGNATION / ACRES

GRAPHIC SCALE

20 15 10 5 0 10 20 40 60

(IN FEET)
1 INCH = 20 FT.

Know what's **below**. Call before you dig.

PREPARED BY:

JOB NO. 22-029-GP

ANACAL ENGINEERING CO.
CIVIL ENGINEERING & LAND SURVEYING
1211 NORTH TUSTIN AVENUE
ANAHEIM, CALIFORNIA 92807
PHONE: 714-774-1763 FAX: 714-774-4690
E-MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

CITY CASE NO. XXX

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 PHONE: 760-955-5158

APPROVED BY:

BRIAN W. GENGLER, RCE C44730 DATE
CITY ENGINEER

REVISION			
NO.	DESCRIPTION	DATE	APPROVED

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT

FIELD BOOK NO. XXXXX

BENCHMARK NO. V-220

ELEVATION: 3090.38'

SHILOH WEST MEDICAL
REDEVELOPED SITE PLAN

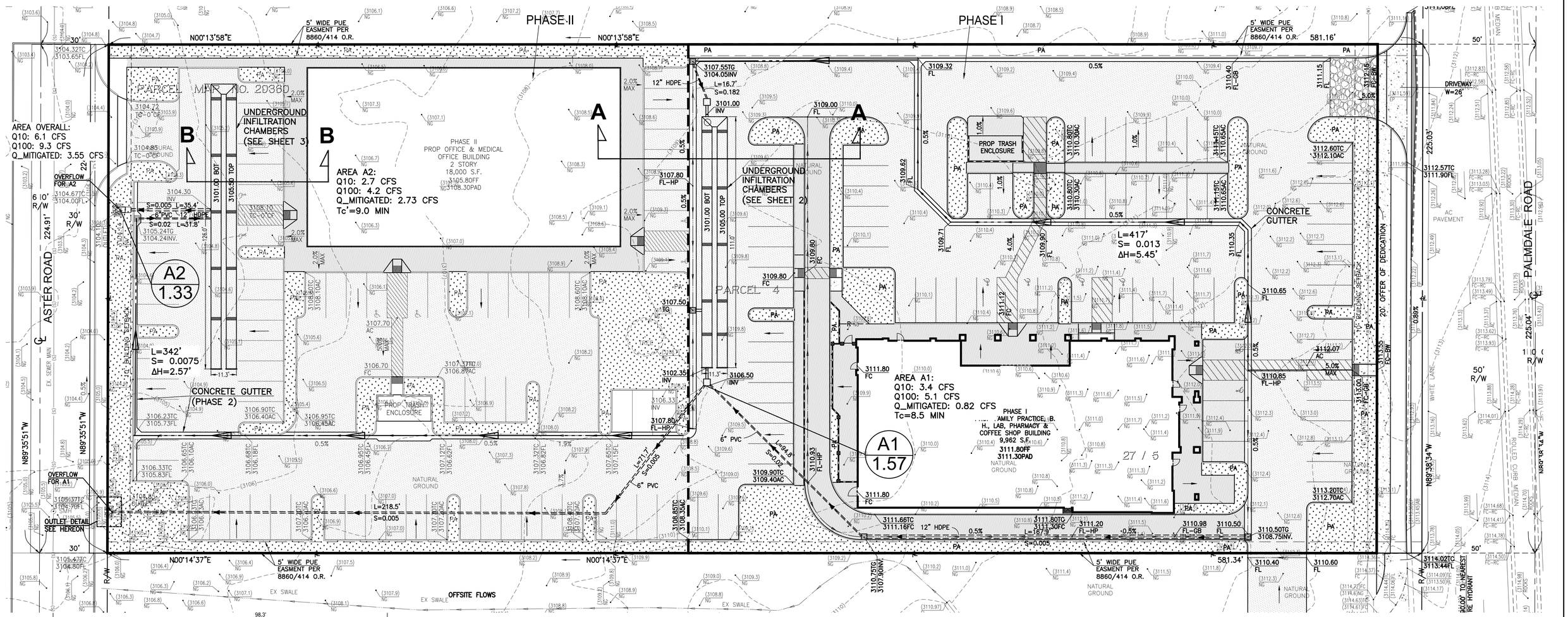
PALMDALE ROAD - APN 3103-561-20

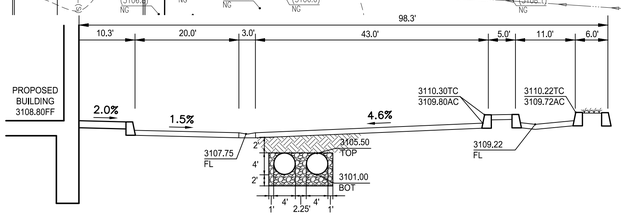
DESIGNED BY: D. C. Q.	SHEET NO.
DRAWN BY: V. F. L.	1 OF 1
CHECKED BY: D. C. Q.	
DATE: 11-10-22	

Exhibit B

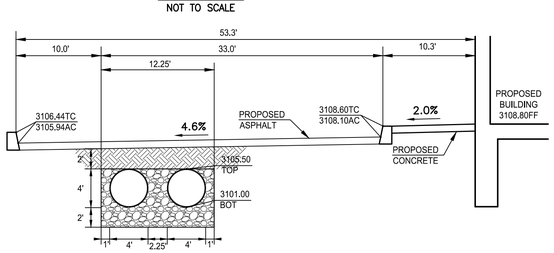
Proposed Hydrology Map

Shiloh West Medical Center
Site: Palmdale & Mesa Linda Rd.

