APPENDIX F1

Preliminary Hydrology Study

Hydrology Study

December 27, 2023
RBCEA180002

APN: 3022-026-03

SEC of Lockheed Way
and 8th Street East

Palmdale, California

PROFESSIONAL ENGINEER'S
AFFIRMATIVE STATEMENT

I have examined and am familiar with the information in this document and all appendices and based on my inquiries of individuals immediately responsible for obtaining the information in this document, I believe that the information is true, accurate, and complete.

Prepared by
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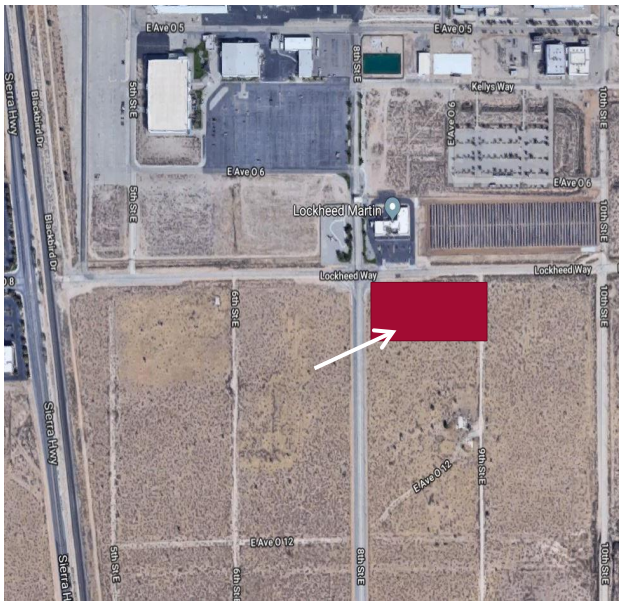
Table of Contents

I. INTRODUCTION

The purpose of this report is to determine the on-site 50-year capital storm flows (Q50) for the pre-construction and post-construction conditions, size the retention basin for the change in flows from pre-construction to post-construction (ΔQ).



II. LOCATION OF PROJECT

The 6.02-acre project site (APN: 3022-026-03) is bounded on the west by Lockheed Way (8th Street East), on the north by Blackbird Drive, on the east by Vacant Land APN: 3022-026-004, and on the south by Vacant Land APN: 3022-026-006. The adjacent property consists of Lockheed Martin Aeronautics along the northern boundary. See Appendix A, Exhibits A & B.

III. FLOODPLAIN INFORMATION

The project site is located inside of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Panel 06037C0700F effective September 26, 2008. This panel indicates that the site is located within Zone X, defined by FEMA as “areas of minimal flood hazard”. See Appendix A, Exhibit E for Los Angeles County.

IV. METHODOLOGY

This study is based on the storm water flows (Q’s) calculated by Los Angeles County’s HydroCalc software and Civilsoft LAR04 hydrology software to model the storm flows and volumes for the proposed site.

The following criteria were used for the on-site tributary flows:

1. Current land use: Vacant Undisturbed
2. Proportion Impervious: 10%-Existing; 87.83%-Developed
3. Intended Use: Industrial and Commercial
4. NOAA 14 Precipitation: 50-year 24-hour = 3.73 inches
   85% = 0.5 inches
   See Appendix A, Exhibit C
5. Soil Type: Adelanto Coarse Sandy Loam (AcA)
   See Appendix A-Exhibits D and F

V. OFF-SITE DRAINAGE DESCRIPTION

Off-site tributary storm flows have been bounded and redirected due to the construction of Sierra Highway and the Railroad on the west that limits these flows to 48-acres (See Appendix A, Exhibit G) and then the construction of Lockheed Way (8th Street East) which captures these flows and conveys them north to Blackbird Drive which conveys these flows east along the north side of the project. The off-site 48 Tributary acres for the purposes of this report is divided into 2 sections. The main section of 45.4 acres is being captured by Lockheed Way. A Unit Hydrograph using HydroCalc was developed that determined that the 50-year storm flow was 7.8 cfs. The second section is only 2.6 acres and starts after Lockheed Way. (See Exhibit G) This small area south of the site conveys sheet flows from Lockheed Way across the project's southern boundary and HydroCalc determined these flows to be 0.45 cfs. These flows will be captured at the southeast corner of the site within the existing off-storm drain easement via a drop-inlet catch basin and conveyed northerly in an independent drainage system that conveys flows north to the pump wet well.

VI. OFF-SITE HYDRAULICS

A Manning's Street Capacity calculation was performed that shows Lockheed Way can capture 47.2 cubic feet per second (cfs) within the right-of-way at this location (See Appendix A, Exhibit G). This will handle the 7.8 cfs of off-site flows from the 45.4 acres and direct them around the project without entering the project.

A concrete gutter drain system is also proposed along the southerly property line that can pick up the off-site 2.6-acre storm flows (0.45 cfs) and convey them easterly within existing easements along the southern boundary to the southeast corner of the project. The 2.6 acre off-site flow of 0.45 cfs will be brought on-site to an independent separate drop inlet and then piped through a 12-inch storm drain pipe at a 0.5% slope directly to the sump pump where they will be pumped out into a parkway drain on Blackbird Lane. Other alternative designs may be proposed or necessary to mitigate this flow. Developer agrees that the off-site flow will be addressed to City standards and requirements at final design as a condition of approval.

VII. ON-SITE PRE-DEVELOPED DRAINAGE DESCRIPTION

It should be noted that the Assessor's Parcel Map shows this Parcel's acreage at 5.20-acres with dedication on 9th Street East, while the survey based off the Record of Survey Book 65 Page 19 determined it to be 6.02 acres with 42-foot half street dedications.

The existing vacant site is moderately covered in annual grasses, blue sage, and a scattering of Joshua Trees sloping northwesterly from 8th Street East to its northeast corner at Blackbird Drive where the flows are conveyed in the street shoulder drainage swales easterly.

VIII. ON-SITE PRE-DEVELOPED HYDROLOGY

The pre-developed site was analyzed as one Drainage Area (DA1) with one Drainage Management Area (DMA-A) sloping from the southwest corner to the northeast corner in a natural channel conveyance having a slope of 0.86% for 725 feet and side slopes of 1:160. After running the HydroCalc software for the pre-developed site, the 50-year storm flow was determined to be 1.01 cfs. See Appendix A, Exhibit H and Appendix B, HydroCalc Calculations.

IX. ON-SITE POST-DEVELOPED DRAINAGE DESCRIPTION

The developed site consists of two (2) 47,000 square foot industrial buildings that divide the site north and south with 196,769 square feet (sf) of hardscape and 29,743 sf of landscaping. The impervious area is 196,769 sf or 87.83% of the developed site. Drainage will be conveyed from the west to the east via three (3) drainage swales to catch basins that capture these flows in a storm drain system and convey them to the east end of the project where they are turned and conveyed to an underground infiltration/detention basin that will detain peak flows while pumping the maximum predeveloped flow to a parkway drain on Blackbird Lane. (See Appendix A, Exhibit J & k).

X. ON-SITE POST-DEVELOPED HYDROLOGY

The developed 50-year storm flow was established using HydroCalc to analyze each Drainage Management Area (DMA) to determine the time of concentration (TC) for each DMA. The proposed 6.02-acre developed site consists of one Drainage Area (DA1) divided into nine (9) Subareas or DMA's. This data was used to determine the overall peak flows using LAR04 software which analyzes each DMA travel time to each subsequent DMA from the highpoint at the entrance driveway on Lockheed Way traveling northeasterly and southeasterly bisecting the site to ultimately confluence along the easterly side of the site where an underground retention basin will be used to mitigate the ΔQ.

The analysis determined that the peak 50-year developed storm flow for the overall site is 9.03 cfs. (See Appendix B, LAR04 Calculations and Appendix A, Exhibit I).

XI. ON-SITE POST-DEVELOPED HYDRAULICS

The developed 50-year storm flows by area are shown on Exhibit I in a table. The north and south initial areas (DMA-1A AND 7C respectively) produce a storm flow of 1.48 cfs and 1.30 cfs respectively which requires a minimum 12-inch pipe at a slope of 0.5% with a maximum flow rate of 2.71 CFS. At DMA-3A & 9C captured storm flows are 4.02 cfs and 3.57 cfs respectively which requires a 12-inch storm drain at a slope in excess of 1.3% and shown on Exhibit I as 2.14% and 1.45% respectively. Storm flows at this point are directed internally via a 16-inch storm drain sloped at a minimum 0.4% with a capacity of 5.84 cfs. This capacity is greater than the maximum required 4.32 cfs, stemming from DMA-4A as shown on Exhibit I. Once DMA-4A AND DMA-10C confluence the (9.03-0.64=) 8.39 cfs can be conveyed in a 16-inch pipe sloped at 1% with a Mannings coefficient of 0.011.

XII. RETENTION BASIN SIZING

The project proposes an infiltration/detention basin to store the peak developed storm flows until they subside to below 85% of the pre-developed storm flow of 1.01 cfs which is 0.85 cfs. A unit hydrograph was developed using the LAR04 software for the developed 50-year capital storm event and routed through a retarding basin calculation (see Appendix B, Unit Hydrograph).

Exhibit I shows the on-site drainage system that conveys storm event flows to the infiltration basin. The size of the basin is determined by calculating the volume of peak storm flow above the 0.85 cfs release. Thus from the retarding basin analysis at the end of this study the volume differential was determined to be (0.40 -0.060=) 0.34 ac-ft which is equal to 14,810 cubic feet of storage. This is greater than the LID calculated volume of 12,757 cubic feet. An ADS underground Stormtech system will be employed to store this volume of flow and is shown at the end of this study.

A goose neck pipe will be installed to set the infiltration volume level in the ADS Stormtech system and a submersible sump pump sized to pump the 0.85 cfs on-site flow to the street parkway drain.

Excess flows from large storm events will drain north along the eastern ribbon gutter to Blackbird Way which will convey these flows to their historic drainage conveyances.

XIII. CONCLUSIONS

The site will produce a pre-developed 50-year peak storm flow of 1.01 cfs and a corresponding developed storm flow of 9.03 cfs. The required retention volume needed to mitigate the change in flows (ΔQ) was determined to be 0.34-acre feet. See Appendix B, Unit Hydrograph. In addition an independent drain system will convey the 0.45 cfs / 2.6 acre off-site flow to the proposed sump pump wet well which is sized to convey 0.85 cfs to the parkway drain on Blackbird Lane. Other alternative designs may be proposed or necessary to mitigate this flow. Developer agrees that the off-site flow will be addressed to City standards and requirements at final design as a condition of approval. Once all drainage devices are installed and working, adequate flood protection will be in place to prevent flooding of the building.

XIV. SUPPORTING DOCUMENTS AND SOFTWARE

County of Los Angeles Open Data, Los Angeles County Soil Types:

https://data.lacounty.gov/Shape-Files/LA-County-Soil-Types/sz94-meiu/data

NOAA Atlas 14, Volume 6, Version 2 POINT PRECIPITATION FREQUENCY (PF) ESTIMATES WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION. Accessed December 2016.

Federal Emergency Management Agency website: https://msc.fema.gov/portal accessed July 2022.

County of Los Angeles Public Works Hydrocalc.

APPENDIX A

Exhibits:

A – Location Map

B- Land Use

C- NOAA 14

D- Soil Type

E – Flood Map

F – Soil Numbers

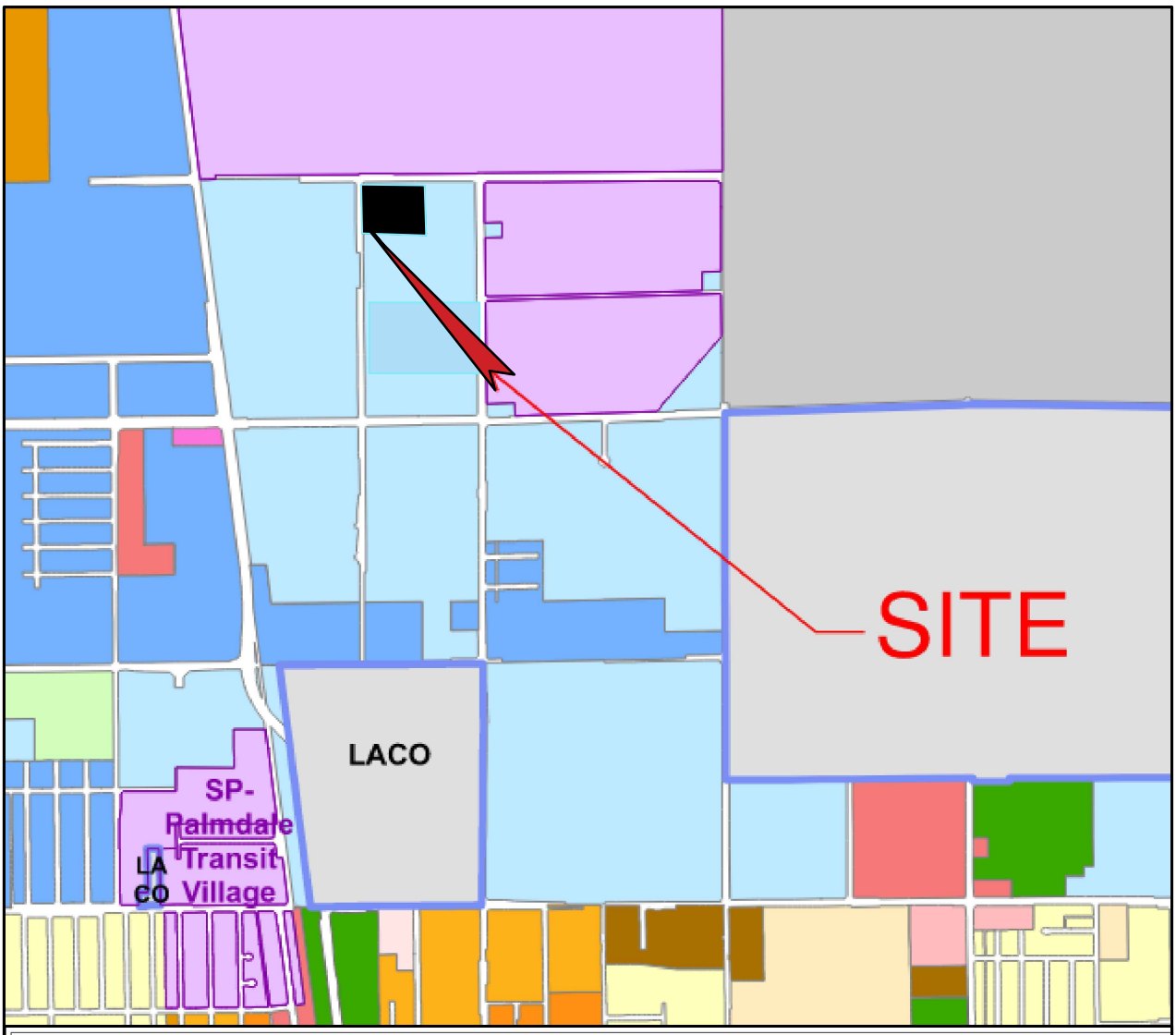
G - Off-Site Tributary Watershed Exhibit

H - Pre-Developed Hydrology

I – Post-Developed Hydrology

J-on-site pipe design

K-Infiltration Basin



PALMDALE
a place to call home

CITY OF PALMDALE GENERAL PLAN LAND USE

ADOPTED BY THE CITY COUNCIL 1/25/93

Legend

Parcel
City of Palmdale

Commercial
- Neighborhood Commercial (NC)
- Office Commercial (OC)
- Community Commercial (CC)
- Downtown Commercial (DC)
- Commercial Manufacturing (CM)
- Regional Commercial (RC)

Industrial
- Industrial (IND)
- Business Park (BP)
- Airport and Related Uses (AR)

Residential
- Equestrian Residential (ER)
- Low Density Residential (LDR)
- Single Family Residential (SFR-1)
- Single Family Residential (SFR-2)
- Single Family Residential (SFR-3)
- Medium Residential (MR)
- Multifamily Residential (MFR)
- Medium High Density Residential (MHDR)
- High Density Residential (HDR)
- Special Development (SD)

Other Land Use
- Public Facility (PF)
- Open Space (OS)
- Mineral Resource Extraction (
- Specific Plan (SP)
- California Aqueduct
- Other Jurisdiction

LACO: Unincorporated LA County Pocket

0 0.5 1 2 3 4 Miles

DATE: 08/17/2022	
DRAWN BY:	DWL
CHECKED BY:	DWL
SCALE: NTS	

EXHIBIT A
LAND USE MAP

PBP INDUSTRIAL PROJECT
PALMDALE, CA
APN: 3022-026-003

RED BRICK SOLUTION
CONSULTING ENGINEERS & ARCHITECTS

Latitude	Longitude
34.608746	-118.115920

DATE: 08/27/2022	**EXHIBIT** B **LOCATION MAP** PBP INDUSTRIAL PROJECT PALMDALE, CA APN: 3022-026-003	RED BRICK SOLUTION CONSULTING ENGINEERS & ARCHITECTS
DRAWN BY: DWL		
CHECKED BY: DWL		
SCALE: NTS		

