HYDROLOGY STUDY

FOR:

Lancaster L4 Warehouse Industrial Park
(W. Avenue L4)

IN THE CITY OF LANCASTER,
LOS ANGELES COUNTY

PREPARED BY:

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Submittal Date: 10-07-2022

ENGINEER'S CERTIFICATION

THE REGISTERED PROFESSIONAL ENGINEER CERTIFIES THAT THE FLOOD AND STORM FACILITIES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE CITY OF LANCASTER ENGINEERING DESIGN GUIDELINES POLICIES & PROCEDURES AND LOS ANGELES COUNTY STANDARDS.

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SECTION 1

INTRODUCTION

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Purpose of the Study

The purpose of this study is to provide the criteria for the design of the on-site storm drain system and other drainage devices and to comply with the requirements established by the City of Lancaster for peak flow reduction, flood protection, dry-lane requirements, and nuisance water management.

Project Description

The Project site is located at the western end of West Avenue L4, in the City of Lancaster, County of Los Angeles, California. It is approximately 1,300 ft southwest of the intersection of West Avenue L and Sierra Highway. It is bounded by vacant lots to the northwest and west, proposed West Avenue L4 to the south, and by existing parking lot areas to the east and north (see Vicinity Map on Section 2).

***EXISTING CONDITION*:**
The total area within the existing boundaries of the property is about 10.6 acres. The site is currently vacant and undeveloped, with minor vegetation. It is relatively flat, with elevation ranges from 2484 to 2495, and it generally drains from southeast to northwest. The site drainage flows overland to the northwest into West Avenue L, and eventually joins the existing earth channel creek that runs north into Pond Two. In addition, the site is located within the FEMA Flood Zone "X", or within area of minimal flood hazard (see FEMA FIRM on Section 2).

***PROPOSED CONDITION*:**
The proposed development is a single building warehouse industrial park with paved parking lots and private driveways, perimeter fence and gates. The project will have 2 gate accesses along the proposed West Avenue L4. The proposed development also includes an onsite privately-maintained storm drain system and an open retention basin to reduce the post-development peak flow from the site. The site outflow will be directed into the same existing condition outlet area through the basin spillway.

Hydrologic Criteria & Methodology

This report follows the hydrologic criteria and methodology set forth by City of Lancaster "Engineering Design Guidelines", which is also applying the hydrologic procedures of the Los Angeles County Department of Public Works, as explained in its "Hydrology Manual".

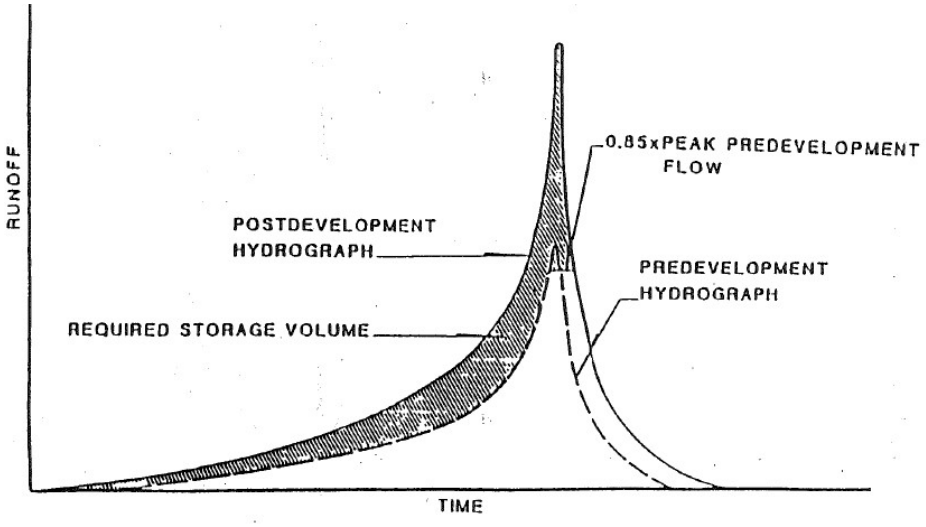
The following are the criteria used in the calculations:

- Storm Frequency:
  - 50-yr for calculating minimum finish floor elevations
  - 25-yr for developed areas, for storm drain design
  - 10-yr for offsite street dry lane calculations
  - 25-, 10- and 2-yr for basin calculations

- Soil Type Number = 124 (or 324 for flow burning using the LAR04 program)
- Basin Name = Antelope Valley
- Isohyet = 2.9” (50-yr, 24-hr)
  2.55" (25-yr, 24-hr)
  2.07" (10-yr, 24-hr)
  1.12" (2-yr, 24-hr)
  0.75" (First Flush, 24-hr)
- % Imperviousness:
  1% for undeveloped areas
  91% for proposed industrial area and public street area.

Time of Concentration (TC) and design Peak Flow (Q) for each subarea are calculated using Hydrocalc program. Burning of flows, outlet Peak Qs and Hydrographs are calculated using the F0601M program (LAR04), also known as the Modified Rational Method program (MODRAT) (see Sections 3 & 4 for TC and MODRAT Calculations).

An MS Excel spreadsheet was used to calculate the minimum retention storage volume requirement from the MODRAT pre- and post-development Q25 hydrographs (as well as for 10-yr and 2-yr frequencies), that corresponds to a maximum outlet discharge of 85% of pre-development condition, as shown on Figure 3.8.1 below (see Section 5, Retention Basin Analysis).



RETARDING BASIN MINIMUM STORAGE REQUIREMENTS
FIGURE 3.8.1

Since the City does not have a specific nuisance flow calculation for industrial areas, the study is using the HydroCalc program to calculate the 0.75" first flush (85th percentile rainfall is less at 0.6") (see Section 6, Nuisance Water Calculations).

FlowMaster is used to determine capacities, etc. of open channels for the street sections, parkway drain and full-flow capacities of pipe sizes using the Manning's equation (see Section 7, Hydraulic Calculations).

Hydrology Summary & Conclusions

The proposed retention basin and onsite storm drain system are be sized based on the storm flows from the total proposed condition onsite tributary area of 9.7 acres; while offsite tributary, if any, will be directed away and around the site.

Comparing the outlet conditions between the Pre-Development and Post-Development as shown in the Q summary table below, the proposed development has demonstrated that the proposed increases in flow for the required 2-, 10- & 25-year frequencies are mitigated by the proposed retention basin, such that, all final proposed outflows are equal to or lower than the 85% of their respective pre-development flows. Therefore, the City's requirement is met. The minimum required retention storage volume from Q25 is 45,388 cu-ft, while the proposed development provided a storage capacity of 52,590 cu-ft.

Alignments and layouts of the drainage devices, retention basin, access ramp, and storm drain system are shown on the Proposed Conditions Map (see Section 4).

Outlet Q Summary Table:

	Pre-Development			**Post-Development**		**Post-Development/ Post-Retention**	
Frequency	**Area** (Ac)	**Q** (cfs)	**85%xQ** (cfs)	**Area** (Ac)	**Q** (cfs)	**Area** (Ac)	**Q** (cfs)
2-yr	10.6	0.69	**0.59**	9.7	2.48	9.7	**0.59**
10-yr	10.6	1.15	**0.98**	9.7	4.26	9.7	**0.98**
25-yr	10.6	1.5	**1.28**	9.7	5.86	9.7	**1.28**
50-yr				9.7	6.93		

The following is the summary of the other requirements from the City:

West Avenue L4 Dry Lane Requirements:
For West Avenue L4, the tributary Q10 of 0.47 cfs and flattest slope of 0.4% resulted in a water surface top width of 5.40', therefore providing a dry lane of 15.60' (ST half-width only) which is greater than the 12' center of full width required for an undivided street (see Section 7 for FlowMaster cross sections and worksheets).

Capital Flood Minimum Finish Floor Elevations:

For the private driveway (north side of building), the total Q50 of 9.63 cfs (Capital Flood) on 0.5% slope resulted in a depth of 5.7" (or 0.475'). The minimum Finish Floor elevations will be set = 2488.0 (Highest Frontage Gutter FL) + 0.475' + 1.0' = 2489.475'.

Retention Spillway Outlet:

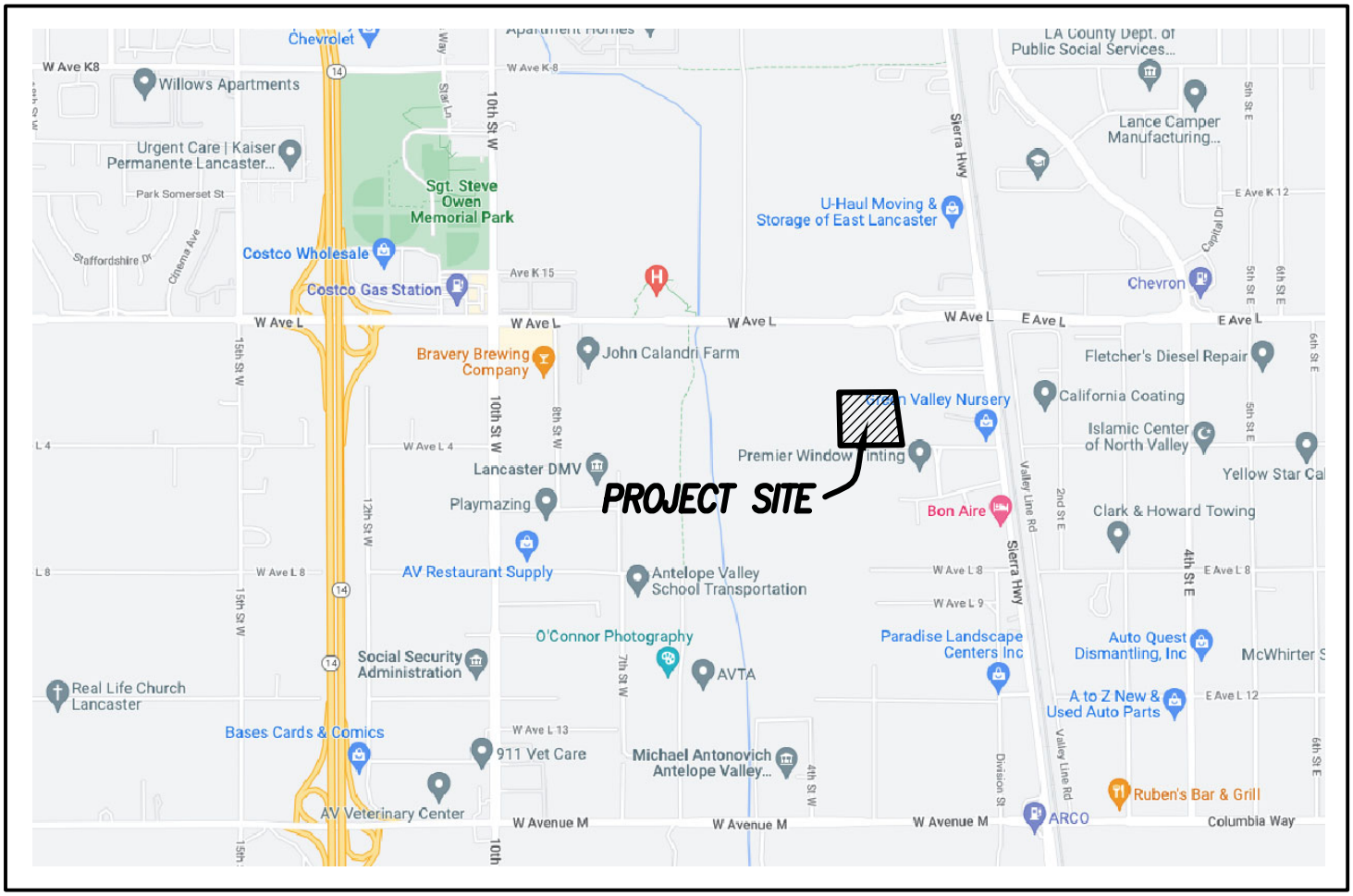
The proposed shallow open channel at the north side of the proposed basin (northwest corner of site) is the retention spillway, and is sized based on the 125% of the total post-development Q25 (125% x 5.86 = 7.33 cfs). The structure is 11'-wide, with depth of 0.21' and slope of 1% minimum. The calculation resulted in a normal depth of 2.2" (or 0.183'). (see Section 7 for FlowMaster cross sections and worksheets).

Nuisance Water Management:

As mentioned above, the City does not have a specific nuisance flow calculation for industrial areas, thus, the study is using the HydroCalc program to calculate the 0.75" first flush (85^{th} percentile rainfall is less at 0.6") and will be providing filter inserts as BMP on all inlets (see Section 6, Nuisance Water Calculations).