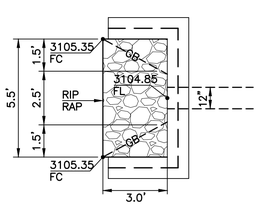




DETAIL A-A
NOT TO SCALE



DETAIL B-B
NOT TO SCALE



OUTLET DETAIL
NO SCALE

AREA CALCULATIONS

TOTAL AREA: 126,260 S.F. (2.90 AC)

PHASE 1
AREA: 68,542 S.F. (1.57 AC)
LANDSCAPE: 7,984 S.F.
HARDSCAPE: 60,558 S.F.

PHASE 2
AREA: 57,718 S.F. (1.33 AC)
LANDSCAPE: 10,220 S.F.
HARDSCAPE: 47,498 S.F.

LEGEND

- DRAINAGE PATH
- DRAINAGE BOUNDARY
- SUBSURFACE DRAINAGE PATH
- DMA–A 1.36 — AREA DESIGNATION / ACRES
- PROPOSED LANDSCAPE AREA
- PROPOSED HARDSCAPE AREA (ASPHALT)
- PROPOSED HARDSCAPE AREA (CONCRETE)

AEC

GRAPHIC SCALE
20 15 10 5 0 10 20 40 60
(IN FEET)
1 INCH = 20 FT.

Know what's below. Call before you dig.

PREPARED BY: JOB NO. 22-029-PROP-HYD

ANACAL ENGINEERING CO.
CIVIL ENGINEERING & LAND SURVEYING
1211 NORTH TUSTIN AVENUE
ANAHEIM, CALIFORNIA 92807
PHONE: 714–774–1763 FAX: 714–774–4690
E–MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

CITY CASE NO. XXX

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 PHONE: 760-955-5158
APPROVED BY:

BRIAN W. GENGLER, RCE C44730 DATE
CITY ENGINEER

REVISION

NO.	DESCRIPTION	DATE	APPROVED

FIELD BOOK NO. XXXXX
BENCHMARK NO. V–220
ELEVATION: 3090.38'

SHILOH WEST MEDICAL
PROPOSED DEVELOPED SITE PLAN

PALMDALE ROAD - APN 3103-561-20

DESIGNED BY: D. C. Q.
DRAWN BY: J.M.
CHECKED BY: D. C. Q.
DATE: 11–10–22

SHEET NO. 1 OF 3

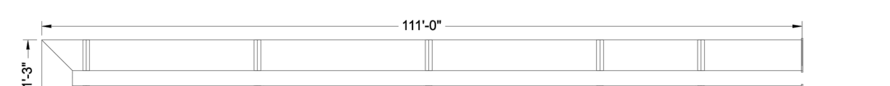
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 224 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 6,000 CF
- PIPE STORAGE VOLUME = 3,567 CF
- BACKFILL STORAGE VOLUME = 2,450 CF
- TOTAL STORAGE PROVIDED = 6,057 CF

PIPE DETAILS
- DIAMETER = 54"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 27"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 24"



ASSEMBLY
SCALE: 1" = 20'

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2⅔" x ½" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

C:\EXPORTS\TEMPLATES\CMP_V8.DWG 10/18/2019 10:02 AM

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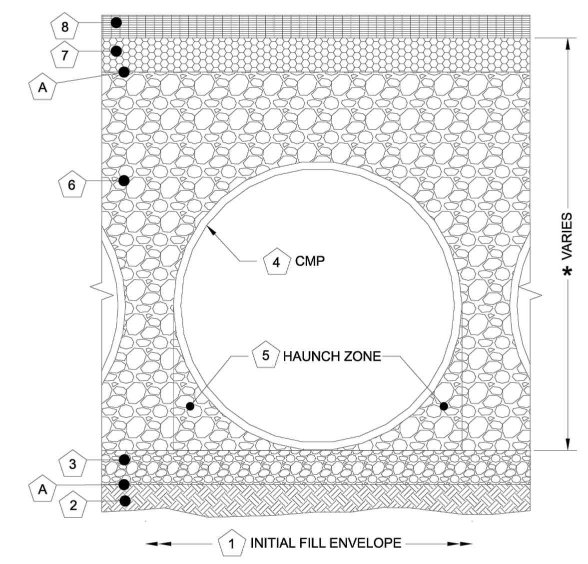
DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS — CONTECH DYODS DRAWING

DYO26153 Shiloh West Medical
Infiltraiton System
Victorville, CA
DETENTION SYSTEM

PROJECT No.: 17351 | SEQ. No.: 26153 | DATE: 1/25/2023
DESIGNED: DYO | DRAWN: DYO
CHECKED: DYO | APPROVED: DYO
SHEET NO.: 1



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe

	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6	Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145- A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A	Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
*	Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