NOAA Atlas 14, Volume 6, Version 2
Location name: Palmdale, California, USA*
Latitude: 34.6087°, Longitude: -118.116°
Elevation: 2596.62 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	**0.067** (0.055-0.081)	**0.097** (0.080-0.118)	**0.136** (0.113-0.167)	**0.169** (0.138-0.208)	**0.212** (0.168-0.271)	**0.246** (0.190-0.320)	**0.279** (0.211-0.374)	**0.314** (0.231-0.433)	**0.361** (0.254-0.519)	**0.398** (0.270-0.591)
10-min	**0.095** (0.079-0.116)	**0.139** (0.115-0.169)	**0.195** (0.161-0.239)	**0.242** (0.198-0.298)	**0.304** (0.241-0.388)	**0.352** (0.273-0.459)	**0.401** (0.303-0.536)	**0.451** (0.331-0.620)	**0.518** (0.364-0.744)	**0.570** (0.387-0.848)
15-min	**0.115** (0.096-0.141)	**0.168** (0.139-0.205)	**0.236** (0.195-0.289)	**0.292** (0.239-0.361)	**0.368** (0.291-0.470)	**0.426** (0.330-0.555)	**0.484** (0.366-0.648)	**0.545** (0.400-0.750)	**0.626** (0.441-0.899)	**0.689** (0.468-1.02)
30-min	**0.162** (0.135-0.198)	**0.236** (0.196-0.288)	**0.333** (0.275-0.408)	**0.411** (0.337-0.508)	**0.518** (0.410-0.661)	**0.600** (0.464-0.782)	**0.682** (0.515-0.912)	**0.767** (0.563-1.06)	**0.882** (0.621-1.27)	**0.971** (0.660-1.44)
60-min	**0.228** (0.189-0.277)	**0.331** (0.274-0.404)	**0.466** (0.385-0.571)	**0.576** (0.472-0.711)	**0.726** (0.574-0.927)	**0.840** (0.650-1.10)	**0.956** (0.722-1.28)	**1.08** (0.789-1.48)	**1.24** (0. 70-1.77)	**1.36** (0.924-2.02)
2-hr	**0.357** (0.296-0.435)	**0.491** (0.407-0.600)	**0.668** (0.551-0.817)	**0.811** (0.664-1.00)	**1.01** (0.796-1.29)	**1.16** (0.896-1.51)	**1.31** (0.989-1.75)	**1.47** (1.08-2.02)	**1.68** (1.18-2.41)	**1.84** (1.25-2.74)
3-hr	**0.455** (0.377-0.555)	**0.617** (0.510-0.752)	**0.828** (0.683-1.01)	**1.00** (0.819-1.24)	**1.24** (0.977-1.58)	**1.42** (1.10-1.85)	**1.60** (1.21-2.14)	**1.79** (1.31-2.46)	**2.04** (1.44-2.93)	**2.24** (1.52-3.33)
6-hr	**0.652** (0.540-0.794)	**0.873** (0.722-1.07)	**1.16** (0.960-1.42)	**1.40** (1.15-1.73)	**1.73** (1.37-2.20)	**1.98** (1.53-2.58)	**2.23** (1.68-2.98)	**2.49** (1.83-3.43)	**2.85** (2.01-4.09)	**3.13** (2.13-4.65)
12-hr	**0.834** (0.691-1.02)	**1.14** (0.942-1.39)	**1.54** (1.27-1.88)	**1.87** (1.53-2.31)	**2.32** (1.84-2.96)	**2.67** (2.07-3.48)	**3.03** (2.29-4.05)	**3.40** (2.50-4.68)	**3.91** (2.75-5.61)	**4.31** (2.93-6.40)
24-hr	**1.08** (0.956-1.24)	**1.51** (1.34-1.74)	**2.09** (1.85-2.42)	**2.57** (2.25-2.99)	**3.22** (2.73-3.88)	**3.73** (3.09-4.58)	**4.25** (3.44-5.35)	**4.79** (3.77-6.21)	**5.53** (4.18-7.48)	**6.12** (4.46-8.56)
2-day	**1.30** (1.16-1.50)	**1.86** (1.65-2.14)	**2.59** (2.29-2.99)	**3.19** (2.80-3.72)	**4.02** (3.41-4.84)	**4.66** (3.87-5.73)	**5.32** (4.31-6.71)	**6.00** (4.72-7.78)	**6.94** (5.24-9.37)	**7.67** (5.59-10.7)
3-day	**1.45** (1.29-1.67)	**2.09** (1.85-2.40)	**2.92** (2.58-3.38)	**3.61** (3.16-4.20)	**4.55** (3.86-5.48)	**5.28** (4.38-6.50)	**6.03** (4.88-7.60)	**6.81** (5.36-8.83)	**7.88** (5.95-10.6)	**8.71** (6.36-12.2)
4-day	**1.56** (1.38-1.79)	**2.24** (1.98-2.58)	**3.14** (2.78-3.63)	**3.89** (3.41-4.53)	**4.91** (4.16-5.91)	**5.71** (4.74-7.02)	**6.53** (5.28-8.22)	**7.38** (5.81-9.56)	**8.54** (6.45-11.5)	**9.46** (6.90-13.2)
7-day	**1.74** (1.54-2.00)	**2.49** (2.21-2.87)	**3.50** (3.10-4.05)	**4.34** (3.80-5.06)	**5.50** (4.66-6.63)	**6.41** (5.32-7.89)	**7.35** (5.95-9.27)	**8.34** (6.56-10.8)	**9.70** (7.32-13.1)	**10.8** (7.86-15.1)
10-day	**1.85** (1.64-2.13)	**2.65** (2.34-3.05)	**3.72** (3.29-4.30)	**4.62** (4.05-5.38)	**5.87** (4.97-7.07)	**6.85** (5.69-8.43)	**7.88** (6.38-9.93)	**8.95** (7.05-11.6)	**10.4** (7.89-14.1)	**11.6** (8.49-16.3)
20-day	**2.17** (1.92-2.50)	**3.11** (2.76-3.58)	**4.40** (3.88-5.08)	**5.48** (4.80-6.39)	**7.02** (5.95-8.46)	**8.25** (6.84-10.1)	**9.54** (7.72-12.0)	**10.9** (8.59-14.1)	**12.8** (9.69-17.3)	**14.4** (10.5-20.1)
30-day	**2.49** (2.21-2.87)	**3.57** (3.16-4.11)	**5.05** (4.46-5.84)	**6.32** (5.54-7.36)	**8.13** (6.88-9.79)	**9.58** (7.95-11.8)	**11.1** (9.00-14.0)	**12.8** (10.0-16.5)	**15.1** (11.4-20.4)	**17.0** (12.4-23.8)
45-day	**2.95** (2.62-3.39)	**4.20** (3.72-4.83)	**5.93** (5.24-6.85)	**7.42** (6.50-8.64)	**9.57** (8.11-11.5)	**11.3** (9.39-13.9)	**13.2** (10.7-16.6)	**15.2** (12.0-19.7)	**18.1** (13.6-24.4)	**20.4** (14.9-28.6)
60-day	**3.31** (2.93-3.80)	**4.66** (4.13-5.37)	**6.56** (5.80-7.58)	**8.21** (7.19-9.56)	**10.6** (8.98-12.8)	**12.6** (10.4-15.4)	**14.7** (11.9-18.5)	**16.9** (13.3-22.0)	**20.2** (15.3-27.3)	**22.9** (16.7-32.1)

[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.

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PF graphical

EXHIBIT D - SOILS MAP LOT 3

nited St tes Department of Agriculture

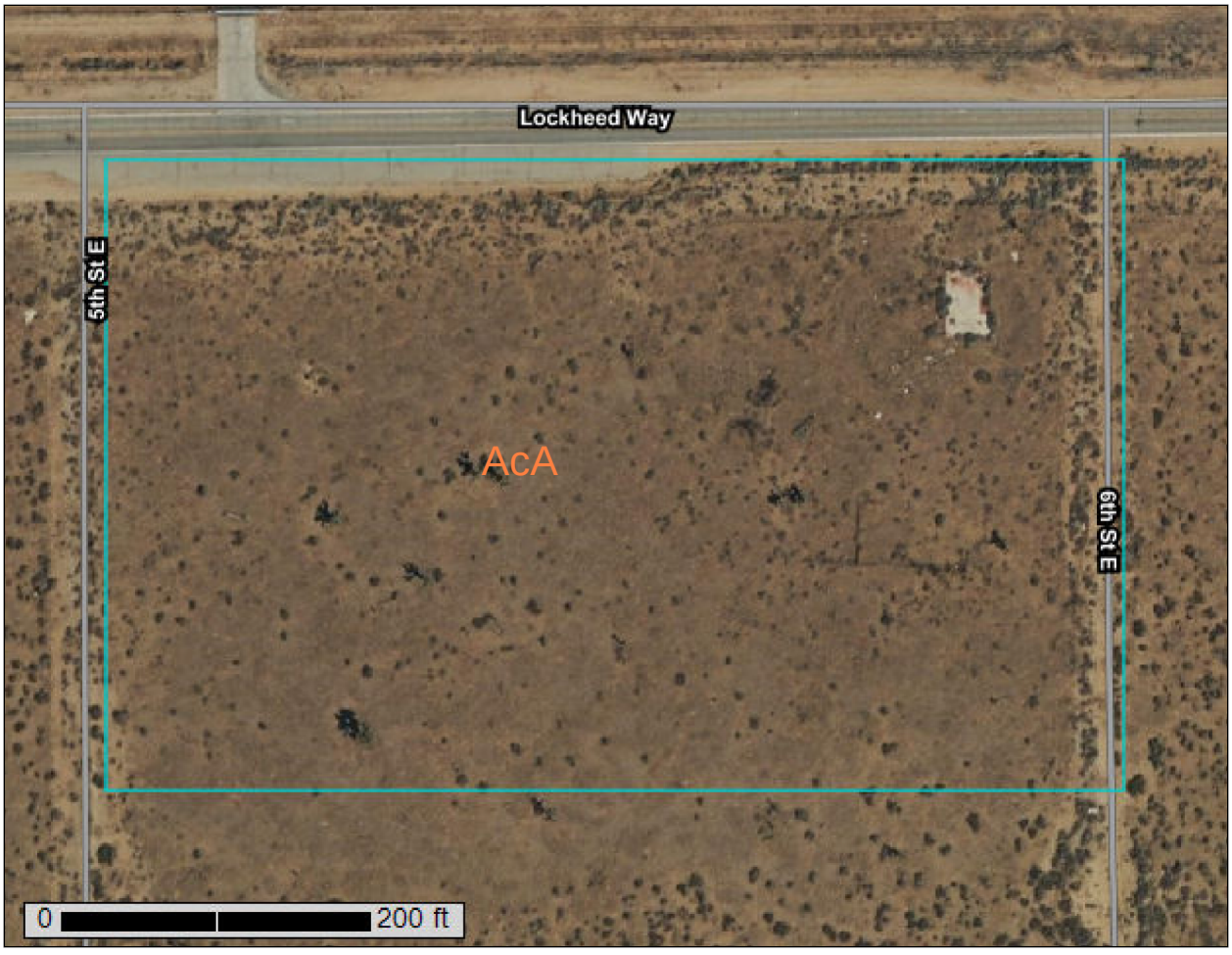
NRCS

Natural Resources Conservation Service

A p oduct of the N tional Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Antelope Valley Area, California

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcA	Adelanto coarse sandy loam, 2 to 5 percent slopes	6.1	100.0%
Totals for Area of Interest		**6.1**	**100.0%**



August 1, 2022

Antelope Valley Area, California

AcA—Adelanto coarse sandy loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hccm
Elevation: 2,000 to 3,000 feet
Mean annual precipitation: 6 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Adelanto and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Adelanto

Setting

Landform: Terraces, alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: coarse sandy loam
H2 - 16 to 41 inches: sandy loam
H3 - 41 to 80 inches: sandy loam
H4 - 80 to 86 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XG021CA - LOAMY 4-9"
Hydric soil rating: No

EXHIBIT E

National Flood Hazard Layer FIRMette

FEMA

118°7'6"W 34°36'42"N

118°6'29"W 34°36'13"N

Feet 1:6,000

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

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

Legend

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

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

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

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

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

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

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

N

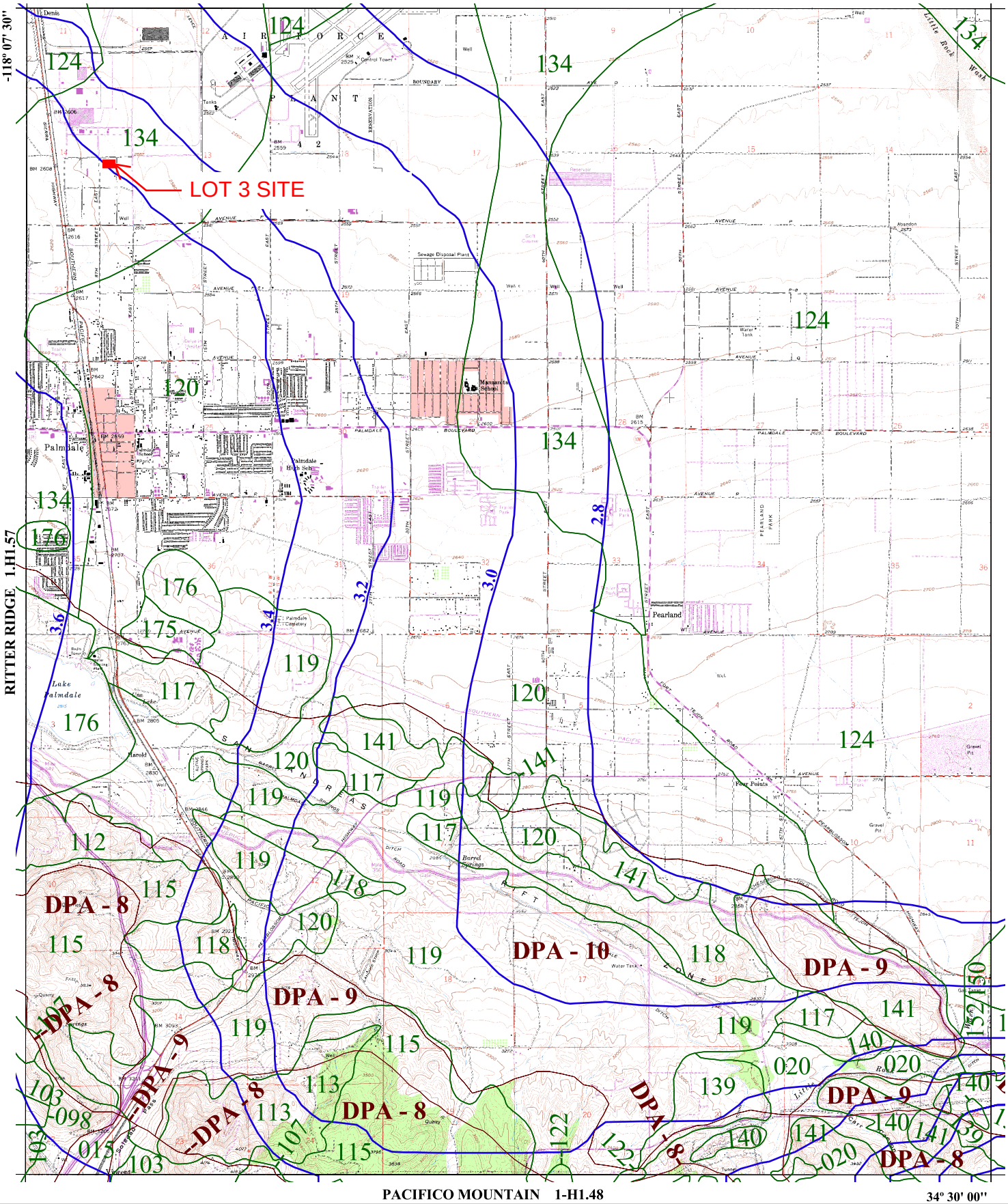
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/26/2022 at 1:57 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.