SECTION 2

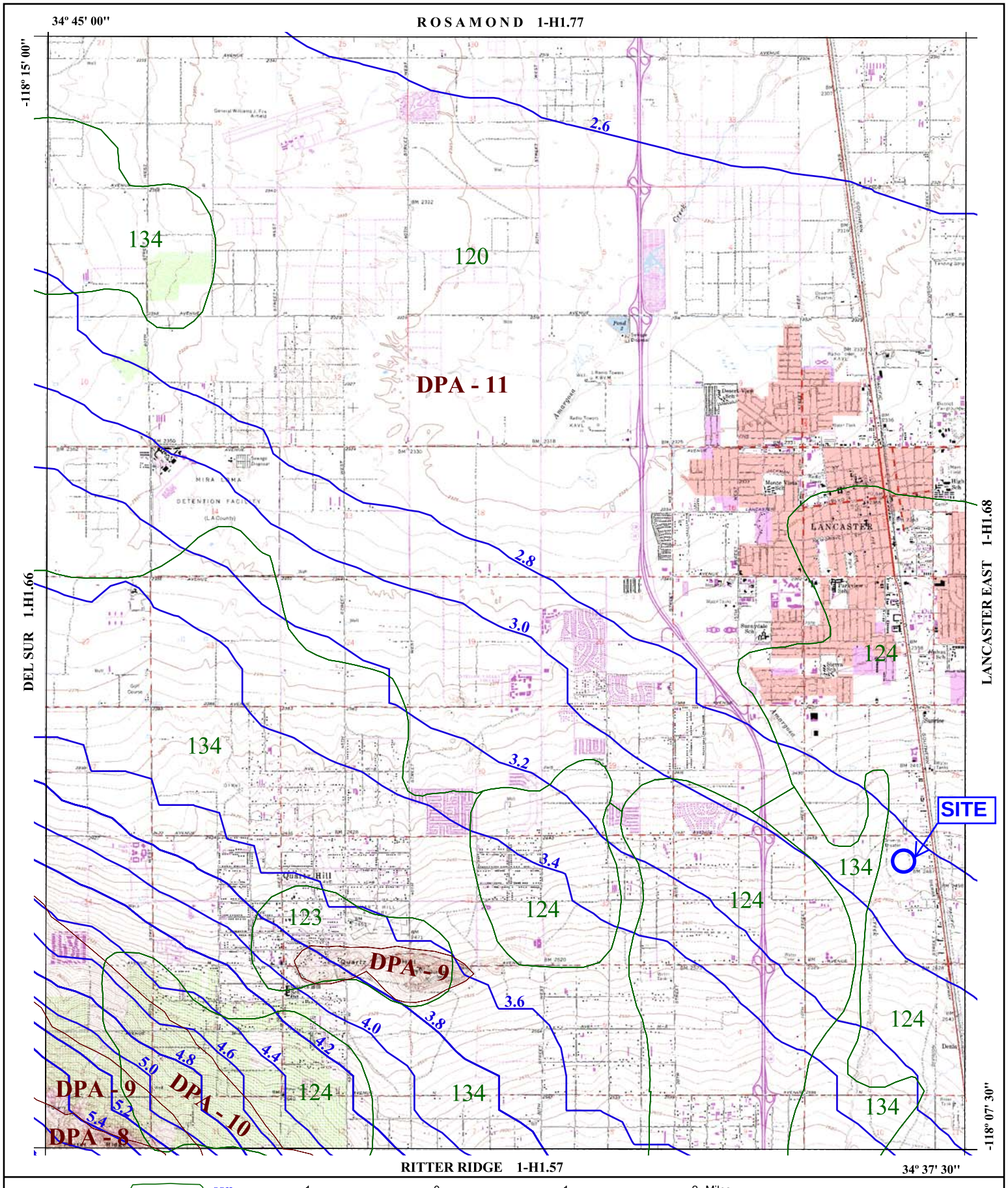
HYDROLOGIC INFORMATION



NORTH

VICINITY MAP

NOT TO SCALE



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

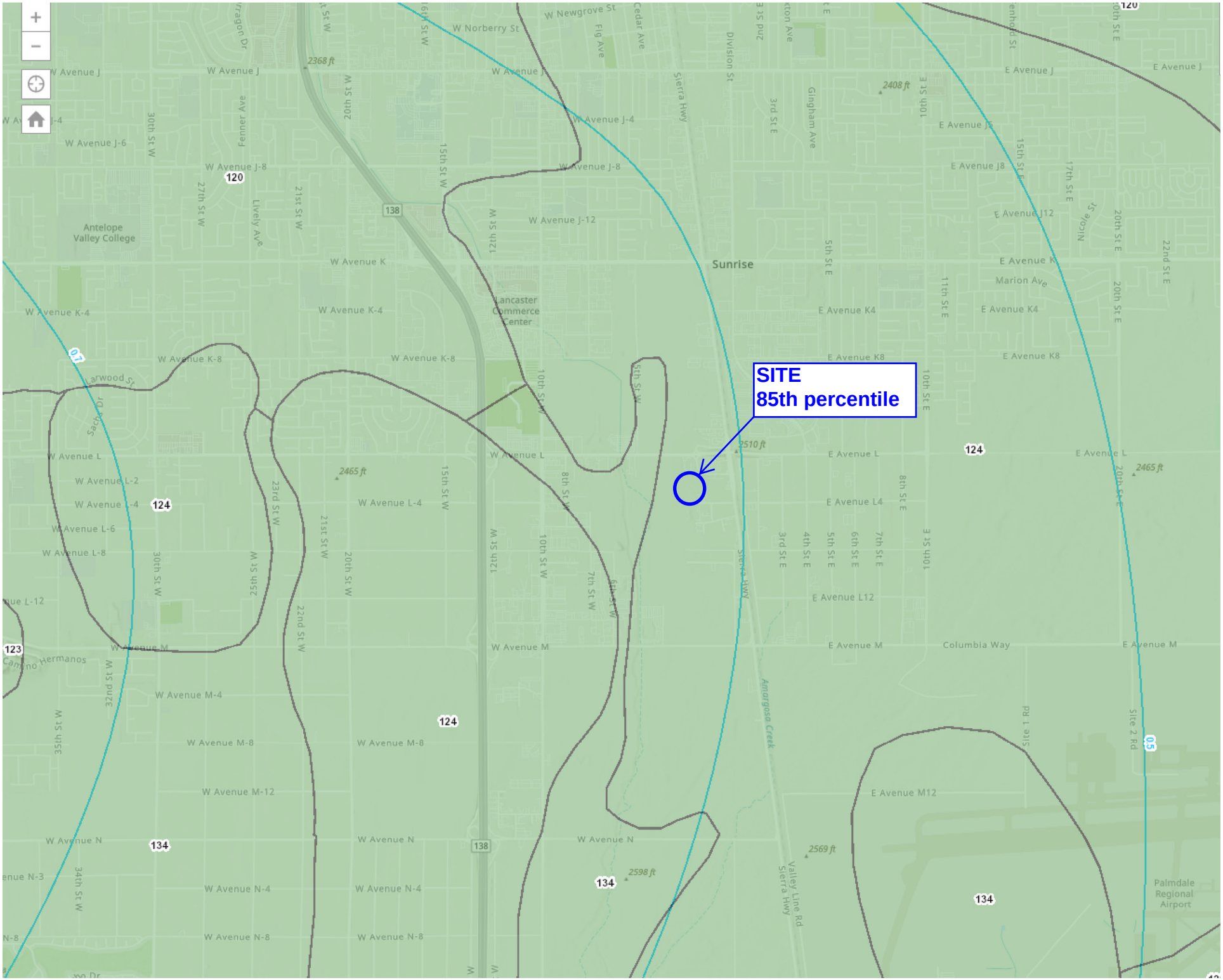
1 0 1 2 Miles

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

LANCASTER WEST
50-YEAR 24-HOUR ISOHYET

1-H1.67

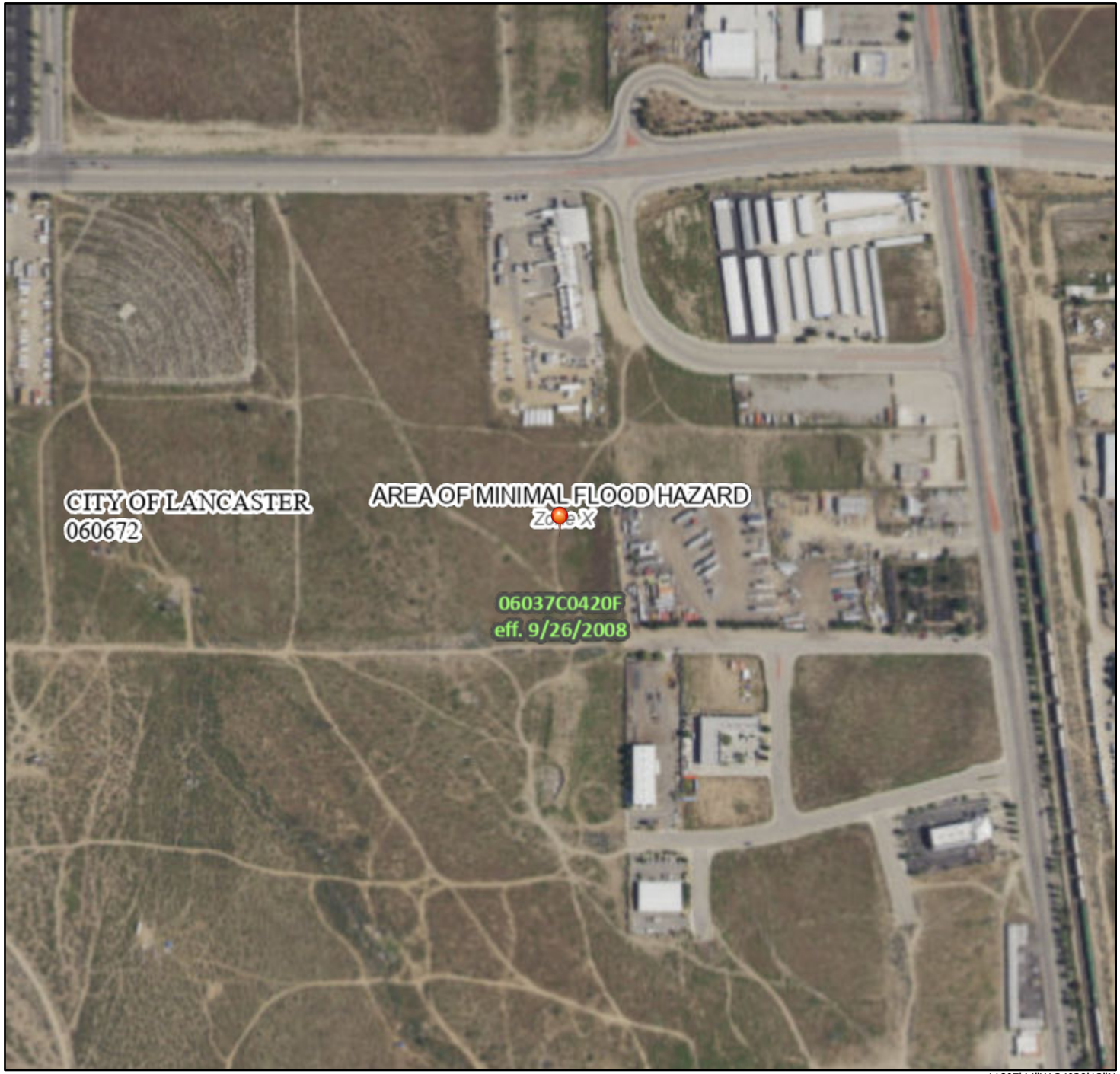
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works


SITE
85th percentile
Sunrise
Antelope Valley College
Lancaster Commerce Center
Amargosa Creek
Palmdale Regional Airport
Columbia Way
Sierra Hwy
Valley Line Rd
W Avenue J
W Avenue K
W Avenue L
W Avenue M
W Avenue N
E Avenue J
E Avenue K
E Avenue L
E Avenue M
120
124
134
138
2368 ft
2408 ft
2510 ft
2465 ft
2569 ft
2598 ft

National Flood Hazard Layer FIRMette

FEMA

118°8'22"W 34°39'42"N



118°7'44"W 34°39'12"N

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

1:6,000

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

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- 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 9/8/2022 at 10:21 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.

Proportion Impervious Data

Code	Land Use Description	% Impervious
1111	High-Density Single Family Residential	42
1112	Low-Density Single Family Residential	21
1121	Mixed Multi-Family Residential	74
1122	Duplexes, Triplexes and 2-or 3-Unit Condominiums and Townhouses	55
1123	Low-Rise Apartments, Condominiums, and Townhouses	86
1124	Medium-Rise Apartments and Condominiums	86
1125	High-Rise Apartments and Condominiums	90
1131	Trailer Parks and Mobile Home Courts, High-Density	91
1132	Mobile Home Courts and Subdivisions, Low-Density	42
1140	Mixed Residential	59
1151	Rural Residential, High-Density	15
1152	Rural Residential, Low-Density	10
1211	Low- and Medium-Rise Major Office Use	91
1212	High-Rise Major Office Use	91
1213	Skyscrapers	91
1221	Regional Shopping Center	95
1222	Retail Centers (Non-Strip With Contiguous Interconnected Off-Street	96
1223	Modern Strip Development	96
1224	Older Strip Development	97
1231	Commercial Storage	90
1232	Commercial Recreation	90
1233	Hotels and Motels	96
1234	Attended Pay Public Parking Facilities	91
1241	Government Offices	91
1242	Police and Sheriff Stations	91
1243	Fire Stations	91
1244	Major Medical Health Care Facilities	74
1245	Religious Facilities	82
1246	Other Public Facilities	91
1247	Non-Attended Public Parking Facilities	91
1251	Correctional Facilities	91
1252	Special Care Facilities	74
1253	Other Special Use Facilities	86
1261	Pre-Schools/Day Care Centers	68
1262	Elementary Schools	82
1263	Junior or Intermediate High Schools	82
1264	Senior High Schools	82
1265	Colleges and Universities	47
1266	Trade Schools and Professional Training Facilities	91
1271	Base (Built-up Area)	65
1271.01	Base High-Density Single Family Residential	42
1271.02	Base Duplexes, Triplexes and 2-or 3-Unit Condominiums and T	55

Code	Land Use Description	% Impervious
1271.03	Base Government Offices	91
1271.04	Base Fire Stations	91
1271.05	Base Non-Attended Public Parking Facilities	91
1271.06	Base Air Field	45
1271.07	Base Petroleum Refining and Processing	91
1271.08	Base Mineral Extraction - Oil and Gas	10
1271.09	Base Harbor Facilities	91
1271.10	Base Navigation Aids	47
1271.11	Base Developed Local Parks and Recreation	10
1271.12	Base Vacant Undifferentiated	1
1272	Vacant Area	2
1273	Air Field	45
1274	Former Base (Built-up Area)	65
1275	Former Base Vacant Area	2
1276	Former Base Air Field	91
1311	Manufacturing, Assembly, and Industrial Services	91
1312	Motion Picture and Television Studio Lots	82
1313	Packing Houses and Grain Elevators	96
1314	Research and Development	91
1321	Manufacturing	91
1322	Petroleum Refining and Processing	91
1323	Open Storage	66
1324	Major Metal Processing	91
1325	Chemical Processing	91
1331	Mineral Extraction - Other Than Oil and Gas	10
1332	Mineral Extraction - Oil and Gas	10
1340	Wholesaling and Warehousing	91
1411	Airports	91
1411.01	Airstrip	10
1412	Railroads	15
1412.01	Railroads-Attended Pay Public Parking Facilities	91
1412.02	Railroads-Non-Attended Public Parking Facilities	91
1412.03	Railroads-Manufacturing, Assembly, and Industrial Services	91
1412.04	Railroads-Petroleum Refining and Processing	91
1412.05	Railroads-Open Storage	66
1412.06	Railroads-Truck Terminals	91
1413	Freeways and Major Roads	91
1414	Park-and-Ride Lots	91
1415	Bus Terminals and Yards	91
1416	Truck Terminals	91
1417	Harbor Facilities	91
1418	Navigation Aids	47
1420	Communication Facilities	82
1420.01	Communication Facilities-Antenna	2

use for post-dev't

use for post-dev't road

Code	Land Use Description	% Impervious
1431	Electrical Power Facilities	47
1431.01	Electrical Power Facilities-Powerlines (Urban)	2
1431.02	Electrical Power Facilities-Powerlines (Rural)	1
1432	Solid Waste Disposal Facilities	15
1433	Liquid Waste Disposal Facilities	96
1434	Water Storage Facilities	91
1435	Natural Gas and Petroleum Facilities	91
1435.01	Natural Gas and Petroleum Facilities-Manufacturing, Assembly, and In	91
1435.02	Natural Gas and Petroleum Facilities-Petroleum Refining and Processing	91
1435.03	Natural Gas and Petroleum Facilities-Mineral Extraction – Oil and Gas	10
1435.04	Natural Gas and Petroleum Facilities-Vacant Undifferentiated	1
1436	Water Transfer Facilities	96
1437	Improved Flood Waterways and Structures	100
1440	Maintenance Yards	91
1450	Mixed Transportation	90
1460	Mixed Transportation and Utility	91
1460.01	Mixed Utility and Transportation-Improved Flood Waterways and Structures	100
1460.02	Mixed Utility and Transportation-Railroads	15
1460.03	Mixed Utility and Transportation-Freeways and Major Roads	91
1500	Mixed Commercial and Industrial	91
1600	Mixed Urban	89
1700	Under Construction (Use appropriate value)	91
1810	Golf Courses	3
1821	Developed Local Parks and Recreation	10
1822	Undeveloped Local Parks and Recreation	2
1831	Developed Regional Parks and Recreation	2
1832	Undeveloped Regional Parks and Recreation	1
1840	Cemeteries	10
1850	Wildlife Preserves and Sanctuaries	2
1850.01	Wildlife-Commercial Recreation	90
1850.02	Wildlife-Other Special Use Facilities	86
1850.03	Wildlife-Developed Local Parks and Recreation	10
1860	Specimen Gardens and Arboreta	15
1870	Beach Parks	10
1880	Other Open Space and Recreation	10
2110	Irrigated Cropland and Improved Pasture Land	2
2120	Non-Irrigated Cropland and Improved Pasture Land	2
2200	Orchards and Vineyards	2
2300	Nurseries	15
2400	Dairy, Intensive Livestock, and Associated Facilities	42
2500	Poultry Operations	62
2600	Other Agriculture	42
2700	Horse Ranches	42

Code	Land Use Description	% Impervious
3100	Vacant Undifferentiated	1
3200	Abandoned Orchards and Vineyards	2
3300	Vacant With Limited Improvements (Use appropriate value)	42
3400	Beaches (Vacant)	1
4100	Water, Undifferentiated	100
4200	Harbor Water Facilities	100
4300	Marina Water Facilities	100
4400	Water Within a Military Installation	100

use for pre-dev't

SECTION 3

EXISTING CONDITION

HydroCalc and MODRAT Calculations:
Onsite 25-, 10- and 2-yr Frequency (Burned)
Existing Hydrology Map

Peak Flow Hydrologic Analysis

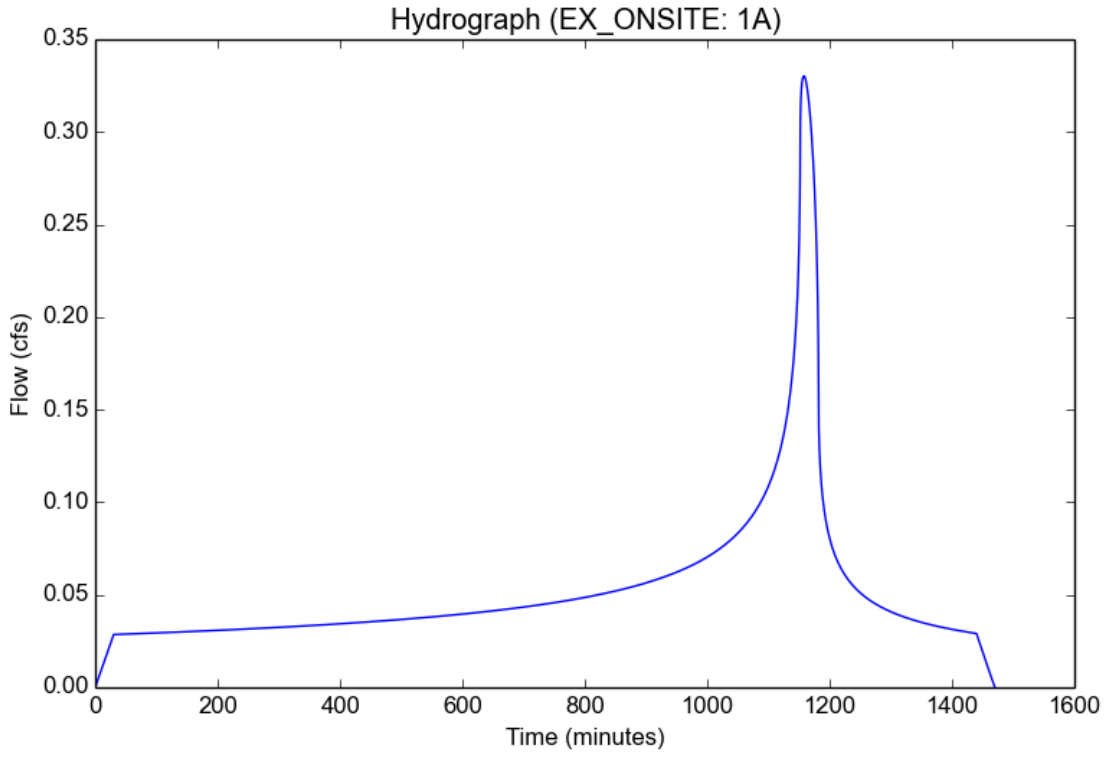
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	EX_ONSITE
Subarea ID	1A
Area (ac)	10.6
Flow Path Length (ft)	919.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	2-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.1223
Peak Intensity (in/hr)	0.2885
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.3302
Burned Peak Flow Rate (cfs)	0.5449
24-Hr Clear Runoff Volume (ac-ft)	0.1062
24-Hr Clear Runoff Volume (cu-ft)	4625.3656