(1) MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

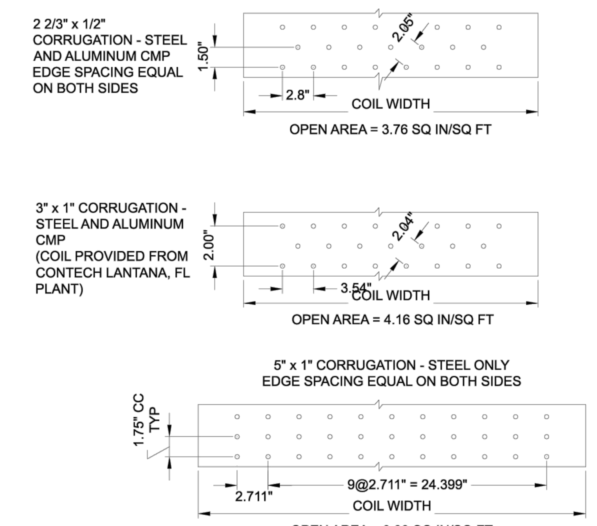
(2) PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

(5) HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL
MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

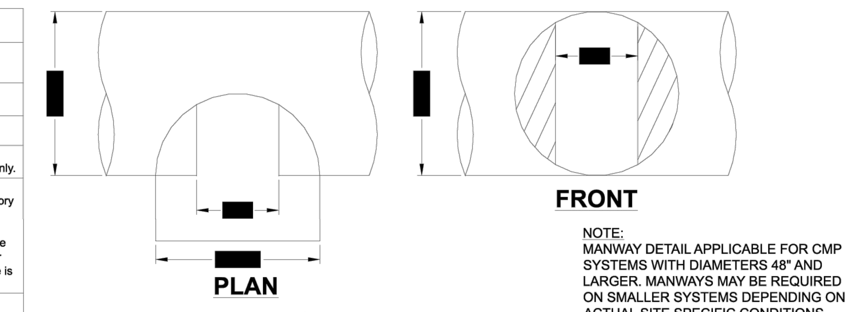
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.



NOTES:

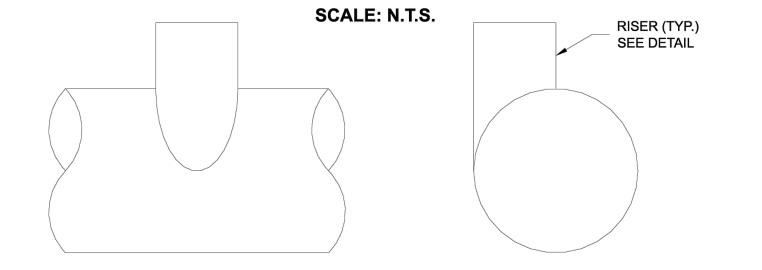
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL
SCALE: N.T.S.



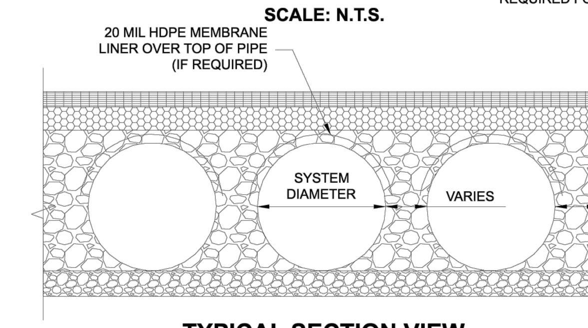
TYPICAL MANWAY DETAIL
SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



TYPICAL RISER DETAIL
SCALE: N.T.S.

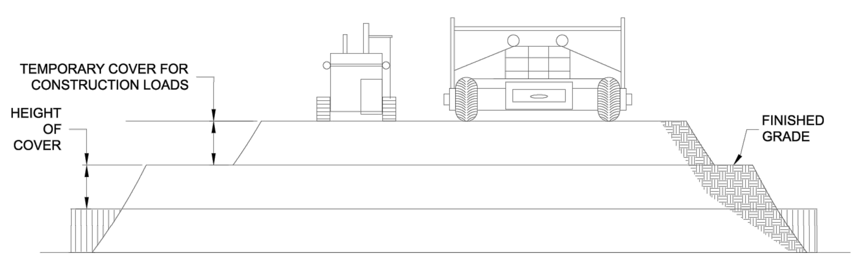
NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW
LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

DYO26153 Shiloh West Medical
Infiltraiton System
Victorville, CA
DETENTION SYSTEM
PROJECT No.: 17351 | SEQ. No.: 26153 | DATE: 1/25/2023
DESIGNED: DYO | DRAWN: DYO
CHECKED: DYO | APPROVED: DYO
SHEET NO.: 1



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

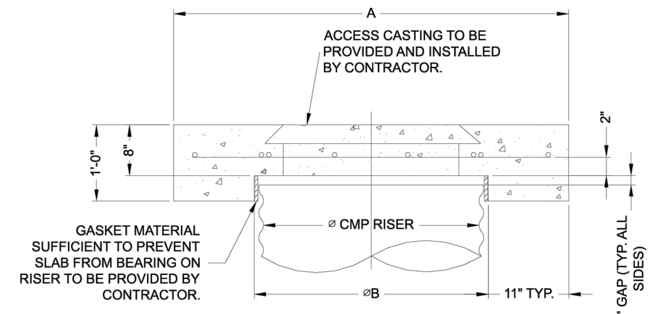
ALUMINUM: AASHTO M-196 OR ASTM B-745
APPLICABLE

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL APPLICABLE PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