EXHIBIT F - SOIL NUMBERS



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

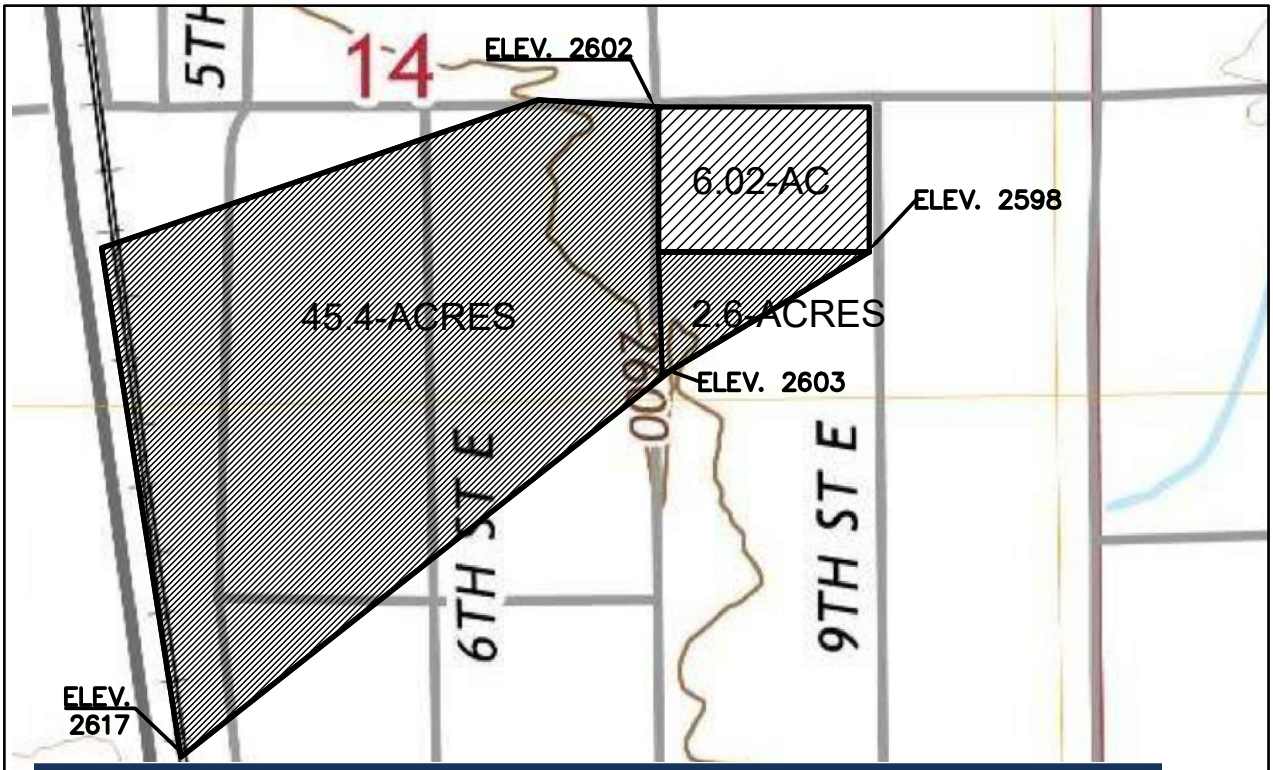
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

P A L M D A L E

50-YEAR 24-HOUR ISOHYET

1-H1.58

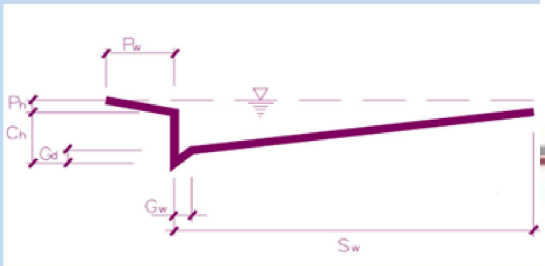
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works



40 FT HALF STREET FLOW CALCULATIONS

Given:

Half Street CL to Curb	Sw	32	Ft
Street X-Slope	Cs =	0.02	Ft/Ft
Gutter Width	Gw =	2	Ft
Gutter Depth	Gd =	0.17	Ft
Parkway width	Pw =	8	Ft
Curb Heigth	Ch =	0.67	Ft
Slope of Street	s =	0.002	Ft/Ft
Manning's Coeficient	n=	0.015	



Then:

	Ph =	0.16		
	Ch-Gd =	0.5		
	Ch-Gd+Ph	0.66		
	Sw1	30	> 25	25
	Sw2	30	> 33	30

ROW Street Capacity				CF Street Capacity	
AREA	A =	12.03	SF	A =	8.67 SF
WETTED PERIMETER	Wp =	40.68	FT	Wp =	27.68 FT
R= A/Wp	R =	0.296		R =	0.313
	Q =	23.62	CFS	Q =	17.69 CFS

DATE: 8/15/2022

DRAWN BY: DWL

CHECKED BY: DWL

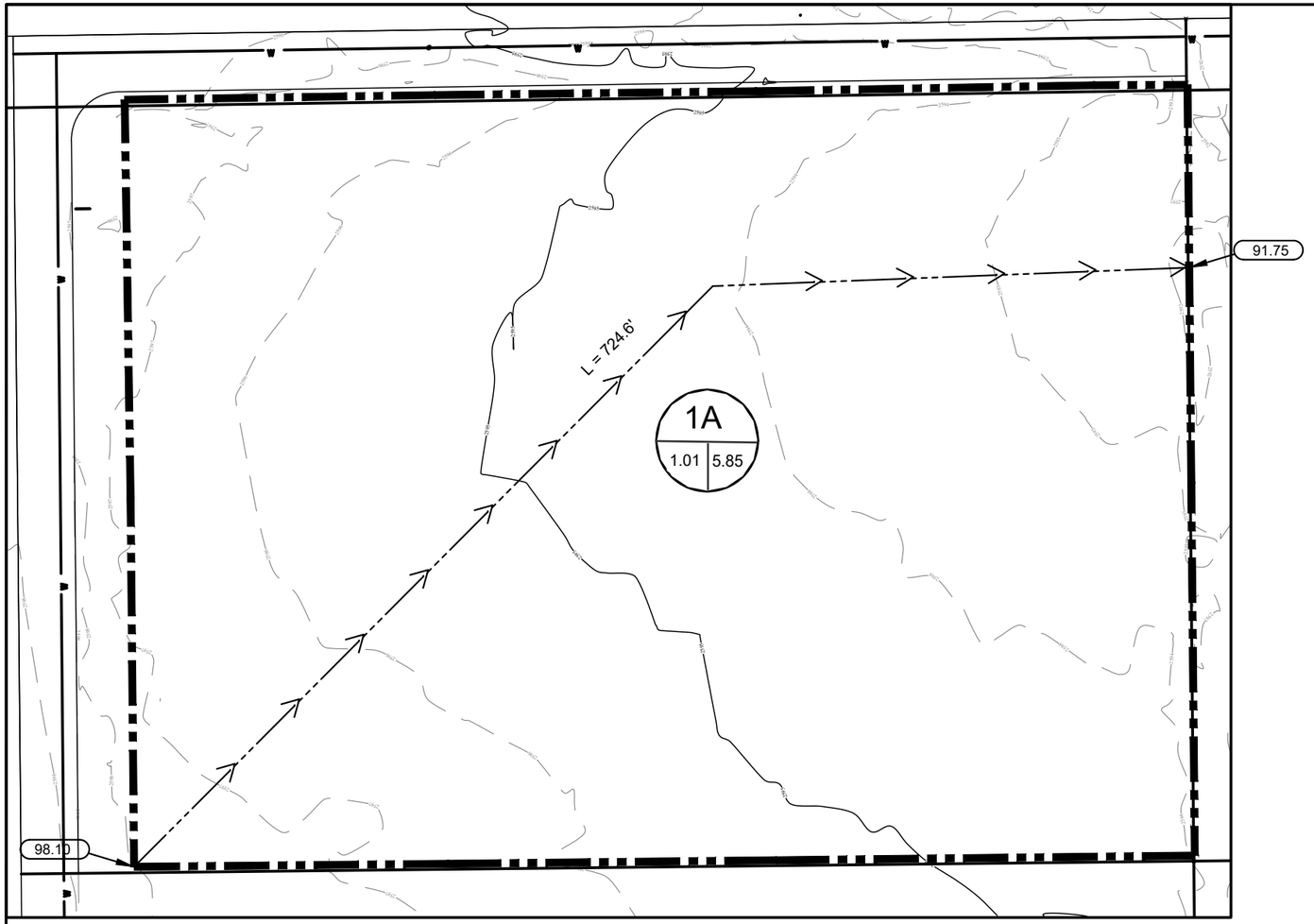
SCALE: 1" = 500'

OFF-SITE TRIBUTARY WATERSHED EXHIBIT

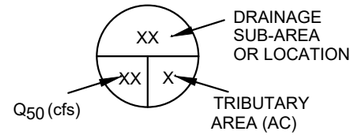
PATRIOT BUSINESS PAREK,LLC
PALMDALE, CA
APN: 3022-026-003

RED BRICK SOLUTION
CONSULTING ENGINEERS & ARCHITECTS

EXHIBIT G



LEGEND:



OVERALL BOUNDARY

DMA AREA BOUNDARY

SUBAREA FLOWLINE

XX.XX — SPOT ELEVATION

GRAPHIC SCALE

0'

(IN FEET)
1 inch = 80 ft.

Input Parameters	
Project Name	Project
Subarea ID	Subarea 1A
Area (ac)	5.85
Flow Path Length (ft)	724.6
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results	
Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	0.9587
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.0095
Burned Peak Flow Rate (cfs)	1.0095
24-Hr Clear Runoff Volume (ac-ft)	0.3246
24-Hr Clear Runoff Volume (cu-ft)	14139.84

LOW IMPACT DEVELOPMENT (LID)

PRE-DEVELOPED CONDITION

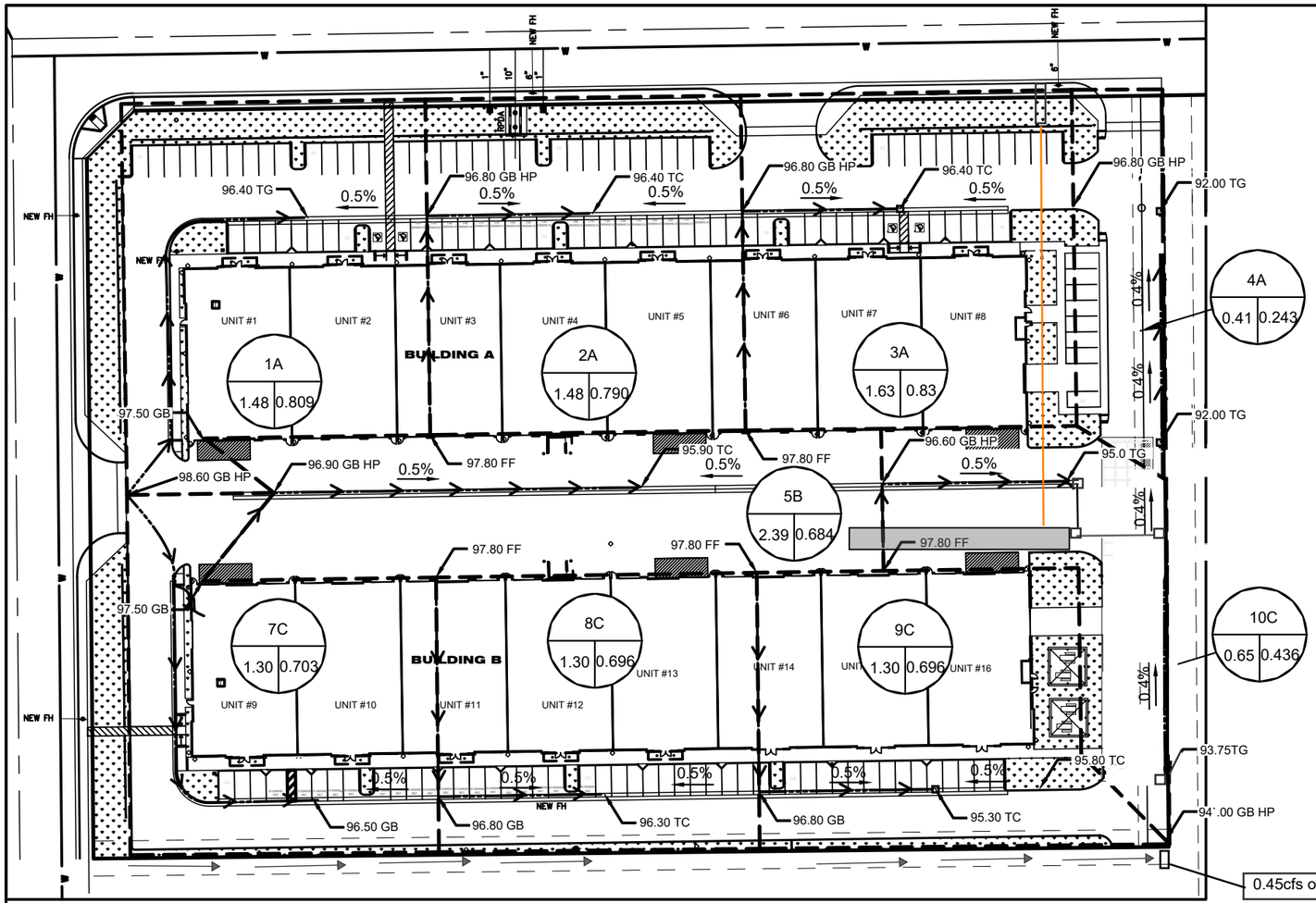
FOR:
8TH STREET INDUSTRIAL - LOT 3

IN THE:
CITY OF PALMDALE, CA

APN:
3022-026-003

RED BRICK SOLUTION
CONSULTING ENGINEERS & ARCHITECTS

EXHIBIT H



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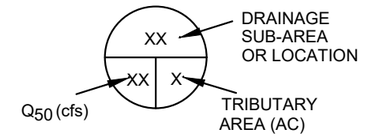


- TRIBUTARY DRAINAGE AREA
- SUBAREA BOUNDARY
- SUBAREA FLOWLINE
- PROPERTY LINE
- 2" FORCE MAIN
- (##) CONVEYANCE
- 96.40 TC — SPOT ELEVATION

EG	EXISTING GRADE
FG	FINISH GRADE
FS	FINISH SURFACE
FF	FINISH FLOOR
IE	INVERT ELEVATION
TC	TOP OF CONCRETE

GRAPHIC SCALE

40' 0' 40' 80'

(IN FEET)
1 inch = 80 ft.

```
 Program Package Serial Number:  2227
08/03/22   FILE: 1802D    INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE      1
                                LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                 PROG F0601M

      Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\CivilCADD\LAR04 - 2227\lasoilx.dat
                                                                                                                STORM DAY 4
                  SUBAREA    SUBAREA      TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV   CONTROL SOIL       TC    RAIN  PCT
LOCATION          AREA(Ac)   Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)  Z      Q(CFS) NAME       MIN   ZONE  IMPV
1802    1A          .8        1.48         .8       1.48    4      163.   .00500    1.00     .00       0.  134        6    A19   1.00
1802    2A          .8        1.48        1.6       2.90    4      176.   .00500    1.00     .00       0.  134        6    A19   1.00
1802    3A          .8        1.63        2.4       4.02    4      150.   .00500    1.00     .00       0.  134        5    A19   1.00
1802    4A          .2         .41        2.6       4.32    0        0.   .00000     .00     .00       0.  134        5    A19   1.00
1802    5B          .7         .64         .7        .64    4      297.   .00500    1.00     .00       0.  134       28    A19   1.00
1802    6AB         .7         .63        3.3       4.90    0        0.   .00000     .00     .00       0.  134        0    A19    .00
1802    7C          .7        1.30         .7       1.30    4      167.   .00500    1.00     .00       0.  134        6    A19   1.00
1802    8C          .7        1.30        1.4       2.53    4      189.   .00500    1.00     .00       0.  134        6    A19   1.00
1802    9C          .7        1.30        2.1       3.57    4      131.   .00500    1.00     .00       0.  134        6    A19   1.00
1802    10C         .4         .65        2.5       4.17    0        0.   .00000     .00     .00       0.  134        8    A19   1.00
1802    11AC       2.5        4.17        5.8       9.03    0        0.   .00000     .00     .00       0.  134        0    A19    .00
1802    12A         .0         .00        5.8       9.03    0        0.   .00000     .00     .00       0.  134       90    A19    .00
```

HYDROLOGY STUDY

HYDROLOGY STUDY

FOR:
18TH STREET INDUSTRIAL - LOT 3

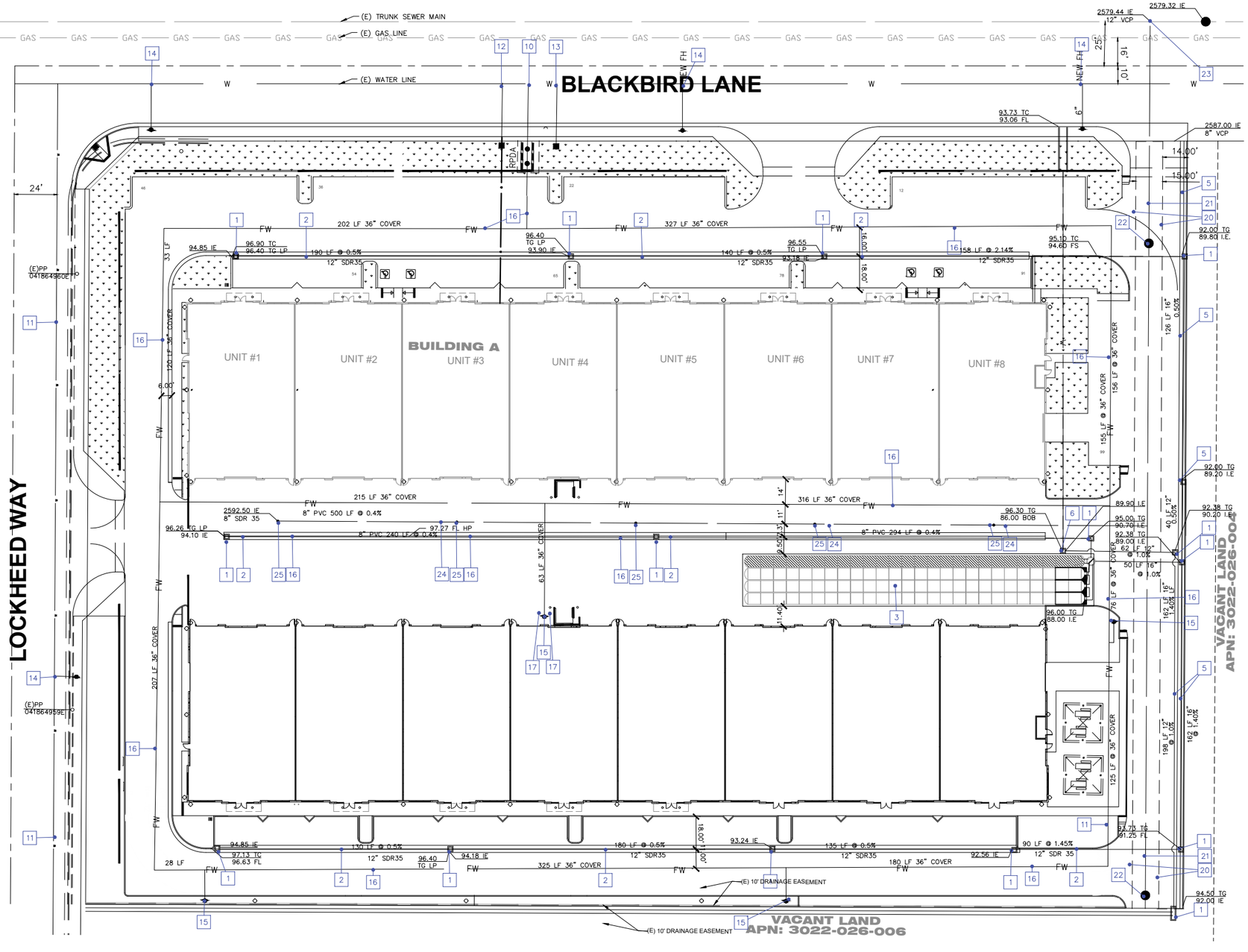
IN THE:
CITY OF PALMDALE, CA

APN:
3022-026-003

RED BRICK SOLUTION

CONSULTING ENGINEERS & ARCHITECTS

EXHIBIT I



KEYED NOTES

STORM WATER

1. PROPOSED CATCH BASIN WITH CLARIFIER
2. PROPOSED 8-16 INCH STORM DRAIN
3. PROPOSED UNDERGROUND DRAINAGE BASIN
4. PROPOSED 2" FORCE MAIN
5. PROPOSED HDPE DBL WALL N12" PIPE
6. PROPOSED WET WELL W/ SUMP PUMP