Peak Flow Hydrologic Analysis

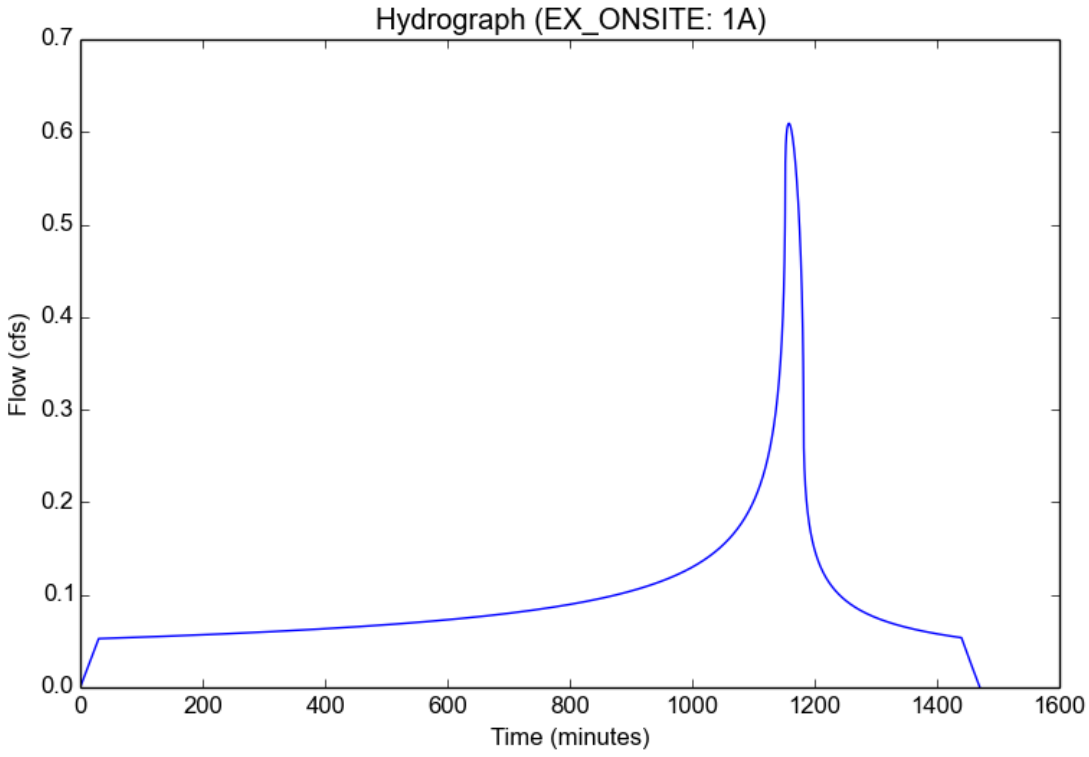
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	EX_ONSITE
Subarea ID	1A
Area (ac)	10.6
Flow Path Length (ft)	919.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	10-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	2.0706
Peak Intensity (in/hr)	0.5322
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.6093
Burned Peak Flow Rate (cfs)	1.0849
24-Hr Clear Runoff Volume (ac-ft)	0.1959
24-Hr Clear Runoff Volume (cu-ft)	8533.6203



Peak Flow Hydrologic Analysis

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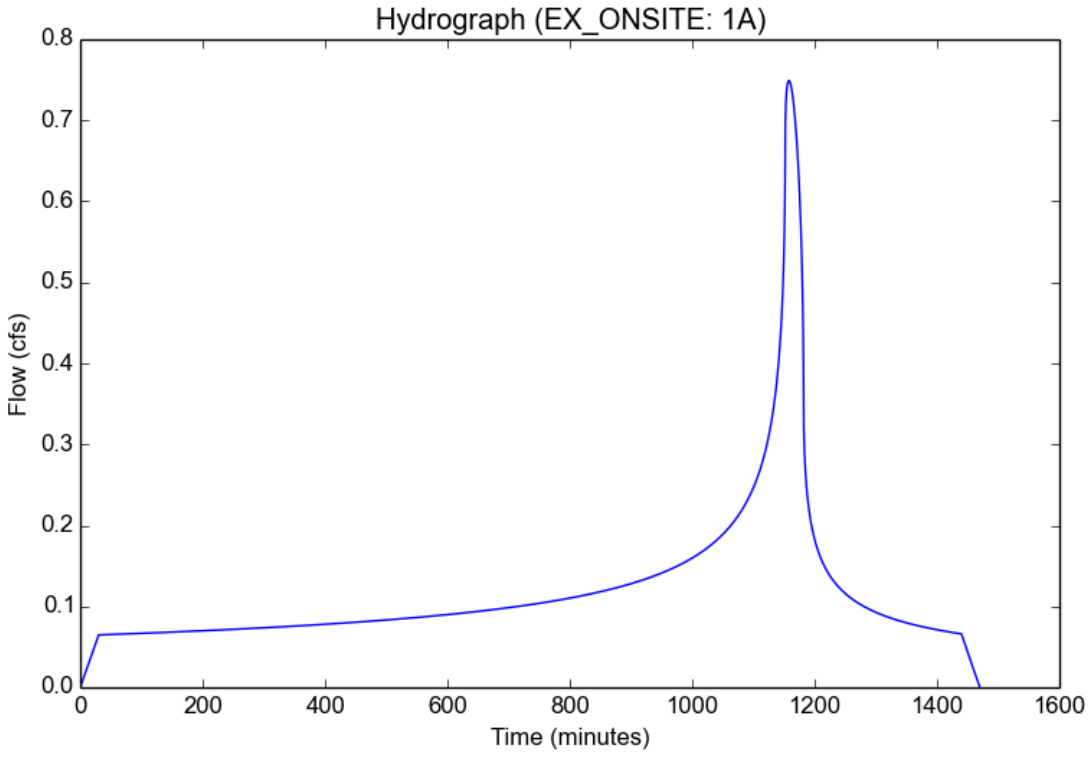
Version: HydroCalc 1.0.2

Input Parameters

Project Name	EX_ONSITE
Subarea ID	1A
Area (ac)	10.6
Flow Path Length (ft)	919.0
Flow Path Slope (vft/hft)	0.011
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	25-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.5462
Peak Intensity (in/hr)	0.6544
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.7492
Burned Peak Flow Rate (cfs)	1.3658
24-Hr Clear Runoff Volume (ac-ft)	0.2409
24-Hr Clear Runoff Volume (cu-ft)	10493.7236



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006     1    1A 324  110.630A06                              G1
006     1    2A 324       99A06                          2  2
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Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, EXIST. 2-YR FREQ BURNED STORM DAY 4

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	RAIN ZONE	PCT IMPV
1	1A	10.6	.69	10.6	.69	0	0.	.00000	.00	.00	0.	324	30	A 6	.01
1	2A	.0	.00	10.6	.69	0	0.	.00000	.00	.00	0.	324	99	A 6	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, EXIST. 2-YR FREQ BURNED, OUTLET
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.05	200	.06	300	.06	400	.06
500	.07	600	.07	700	.08	800	.09	900	.10
1000	.13	1050	.16	1100	.21	1110	.23	1120	.25
1130	.30	1131	.30	1132	.31	1133	.31	1134	.32
1135	.32	1136	.33	1137	.34	1138	.34	1139	.35
1140	.36	1141	.37	1142	.37	1143	.38	1144	.39
1145	.40	1146	.42	1147	.43	1148	.45	1149	.49
1150	.53	1151	.58	1152	.62	1153	.66	1154	.67
1155	.68	1156	.69	1157	.69	1158	.69	1159	.69
1160	.69	1161	.68	1162	.68	1163	.68	1164	.68
1165	.67	1166	.66	1167	.65	1168	.64	1169	.64
1170	.63	1171	.62	1172	.60	1173	.59	1174	.58
1175	.57	1176	.54	1177	.53	1178	.51	1179	.46
1180	.42	1181	.37	1182	.32	1183	.27	1184	.25
1185	.24	1186	.23	1187	.22	1188	.21	1189	.21
1190	.20	1191	.20	1192	.19	1193	.18	1194	.18
1195	.18	1196	.18	1197	.17	1198	.17	1199	.16
1200	.16	1201	.16	1202	.16	1203	.15	1204	.15
1205	.15	1206	.15	1207	.15	1208	.15	1209	.15
1210	.14	1211	.14	1212	.14	1213	.13	1214	.13
1215	.13	1216	.13	1217	.13	1218	.13	1219	.13
1220	.13	1221	.13	1222	.12	1223	.12	1224	.12
1225	.12	1226	.12	1227	.12	1228	.11	1229	.11
1230	.11	1231	.11	1232	.11	1233	.11	1234	.11
1235	.11	1236	.11	1237	.11	1238	.10	1239	.10
1240	.10	1241	.10	1242	.10	1243	.10	1244	.10
1245	.10	1246	.10	1247	.10	1248	.10	1249	.10
1250	.10	1251	.10	1252	.10	1253	.10	1254	.10
1255	.10	1256	.10	1257	.10	1258	.10	1259	.10
1260	.10	1261	.09	1262	.09	1263	.09	1264	.09
1265	.09	1266	.09	1267	.09	1268	.09	1269	.09
1270	.09	1271	.09	1272	.09	1273	.09	1274	.09
1275	.09	1276	.09	1277	.09	1278	.09	1279	.09
1280	.08	1281	.09	1282	.08	1283	.08	1284	.09
1285	.08	1286	.08	1287	.08	1288	.08	1289	.08
1290	.08	1291	.08	1292	.08	1293	.08	1294	.08
1295	.08	1296	.08	1297	.08	1298	.08	1299	.08
1300	.08	1310	.08	1320	.07	1330	.07	1340	.06
1350	.07	1360	.06	1370	.06	1380	.06	1390	.06
1400	.06	1420	.06	1440	.05	1460	.01	1500	.00

TOTAL VOLUME THIS HYDROGRAPH = .20(Ac.Ft)

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006     1    1A 324  110.630A10                              G1
006     1    2A 324        99A10                          2  2
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Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, EXIST. 10-YR FREQ BURNED STORM DAY 4

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	RAIN ZONE	PCT IMPV
1	1A	10.6	1.15	10.6	1.15	0	0.	.00000	.00	.00	0.	324	30	A10	.01
1	2A	.0	.00	10.6	1.15	0	0.	.00000	.00	.00	0.	324	99	A10	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, EXIST. 10-YR FREQ BURNED, OUTLE
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.09	200	.10	300	.10	400	.11
500	.12	600	.13	700	.14	800	.15	900	.18
1000	.22	1050	.27	1100	.35	1110	.38	1120	.43
1130	.51	1131	.52	1132	.52	1133	.53	1134	.54
1135	.55	1136	.55	1137	.57	1138	.58	1139	.59
1140	.60	1141	.61	1142	.63	1143	.64	1144	.66
1145	.68	1146	.70	1147	.73	1148	.75	1149	.82
1150	.89	1151	.96	1152	1.03	1153	1.11	1154	1.13
1155	1.14	1156	1.14	1157	1.15	1158	1.15	1159	1.15
1160	1.15	1161	1.15	1162	1.14	1163	1.13	1164	1.12
1165	1.11	1166	1.11	1167	1.10	1168	1.08	1169	1.06
1170	1.05	1171	1.04	1172	1.01	1173	1.00	1174	.97
1175	.95	1176	.92	1177	.89	1178	.86	1179	.78
1180	.70	1181	.62	1182	.54	1183	.46	1184	.43
1185	.40	1186	.39	1187	.37	1188	.36	1189	.35
1190	.34	1191	.33	1192	.32	1193	.31	1194	.31
1195	.30	1196	.30	1197	.29	1198	.29	1199	.28
1200	.28	1201	.27	1202	.27	1203	.26	1204	.26
1205	.25	1206	.25	1207	.25	1208	.25	1209	.25
1210	.24	1211	.24	1212	.23	1213	.23	1214	.23
1215	.23	1216	.22	1217	.22	1218	.22	1219	.22
1220	.21	1221	.21	1222	.21	1223	.21	1224	.21
1225	.20	1226	.20	1227	.20	1228	.20	1229	.20
1230	.20	1231	.20	1232	.20	1233	.19	1234	.20
1235	.19	1236	.19	1237	.19	1238	.19	1239	.18
1240	.18	1241	.18	1242	.18	1243	.18	1244	.18
1245	.18	1246	.18	1247	.17	1248	.17	1249	.17
1250	.17	1251	.17	1252	.17	1253	.17	1254	.17
1255	.17	1256	.16	1257	.16	1258	.17	1259	.16
1260	.16	1261	.16	1262	.16	1263	.16	1264	.15
1265	.16	1266	.16	1267	.16	1268	.15	1269	.15
1270	.15	1271	.15	1272	.15	1273	.15	1274	.15
1275	.15	1276	.15	1277	.15	1278	.15	1279	.15
1280	.15	1281	.15	1282	.15	1283	.14	1284	.15
1285	.15	1286	.15	1287	.15	1288	.14	1289	.14
1290	.14	1291	.14	1292	.14	1293	.14	1294	.14
1295	.14	1296	.14	1297	.14	1298	.14	1299	.14
1300	.14	1310	.13	1320	.13	1330	.12	1340	.12
1350	.11	1360	.11	1370	.11	1380	.10	1390	.10
1400	.10	1420	.10	1440	.09	1460	.03	1500	.00