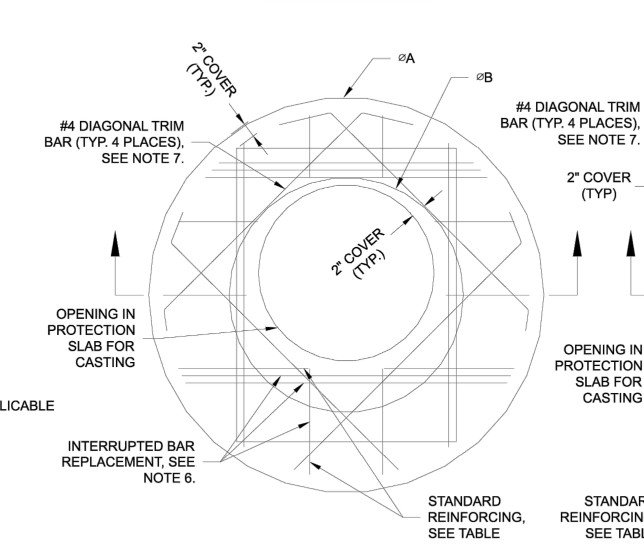


SECTION VIEW

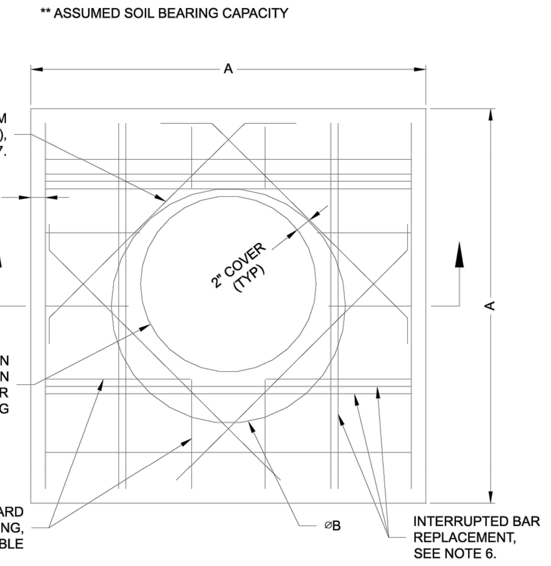
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

REINFORCING TABLE

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

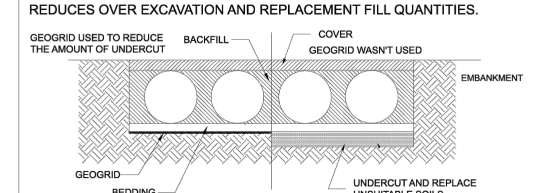
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

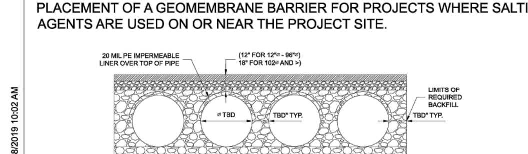


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

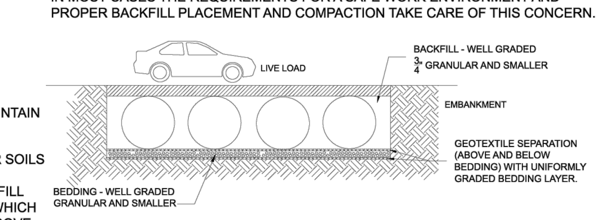
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

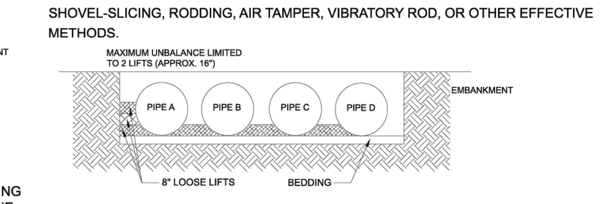
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



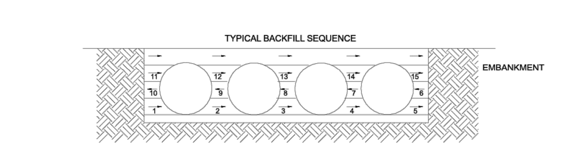
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

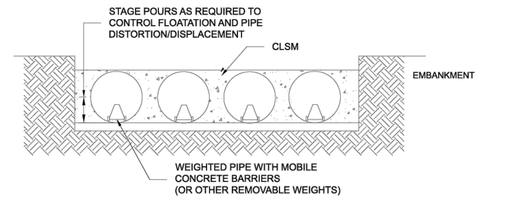


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

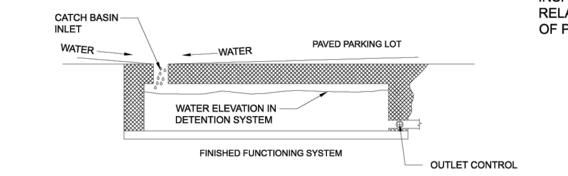


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

Know what's **below**.
Call before you dig.