DOMESTIC & FIRE WATER

10. PROPOSED 6 TO 8-INCH RPDA AND FDC
11. PROPOSED PUBLIC WATER MAIN (LAC CSA 70)
12. PROPOSED 1-INCH DOMESTIC WATER METER
13. PROPOSED 1-INCH IRRIGATION METER
14. PROPOSED PUBLIC FIRE HYDRANT
15. PROPOSED PRIVATE FIRE HYDRANT SERVICE
16. PROPOSED 8-INCH PRIVATE FIRE WATER LOOP
17. PROPOSED BOLLARDS PER DETAIL HEREON

SANITARY SEWER

20. PROPOSED 15' WIDE PUBLIC SEWER EASMENT
21. PROPOSED 15" CLAY PIPE SEWER LINE
22. PROPOSED 4/FT DIAMETER SEWER MANHOLE
23. PROPOSED CONNECTION TO TRUNK SEWER LINE
24. PROPOSED 4-INCH PVC SEWER CLEANOUT
25. PROPOSED 6-INCH PRIVATE SEWER LINE

HYDROLOGY STUDY

BASIN DESIGN

FOR:
8TH STREET INDUSTRIAL LOT 3

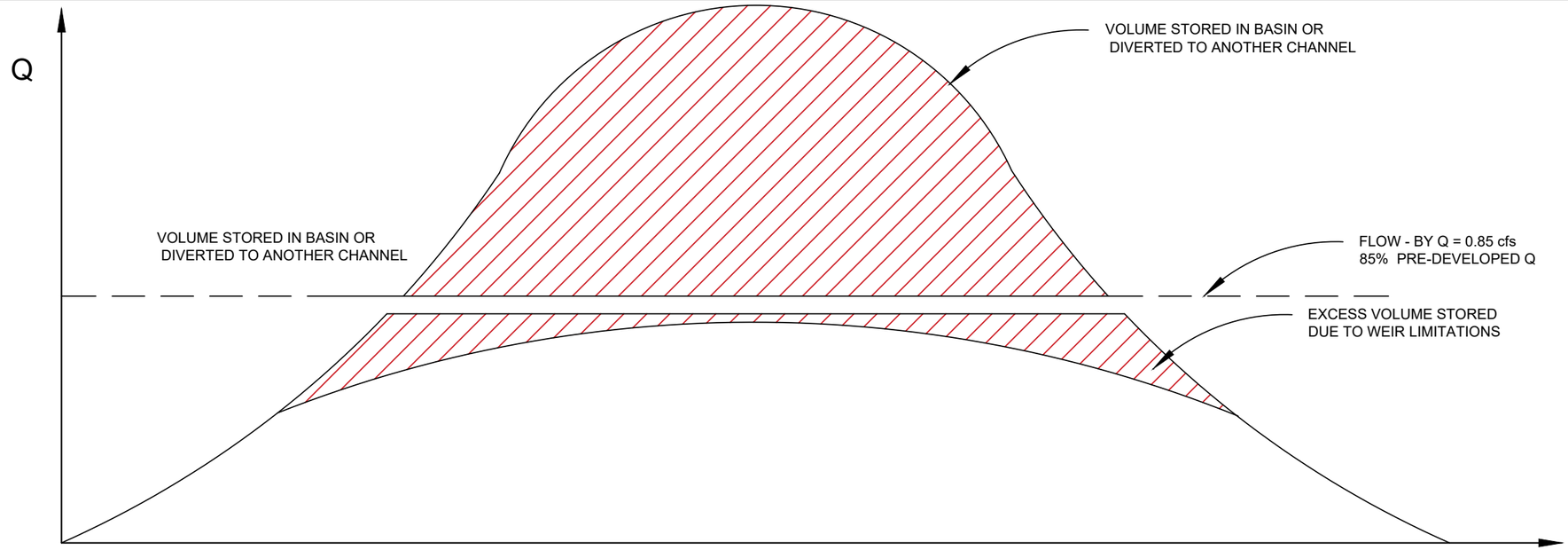
IN THE:
CITY OF PALMDALE, CA

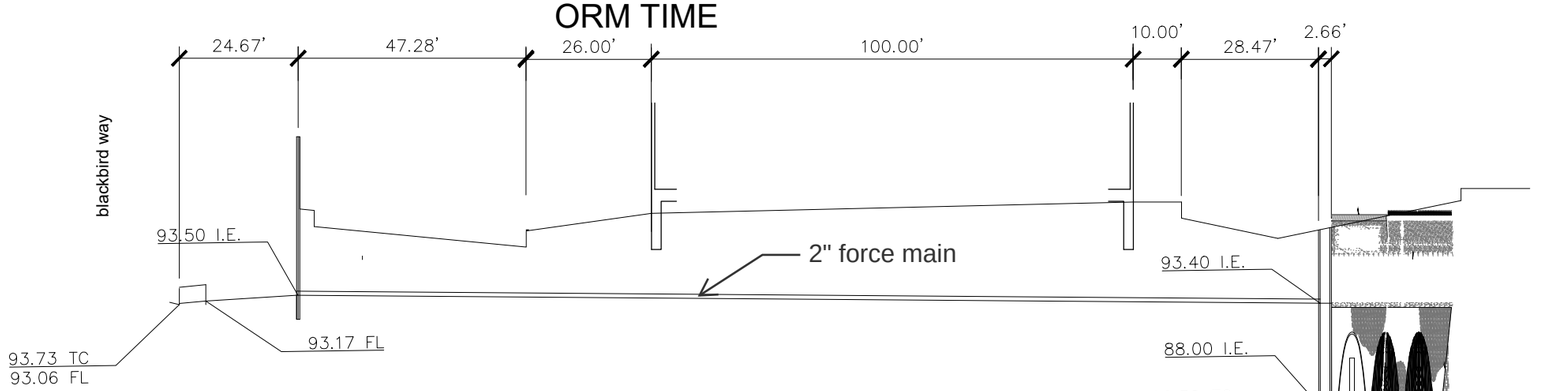
APN:
3022-026-003

RED BRICK SOLUTION

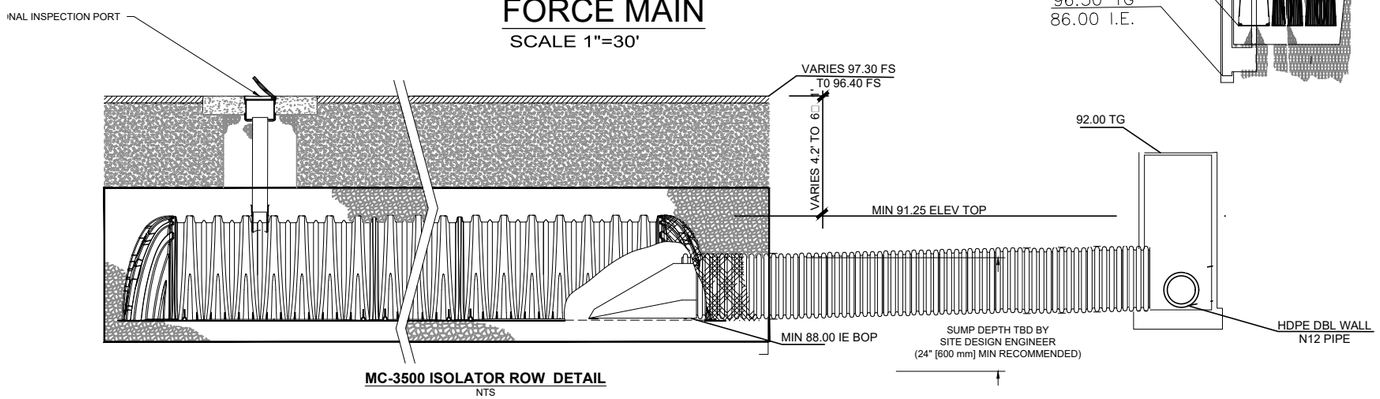
CONSULTING ENGINEERS & ARCHITECTS

EXHIBIT J





FORCE MAIN
SCALE 1"=30'



MC-3500 ISOLATOR ROW DETAIL
NTS

HYDROLOGY STUDY

BASIN DESIGN

FOR:
8TH STREET INDUSTRIAL LOT 3

IN THE:
CITY OF PALMDALE, CA

APN:
3022-026-003

RED BRICK SOLUTION

CONSULTING ENGINEERS
& ARCHITECTS

EXHIBIT K

Appendix B:

45.4-Ac. Off-site HydroCalc Calculations

2.6-Ac. Off-site HydroCalc Calculations

Pre-Developed HydroCalc Calculations

Post-Developed HydroCalc Calculations

LAR04 Software Calculations

Peak Flow Hydrologic Analysis Off-Site 45.4 Acres

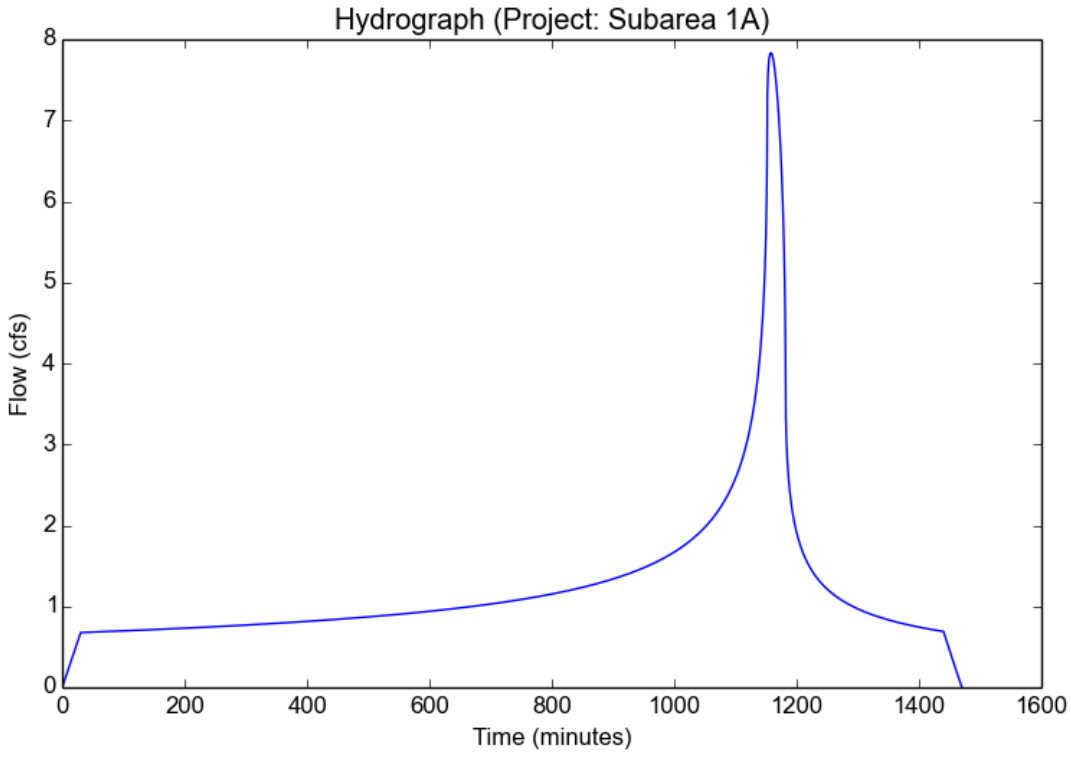
File location: C:/HydroCalc/HydroCalc/1802 45.4ac - Subarea 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea 1A
Area (ac)	45.4
Flow Path Length (ft)	2200.0
Flow Path Slope (vft/hft)	0.0068
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	0.9587
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	7.8345
Burned Peak Flow Rate (cfs)	7.8345
24-Hr Clear Runoff Volume (ac-ft)	2.5192
24-Hr Clear Runoff Volume (cu-ft)	109734.8759



Peak Flow Hydrologic Analysis Off-Site 2.6 Acres

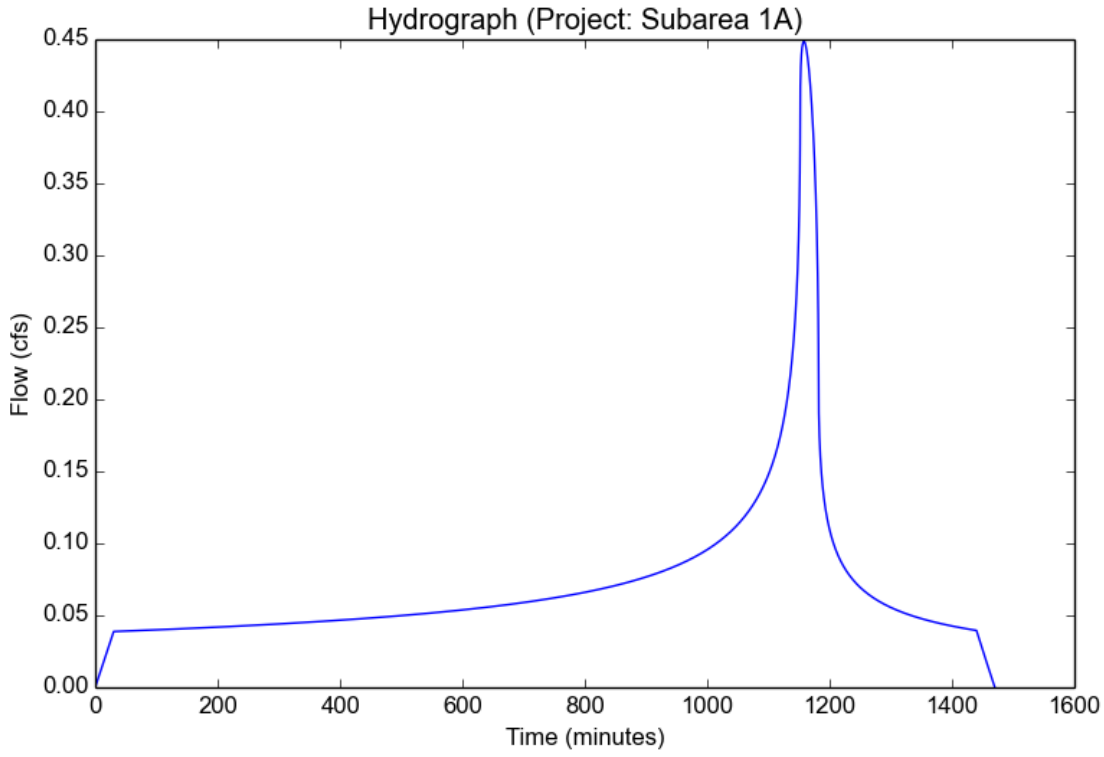
File location: C:/HydroCalc/HydroCalc/180002 2.6ac - Subarea 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea 1A
Area (ac)	2.6
Flow Path Length (ft)	700.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	0.9587
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.4487
Burned Peak Flow Rate (cfs)	0.4487
24-Hr Clear Runoff Volume (ac-ft)	0.1443
24-Hr Clear Runoff Volume (cu-ft)	6284.3762