TOTAL VOLUME THIS HYDROGRAPH = .35(Ac.Ft)

```
006     1    1A 324  110.630A13                              G1
006     1    2A 324       99A13                          2  2
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Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, EXIST. 25-YR FREQ BURNED STORM DAY 4

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	RAIN ZONE	PCT IMPV
1	1A	10.6	1.50	10.6	1.50	0	0.	.00000	.00	.00	0.	324	30	A13	.01
1	2A	.0	.00	10.6	1.50	0	0.	.00000	.00	.00	0.	324	99	A13	.00

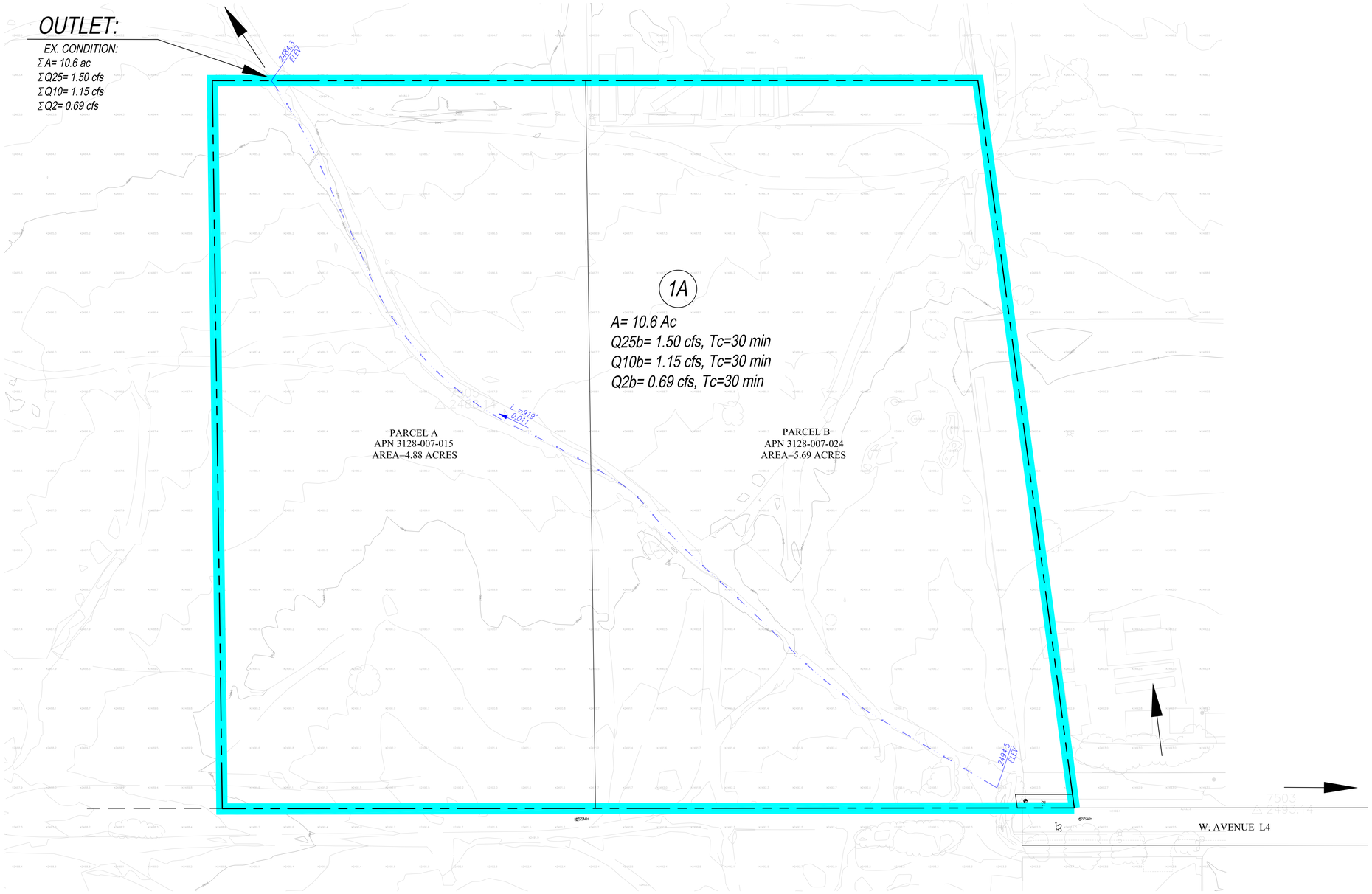
Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, EXIST. 25-YR FREQ BURNED, OUTLE
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

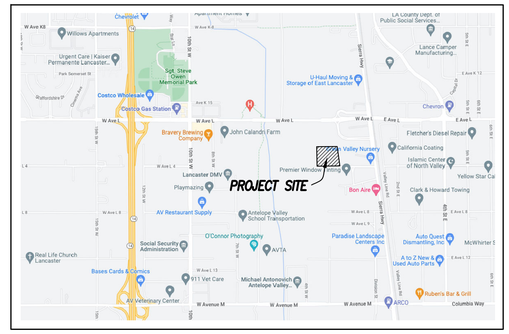
TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.12	200	.13	300	.14	400	.15
500	.16	600	.17	700	.18	800	.20	900	.24
1000	.29	1050	.36	1100	.46	1110	.50	1120	.56
1130	.66	1131	.67	1132	.68	1133	.69	1134	.70
1135	.71	1136	.72	1137	.73	1138	.75	1139	.76
1140	.78	1141	.80	1142	.82	1143	.84	1144	.86
1145	.88	1146	.92	1147	.94	1148	.98	1149	1.07
1150	1.16	1151	1.26	1152	1.35	1153	1.44	1154	1.47
1155	1.48	1156	1.49	1157	1.50	1158	1.50	1159	1.50
1160	1.50	1161	1.49	1162	1.49	1163	1.48	1164	1.46
1165	1.45	1166	1.44	1167	1.43	1168	1.40	1169	1.39
1170	1.37	1171	1.35	1172	1.32	1173	1.30	1174	1.27
1175	1.23	1176	1.19	1177	1.15	1178	1.11	1179	1.01
1180	.91	1181	.81	1182	.70	1183	.60	1184	.56
1185	.53	1186	.51	1187	.49	1188	.47	1189	.45
1190	.44	1191	.43	1192	.42	1193	.41	1194	.40
1195	.39	1196	.39	1197	.38	1198	.38	1199	.37
1200	.36	1201	.35	1202	.35	1203	.34	1204	.34
1205	.34	1206	.33	1207	.33	1208	.32	1209	.32
1210	.31	1211	.31	1212	.30	1213	.30	1214	.30
1215	.30	1216	.29	1217	.29	1218	.29	1219	.29
1220	.28	1221	.28	1222	.28	1223	.28	1224	.27
1225	.27	1226	.27	1227	.27	1228	.26	1229	.26
1230	.26	1231	.26	1232	.25	1233	.25	1234	.25
1235	.25	1236	.25	1237	.25	1238	.25	1239	.25
1240	.24	1241	.24	1242	.24	1243	.24	1244	.24
1245	.24	1246	.23	1247	.23	1248	.23	1249	.23
1250	.23	1251	.22	1252	.22	1253	.22	1254	.22
1255	.22	1256	.22	1257	.22	1258	.21	1259	.22
1260	.21	1261	.21	1262	.21	1263	.21	1264	.21
1265	.21	1266	.20	1267	.21	1268	.20	1269	.20
1270	.20	1271	.20	1272	.20	1273	.20	1274	.20
1275	.20	1276	.20	1277	.20	1278	.20	1279	.20
1280	.19	1281	.20	1282	.19	1283	.20	1284	.19
1285	.19	1286	.19	1287	.19	1288	.19	1289	.19
1290	.19	1291	.18	1292	.19	1293	.18	1294	.18
1295	.18	1296	.18	1297	.18	1298	.18	1299	.18
1300	.18	1310	.17	1320	.17	1330	.16	1340	.16
1350	.15	1360	.15	1370	.15	1380	.14	1390	.14
1400	.13	1420	.13	1440	.13	1460	.03	1500	.00

TOTAL VOLUME THIS HYDROGRAPH = .45(Ac.Ft)

OUTLET:

EX. CONDITION:
Σ A= 10.6 ac
Σ Q25= 1.50 cfs
Σ Q10= 1.15 cfs
Σ Q2= 0.69 cfs





NORTH

VICINITY MAP

NOT TO SCALE

LEGEND

- MAIN DRAINAGE BOUNDARY
- FLOW LINE
- TRACT BOUNDARY

(1A) .... LOCATION/SUBAREA NAME
A .... AREA IN ACRES, Ac
Q .... STORM FLOW IN CUBIC FEET PER SECOND, FREQUENCY AS SHOWN, cfs
Tc .... TIME OF CONCENTRATION, min
b .... BURNED FLOW, cfs
Σ .... TOTAL

HYDROLOGY CRITERIA

.... STORM FREQUENCY:
25-, 10- & 2-YR FOR OUTLET COMPARISON CALCULATIONS
.... BASIN NAME = ANTELOPE VALLEY
.... SOIL TYPE NUMBER = 124
(324 FOR FLOW BURNING USING LAR04 PROGRAM)
.... ISOHYET:
2.9" (50-YR, 24-hr)
2.55" (25-YR, 24-hr)
2.07" (10-YR, 24-hr)
1.12" (2-YR, 24-hr)
.... % IMPERVIOUSNESS:
1% FOR UNDEVELOPED AREAS

EXISTING CONDITION

HYDROLOGY MAP

for L4 Warehouse Industrial Park

W. Avenue L4

IN THE CITY OF LANCASTER, LOS ANGELES COUNTY

DATE: 09/23/2022

NORTH
SCALE: 1"=40'

PREPARED BY :
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd. #100, Van Nuys, CA 91411
Phone : (818) 787- 8550, Fax : (818) 901-7451
www.sikand.com, E-mail: info@sikand.com

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2024
CIVIL
STATE OF CALIFORNIA

SHEET 1 OF 1 SHEETS

SECTION 4

PROPOSED CONDITION

HydroCalc and MODRAT Calculations:
Onsite 50-, 25-, 10- and 2-yr Frequency
Proposed Hydrology Map

Peak Flow Hydrologic Analysis

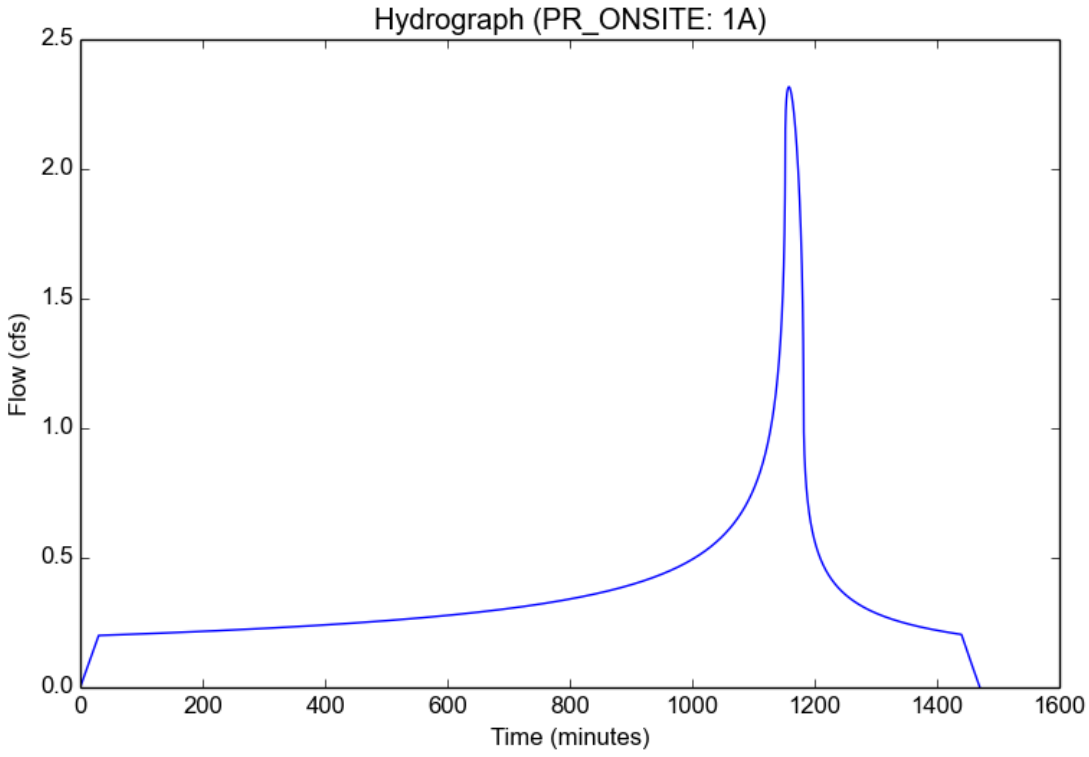
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	PR_ONSITE
Subarea ID	1A
Area (ac)	9.7
Flow Path Length (ft)	1222.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	2-yr
Fire Factor	0
LID	False

Output Results

Modeled (2-yr) Rainfall Depth (in)	1.1223
Peak Intensity (in/hr)	0.2885
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.3168
Burned Peak Flow Rate (cfs)	2.3168
24-Hr Clear Runoff Volume (ac-ft)	0.745
24-Hr Clear Runoff Volume (cu-ft)	32450.2854



Peak Flow Hydrologic Analysis

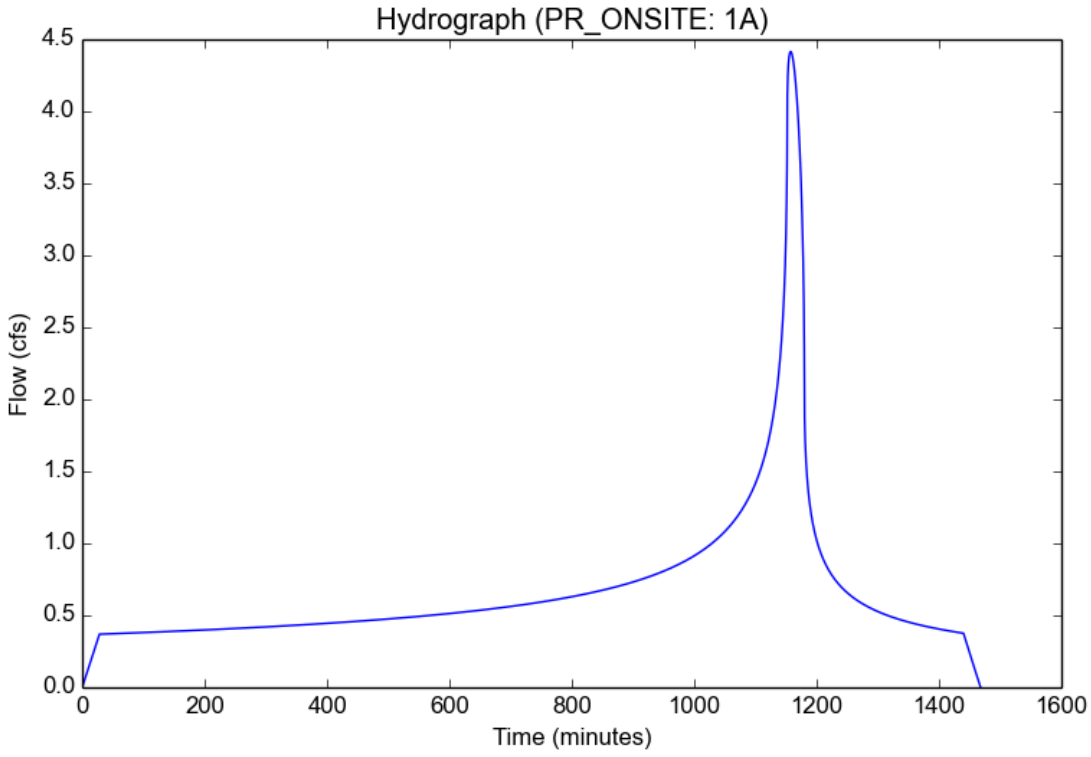
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	PR_ONSITE
Subarea ID	1A
Area (ac)	9.7
Flow Path Length (ft)	1222.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	2.0706
Peak Intensity (in/hr)	0.5497
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	4.4152
Burned Peak Flow Rate (cfs)	4.4152
24-Hr Clear Runoff Volume (ac-ft)	1.3744
24-Hr Clear Runoff Volume (cu-ft)	59869.4295



Peak Flow Hydrologic Analysis

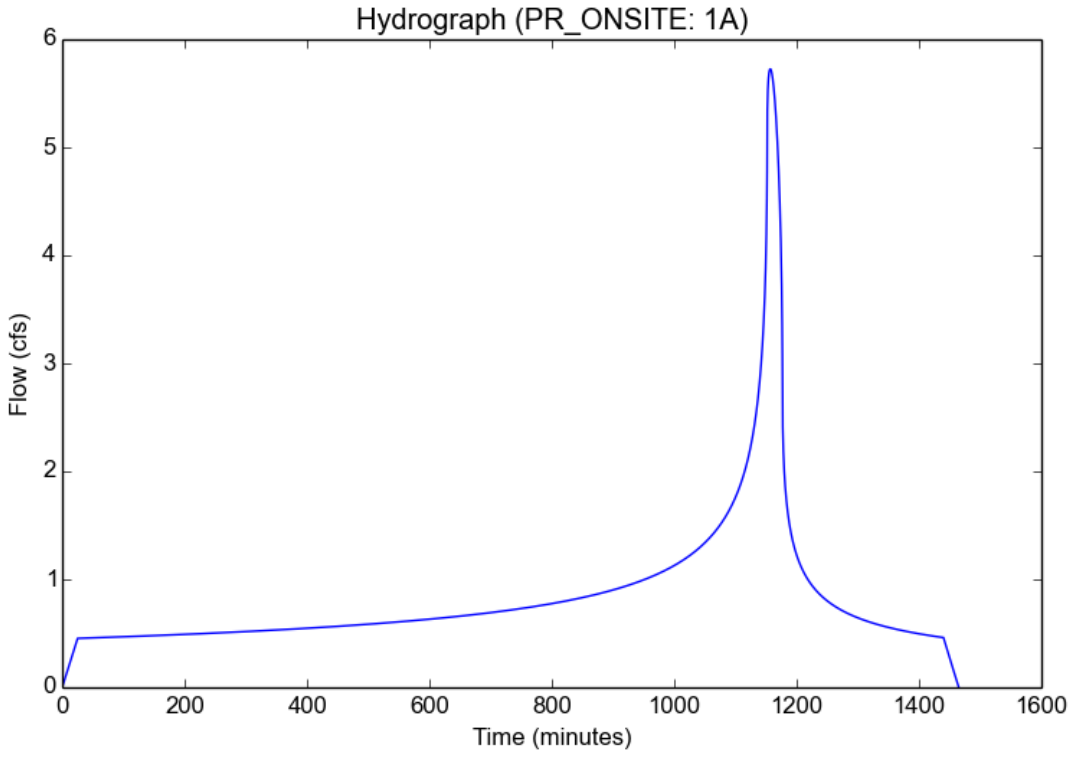
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	PR_ONSITE
Subarea ID	1A
Area (ac)	9.7
Flow Path Length (ft)	1222.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.5462
Peak Intensity (in/hr)	0.713
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	5.7264
Burned Peak Flow Rate (cfs)	5.7264
24-Hr Clear Runoff Volume (ac-ft)	1.6901
24-Hr Clear Runoff Volume (cu-ft)	73620.8008



Peak Flow Hydrologic Analysis

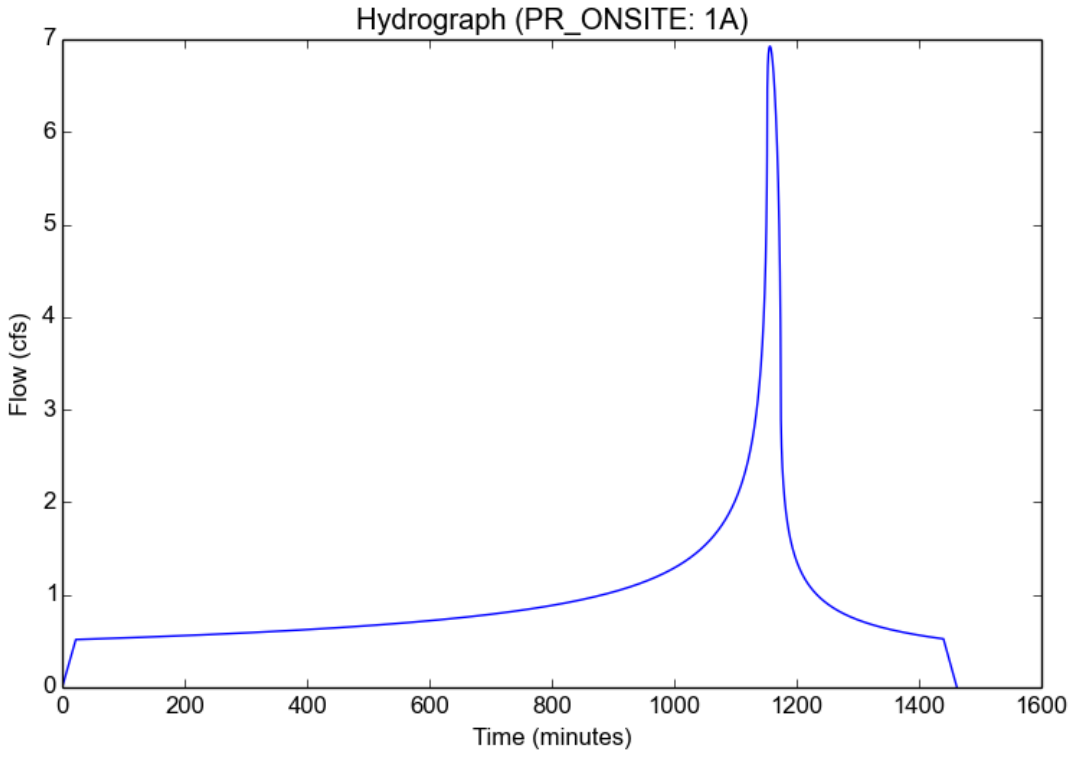
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	PR_ONSITE
Subarea ID	1A
Area (ac)	9.7
Flow Path Length (ft)	1222.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.9
Peak Intensity (in/hr)	0.8623
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	22.0
Clear Peak Flow Rate (cfs)	6.926
Burned Peak Flow Rate (cfs)	6.926
24-Hr Clear Runoff Volume (ac-ft)	1.9249
24-Hr Clear Runoff Volume (cu-ft)	83850.419



Peak Flow Hydrologic Analysis

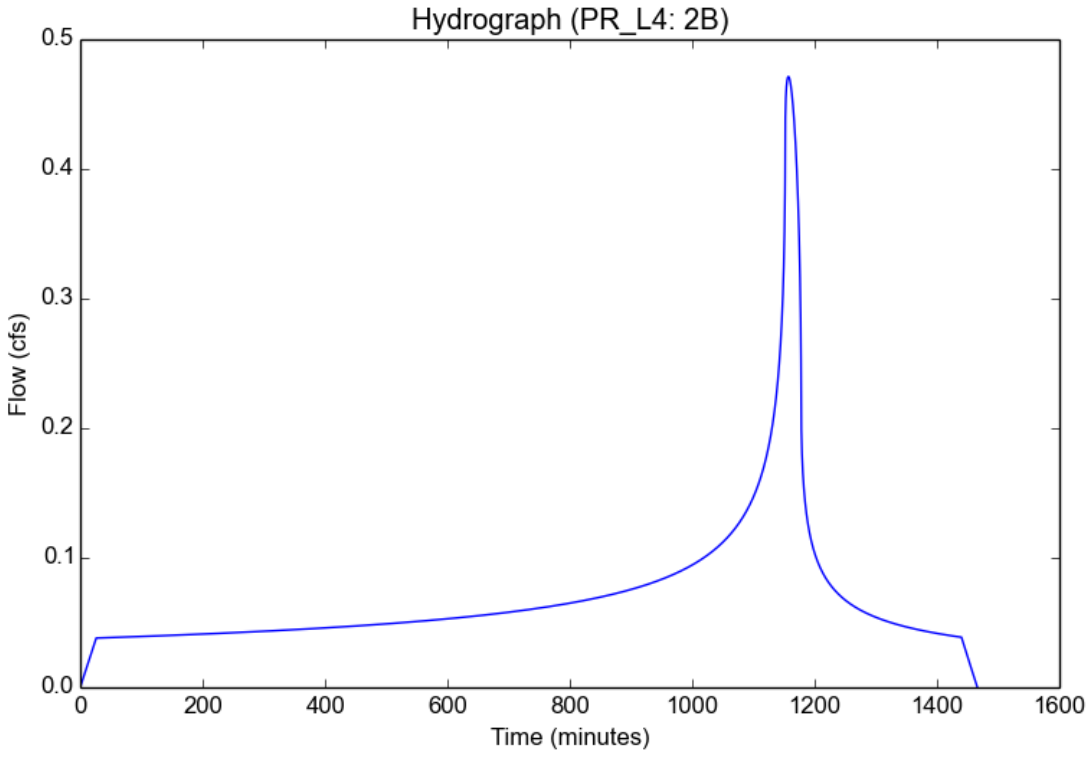
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	PR_L4
Subarea ID	2B
Area (ac)	1.0
Flow Path Length (ft)	920.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	2.9
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	2.0706
Peak Intensity (in/hr)	0.5692
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	26.0
Clear Peak Flow Rate (cfs)	0.4713
Burned Peak Flow Rate (cfs)	0.4713
24-Hr Clear Runoff Volume (ac-ft)	0.1417
24-Hr Clear Runoff Volume (cu-ft)	6172.0976



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006     1    2A 124       99A06                          2  2
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Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, PROP.2-YR FREQ STORM DAY 4

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	RAIN ZONE	PCT IMPV
1	1A	9.7	2.48	9.7	2.48	0	0.	.00000	.00	.00	0.	124	30	A 6	.91
1	2A	.0	.00	9.7	2.48	0	0.	.00000	.00	.00	0.	124	99	A 6	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, PROP.2-YR FREQ, OUTLET HYD.
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.22	200	.23	300	.24	400	.25
500	.27	600	.29	700	.31	800	.35	900	.40
1000	.49	1050	.60	1100	.77	1110	.84	1120	.93
1130	1.09	1131	1.11	1132	1.12	1133	1.14	1134	1.16
1135	1.17	1136	1.19	1137	1.22	1138	1.25	1139	1.27
1140	1.30	1141	1.33	1142	1.36	1143	1.39	1144	1.42
1145	1.46	1146	1.52	1147	1.57	1148	1.61	1149	1.77
1150	1.93	1151	2.08	1152	2.23	1153	2.38	1154	2.42
1155	2.44	1156	2.46	1157	2.47	1158	2.48	1159	2.47
1160	2.47	1161	2.46	1162	2.44	1163	2.44	1164	2.43
1165	2.39	1166	2.38	1167	2.35	1168	2.31	1169	2.30
1170	2.25	1171	2.22	1172	2.17	1173	2.14	1174	2.09
1175	2.04	1176	1.96	1177	1.91	1178	1.85	1179	1.67
1180	1.51	1181	1.33	1182	1.16	1183	1.00	1184	.93
1185	.88	1186	.84	1187	.82	1188	.79	1189	.77
1190	.74	1191	.72	1192	.71	1193	.67	1194	.67
1195	.67	1196	.66	1197	.64	1198	.63	1199	.61
1200	.61	1201	.59	1202	.59	1203	.58	1204	.58
1205	.56	1206	.56	1207	.55	1208	.55	1209	.55
1210	.53	1211	.53	1212	.53	1213	.50	1214	.50
1215	.50	1216	.50	1217	.48	1218	.48	1219	.48
1220	.48	1221	.48	1222	.47	1223	.47	1224	.45
1225	.45	1226	.45	1227	.45	1228	.43	1229	.43
1230	.43	1231	.43	1232	.43	1233	.43	1234	.42
1235	.42	1236	.42	1237	.42	1238	.40	1239	.40
1240	.40	1241	.40	1242	.40	1243	.40	1244	.40
1245	.40	1246	.40	1247	.39	1248	.39	1249	.39
1250	.39	1251	.37	1252	.39	1253	.39	1254	.37
1255	.37	1256	.37	1257	.37	1258	.37	1259	.37
1260	.37	1261	.35	1262	.35	1263	.35	1264	.35
1265	.35	1266	.35	1267	.35	1268	.35	1269	.35
1270	.35	1271	.34	1272	.34	1273	.35	1274	.34
1275	.34	1276	.34	1277	.34	1278	.34	1279	.34
1280	.32	1281	.34	1282	.32	1283	.32	1284	.34
1285	.32	1286	.32	1287	.32	1288	.32	1289	.32
1290	.32	1291	.32	1292	.32	1293	.31	1294	.32
1295	.32	1296	.31	1297	.31	1298	.31	1299	.31
1300	.31	1310	.31	1320	.27	1330	.27	1340	.26
1350	.27	1360	.26	1370	.26	1380	.24	1390	.24
1400	.24	1420	.22	1440	.22	1460	.07	1500	.00

TOTAL VOLUME THIS HYDROGRAPH = .77(Ac.Ft)

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006     1    1A 124 91 9.728A10                              G1
006     1    2A 124       99A10                          2  2
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Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, PROP.10-YR FREQ STORM DAY 4

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	RAIN ZONE	PCT IMPV
1	1A	9.7	4.26	9.7	4.26	0	0.	.00000	.00	.00	0.	124	28	A10	.91
1	2A	.0	.00	9.7	4.26	0	0.	.00000	.00	.00	0.	124	99	A10	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, PROP.10-YR FREQ, OUTLET HYD.
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.36	200	.38	300	.40	400	.42
500	.45	600	.48	700	.53	800	.58	900	.67
1000	.81	1050	1.00	1100	1.28	1110	1.39	1120	1.59
1130	1.85	1131	1.88	1132	1.89	1133	1.94	1134	1.97
1135	1.99	1136	2.02	1137	2.07	1138	2.12	1139	2.15
1140	2.19	1141	2.23	1142	2.29	1143	2.34	1144	2.40
1145	2.49	1146	2.57	1147	2.66	1148	2.74	1149	3.01
1150	3.28	1151	3.55	1152	3.82	1153	4.09	1154	4.17
1155	4.21	1156	4.23	1157	4.26	1158	4.25	1159	4.25
1160	4.25	1161	4.22	1162	4.18	1163	4.16	1164	4.13
1165	4.08	1166	4.04	1167	3.99	1168	3.92	1169	3.87
1170	3.80	1171	3.73	1172	3.65	1173	3.55	1174	3.42
1175	3.32	1176	3.22	1177	2.93	1178	2.62	1179	2.31
1180	2.00	1181	1.69	1182	1.58	1183	1.50	1184	1.45
1185	1.38	1186	1.34	1187	1.29	1188	1.26	1189	1.22
1190	1.20	1191	1.17	1192	1.14	1193	1.12	1194	1.08
1195	1.07	1196	1.07	1197	1.05	1198	1.02	1199	1.00
1200	1.00	1201	.96	1202	.96	1203	.95	1204	.93
1205	.91	1206	.91	1207	.89	1208	.89	1209	.89
1210	.86	1211	.86	1212	.84	1213	.84	1214	.83
1215	.83	1216	.81	1217	.81	1218	.79	1219	.79
1220	.79	1221	.79	1222	.77	1223	.76	1224	.76
1225	.74	1226	.76	1227	.74	1228	.72	1229	.74
1230	.72	1231	.72	1232	.72	1233	.71	1234	.71
1235	.71	1236	.69	1237	.67	1238	.69	1239	.67
1240	.67	1241	.67	1242	.67	1243	.65	1244	.65
1245	.65	1246	.65	1247	.64	1248	.64	1249	.64
1250	.64	1251	.64	1252	.62	1253	.64	1254	.62
1255	.62	1256	.62	1257	.60	1258	.62	1259	.60
1260	.60	1261	.60	1262	.59	1263	.59	1264	.59
1265	.60	1266	.59	1267	.59	1268	.59	1269	.57
1270	.57	1271	.57	1272	.59	1273	.57	1274	.57
1275	.57	1276	.57	1277	.55	1278	.55	1279	.55
1280	.55	1281	.53	1282	.53	1283	.53	1284	.55
1285	.55	1286	.53	1287	.53	1288	.53	1289	.53
1290	.53	1291	.53	1292	.53	1293	.52	1294	.52
1295	.52	1296	.52	1297	.52	1298	.52	1299	.52
1300	.50	1310	.50	1320	.48	1330	.46	1340	.45
1350	.43	1360	.43	1370	.42	1380	.40	1390	.40
1400	.40	1420	.37	1440	.36	1460	.10	1500	.00

TOTAL VOLUME THIS HYDROGRAPH = 1.28(Ac.Ft)

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006     1    1A 124 91 9.725A13                              G1
006     1    2A 124       99A13                          2  2
```