PREPARED BY: JOB NO. 22-029-PROP-HYD

ANACAL ENGINEERING CO.
CIVIL ENGINEERING & LAND SURVEYING
1211 NORTH TUSTIN AVENUE
ANAHEIM, CALIFORNIA 92807
PHONE: 714-774-1763 FAX: 714-774-4690
E-MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

CITY CASE NO. XXX

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 PHONE: 760-955-5158
APPROVED BY:

BRIAN W. GENGLER, RCE C44730 — DATE
CITY ENGINEER

REVISION

NO.	DESCRIPTION	DATE	APPROVED

FIELD BOOK NO. XXXXX
BENCHMARK NO. V-220
ELEVATION: 3090.38'

SHILOH WEST MEDICAL
PROPOSED DEVELOPED SITE PLAN
INFILTRATION CHAMBERS (PHASE 1)
PALMDALE ROAD - APN 3103-561-20

DESIGNED BY: D. C. Q.
DRAWN BY: J.M.
CHECKED BY: D. C. Q.
DATE: 11-10-22

SHEET NO. 2 OF 3

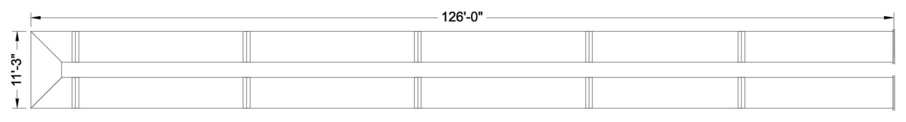
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 254 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 6,800 CF
- PIPE STORAGE VOLUME = 4,044 CF
- BACKFILL STORAGE VOLUME = 2,792 CF
- TOTAL STORAGE PROVIDED = 6,836 CF

PIPE DETAILS
- DIAMETER = 54"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 27"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 24"



ASSEMBLY
SCALE: 1" = 20'

NOTES
- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2⅔" x ½" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

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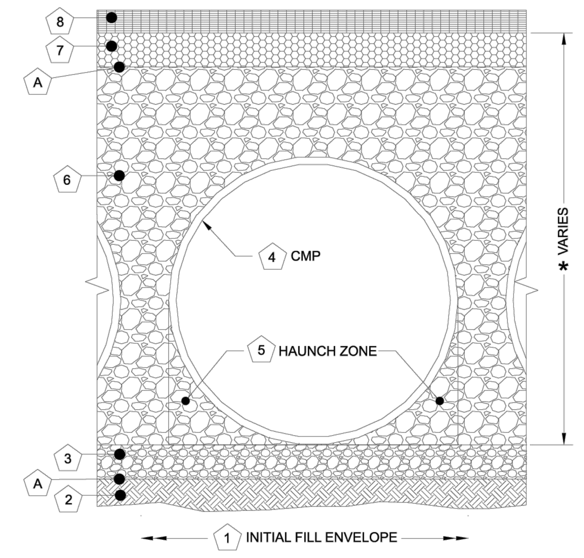
CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX
CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO26157 Shiloh West Medical
Infiltration System-Phase 2
Victorville, CA
DETENTION SYSTEM

PROJECT No.: 17351	SEQ. No.: 26157	DATE: 1/25/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



	Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6	Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145- A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A	Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
*	Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1. MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

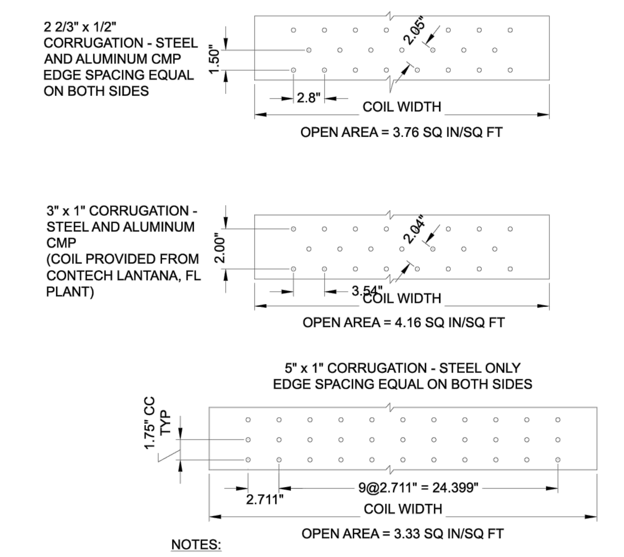
2. PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5. HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL
MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

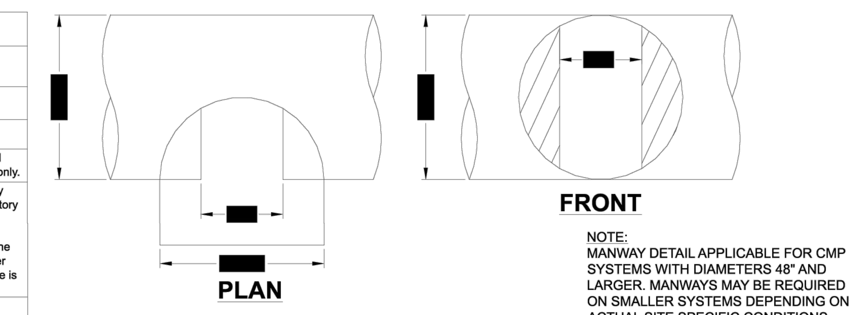
EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.