Peak Flow Hydrologic Analysis Pre-Developed Site

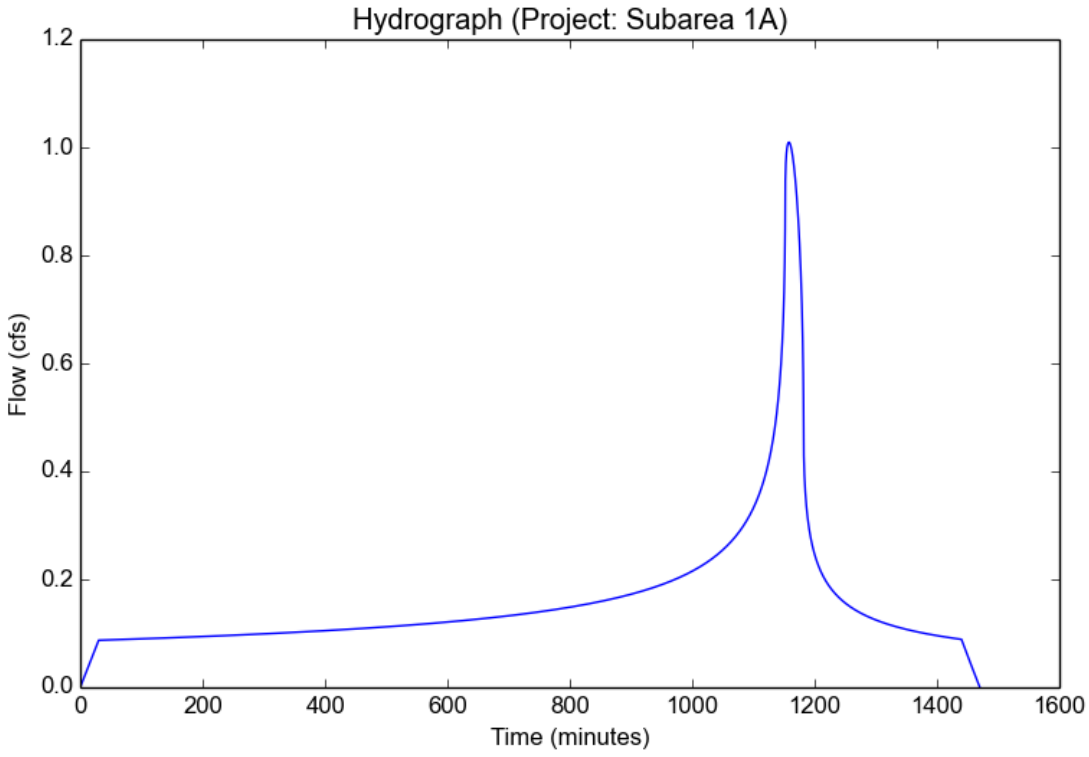
File location: C:/Users/Leslie Crawford/Desktop/Pre-Developed - Subarea 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea 1A
Area (ac)	5.85
Flow Path Length (ft)	724.6
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.1
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	0.9587
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.18
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.0095
Burned Peak Flow Rate (cfs)	1.0095
24-Hr Clear Runoff Volume (ac-ft)	0.3246
24-Hr Clear Runoff Volume (cu-ft)	14139.8463



Peak Flow Hydrologic Analysis Post-Developed Site

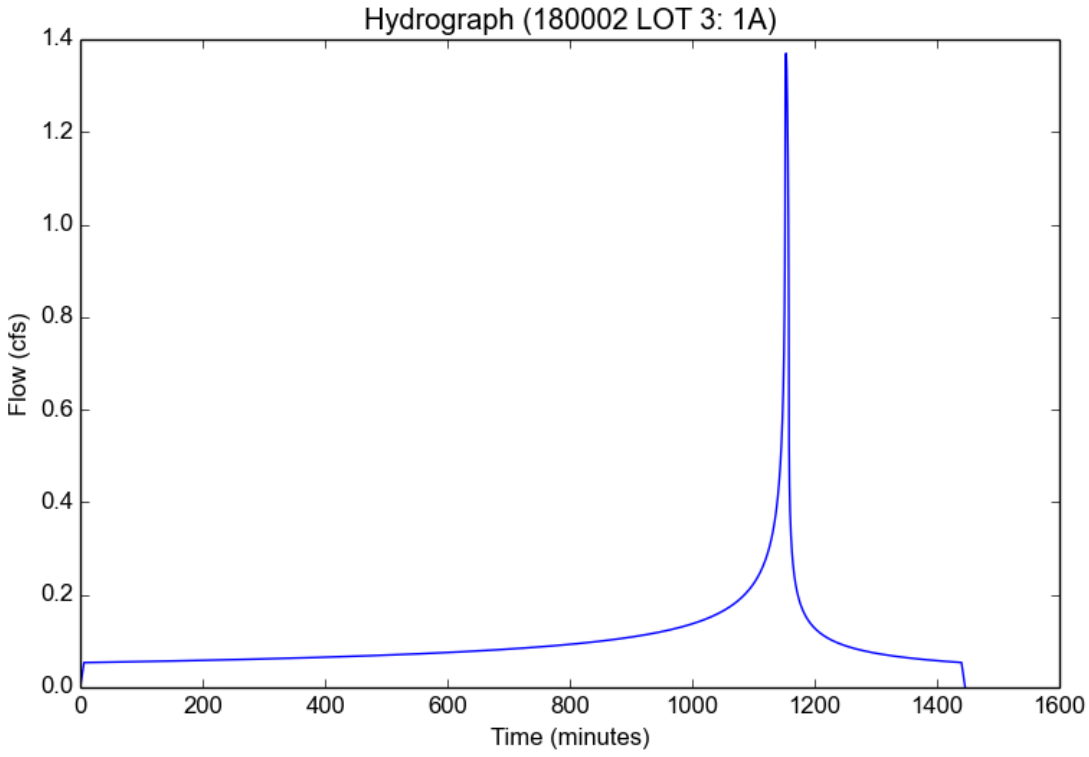
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	1A
Area (ac)	0.809
Flow Path Length (ft)	231.2
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.3697
Burned Peak Flow Rate (cfs)	1.3697
24-Hr Clear Runoff Volume (ac-ft)	0.2004
24-Hr Clear Runoff Volume (cu-ft)	8731.5349



Peak Flow Hydrologic Analysis Post-Developed Site

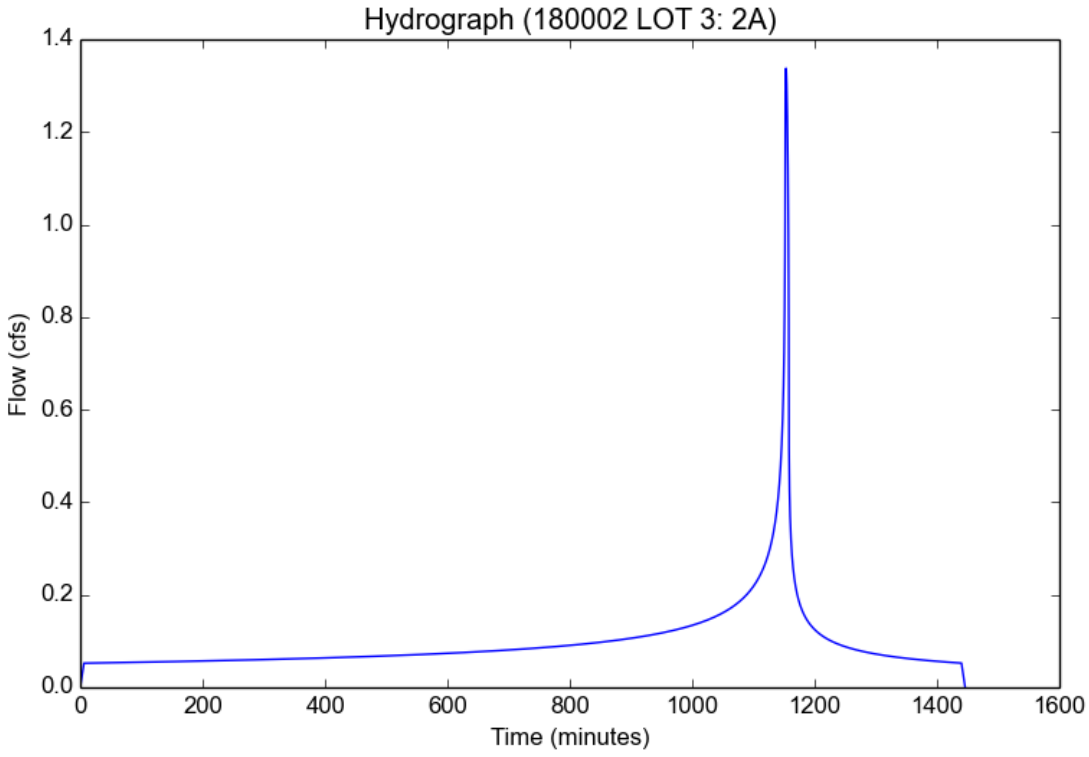
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	2A
Area (ac)	0.79
Flow Path Length (ft)	217.5
Flow Path Slope (vft/hft)	0.006
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.3376
Burned Peak Flow Rate (cfs)	1.3376
24-Hr Clear Runoff Volume (ac-ft)	0.1957
24-Hr Clear Runoff Volume (cu-ft)	8526.468



Peak Flow Hydrologic Analysis Post-Developed Site

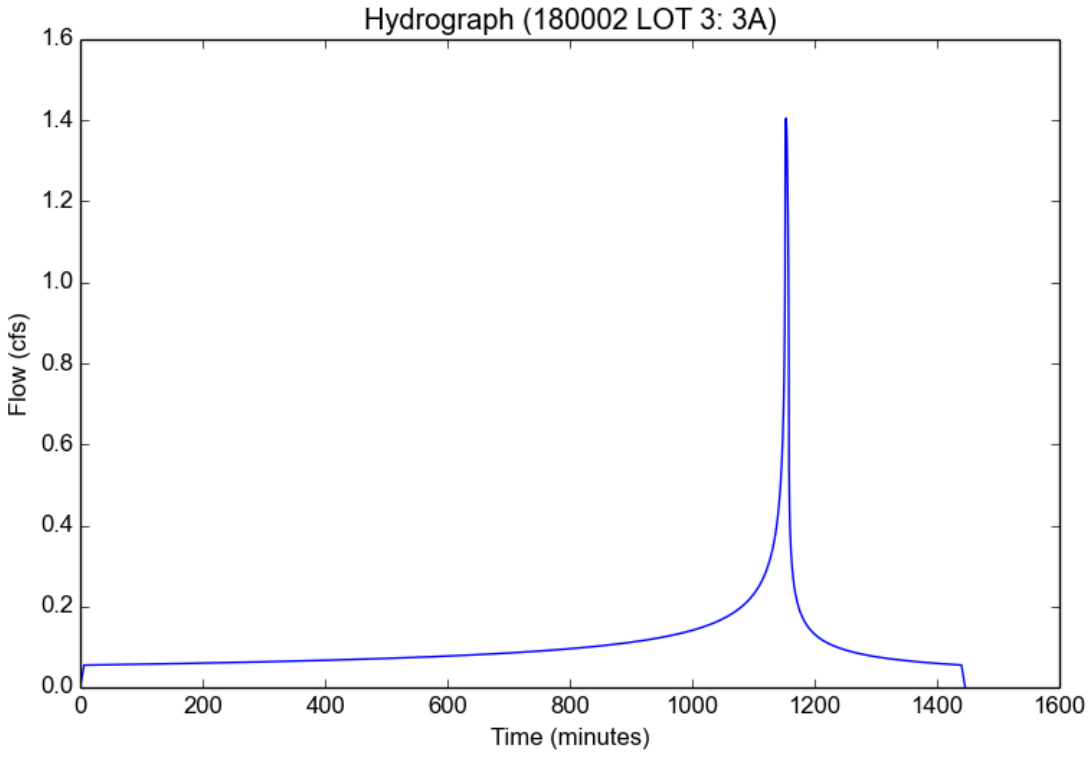
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	3A
Area (ac)	0.83
Flow Path Length (ft)	217.5
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.4053
Burned Peak Flow Rate (cfs)	1.4053
24-Hr Clear Runoff Volume (ac-ft)	0.2057
24-Hr Clear Runoff Volume (cu-ft)	8958.1879



Peak Flow Hydrologic Analysis Post-Developed Site

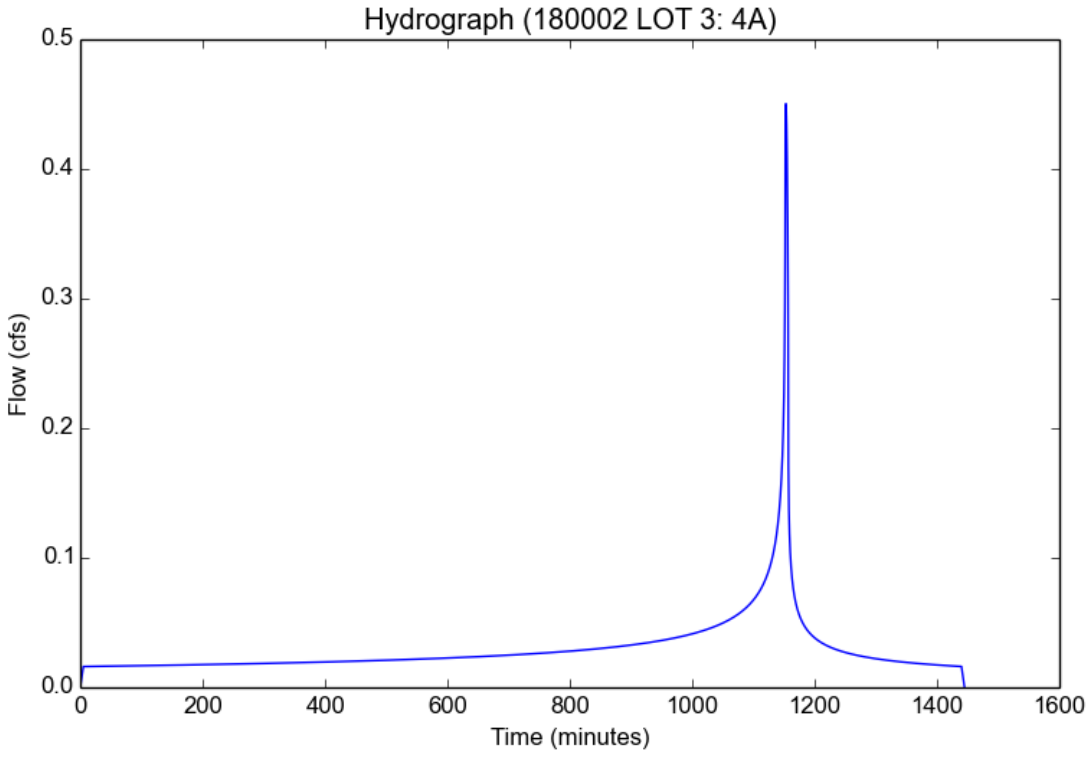
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	4A
Area (ac)	0.243
Flow Path Length (ft)	170.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.2254
Undeveloped Runoff Coefficient (Cu)	0.3473
Developed Runoff Coefficient (Cd)	0.8327
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.4503
Burned Peak Flow Rate (cfs)	0.4503
24-Hr Clear Runoff Volume (ac-ft)	0.0602
24-Hr Clear Runoff Volume (cu-ft)	2623.0533



Peak Flow Hydrologic Analysis Post-Developed Site

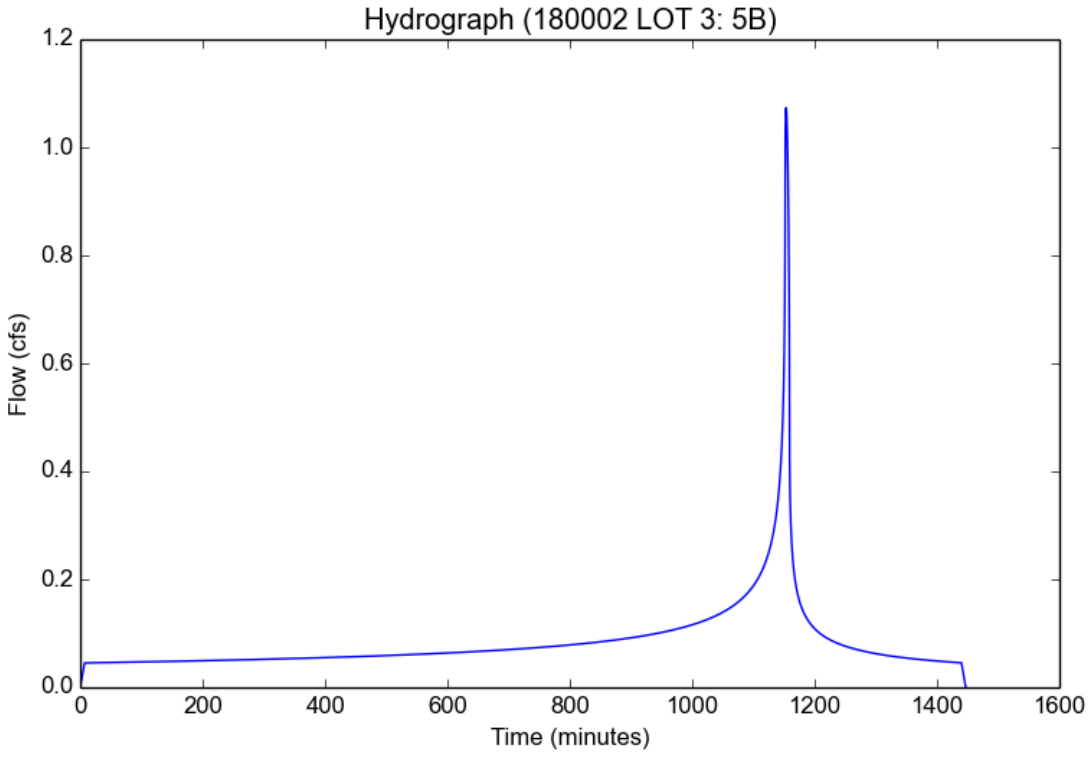
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	5B
Area (ac)	0.684
Flow Path Length (ft)	272.0
Flow Path Slope (vft/hft)	0.006
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	1.8999
Undeveloped Runoff Coefficient (Cu)	0.2908
Developed Runoff Coefficient (Cd)	0.8259
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	1.0732
Burned Peak Flow Rate (cfs)	1.0732
24-Hr Clear Runoff Volume (ac-ft)	0.1695
24-Hr Clear Runoff Volume (cu-ft)	7381.4597