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\LAR04_RETARD\scr_soilx_34.dat

Lancaster L4 Warehouse, AREA A, PROP.25-YR FREQ

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
1	1A	9.7	5.86	9.7	5.86	0	0.	.00000	.00	.00	0.	124	25	A13	.91
1	2A	.0	.00	9.7	5.86	0	0.	.00000	.00	.00	0.	124	99	A13	.00

Version 11, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:
Lancaster L4 Warehouse, AREA A, PROP.25-YR FREQ, OUTLET HYD.
HYDROGRAPH AT 1 2A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	.47	200	.49	300	.52	400	.55
500	.58	600	.63	700	.68	800	.76	900	.87
1000	1.05	1050	1.31	1100	1.66	1110	1.84	1120	2.10
1130	2.43	1131	2.46	1132	2.49	1133	2.54	1134	2.59
1135	2.64	1136	2.66	1137	2.73	1138	2.79	1139	2.83
1140	2.89	1141	2.97	1142	3.05	1143	3.13	1144	3.22
1145	3.33	1146	3.46	1147	3.56	1148	3.69	1149	4.06
1150	4.45	1151	4.85	1152	5.24	1153	5.63	1154	5.74
1155	5.80	1156	5.84	1157	5.86	1158	5.84	1159	5.82
1160	5.78	1161	5.76	1162	5.71	1163	5.63	1164	5.57
1165	5.51	1166	5.42	1167	5.32	1168	5.20	1169	5.11
1170	4.97	1171	4.80	1172	4.65	1173	4.49	1174	4.07
1175	3.62	1176	3.18	1177	2.74	1178	2.29	1179	2.14
1180	2.02	1181	1.93	1182	1.85	1183	1.79	1184	1.72
1185	1.68	1186	1.64	1187	1.58	1188	1.56	1189	1.52
1190	1.48	1191	1.45	1192	1.43	1193	1.41	1194	1.37
1195	1.35	1196	1.33	1197	1.31	1198	1.29	1199	1.27
1200	1.25	1201	1.23	1202	1.23	1203	1.21	1204	1.20
1205	1.18	1206	1.16	1207	1.14	1208	1.12	1209	1.12
1210	1.10	1211	1.08	1212	1.08	1213	1.06	1214	1.06
1215	1.04	1216	1.04	1217	1.02	1218	1.02	1219	1.02
1220	1.00	1221	1.00	1222	1.00	1223	.98	1224	.96
1225	.96	1226	.96	1227	.94	1228	.94	1229	.93
1230	.93	1231	.93	1232	.93	1233	.91	1234	.91
1235	.91	1236	.91	1237	.89	1238	.89	1239	.89
1240	.87	1241	.87	1242	.87	1243	.85	1244	.85
1245	.85	1246	.83	1247	.83	1248	.81	1249	.83
1250	.83	1251	.81	1252	.81	1253	.79	1254	.81
1255	.81	1256	.79	1257	.79	1258	.79	1259	.79
1260	.77	1261	.77	1262	.77	1263	.77	1264	.75
1265	.77	1266	.75	1267	.75	1268	.75	1269	.75
1270	.73	1271	.75	1272	.73	1273	.73	1274	.73
1275	.71	1276	.73	1277	.71	1278	.73	1279	.71
1280	.69	1281	.71	1282	.69	1283	.71	1284	.69
1285	.69	1286	.69	1287	.69	1288	.67	1289	.69
1290	.67	1291	.67	1292	.67	1293	.67	1294	.66
1295	.67	1296	.66	1297	.66	1298	.67	1299	.66
1300	.66	1310	.64	1320	.62	1330	.61	1340	.59
1350	.56	1360	.56	1370	.55	1380	.52	1390	.51
1400	.50	1420	.50	1440	.47	1460	.09	1500	.00