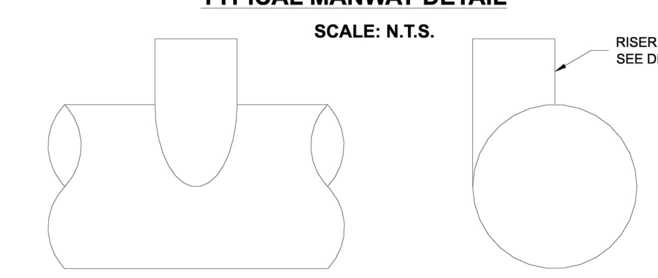
NOTES:
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL
SCALE: N.T.S.



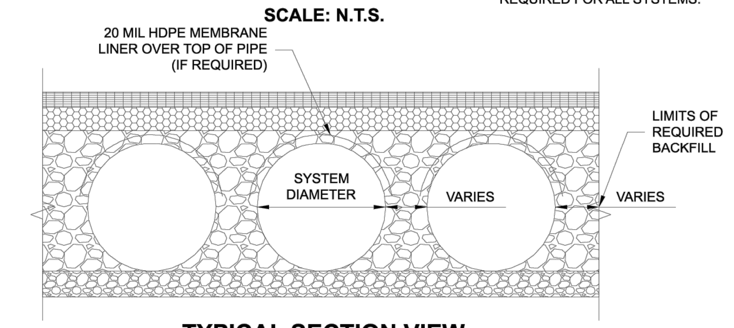
TYPICAL MANWAY DETAIL
SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



TYPICAL RISER DETAIL
SCALE: N.T.S.

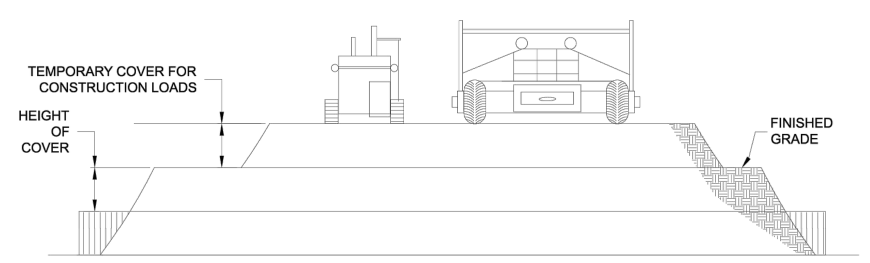
NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW
LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

DYO26157 Shiloh West Medical
Infiltration System-Phase 2
Victorville, CA
DETENTION SYSTEM



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745
APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL APPLICABLE PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
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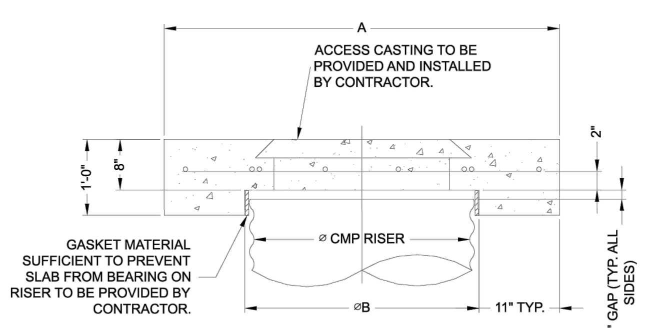
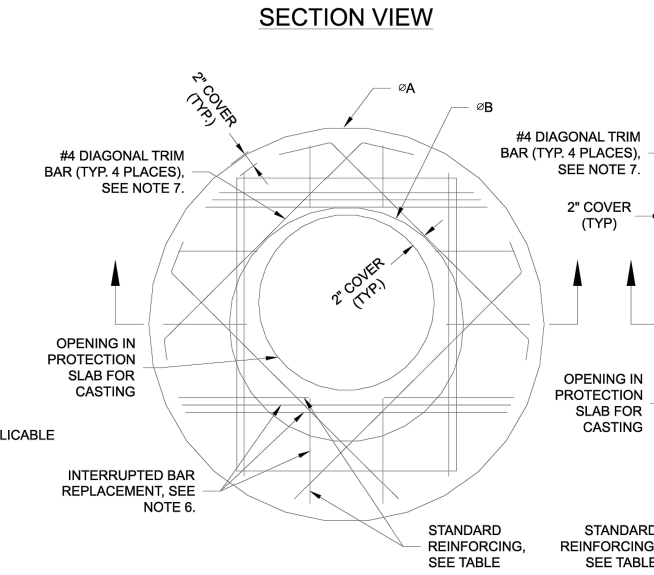


SECTION VIEW

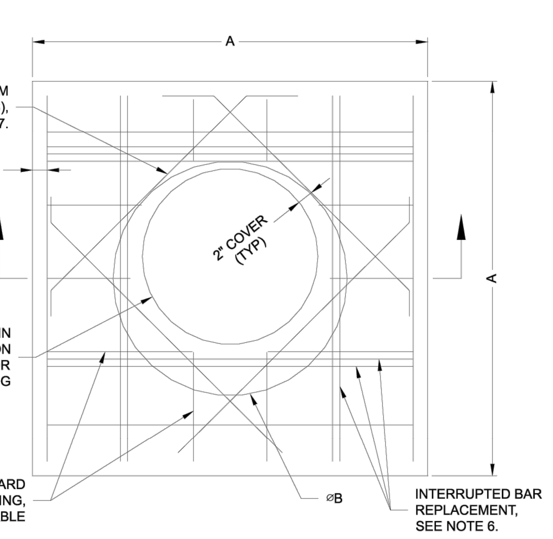
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