Peak Flow Hydrologic Analysis Post-Developed Site

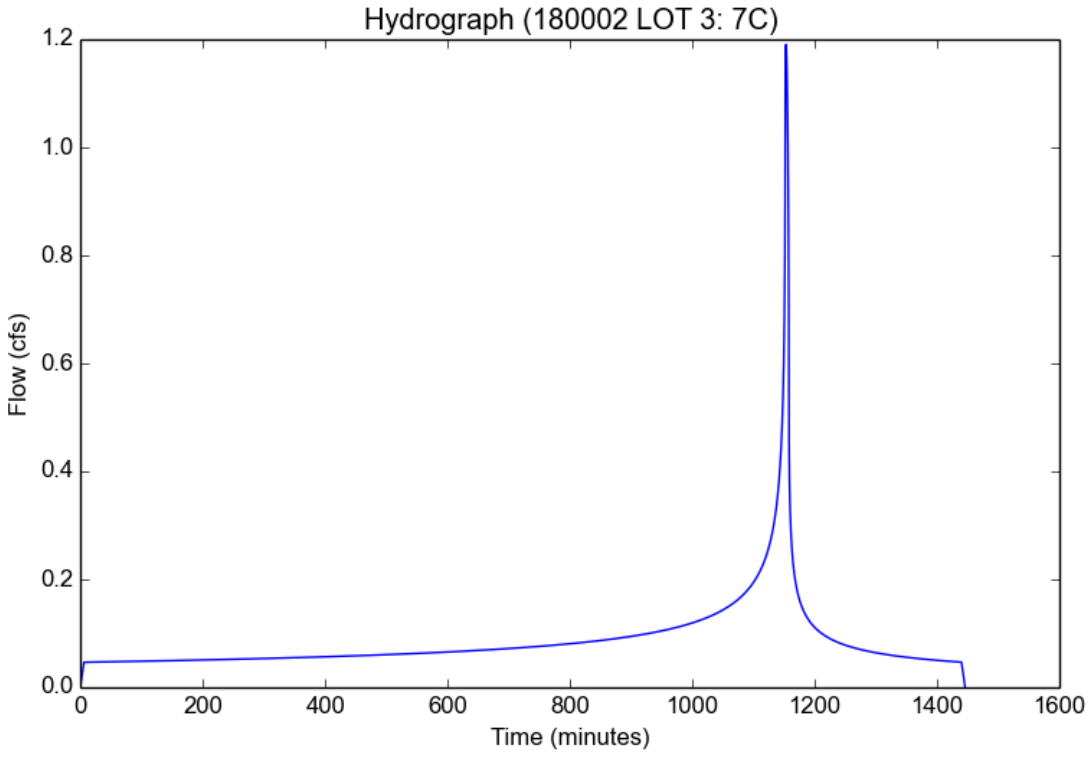
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	7C
Area (ac)	0.703
Flow Path Length (ft)	239.0
Flow Path Slope (vft/hft)	0.009
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.1903
Burned Peak Flow Rate (cfs)	1.1903
24-Hr Clear Runoff Volume (ac-ft)	0.1742
24-Hr Clear Runoff Volume (cu-ft)	7587.4772



Peak Flow Hydrologic Analysis Post-Developed Site

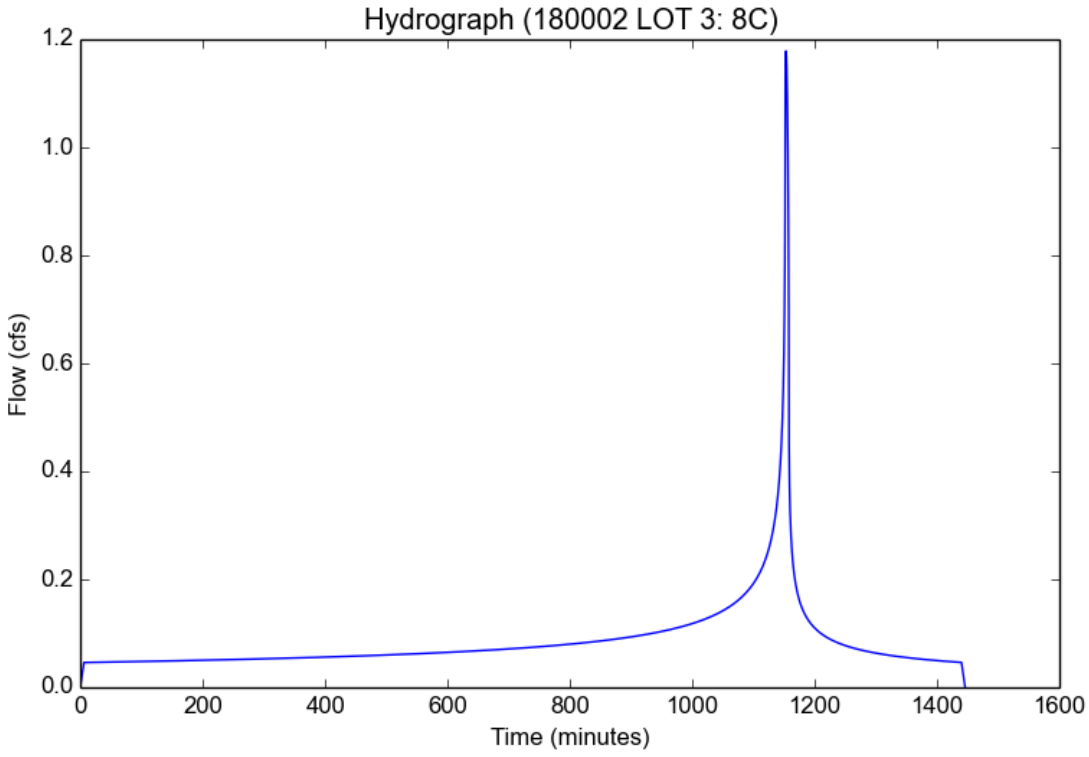
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	8C
Area (ac)	0.696
Flow Path Length (ft)	224.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.1784
Burned Peak Flow Rate (cfs)	1.1784
24-Hr Clear Runoff Volume (ac-ft)	0.1725
24-Hr Clear Runoff Volume (cu-ft)	7511.9262



Peak Flow Hydrologic Analysis Post-Developed Site

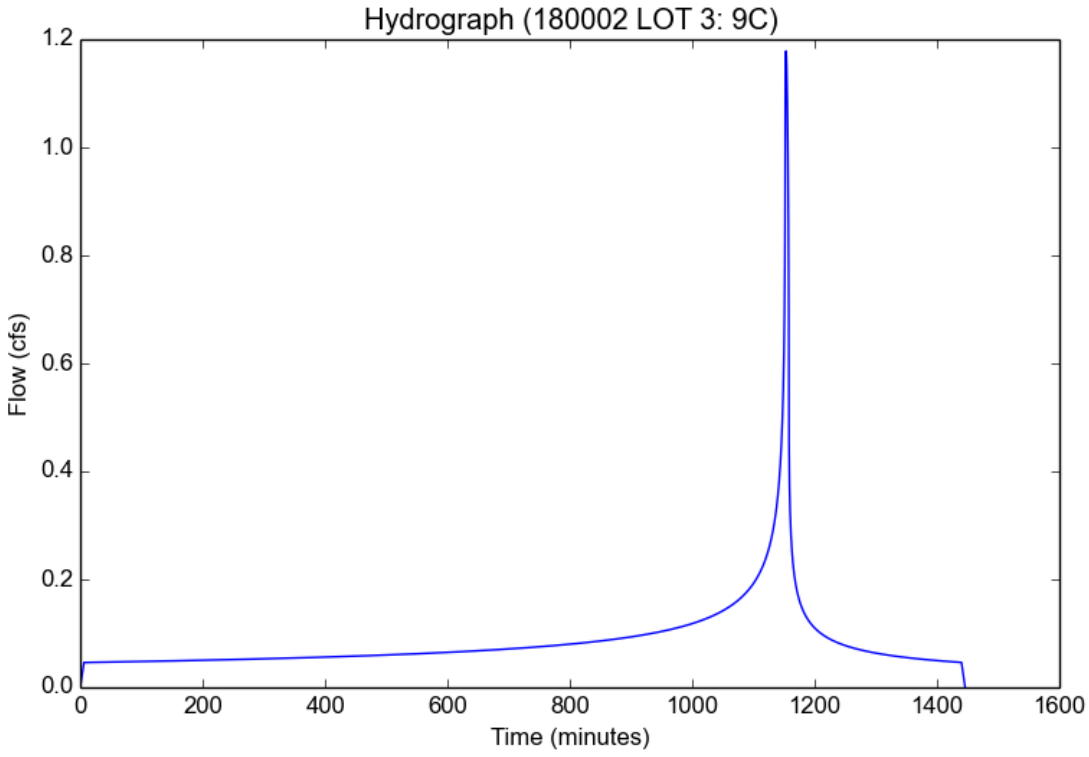
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	9C
Area (ac)	0.696
Flow Path Length (ft)	224.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	2.0427
Undeveloped Runoff Coefficient (Cu)	0.3156
Developed Runoff Coefficient (Cd)	0.8289
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	1.1784
Burned Peak Flow Rate (cfs)	1.1784
24-Hr Clear Runoff Volume (ac-ft)	0.1725
24-Hr Clear Runoff Volume (cu-ft)	7511.9262



Peak Flow Hydrologic Analysis Post-Developed Site

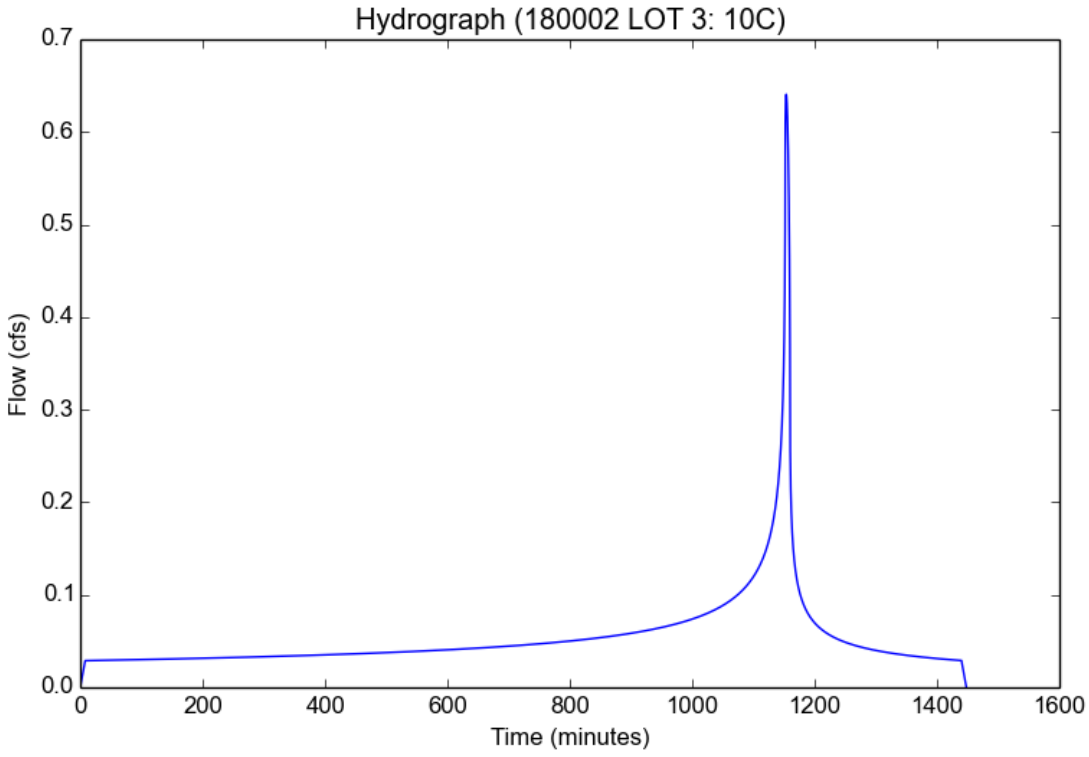
File location: C:/Users/Leslie Crawford/Desktop/180002 LOT 3 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	180002 LOT 3
Subarea ID	10C
Area (ac)	0.436
Flow Path Length (ft)	351.0
Flow Path Slope (vft/hft)	0.008
50-yr Rainfall Depth (in)	3.73
Percent Impervious	0.8783
Soil Type	134
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.73
Peak Intensity (in/hr)	1.7843
Undeveloped Runoff Coefficient (Cu)	0.2708
Developed Runoff Coefficient (Cd)	0.8234
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	0.6406
Burned Peak Flow Rate (cfs)	0.6406
24-Hr Clear Runoff Volume (ac-ft)	0.108
24-Hr Clear Runoff Volume (cu-ft)	4704.5099



Post-Developed Site Program Package Serial Number: 2227

Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\CivilCADD\LAR04 - 2227\lasoilx.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
1802	1A	.8	1.48	.8	1.48	4	163.	.00500	1.00	.00	0.	134	6	A19	1.00
1802	2A	.8	1.48	1.6	2.90	4	176.	.00500	1.00	.00	0.	134	6	A19	1.00
1802	3A	.8	1.63	2.4	4.02	4	150.	.00500	1.00	.00	0.	134	5	A19	1.00
1802	4A	.2	.41	2.6	4.32	0	0.	.00000	.00	.00	0.	134	5	A19	1.00
1802	5B	.7	.64	.7	.64	4	297.	.00500	1.00	.00	0.	134	28	A19	1.00
1802	6AB	.7	.63	3.3	4.90	0	0.	.00000	.00	.00	0.	134	0	A19	.00
1802	7C	.7	1.30	.7	1.30	4	167.	.00500	1.00	.00	0.	134	6	A19	1.00
1802	8C	.7	1.30	1.4	2.53	4	189.	.00500	1.00	.00	0.	134	6	A19	1.00
1802	9C	.7	1.30	2.1	3.57	4	131.	.00500	1.00	.00	0.	134	6	A19	1.00
1802	10C	.4	.65	2.5	4.17	0	0.	.00000	.00	.00	0.	134	8	A19	1.00
1802	11AC	2.5	4.17	5.8	9.03	0	0.	.00000	.00	.00	0.	134	0	A19	.00
1802	12A	.0	.00	5.8	9.03	0	0.	.00000	.00	.00	0.	134	90	A19	.00

Appendix C:

Retarding Basin Calculations

12-inch Pipe Capacity

16-inch Pipe Capacity

Triangular Channel Calcs

ADS Stormtech underground basin

FILE 1802RT

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1997-2004 Version 6.4

Study Date : 09/29/23 Input hydrograph file name : 1802d.hyd
Output hydrograph file name: 1802rt.hin
180002 basin

INFILTRATION/DETENTION BASIN

User entry of depth-outflow-storage data

Hydrograph time unit varies
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data @ 1 Min. Intervals:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.112	0.893	0.111	0.113
2.000	0.224	0.894	0.223	0.225
3.000	0.336	0.895	0.335	0.337
4.000	0.440	0.896	0.439	0.441

Hydrograph Detention Basin Routing
Hydrograph at 1802 12 A Storm Day: 4 Drainage Area = 5.80
Total flood hydrograph volume this storm day = 0.86 Ac. Ft.

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

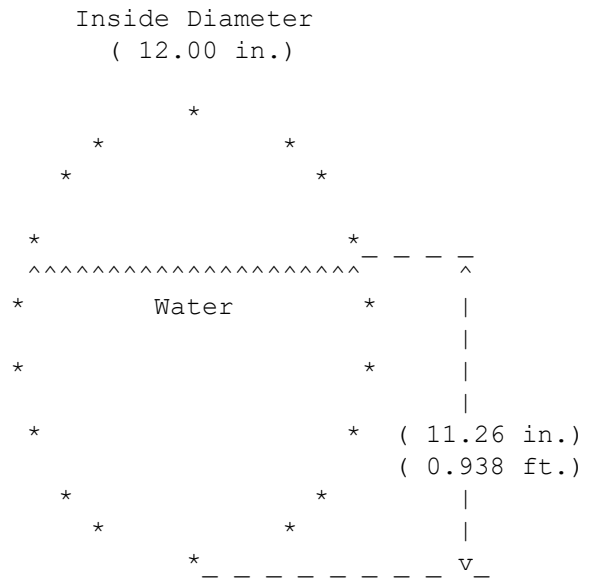
Time (Min)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 2.3 4.5 6.8 9.0	Depth (Ft.)	
0	0.0	0.0	0.000	O	0.0	
100	0.0	0.0	0.000	O	0.0	
200	0.0	0.0	0.000	O	0.0	
300	0.1	0.0	0.005	O	0.0	
400	0.1	0.1	0.010	O	0.1	
500	0.1	0.1	0.012	O	0.1	
600	0.1	0.1	0.012	O	0.1	
700	0.1	0.1	0.012	O	0.1	
800	0.1	0.1	0.013	O	0.1	
900	0.4	0.2	0.027	OI	0.2	
1000	1.0	0.6	0.072	O I	0.6	0.85 INFLOW
1050	1.2	0.8	0.101	O I	0.9	0.060 AC.FT
1100	1.6	0.9	0.137	O I	1.2	
1110	1.9	0.9	0.149	O I	1.3	
1120	2.1	0.9	0.164	O I	1.5	
1130	2.4	0.9	0.183	O I	1.6	
1131	2.5	0.9	0.186	O I	1.7	
1132	2.5	0.9	0.188	O I	1.7	
1133	2.6	0.9	0.190	O I	1.7	
1134	2.6	0.9	0.192	O I	1.7	