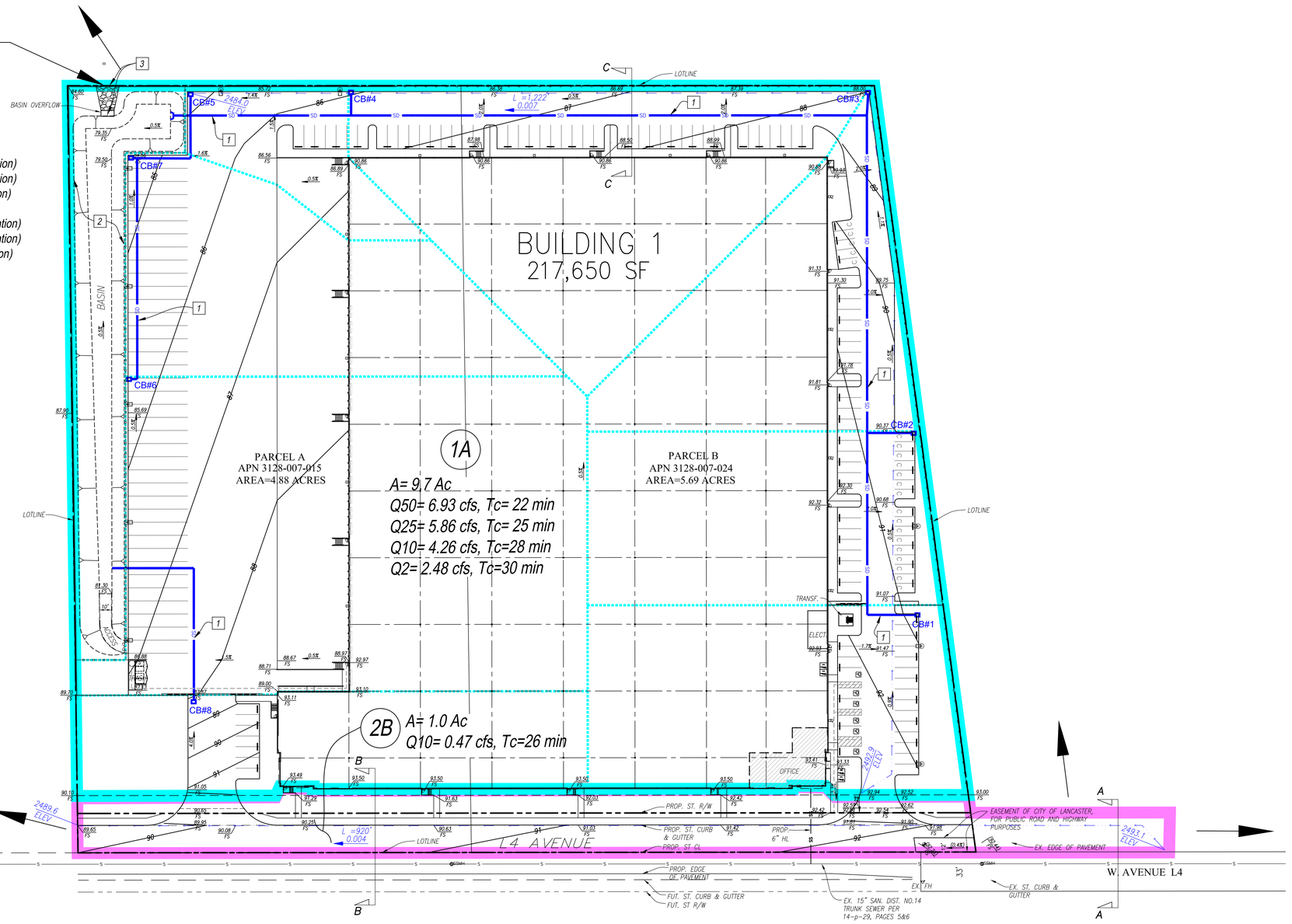
TOTAL VOLUME THIS HYDROGRAPH = 1.66(Ac.Ft)

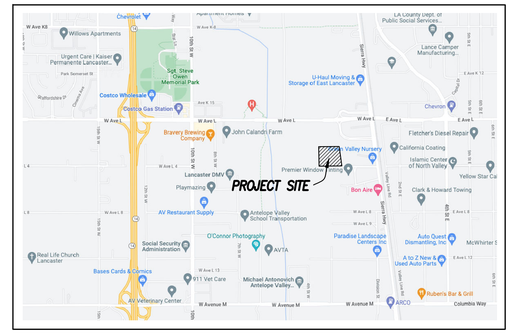
OUTLET:

EX. CONDITION:
- Σ A= 10.6 ac
- Σ Q25= 1.50 cfs
- Σ Q10= 1.15 cfs
- Σ Q2= 0.69 cfs

PROP. CONDITION:
- Σ A= 9.7 ac
- Σ Q25= 5.86 cfs (Pre-retention)
- Σ Q10= 4.26 cfs (Pre-retention)
- Σ Q2= 2.48 cfs (Pre-retention)

- Σ Q25= 1.28 cfs (Post-retention)
- Σ Q10= 0.98 cfs (Post-retention)
- Σ Q2= 0.59cfs (Post-retention)





NORTH

VICINITY MAP

NOT TO SCALE

LEGEND

- MAIN DRAINAGE BOUNDARY
- CATCH BASIN SUBAREA
- FLOW LINE
- TRACT BOUNDARY
- PROPOSED STORM DRAIN PIPE (PRIVATELY-MAINTAINED)

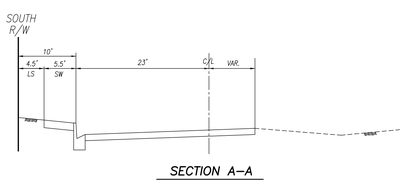
- (1A) .... LOCATION/SUBAREA NAME
- A .... AREA IN ACRES, Ac
- Q .... STORM FLOW IN CUBIC FEET PER SECOND, FREQUENCY AS SHOWN, cfs
- Tc .... TIME OF CONCENTRATION, min
- Σ .... TOTAL
- [1] .... PROPOSED STORM DRAIN AND CATCH BASINS WITH FILTER INSERTS, TO BE PRIVATELY-MAINTAINED
- [2] .... PROPOSED RETENTION BASIN WITH ACCESS RAMP, TO BE PRIVATELY-MAINTAINED
- [3] .... PROPOSED 11'-WIDE SPILLWAY CONCRETE CHANNEL WITH RIPRAP @1.0% SLOPE, TO BE PRIVATELY-MAINTAINED

HYDROLOGY CRITERIA

- .... STORM FREQUENCY:
  - 50-YR FOR CALCULATING MINIMUM FINISH FLOOR
  - 25-YR FOR DEVELOPED AREAS, FOR STORM DRAIN DESIGN
  - 10-YR FOR OFFSITE STREET DRY LANE CALCULATIONS
  - 25-, 10- & 2-YR FOR BASIN CALCULATIONS
- .... BASIN NAME = ANTELOPE VALLEY
- .... SOIL TYPE NUMBER = 124
- .... ISOHYET:
  - 2.9" (50-YR, 24-hr)
  - 2.55" (25-YR, 24-hr)
  - 2.07" (10-YR, 24-hr)
  - 1.12" (2-YR, 24-hr)
- .... % IMPERVIOUSNESS:
  - 91% FOR PROPOSED INDUSTRIAL AREA AND PUBLIC STREET AREA

GENERAL NOTES

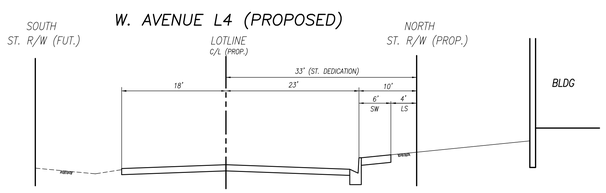
1. STORM DRAIN ALIGNMENTS SHOWN ARE NOT NECESSARILY APPROVED.
2. ALL ONSITE PROPOSED STORM DRAINS & APPURTENANT STRUCTURES TO BE PRIVATELY MAINTAINED UNLESS OTHERWISE NOTED.



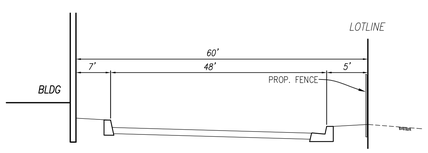
SECTION A–A
NO SCALE

W. AVENUE L4 (EXISTING)

W. AVENUE L4 (PROPOSED)



SECTION B–B
NO SCALE



PRIVATE DRIVE
SECTION C–C
NOT TO SCALE

CATCH BASIN Q25 PRORATION

CB subarea	Area (ac)	Q25rate (cfs/ac)	Qsubarea (cfs)	Qjunction (cfs)
CB1	1.1	0.604	0.66	
CB2	1	0.604	0.6	1.26
CB3	1	0.604	0.6	1.86
CB4	1.5	0.604	0.91	2.77
CB5	0.3	0.604	0.18	5.00
CB6	2.4	0.604	1.45	
CB7	1	0.604	0.6	2.05
CB8	0.8	0.604	0.48	
BASIN	0.6	0.604	0.36	

RETENTION BASIN NOTES:

MINIMUM Q25 RETENTION STORAGE REQUIRED = 45,388 CU-FT

BASIN CAPACITY PROVIDED = 52,590 CU-FT

PROPOSED CONDITION

HYDROLOGY MAP
for L4 Warehouse Industrial Park

W. Avenue L4

IN THE CITY OF LANCASTER, LOS ANGELES COUNTY

DATE: 10/07/2022

NORTH

SCALE: 1"=40'

PREPARED BY :
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd. #100, Van Nuys, CA 91411
Phone : (818) 787- 8550, Fax : (818) 901-7451
www.sikand.com, E-mail: info@sikand.com

REGISTERED PROFESSIONAL ENGINEER
CRAIG FARMER
No.49041
Exp. 09-30-2024
CIVIL
STATE OF CALIFORNIA

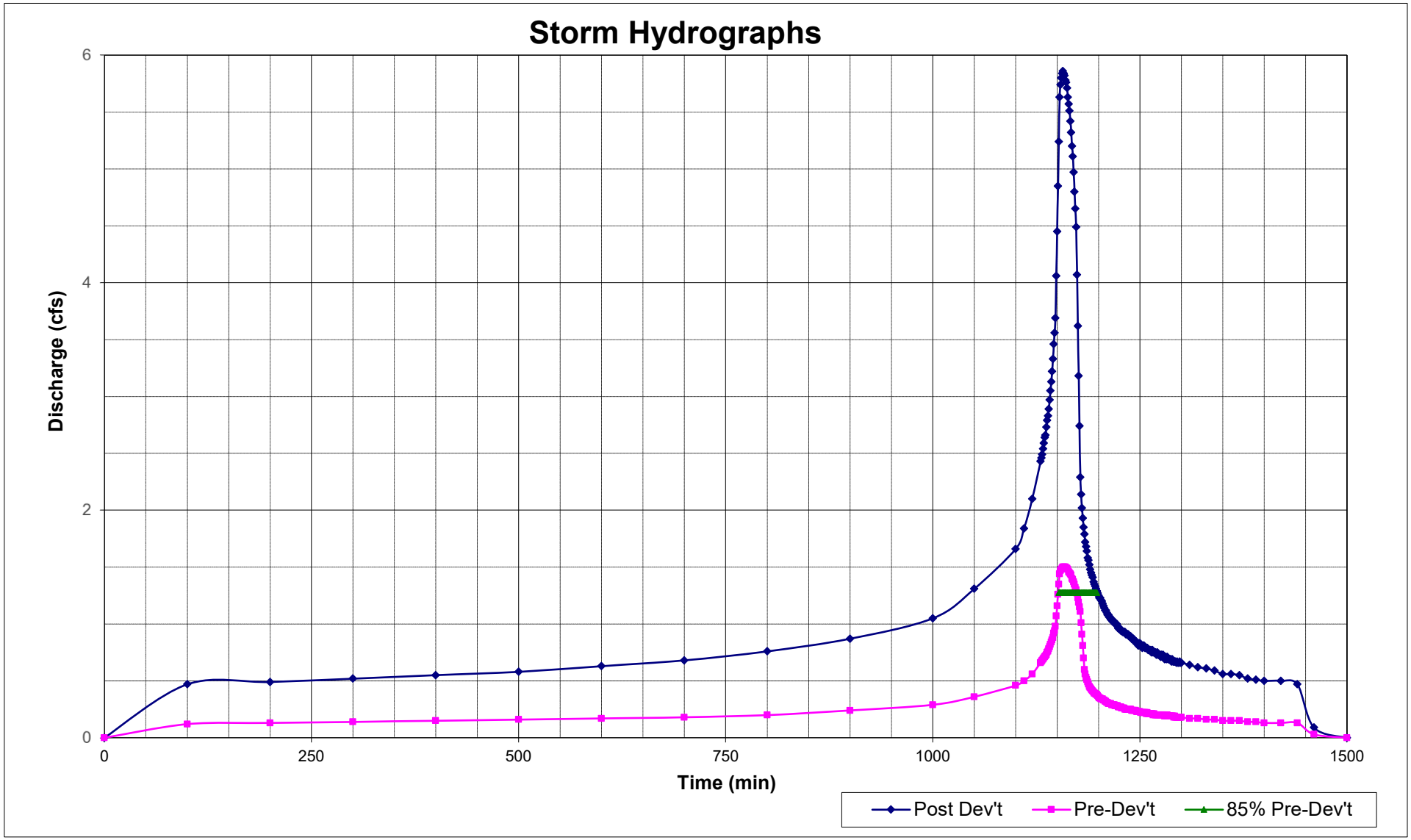
SHEET 1 OF 1 SHEETS

SECTION 5

RETENTION BASIN ANALYSIS

25-, 10- and 2-yr Frequency Retention Requirement
Basin Sizing, Drawdown Calculation & Exhibit
Excerpt from Infiltration Testing Report

Retention Basin, Min. Req'd. Volume, 25-yr Frequency



Peak $Q_{POST\text{-}DEV'T}$ =	**5.86** cfs
Peak $Q_{PRE\text{-}DEV'T}$ =	**1.5** cfs
85% Peak $Q_{PRE\text{-}DEV'T}$ =	**1.28** cfs
$V_{FOR\ STORAGE}$ =	**45387.9** ft^3
$V_{FOR\ STORAGE}$ =	**1.04** ac-ft

RETENTION Basin Minimum Storage Requirement

Calculation Summary

25-yr Frequency

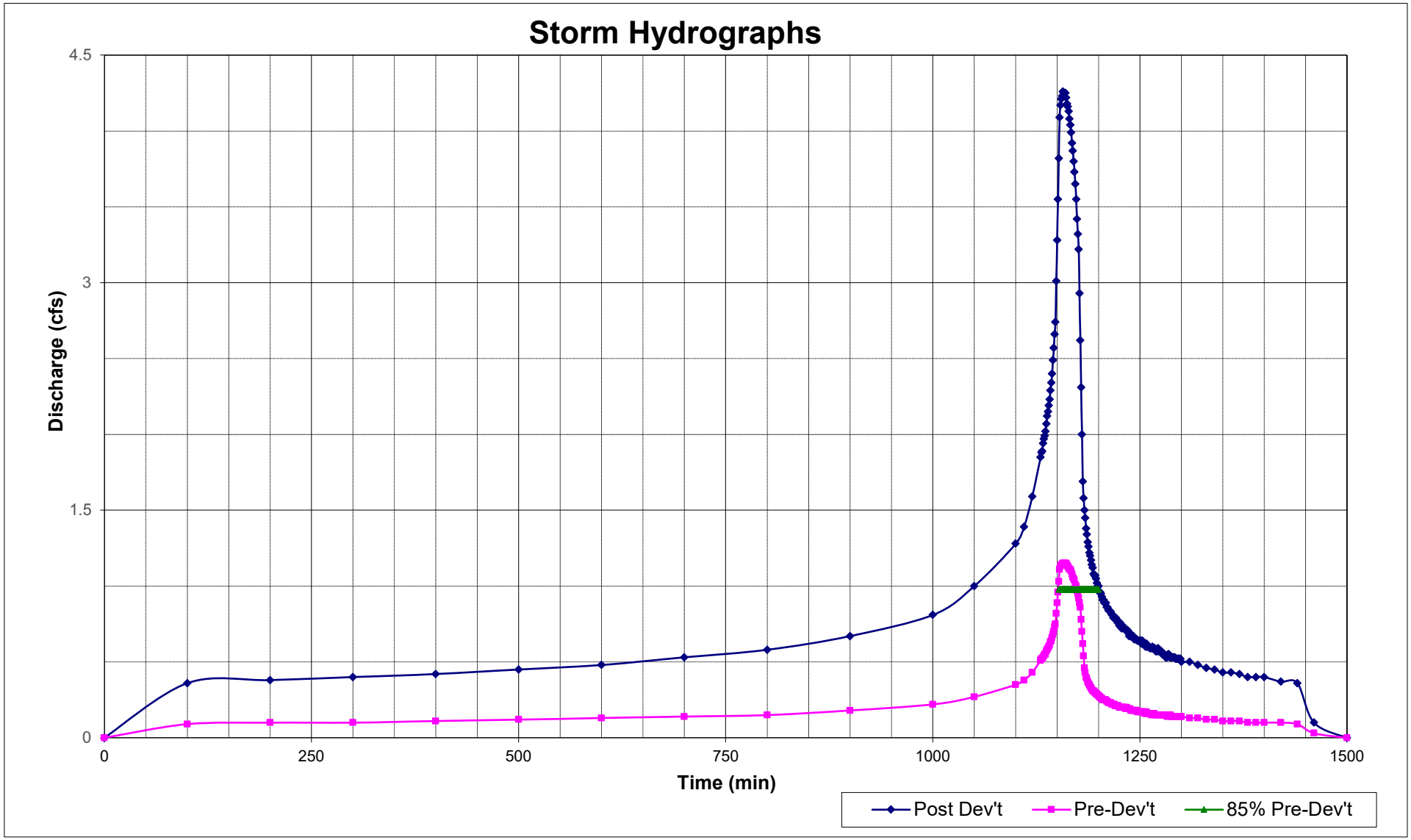
Post-Dev't		Pre-Dev't		85% Pre-Dev't				
Time (min)	Q (cfs)	Time (min)	Q (cfs)	Time (min)	Q (cfs)	Delta Q (cfs)	Volume (cu-ft)	Volume (ac-ft)
0	-	0	-		-	-	-	-
100	0.47	100	0.12		-	0.35	1,050	0.024
200	0.49	200	0.13		-	0.36	2,130	0.049
300	0.52	300	0.14		-	0.38	2,220	0.051
400	0.55	400	0.15		-	0.40	2,340	0.054
500	0.58	500	0.16		-	0.42	2,460	0.056
600	0.63	600	0.17		-	0.46	2,640	0.061
700	0.68	700	0.18		-	0.50	2,880	0.066
800	0.76	800	0.20		-	0.56	3,180	0.073
900	0.87	900	0.24		-	0.63	3,570	0.082
1000	1.05	1000	0.29		-	0.76	4,170	0.096
1050	1.31	1050	0.36		-	0.95	2,565	0.059
1100	1.66	1100	0.46		-	1.20	3,225	0.074
1110	1.84	1110	0.50		-	1.34	762	0.017
1120	2.10	1120	0.56		-	1.54	864	0.020
1130	2.43	1130	0.66		-	1.77	993	0.023
1131	2.46	1131	0.67		-	1.79	107	0.002
1132	2.49	1132	0.68		-	1.81	108	0.002
1133	2.54	1133	0.69		-	1.85	110	0.003
1134	2.59	1134	0.70		-	1.89	112	0.003
1135	2.64	1135	0.71		-	1.93	115	0.003
1136	2.66	1136	0.72		-	1.94	116	0.003
1137	2.73	1137	0.73		-	2.00	118	0.003
1138	2.79	1138	0.75		-	2.04	121	0.003
1139	2.83	1139	0.76		-	2.07	123	0.003
1140	2.89	1140	0.78		-	2.11	125	0.003
1141	2.97	1141	0.80		-	2.17	128	0.003
1142	3.05	1142	0.82		-	2.23	132	0.003
1143	3.13	1143	0.84		-	2.29	136	0.003
1144	3.22	1144	0.86		-	2.36	140	0.003
1145	3.33	1145	0.88		-	2.45	144	0.003
1146	3.46	1146	0.92		-	2.54	150	0.003
1147	3.56	1147	0.94		-	2.62	155	0.004
1148	3.69	1148	0.98		-	2.71	160	0.004
1149	4.06	1149	1.07		-	2.99	171	0.004
1150	4.45	1150	1.16		-	3.29	188	0.004
1151	4.85	1151	1.26		-	3.59	206	0.005
1152	5.24	1152	1.35	1152	1.28	3.97	227	0.005
1153	5.63	1153	1.44	1153	1.28	4.36	250	0.006
1154	5.74	1154	1.47	1154	1.28	4.47	265	0.006
1155	5.80	1155	1.48	1155	1.28	4.53	270	0.006
1156	5.84	1156	1.49	1156	1.28	4.57	273	0.006
1157	5.86	1157	1.50	1157	1.28	4.59	275	0.006
1158	5.84	1158	1.50	1158	1.28	4.57	275	0.006
1159	5.82	1159	1.50	1159	1.28	4.55	273	0.006
1160	5.78	1160	1.50	1160	1.28	4.51	272	0.006