REINFORCING TABLE

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:
1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

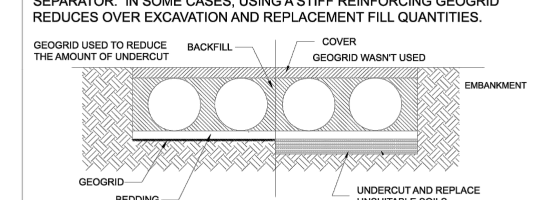
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

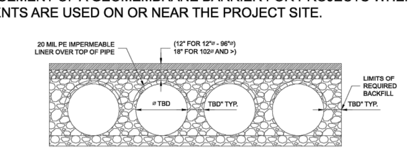


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

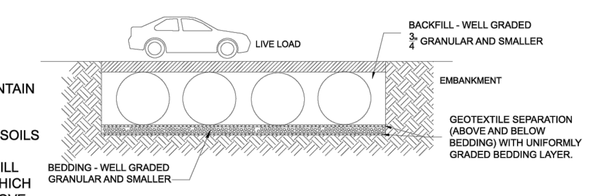
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

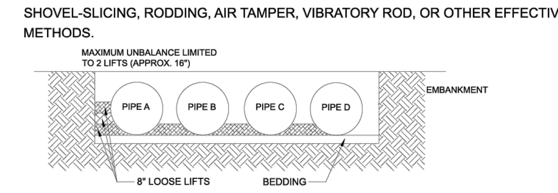
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



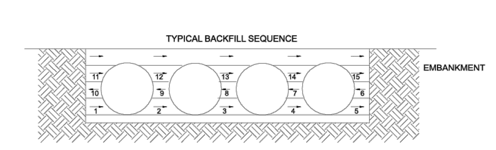
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

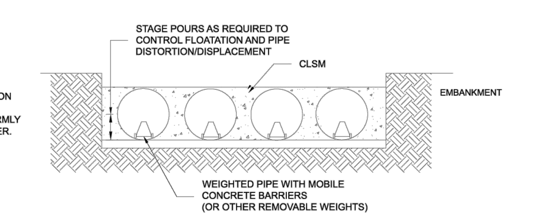


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

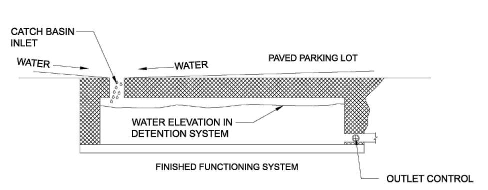


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

Know what's **below**.
Call before you dig.

PREPARED BY: JOB NO. 22-029-PROP-HYD
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CIVIL ENGINEERING & LAND SURVEYING
1211 NORTH TUSTIN AVENUE
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E-MAIL ADDRESS: ANACAL@ANACALENGINEERING.COM

CITY CASE NO. XXX

CITY OF VICTORVILLE
ENGINEERING DEPARTMENT
14343 CIVIC DRIVE, VICTORVILLE, CA. 92392 PHONE: 760-955-5158
APPROVED BY:

BRIAN W. GENGLER, RCE C44730 DATE
CITY ENGINEER

REVISION			
NO.	DESCRIPTION	DATE	APPROVED

FIELD BOOK NO. XXXXX
BENCHMARK NO. V-220
ELEVATION: 3090.38'