1135	2.7	0.9	0.195	O	I				1.7
1136	2.8	0.9	0.198	O	I				1.8
1137	2.8	0.9	0.200	O	I				1.8
1138	2.9	0.9	0.203	O	I				1.8
1139	3.0	0.9	0.206	O	I				1.8
1140	3.1	0.9	0.209	O	I				1.9
1141	3.2	0.9	0.212	O	I				1.9
1142	3.3	0.9	0.215	O	I				1.9
1143	3.4	0.9	0.219	O	I				2.0
1144	3.5	0.9	0.222	O	I				2.0
1145	3.7	0.9	0.226	O	I				2.0
1146	3.8	0.9	0.230	O	I				2.1
1147	4.0	0.9	0.235	O	I				2.1
1148	4.2	0.9	0.239	O	I				2.1
1149	4.6	0.9	0.244	O	I				2.2
1150	5.2	0.9	0.250	O	I				2.2
1151	5.9	0.9	0.257	O	I				2.3
1152	6.9	0.9	0.265	O	I				2.4
1153	8.2	0.9	0.275	O	I				2.5
1154	8.9	0.9	0.286	O	I				2.6
1155	9.0	0.9	0.298	O	I				2.7
1156	8.9	0.9	0.309	O	I				2.8
1157	8.1	0.9	0.319	O	I				2.8
1158	7.4	0.9	0.328	O	I				2.9
1159	6.5	0.9	0.335	O	I				3.0
1160	5.5	0.9	0.342	O	I				3.1
1161	4.6	0.9	0.347	O	I				3.1
1162	3.9	0.9	0.351	O	I				3.1
1163	3.4	0.9	0.354	O	I				3.2
1164	3.1	0.9	0.357	O	I				3.2
1165	2.9	0.9	0.360	O	I				3.2
1166	2.7	0.9	0.363	O	I				3.3
1167	2.6	0.9	0.365	O	I				3.3
1168	2.5	0.9	0.367	O	I				3.3
1169	2.4	0.9	0.369	O	I				3.3
1170	2.3	0.9	0.371	O	I				3.3
1171	2.2	0.9	0.373	O	I				3.4
1172	2.2	0.9	0.375	O	I				3.4
1173	2.1	0.9	0.376	O	I				3.4
1174	2.1	0.9	0.378	O	I				3.4
1175	2.0	0.9	0.380	O	I				3.4
1176	1.9	0.9	0.381	O	I				3.4
1177	1.9	0.9	0.382	O	I				3.4
1178	1.8	0.9	0.384	O	I				3.5
1179	1.8	0.9	0.385	O	I				3.5
1180	1.7	0.9	0.386	O	I				3.5
1181	1.6	0.9	0.387	O	I				3.5
1182	1.6	0.9	0.388	O	I				3.5
1183	1.5	0.9	0.389	O	I				3.5
1184	1.5	0.9	0.390	O	I				3.5
1185	1.4	0.9	0.390	O	I				3.5
1186	1.4	0.9	0.391	O	I				3.5
1187	1.4	0.9	0.392	O	I				3.5
1188	1.3	0.9	0.392	O	I				3.5
1189	1.3	0.9	0.393	O	I				3.5
1190	1.3	0.9	0.393	O	I				3.6
1191	1.3	0.9	0.394	O	I				3.6
1192	1.2	0.9	0.394	O	I				3.6
1193	1.2	0.9	0.395	O	I				3.6
1194	1.2	0.9	0.395	O	I				3.6
1195	1.2	0.9	0.396	O	I				3.6
1196	1.2	0.9	0.396	O	I				3.6
1197	1.2	0.9	0.396	O	I				3.6

1198	1.1	0.9	0.397	O					3.6	
1199	1.1	0.9	0.397	O					3.6	
1200	1.1	0.9	0.397	O					3.6	
1201	1.1	0.9	0.398	O					3.6	
1202	1.1	0.9	0.398	O					3.6	
1203	1.1	0.9	0.398	O					3.6	
1204	1.1	0.9	0.398	O					3.6	
1205	1.1	0.9	0.399	O					3.6	
1206	1.0	0.9	0.399	O					3.6	
1207	1.0	0.9	0.399	O					3.6	
1208	1.0	0.9	0.399	O					3.6	
1209	1.0	0.9	0.399	O					3.6	
1210	1.0	0.9	0.399	O					3.6	
1211	1.0	0.9	0.399	O					3.6	
1212	1.0	0.9	0.400	O					3.6	
1213	1.0	0.9	0.400	O					3.6	
1214	1.0	0.9	0.400	O					3.6	
1215	1.0	0.9	0.400	O					3.6	
1216	0.9	0.9	0.400	O					3.6	
1217	0.9	0.9	0.400	O					3.6	
1218	0.9	0.9	0.400	O					3.6	
1219	0.9	0.9	0.400	O					3.6	
1220	0.9	0.9	0.400	O					3.6	
1221	0.9	0.9	0.400	O					3.6	
1222	0.9	0.9	0.400	O					3.6	
1223	0.9	0.9	0.400	O					3.6	
1224	0.9	0.9	0.400	O					3.6	
1225	0.9	0.9	0.400	O					3.6	
1226	0.9	0.9	0.400	O					3.6	0.40-0.060=
1227	0.9	0.9	0.400	O					3.6	0.340
1228	0.9	0.9	0.400	O					3.6	
1229	0.9	0.9	0.400	O					3.6	
1230	0.8	0.9	0.400	IO					3.6	
1231	0.8	0.9	0.400	IO					3.6	
1232	0.8	0.9	0.400	IO					3.6	
1233	0.8	0.9	0.400	IO					3.6	
1234	0.8	0.9	0.399	IO					3.6	
1235	0.8	0.9	0.399	IO					3.6	
1236	0.8	0.9	0.399	IO					3.6	
1237	0.8	0.9	0.399	IO					3.6	
1238	0.8	0.9	0.399	IO					3.6	
1239	0.8	0.9	0.399	IO					3.6	
1240	0.8	0.9	0.399	IO					3.6	
1241	0.8	0.9	0.399	IO					3.6	
1242	0.8	0.9	0.398	IO					3.6	
1243	0.8	0.9	0.398	IO					3.6	
1244	0.8	0.9	0.398	IO					3.6	
1245	0.8	0.9	0.398	IO					3.6	
1246	0.8	0.9	0.398	IO					3.6	
1247	0.8	0.9	0.398	IO					3.6	
1248	0.8	0.9	0.398	IO					3.6	
1249	0.8	0.9	0.398	IO					3.6	
1250	0.8	0.9	0.397	IO					3.6	
1251	0.7	0.9	0.397	IO					3.6	
1252	0.7	0.9	0.397	IO					3.6	
1253	0.7	0.9	0.397	IO					3.6	
1254	0.7	0.9	0.396	IO					3.6	
1255	0.7	0.9	0.396	IO					3.6	
1256	0.7	0.9	0.396	IO					3.6	
1257	0.7	0.9	0.396	IO					3.6	
1258	0.7	0.9	0.395	IO					3.6	
1259	0.7	0.9	0.395	IO					3.6	
1260	0.6	0.9	0.395	IO					3.6	

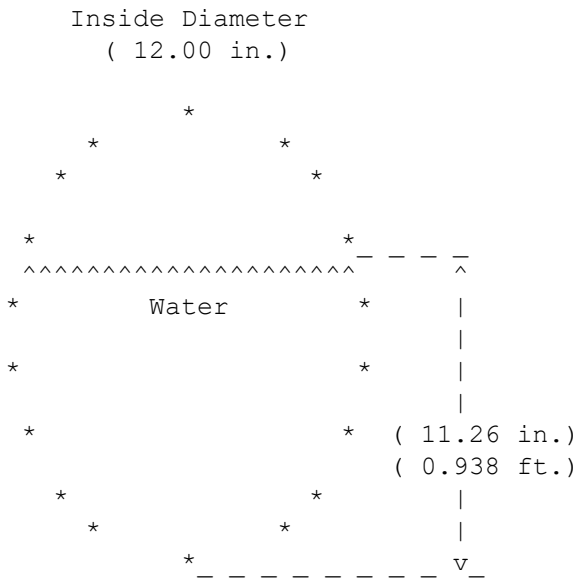
1261	0.6	0.9	0.394	| IO	|	|	|	3.6
1262	0.6	0.9	0.394	| IO	|	|	|	3.6
1263	0.5	0.9	0.393	|I O	|	|	|	3.6
1264	0.5	0.9	0.393	|I O	|	|	|	3.5
1265	0.5	0.9	0.392	|I O	|	|	|	3.5
1266	0.5	0.9	0.392	|I O	|	|	|	3.5
1267	0.5	0.9	0.391	|I O	|	|	|	3.5
1268	0.5	0.9	0.390	|I O	|	|	|	3.5
1269	0.5	0.9	0.390	|I O	|	|	|	3.5
1270	0.5	0.9	0.389	|I O	|	|	|	3.5
1271	0.5	0.9	0.389	|I O	|	|	|	3.5
1272	0.4	0.9	0.388	|I O	|	|	|	3.5
1273	0.4	0.9	0.387	|I O	|	|	|	3.5
1274	0.4	0.9	0.387	|I O	|	|	|	3.5
1275	0.4	0.9	0.386	|I O	|	|	|	3.5
1276	0.3	0.9	0.385	|I O	|	|	|	3.5
1277	0.3	0.9	0.384	|I O	|	|	|	3.5
1278	0.3	0.9	0.384	|I O	|	|	|	3.5
1279	0.3	0.9	0.383	|I O	|	|	|	3.5
1280	0.3	0.9	0.382	|I O	|	|	|	3.4
1281	0.3	0.9	0.381	|I O	|	|	|	3.4
1282	0.3	0.9	0.380	|I O	|	|	|	3.4
1283	0.3	0.9	0.380	|I O	|	|	|	3.4
1284	0.3	0.9	0.379	|I O	|	|	|	3.4
1285	0.3	0.9	0.378	|I O	|	|	|	3.4
1286	0.3	0.9	0.377	|I O	|	|	|	3.4
1287	0.3	0.9	0.376	|I O	|	|	|	3.4
1288	0.3	0.9	0.375	|I O	|	|	|	3.4
1289	0.2	0.9	0.374	I O	|	|	|	3.4
1290	0.2	0.9	0.374	I O	|	|	|	3.4
1291	0.2	0.9	0.373	I O	|	|	|	3.4
1292	0.2	0.9	0.372	I O	|	|	|	3.3
1293	0.2	0.9	0.371	I O	|	|	|	3.3
1294	0.2	0.9	0.370	I O	|	|	|	3.3
1295	0.2	0.9	0.369	I O	|	|	|	3.3
1296	0.2	0.9	0.368	I O	|	|	|	3.3
1297	0.2	0.9	0.367	I O	|	|	|	3.3
1298	0.2	0.9	0.366	I O	|	|	|	3.3
1299	0.1	0.9	0.365	I O	|	|	|	3.3
1300	0.1	0.9	0.364	I O	|	|	|	3.3
1310	0.1	0.9	0.353	I O	|	|	|	3.2
1320	0.1	0.9	0.342	I O	|	|	|	3.1
1330	0.1	0.9	0.331	I O	|	|	|	3.0
1340	0.1	0.9	0.320	I O	|	|	|	2.9
1350	0.1	0.9	0.309	I O	|	|	|	2.8
1360	0.1	0.9	0.298	I O	|	|	|	2.7
1370	0.1	0.9	0.287	I O	|	|	|	2.6
1380	0.0	0.9	0.275	I O	|	|	|	2.5
1390	0.1	0.9	0.264	I O	|	|	|	2.4
1400	0.0	0.9	0.252	I O	|	|	|	2.3
1420	0.0	0.9	0.227	I O	|	|	|	2.0
1440	0.0	0.9	0.203	I O	|	|	|	1.8
1460	0.0	0.9	0.178	I O	|	|	|	1.6
1500	0.0	0.9	0.129	I O	|	|	|	1.2

Remaining water in basin = 0.13 (Ac.Ft)
Peak flow out of basin = 0.90(CFS)
Peak flow time = 1229 Min., time interval # = 115
Maximum depth in basin = 3.62(Ft.)



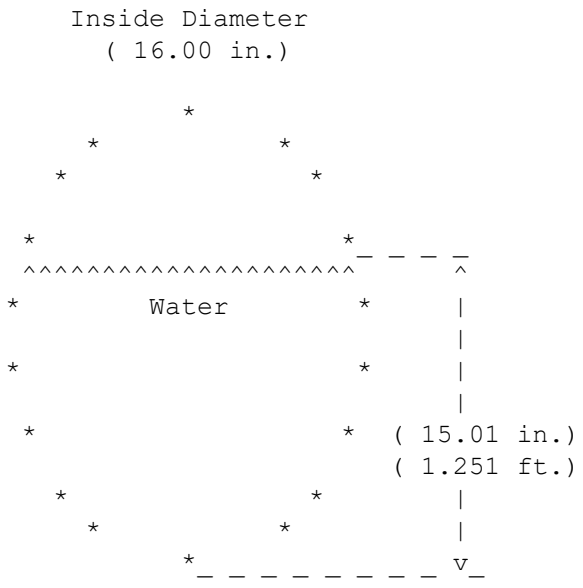
Circular Channel Section

Flowrate	2.710	CFS
Velocity	3.542	fps
Pipe Diameter	12.000	inches
Depth of Flow	11.256	inches
Depth of Flow	0.938	feet
Critical Depth	0.703	feet
Depth/Diameter (D/d)	0.938	
Slope of Pipe	0.500	%
X-Sectional Area	0.765	sq. ft.
Wetted Perimeter	2.638	feet
AR^(2/3)	0.335	
Mannings 'n'	0.013	
Min. Fric. Slope, 12 inch Pipe Flowing Full	0.579	%



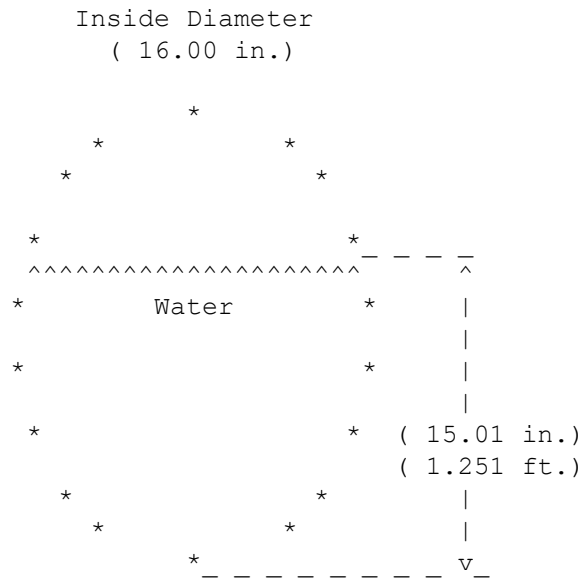
Circular Channel Section

Flowrate	5.420	CFS
Velocity	7.083	fps
Pipe Diameter	12.000	inches
Depth of Flow	11.256	inches
Depth of Flow	0.938	feet
Critical Depth	0.933	feet
Depth/Diameter (D/d)	0.938	
Slope of Pipe	2.000	%
X-Sectional Area	0.765	sq. ft.
Wetted Perimeter	2.638	feet
AR^(2/3)	0.335	
Mannings 'n'	0.013	
Min. Fric. Slope, 12 inch Pipe Flowing Full	2.314	%



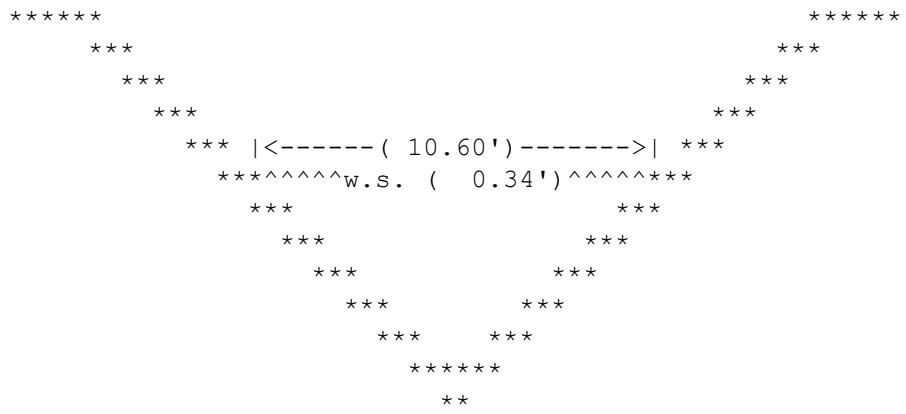
Circular Channel Section

Flowrate	5.836	CFS
Velocity	4.290	fps
Pipe Diameter	16.000	inches
Depth of Flow	15.008	inches
Depth of Flow	1.251	feet
Critical Depth	0.962	feet
Depth/Diameter (D/d)	0.938	
Slope of Pipe	0.500	%
X-Sectional Area	1.360	sq. ft.
Wetted Perimeter	3.518	feet
AR^(2/3)	0.722	
Mannings 'n'	0.013	
Min. Fric. Slope, 16 inch Pipe Flowing Full	0.579	%



Circular Channel Section

Flowrate	9.755	CFS
Velocity	7.171	fps
Pipe Diameter	16.000	inches
Depth of Flow	15.008	inches
Depth of Flow	1.251	feet
Critical Depth	1.199	feet
Depth/Diameter (D/d)	0.938	
Slope of Pipe	1.000	%
X-Sectional Area	1.360	sq. ft.
Wetted Perimeter	3.518	feet
AR^(2/3)	0.722	
Mannings 'n'	0.011	
Min. Fric. Slope, 16 inch Pipe Flowing Full	1.157	%



Triangular Channel

Flowrate	4.000	CFS
Velocity	2.207	fps
Depth of Flow	0.342	feet
Freeboard	0.000	feet
Total Depth	0.342	feet
Width at Water Surface	10.600	feet
Top Width	10.600	feet
Slope of Channel	0.400	%
Left Side Slope	1.000	: 1
Right Side Slope	30.000	: 1
X-Sectional Area	1.812	sq. ft.
Wetted Perimeter	10.747	feet
AR^(2/3)	0.553	
Mannings 'n'	0.013	

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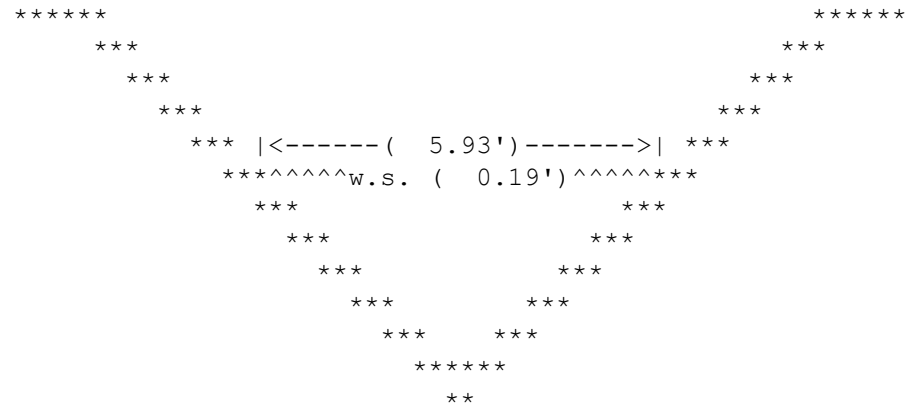
Consulting Engineers
234 N. Arrowhead Ave.
San Bernardino, California 92408
(909)885-3806



Triangular Channel

Flowrate	0.850	CFS
Velocity	1.498	fps
Depth of Flow	0.191	feet
Freeboard	0.000	feet
Total Depth	0.191	feet
Width at Water Surface	5.934	feet
Top Width	5.934	feet
Slope of Channel	0.400	%
Left Side Slope	1.000	: 1
Right Side Slope	30.000	: 1
X-Sectional Area	0.568	sq. ft.
Wetted Perimeter	6.017	feet
AR^(2/3)	0.118	
Mannings 'n'	0.013	

User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	No
Project Name:	Lot 3 PATRIOT IN-DUSTRIAL
Engineer:	David Larson
Project Location:	California
Measurement Type:	Imperial
Required Storage Volume:	19166 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Average Cover Over Chambers:	18 in.
Design Constraint Dimensions:	(34 ft. x 200 ft.)