1161	5.76	1161	1.49	1161	1.28	4.49	270	0.006
1162	5.71	1162	1.49	1162	1.28	4.44	268	0.006
1163	5.63	1163	1.48	1163	1.28	4.36	264	0.006
1164	5.57	1164	1.46	1164	1.28	4.30	260	0.006
1165	5.51	1165	1.45	1165	1.28	4.24	256	0.006
1166	5.42	1166	1.44	1166	1.28	4.15	251	0.006
1167	5.32	1167	1.43	1167	1.28	4.05	246	0.006
1168	5.20	1168	1.40	1168	1.28	3.93	239	0.005
1169	5.11	1169	1.39	1169	1.28	3.84	233	0.005
1170	4.97	1170	1.37	1170	1.28	3.70	226	0.005
1171	4.80	1171	1.35	1171	1.28	3.53	217	0.005
1172	4.65	1172	1.32	1172	1.28	3.38	207	0.005
1173	4.49	1173	1.30	1173	1.28	3.22	198	0.005
1174	4.07	1174	1.27	1174	1.28	2.80	180	0.004
1175	3.62	1175	1.23	1175	1.28	2.39	156	0.004
1176	3.18	1176	1.19	1176	1.28	1.99	131	0.003
1177	2.74	1177	1.15	1177	1.28	1.59	107	0.002
1178	2.29	1178	1.11	1178	1.28	1.18	83	0.002
1179	2.14	1179	1.01	1179	1.28	1.13	69	0.002
1180	2.02	1180	0.91	1180	1.28	1.11	67	0.002
1181	1.93	1181	0.81	1181	1.28	1.12	67	0.002
1182	1.85	1182	0.70	1182	1.28	1.15	68	0.002
1183	1.79	1183	0.60	1183	1.28	1.19	70	0.002
1184	1.72	1184	0.56	1184	1.28	1.16	71	0.002
1185	1.68	1185	0.53	1185	1.28	1.15	69	0.002
1186	1.64	1186	0.51	1186	1.28	1.13	68	0.002
1187	1.58	1187	0.49	1187	1.28	1.09	67	0.002
1188	1.56	1188	0.47	1188	1.28	1.09	65	0.002
1189	1.52	1189	0.45	1189	1.28	1.07	65	0.001
1190	1.48	1190	0.44	1190	1.28	1.04	63	0.001
1191	1.45	1191	0.43	1191	1.28	1.02	62	0.001
1192	1.43	1192	0.42	1192	1.28	1.01	61	0.001
1193	1.41	1193	0.41	1193	1.28	1.00	60	0.001
1194	1.37	1194	0.40	1194	1.28	0.97	59	0.001
1195	1.35	1195	0.39	1195	1.28	0.96	58	0.001
1196	1.33	1196	0.39	1196	1.28	0.94	57	0.001
1197	1.31	1197	0.38	1197	1.28	0.93	56	0.001
1198	1.29	1198	0.38	1198	1.28	0.91	55	0.001
1199	1.27	1199	0.37		-	-	27	0.001
1200	1.25	1200	0.36		-	-	-	-
1201	1.23	1201	0.35		-	-	-	-
1202	1.23	1202	0.35		-	-	-	-
1203	1.21	1203	0.34		-	-	-	-
1204	1.20	1204	0.34		-	-	-	-
1205	1.18	1205	0.34		-	-	-	-
1206	1.16	1206	0.33		-	-	-	-
1207	1.14	1207	0.33		-	-	-	-
1208	1.12	1208	0.32		-	-	-	-
1209	1.12	1209	0.32		-	-	-	-
1210	1.10	1210	0.31		-	-	-	-
1211	1.08	1211	0.31		-	-	-	-
1212	1.08	1212	0.30		-	-	-	-
1213	1.06	1213	0.30		-	-	-	-
1214	1.06	1214	0.30		-	-	-	-

1215	1.04	1215	0.30	-	-	-	-
1216	1.04	1216	0.29	-	-	-	-
1217	1.02	1217	0.29	-	-	-	-
1218	1.02	1218	0.29	-	-	-	-
1219	1.02	1219	0.29	-	-	-	-
1220	1.00	1220	0.28	-	-	-	-
1221	1.00	1221	0.28	-	-	-	-
1222	1.00	1222	0.28	-	-	-	-
1223	0.98	1223	0.28	-	-	-	-
1224	0.96	1224	0.27	-	-	-	-
1225	0.96	1225	0.27	-	-	-	-
1226	0.96	1226	0.27	-	-	-	-
1227	0.94	1227	0.27	-	-	-	-
1228	0.94	1228	0.26	-	-	-	-
1229	0.93	1229	0.26	-	-	-	-
1230	0.93	1230	0.26	-	-	-	-
1231	0.93	1231	0.26	-	-	-	-
1232	0.93	1232	0.25	-	-	-	-
1233	0.91	1233	0.25	-	-	-	-
1234	0.91	1234	0.25	-	-	-	-
1235	0.91	1235	0.25	-	-	-	-
1236	0.91	1236	0.25	-	-	-	-
1237	0.89	1237	0.25	-	-	-	-
1238	0.89	1238	0.25	-	-	-	-
1239	0.89	1239	0.25	-	-	-	-
1240	0.87	1240	0.24	-	-	-	-
1241	0.87	1241	0.24	-	-	-	-
1242	0.87	1242	0.24	-	-	-	-
1243	0.85	1243	0.24	-	-	-	-
1244	0.85	1244	0.24	-	-	-	-
1245	0.85	1245	0.24	-	-	-	-
1246	0.83	1246	0.23	-	-	-	-
1247	0.83	1247	0.23	-	-	-	-
1248	0.81	1248	0.23	-	-	-	-
1249	0.83	1249	0.23	-	-	-	-
1250	0.83	1250	0.23	-	-	-	-
1251	0.81	1251	0.22	-	-	-	-
1252	0.81	1252	0.22	-	-	-	-
1253	0.79	1253	0.22	-	-	-	-
1254	0.81	1254	0.22	-	-	-	-
1255	0.81	1255	0.22	-	-	-	-
1256	0.79	1256	0.22	-	-	-	-
1257	0.79	1257	0.22	-	-	-	-
1258	0.79	1258	0.21	-	-	-	-
1259	0.79	1259	0.22	-	-	-	-
1260	0.77	1260	0.21	-	-	-	-
1261	0.77	1261	0.21	-	-	-	-
1262	0.77	1262	0.21	-	-	-	-
1263	0.77	1263	0.21	-	-	-	-
1264	0.75	1264	0.21	-	-	-	-
1265	0.77	1265	0.21	-	-	-	-
1266	0.75	1266	0.20	-	-	-	-
1267	0.75	1267	0.21	-	-	-	-
1268	0.75	1268	0.20	-	-	-	-

1269	0.75	1269	0.20	-	-	-	-
1270	0.73	1270	0.20	-	-	-	-
1271	0.75	1271	0.20	-	-	-	-
1272	0.73	1272	0.20	-	-	-	-
1273	0.73	1273	0.20	-	-	-	-
1274	0.73	1274	0.20	-	-	-	-
1275	0.71	1275	0.20	-	-	-	-
1276	0.73	1276	0.20	-	-	-	-
1277	0.71	1277	0.20	-	-	-	-
1278	0.73	1278	0.20	-	-	-	-
1279	0.71	1279	0.20	-	-	-	-
1280	0.69	1280	0.19	-	-	-	-
1281	0.71	1281	0.20	-	-	-	-
1282	0.69	1282	0.19	-	-	-	-
1283	0.71	1283	0.20	-	-	-	-
1284	0.69	1284	0.19	-	-	-	-
1285	0.69	1285	0.19	-	-	-	-
1286	0.69	1286	0.19	-	-	-	-
1287	0.69	1287	0.19	-	-	-	-
1288	0.67	1288	0.19	-	-	-	-
1289	0.69	1289	0.19	-	-	-	-
1290	0.67	1290	0.19	-	-	-	-
1291	0.67	1291	0.18	-	-	-	-
1292	0.67	1292	0.19	-	-	-	-
1293	0.67	1293	0.18	-	-	-	-
1294	0.66	1294	0.18	-	-	-	-
1295	0.67	1295	0.18	-	-	-	-
1296	0.66	1296	0.18	-	-	-	-
1297	0.66	1297	0.18	-	-	-	-
1298	0.67	1298	0.18	-	-	-	-
1299	0.66	1299	0.18	-	-	-	-
1300	0.66	1300	0.18	-	-	-	-
1310	0.64	1310	0.17	-	-	-	-
1320	0.62	1320	0.17	-	-	-	-
1330	0.61	1330	0.16	-	-	-	-
1340	0.59	1340	0.16	-	-	-	-
1350	0.56	1350	0.15	-	-	-	-
1360	0.56	1360	0.15	-	-	-	-
1370	0.55	1370	0.15	-	-	-	-
1380	0.52	1380	0.14	-	-	-	-
1390	0.51	1390	0.14	-	-	-	-
1400	0.50	1400	0.13	-	-	-	-
1420	0.50	1420	0.13	-	-	-	-
1440	0.47	1440	0.13	-	-	-	-
1460	0.09	1460	0.03	-	-	-	-
1500	-	1500	-	-	-	-	-
					Totals:	**45,388**	**1.042**

Retention Basin, Min. Req'd. Volume, 10-yr Frequency



Peak $Q_{POST\text{-}DEV'T}$ =	**4.26** cfs
Peak $Q_{PRE\text{-}DEV'T}$ =	**1.15** cfs
85% Peak $Q_{PRE\text{-}DEV'T}$ =	**0.98** cfs
$V_{FOR\ STORAGE}$ =	**35240.1** ft^3
$V_{FOR\ STORAGE}$ =	**0.81** ac-ft

RETENTION Basin Minimum Storage Requirement

Calculation Summary

10-yr Frequency

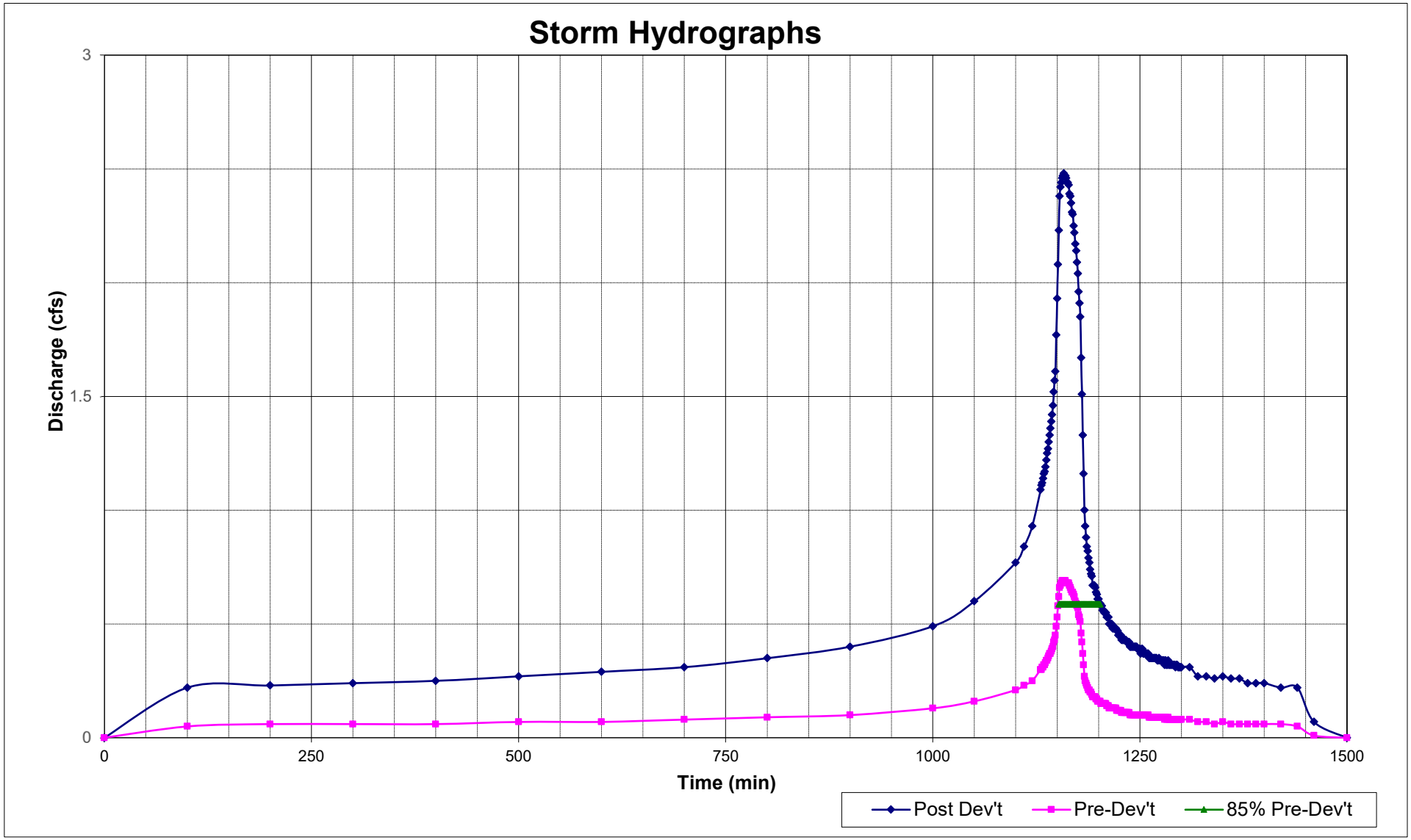
Post-Dev't		Pre-Dev't		85% Pre-Dev't				
Time (min)	Q (cfs)	Time (min)	Q (cfs)	Time (min)	Q (cfs)	Delta Q (cfs)	Volume (cu-ft)	Volume (ac-ft)
0	-	0	-		-	-	-	-
100	0.36	100	0.09		-	0.27	810	0.019
200	0.38	200	0.10		-	0.28	1,650	0.038
300	0.40	300	0.10		-	0.30	1,740	0.040
400	0.42	400	0.11		-	0.31	1,830	0.042
500	0.45	500	0.12		-	0.33	1,920	0.044
600	0.48	600	0.13		-	0.35	2,040	0.047
700	0.53	700	0.14		-	0.39	2,220	0.051
800	0.58	800	0.15		-	0.43	2,460	0.056
900	0.67	900	0.18		-	0.49	2,760	0.063
1000	0.81	1000	0.22		-	0.59	3,240	0.074
1050	1.00	1050	0.27		-	0.73	1,980	0.045
1100	1.28	1100	0.35		-	0.93	2,490	0.057
1110	1.39	1110	0.38		-	1.01	582	0.013
1120	1.59	1120	0.43		-	1.16	651	0.015
1130	1.85	1130	0.51		-	1.34	750	0.017
1131	1.88	1131	0.52		-	1.36	81	0.002
1132	1.89	1132	0.52		-	1.37	82	0.002
1133	1.94	1133	0.53		-	1.41	83	0.002
1134	1.97	1134	0.54		-	1.43	85	0.002
1135	1.99	1135	0.55		-	1.44	86	0.002
1136	2.02	1136	0.55		-	1.47	87	0.002
1137	2.07	1137	0.57		-	1.50	89	0.002
1138	2.12	1138	0.58		-	1.54	91	0.002
1139	2.15	1139	0.59		-	1.56	93	0.002
1140	2.19	1140	0.60		-	1.59	95	0.002
1141	2.23	1141	0.61		-	1.62	96	0.002
1142	2.29	1142	0.63		-	1.66	98	0.002
1143	2.34	1143	0.64		-	1.70	101	0.002
1144	2.40	1144	0.66		-	1.74	103	0.002
1145	2.49	1145	0.68		-	1.81	107	0.002
1146	2.57	1146	0.70		-	1.87	110	0.003
1147	2.66	1147	0.73		-	1.93	114	0.003
1148	2.74	1148	0.75		-	1.99	118	0.003
1149	3.01	1149	0.82		-	2.19	125	0.003
1150	3.28	1150	0.89		-	2.39	137	0.003
1151	3.55	1151	0.96		-	2.59	149	0.003
1152	3.82	1152	1.03	1152	0.98	2.84	163	0.004
1153	4.09	1153	1.11	1153	0.98	3.11	179	0.004
1154	4.17	1154	1.13	1154	0.98	3.19	189	0.004
1155	4.21	1155	1.14	1155	0.98	3.23	193	0.004
1156	4.23	1156	1.14	1156	0.98	3.25	195	0.004
1157	4.26	1157	1.15	1157	0.98	3.28	196	0.005
1158	4.25	1158	1.15	1158	0.98	3.27	197	0.005
1159	4.25	1159	1.15	1159	0.98	3.27	196	0.005
1160	4.25	1160	1.15	1160	0.98	3.27	196	0.005