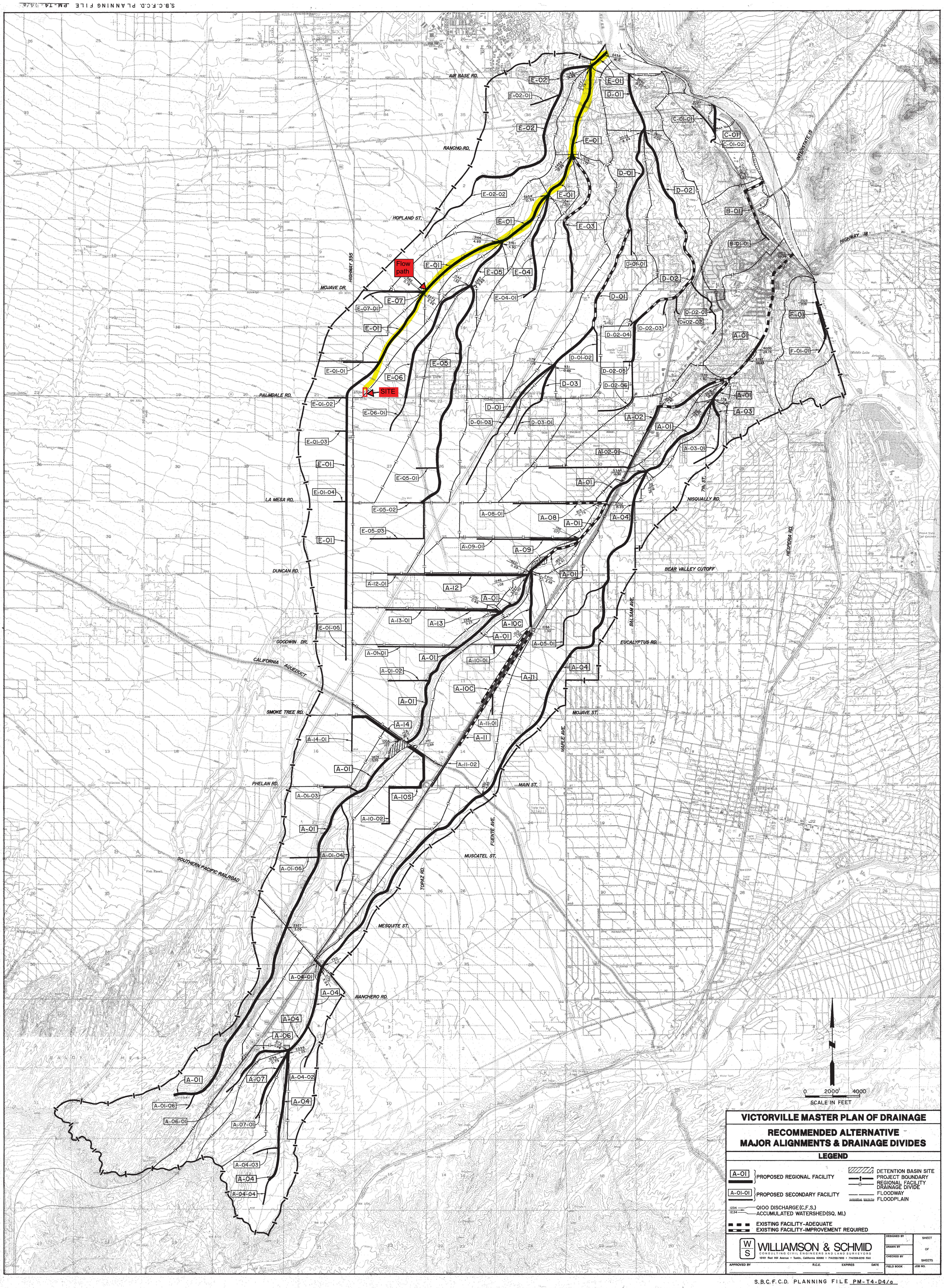
SHILOH WEST MEDICAL
PROPOSED DEVELOPED SITE PLAN
INFILTRATION CHAMBERS (PHASE 2)
PALMDALE ROAD - APN 3103-561-20

DESIGNED BY: D. C. Q.	SHEET NO.
DRAWN BY: J.M.	
CHECKED BY: D. C. Q.	3 OF 3
DATE: 11-10-22	

Exhibit C

Lancaster Master Drainage Plan

Shiloh West Medical Center
Site: Palmdale & Mesa Linda Rd.


VICTORVILLE MASTER PLAN OF DRAINAGE
RECOMMENDED ALTERNATIVE
MAJOR ALIGNMENTS & DRAINAGE DIVIDES
LEGEND
A-01 PROPOSED REGIONAL FACILITY
A-01-01 PROPOSED SECONDARY FACILITY
DETENTION BASIN SITE
PROJECT BOUNDARY
REGIONAL FACILITY DRAINAGE DIVIDE
FLOODWAY
FLOODPLAIN
1234 Q100 DISCHARGE (C.F.S.)
12.34 ACCUMULATED WATERSHED (SQ. MI.)
EXISTING FACILITY-ADEQUATE
EXISTING FACILITY-IMPROVEMENT REQUIRED
WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
15101 Red Hill Avenue • Tustin, California 92680 • 714/259-7900 • 714/259-0210 FAX
DESIGNED BY
DRAWN BY
CHECKED BY
FIELD BOOK
SHEET
OF
SHEETS
JOB NO.
APPROVED BY
R.C.E.
EXPIRES
DATE
0 2000' 4000
SCALE IN FEET
Flow path
SITE
AIR BASE RD.
RANCHO RD.
HOPLAND ST.
MOJAVE DR.
PALMDALE RD.
LA MESA RD.
DUNCAN RD.
GOODWIN DR.
CALIFORNIA AQUEDUCT
SMOKE TREE RD.
PHELAN RD.
SOUTHERN PACIFIC RAILROAD
MESQUITE ST.
RANCHERO RD.
MUSCATEL ST.
MAIN ST.
MOJAVE ST.
EUCALYPTUS RD.
BEAR VALLEY CUTOFF
NISQUALLY RD.
HESPERIA RD.
BALSAM AVE.
MAPLE AVE.
FUENTE AVE.
TOPAZ RD.
71th ST.
HIGHWAY 395
HIGHWAY 18
INTERSTATE 15
E-01
E-01-01
E-01-02
E-01-03
E-01-04
E-01-05
E-02
E-02-01
E-02-02
E-03
E-04
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A-09-01
A-10C
A-10-01
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A-12-01
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A-14-01
B-01
B-01-01
C-01
C-01-01
C-01-02
D-01
D-01-01
D-01-02
D-01-03
D-02
D-02-01
D-02-02
D-02-03
D-02-04
D-02-05
D-02-06
D-03
D-03-01
F-01
F-01-01

Exhibit D

FEMA Flood Map

Shilo West Medical Center
Site: Palmdale & Mesa Linda Rd.

National Flood Hazard Layer FIRMette

FEMA

117°24'2"W 34°30'39"N

Feet

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

1:6,000

117°23'24"W 34°30'9"N

Basemap Imagery Source: USGS National Map 2023

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

- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 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 12/29/2023 at 2:52 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.