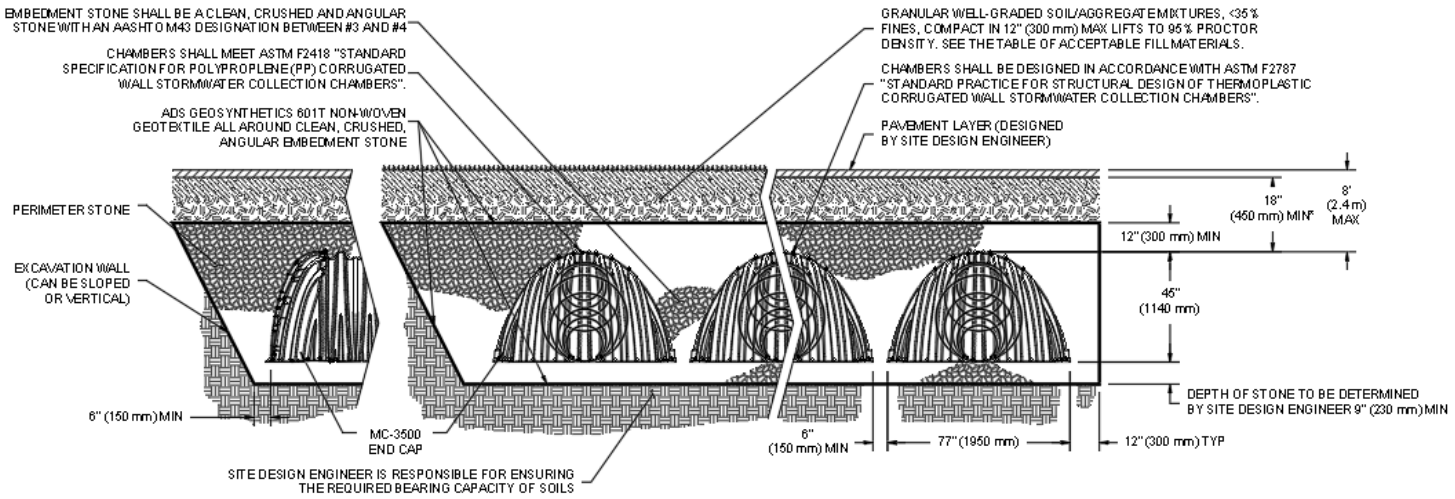
Results

System Volume and Bed Size

Installed Storage Volume:	19519.80 cubic ft.
Storage Volume Per Chamber:	109.90 cubic ft.
Number Of Chambers Required:	104
Number Of End Caps Required:	8
Chamber Rows:	4
Maximum Length:	196.22 ft.
Maximum Width:	29.17 ft.
Approx. Bed Size Required:	5722.96 square ft.

System Components

Amount Of Stone Required:	739 cubic yards
Volume Of Excavation (Not Including Fill):	1166 cubic yards
Total Non-woven Geotextile Required:	1857 square yards
Woven Geotextile Required (excluding Isolator Row):	51 square yards
Woven Geotextile Required (Isolator Row):	222 square yards
Total Woven Geotextile Required:	272 square yards
Impervious Liner Required:	0 square yards



PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

ADS SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

LOT 3 PATRIOT INDUSTRIAL

PALMDALE, CA, USA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

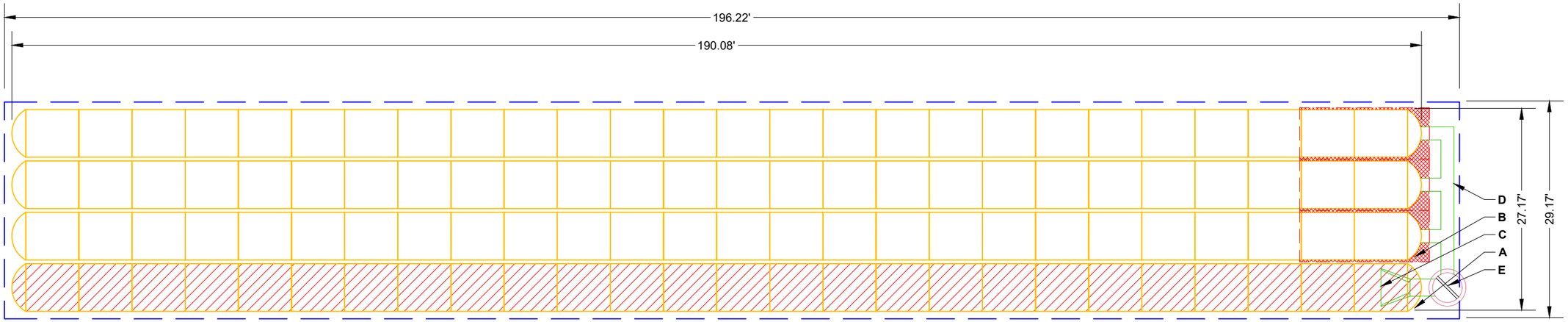
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
104	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	12.50
8	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	6.50
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	6.00
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	6.00
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	6.00
19523	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	5.50
		TOP OF MC-3500 CHAMBER:	4.50
		24" ISOLATOR ROW PLUS INVERT:	0.92
		18" x 18" BOTTOM MANIFOLD INVERT:	0.90
5723	SYSTEM AREA (SF)	BOTTOM OF MC-3500 CHAMBER:	0.75
450.8	SYSTEM PERIMETER (ft)	BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.06"	
PREFABRICATED END CAP	B	18" BOTTOM CORED END CAP, PART#: MC3500IEPP18BC / TYP OF ALL 18" BOTTOM CONNECTIONS	1.77"	
FLAMP	C	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	D	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.77"	
CONCRETE STRUCTURE W/WEIR	E	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		16.5 CFS IN



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

LOT 3 PATRIOT INDUSTRIAL
PALMDALE, CA, USA
DATE:
DRAWN: DL
CHECKED: N/A
PROJECT #:

DESCRIPTION	DATE	DRW	CHK

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Chamber System
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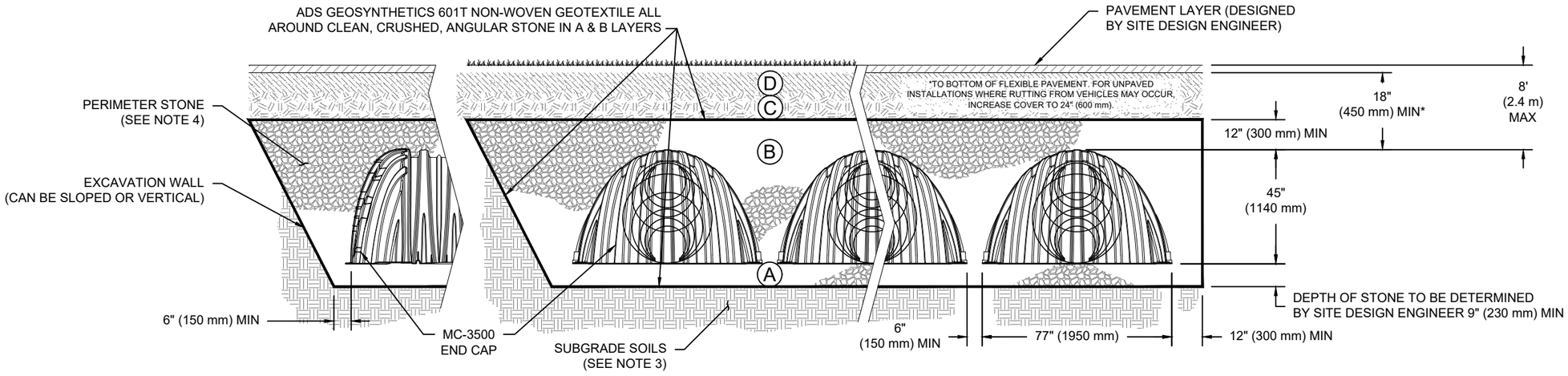
0 15 30

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

LOT 3 PATRIOT INDUSTRIAL
PALMDALE, CA, USA
DATE:
DRAWN: DL
CHECKED: N/A
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

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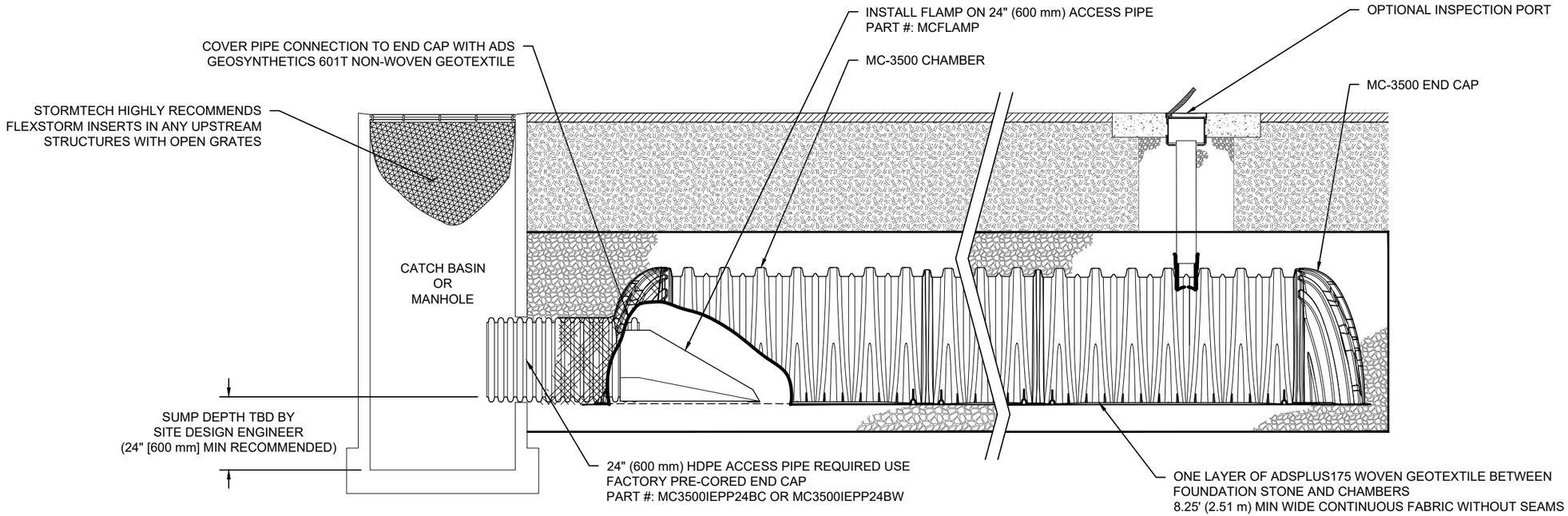


MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

LOT 3 PATRIOT INDUSTRIAL
PALMDALE, CA, USA
DATE: DRAWN: DL
PROJECT #: CHECKED: N/A

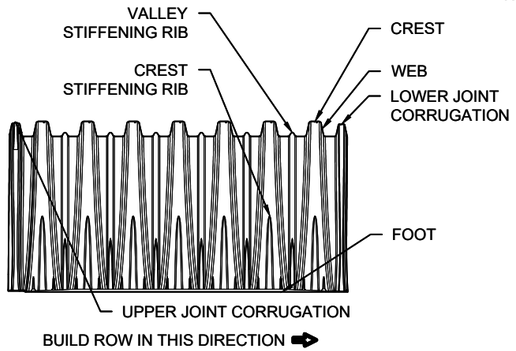
DESCRIPTION	CHK	DRW	DATE

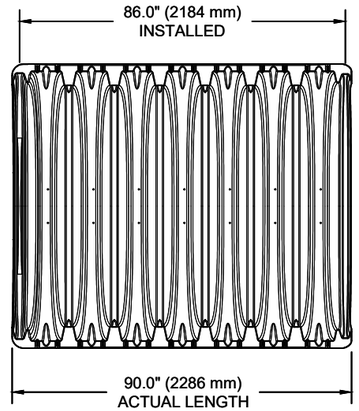
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

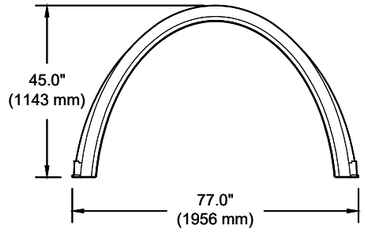
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

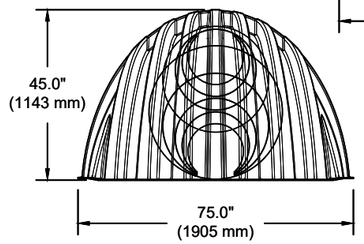
MC-3500 TECHNICAL SPECIFICATION

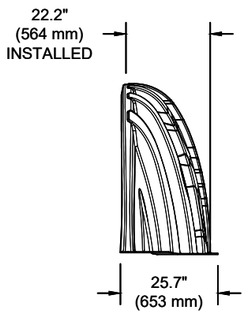
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

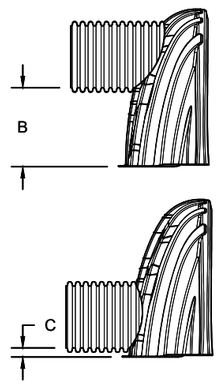
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

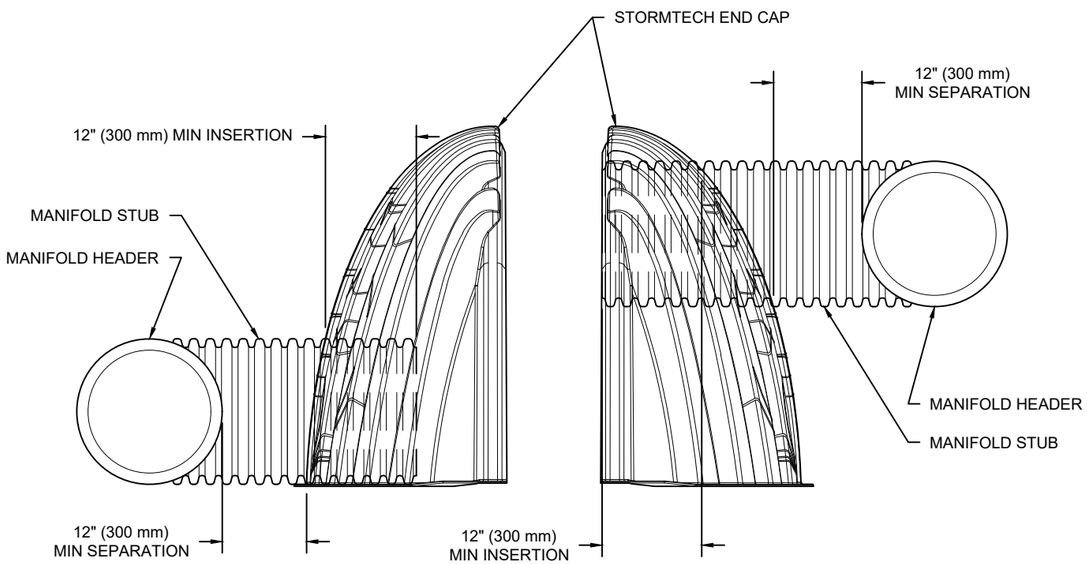
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

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