1161	4.22	1161	1.15	1161	0.98	3.24	195	0.004
1162	4.18	1162	1.14	1162	0.98	3.20	193	0.004
1163	4.16	1163	1.13	1163	0.98	3.18	192	0.004
1164	4.13	1164	1.12	1164	0.98	3.15	190	0.004
1165	4.08	1165	1.11	1165	0.98	3.10	188	0.004
1166	4.04	1166	1.11	1166	0.98	3.06	185	0.004
1167	3.99	1167	1.10	1167	0.98	3.01	182	0.004
1168	3.92	1168	1.08	1168	0.98	2.94	179	0.004
1169	3.87	1169	1.06	1169	0.98	2.89	175	0.004
1170	3.80	1170	1.05	1170	0.98	2.82	171	0.004
1171	3.73	1171	1.04	1171	0.98	2.75	167	0.004
1172	3.65	1172	1.01	1172	0.98	2.67	163	0.004
1173	3.55	1173	1.00	1173	0.98	2.57	157	0.004
1174	3.42	1174	0.97	1174	0.98	2.45	151	0.003
1175	3.32	1175	0.95	1175	0.98	2.37	145	0.003
1176	3.22	1176	0.92	1176	0.98	2.30	140	0.003
1177	2.93	1177	0.89	1177	0.98	2.04	130	0.003
1178	2.62	1178	0.86	1178	0.98	1.76	114	0.003
1179	2.31	1179	0.78	1179	0.98	1.53	99	0.002
1180	2.00	1180	0.70	1180	0.98	1.30	85	0.002
1181	1.69	1181	0.62	1181	0.98	1.07	71	0.002
1182	1.58	1182	0.54	1182	0.98	1.04	63	0.001
1183	1.50	1183	0.46	1183	0.98	1.04	62	0.001
1184	1.45	1184	0.43	1184	0.98	1.02	62	0.001
1185	1.38	1185	0.40	1185	0.98	0.98	60	0.001
1186	1.34	1186	0.39	1186	0.98	0.95	58	0.001
1187	1.29	1187	0.37	1187	0.98	0.92	56	0.001
1188	1.26	1188	0.36	1188	0.98	0.90	55	0.001
1189	1.22	1189	0.35	1189	0.98	0.87	53	0.001
1190	1.20	1190	0.34	1190	0.98	0.86	52	0.001
1191	1.17	1191	0.33	1191	0.98	0.84	51	0.001
1192	1.14	1192	0.32	1192	0.98	0.82	50	0.001
1193	1.12	1193	0.31	1193	0.98	0.81	49	0.001
1194	1.08	1194	0.31	1194	0.98	0.77	47	0.001
1195	1.07	1195	0.30	1195	0.98	0.77	46	0.001
1196	1.07	1196	0.30	1196	0.98	0.77	46	0.001
1197	1.05	1197	0.29	1197	0.98	0.76	46	0.001
1198	1.02	1198	0.29	1198	0.98	0.73	45	0.001
1199	1.00	1199	0.28	1199	0.98	0.72	44	0.001
1200	1.00	1200	0.28	1200	0.98	0.72	43	0.001
1201	0.96	1201	0.27		-	-	22	0.000
1202	0.96	1202	0.27		-	-	-	-
1203	0.95	1203	0.26		-	-	-	-
1204	0.93	1204	0.26		-	-	-	-
1205	0.91	1205	0.25		-	-	-	-
1206	0.91	1206	0.25		-	-	-	-
1207	0.89	1207	0.25		-	-	-	-
1208	0.89	1208	0.25		-	-	-	-
1209	0.89	1209	0.25		-	-	-	-
1210	0.86	1210	0.24		-	-	-	-
1211	0.86	1211	0.24		-	-	-	-
1212	0.84	1212	0.23		-	-	-	-
1213	0.84	1213	0.23		-	-	-	-
1214	0.83	1214	0.23		-	-	-	-

1215	0.83	1215	0.23	-	-	-	-
1216	0.81	1216	0.22	-	-	-	-
1217	0.81	1217	0.22	-	-	-	-
1218	0.79	1218	0.22	-	-	-	-
1219	0.79	1219	0.22	-	-	-	-
1220	0.79	1220	0.21	-	-	-	-
1221	0.79	1221	0.21	-	-	-	-
1222	0.77	1222	0.21	-	-	-	-
1223	0.76	1223	0.21	-	-	-	-
1224	0.76	1224	0.21	-	-	-	-
1225	0.74	1225	0.20	-	-	-	-
1226	0.76	1226	0.20	-	-	-	-
1227	0.74	1227	0.20	-	-	-	-
1228	0.72	1228	0.20	-	-	-	-
1229	0.74	1229	0.20	-	-	-	-
1230	0.72	1230	0.20	-	-	-	-
1231	0.72	1231	0.20	-	-	-	-
1232	0.72	1232	0.20	-	-	-	-
1233	0.71	1233	0.19	-	-	-	-
1234	0.71	1234	0.20	-	-	-	-
1235	0.71	1235	0.19	-	-	-	-
1236	0.69	1236	0.19	-	-	-	-
1237	0.67	1237	0.19	-	-	-	-
1238	0.69	1238	0.19	-	-	-	-
1239	0.67	1239	0.18	-	-	-	-
1240	0.67	1240	0.18	-	-	-	-
1241	0.67	1241	0.18	-	-	-	-
1242	0.67	1242	0.18	-	-	-	-
1243	0.65	1243	0.18	-	-	-	-
1244	0.65	1244	0.18	-	-	-	-
1245	0.65	1245	0.18	-	-	-	-
1246	0.65	1246	0.18	-	-	-	-
1247	0.64	1247	0.17	-	-	-	-
1248	0.64	1248	0.17	-	-	-	-
1249	0.64	1249	0.17	-	-	-	-
1250	0.64	1250	0.17	-	-	-	-
1251	0.64	1251	0.17	-	-	-	-
1252	0.62	1252	0.17	-	-	-	-
1253	0.64	1253	0.17	-	-	-	-
1254	0.62	1254	0.17	-	-	-	-
1255	0.62	1255	0.17	-	-	-	-
1256	0.62	1256	0.16	-	-	-	-
1257	0.60	1257	0.16	-	-	-	-
1258	0.62	1258	0.17	-	-	-	-
1259	0.60	1259	0.16	-	-	-	-
1260	0.60	1260	0.16	-	-	-	-
1261	0.60	1261	0.16	-	-	-	-
1262	0.59	1262	0.16	-	-	-	-
1263	0.59	1263	0.16	-	-	-	-
1264	0.59	1264	0.15	-	-	-	-
1265	0.60	1265	0.16	-	-	-	-
1266	0.59	1266	0.16	-	-	-	-
1267	0.59	1267	0.16	-	-	-	-
1268	0.59	1268	0.15	-	-	-	-

1269	0.57	1269	0.15	-	-	-	-
1270	0.57	1270	0.15	-	-	-	-
1271	0.57	1271	0.15	-	-	-	-
1272	0.59	1272	0.15	-	-	-	-
1273	0.57	1273	0.15	-	-	-	-
1274	0.57	1274	0.15	-	-	-	-
1275	0.57	1275	0.15	-	-	-	-
1276	0.57	1276	0.15	-	-	-	-
1277	0.55	1277	0.15	-	-	-	-
1278	0.55	1278	0.15	-	-	-	-
1279	0.55	1279	0.15	-	-	-	-
1280	0.55	1280	0.15	-	-	-	-
1281	0.53	1281	0.15	-	-	-	-
1282	0.53	1282	0.15	-	-	-	-
1283	0.53	1283	0.14	-	-	-	-
1284	0.55	1284	0.15	-	-	-	-
1285	0.55	1285	0.15	-	-	-	-
1286	0.53	1286	0.15	-	-	-	-
1287	0.53	1287	0.15	-	-	-	-
1288	0.53	1288	0.14	-	-	-	-
1289	0.53	1289	0.14	-	-	-	-
1290	0.53	1290	0.14	-	-	-	-
1291	0.53	1291	0.14	-	-	-	-
1292	0.53	1292	0.14	-	-	-	-
1293	0.52	1293	0.14	-	-	-	-
1294	0.52	1294	0.14	-	-	-	-
1295	0.52	1295	0.14	-	-	-	-
1296	0.52	1296	0.14	-	-	-	-
1297	0.52	1297	0.14	-	-	-	-
1298	0.52	1298	0.14	-	-	-	-
1299	0.52	1299	0.14	-	-	-	-
1300	0.50	1300	0.14	-	-	-	-
1310	0.50	1310	0.13	-	-	-	-
1320	0.48	1320	0.13	-	-	-	-
1330	0.46	1330	0.12	-	-	-	-
1340	0.45	1340	0.12	-	-	-	-
1350	0.43	1350	0.11	-	-	-	-
1360	0.43	1360	0.11	-	-	-	-
1370	0.42	1370	0.11	-	-	-	-
1380	0.40	1380	0.10	-	-	-	-
1390	0.40	1390	0.10	-	-	-	-
1400	0.40	1400	0.10	-	-	-	-
1420	0.37	1420	0.10	-	-	-	-
1440	0.36	1440	0.09	-	-	-	-
1460	0.10	1460	0.03	-	-	-	-
1500	-	1500	-	-	-	-	-
					Totals:	**35,240**	**0.809**

Retention Basin, Min. Req'd. Volume, 2-yr Frequency



Peak $Q_{POST\text{-}DEV'T}$ =	**2.48** cfs
Peak $Q_{PRE\text{-}DEV'T}$ =	**0.69** cfs
85% Peak $Q_{PRE\text{-}DEV'T}$ =	**0.59** cfs
$V_{FOR\ STORAGE}$ =	**21441.72** ft^3
$V_{FOR\ STORAGE}$ =	**0.49** ac-ft

RETENTION Basin Minimum Storage Requirement

Calculation Summary

2-yr Frequency

Post-Dev't		Pre-Dev't		85% Pre-Dev't				
Time (min)	Q (cfs)	Time (min)	Q (cfs)	Time (min)	Q (cfs)	Delta Q (cfs)	Volume (cu-ft)	Volume (ac-ft)
0	-	0	-		-	-	-	-
100	0.22	100	0.05		-	0.17	510	0.012
200	0.23	200	0.06		-	0.17	1,020	0.023
300	0.24	300	0.06		-	0.18	1,050	0.024
400	0.25	400	0.06		-	0.19	1,110	0.025
500	0.27	500	0.07		-	0.20	1,170	0.027
600	0.29	600	0.07		-	0.22	1,260	0.029
700	0.31	700	0.08		-	0.23	1,350	0.031
800	0.35	800	0.09		-	0.26	1,470	0.034
900	0.40	900	0.10		-	0.30	1,680	0.039
1000	0.49	1000	0.13		-	0.36	1,980	0.045
1050	0.60	1050	0.16		-	0.44	1,200	0.028
1100	0.77	1100	0.21		-	0.56	1,500	0.034
1110	0.84	1110	0.23		-	0.61	351	0.008
1120	0.93	1120	0.25		-	0.68	387	0.009
1130	1.09	1130	0.30		-	0.79	441	0.010
1131	1.11	1131	0.30		-	0.81	48	0.001
1132	1.12	1132	0.31		-	0.81	49	0.001
1133	1.14	1133	0.31		-	0.83	49	0.001
1134	1.16	1134	0.32		-	0.84	50	0.001
1135	1.17	1135	0.32		-	0.85	51	0.001
1136	1.19	1136	0.33		-	0.86	51	0.001
1137	1.22	1137	0.34		-	0.88	52	0.001
1138	1.25	1138	0.34		-	0.91	54	0.001
1139	1.27	1139	0.35		-	0.92	55	0.001
1140	1.30	1140	0.36		-	0.94	56	0.001
1141	1.33	1141	0.37		-	0.96	57	0.001
1142	1.36	1142	0.37		-	0.99	59	0.001
1143	1.39	1143	0.38		-	1.01	60	0.001
1144	1.42	1144	0.39		-	1.03	61	0.001
1145	1.46	1145	0.40		-	1.06	63	0.001
1146	1.52	1146	0.42		-	1.10	65	0.001
1147	1.57	1147	0.43		-	1.14	67	0.002
1148	1.61	1148	0.45		-	1.16	69	0.002
1149	1.77	1149	0.49		-	1.28	73	0.002
1150	1.93	1150	0.53		-	1.40	80	0.002
1151	2.08	1151	0.58		-	1.50	87	0.002
1152	2.23	1152	0.62	1152	0.59	1.64	94	0.002
1153	2.38	1153	0.66	1153	0.59	1.79	103	0.002
1154	2.42	1154	0.67	1154	0.59	1.83	109	0.002
1155	2.44	1155	0.68	1155	0.59	1.85	111	0.003
1156	2.46	1156	0.69	1156	0.59	1.87	112	0.003
1157	2.47	1157	0.69	1157	0.59	1.88	113	0.003
1158	2.48	1158	0.69	1158	0.59	1.89	113	0.003
1159	2.47	1159	0.69	1159	0.59	1.88	113	0.003
1160	2.47	1160	0.69	1160	0.59	1.88	113	0.003

1161	2.46	1161	0.68	1161	0.59	1.87	113	0.003
1162	2.44	1162	0.68	1162	0.59	1.85	112	0.003
1163	2.44	1163	0.68	1163	0.59	1.85	111	0.003
1164	2.43	1164	0.68	1164	0.59	1.84	111	0.003
1165	2.39	1165	0.67	1165	0.59	1.80	109	0.003
1166	2.38	1166	0.66	1166	0.59	1.79	108	0.002
1167	2.35	1167	0.65	1167	0.59	1.76	107	0.002
1168	2.31	1168	0.64	1168	0.59	1.72	105	0.002
1169	2.30	1169	0.64	1169	0.59	1.71	103	0.002
1170	2.25	1170	0.63	1170	0.59	1.66	101	0.002
1171	2.22	1171	0.62	1171	0.59	1.63	99	0.002
1172	2.17	1172	0.60	1172	0.59	1.58	97	0.002
1173	2.14	1173	0.59	1173	0.59	1.55	94	0.002
1174	2.09	1174	0.58	1174	0.59	1.51	92	0.002
1175	2.04	1175	0.57	1175	0.59	1.47	89	0.002
1176	1.96	1176	0.54	1176	0.59	1.42	87	0.002
1177	1.91	1177	0.53	1177	0.59	1.38	84	0.002
1178	1.85	1178	0.51	1178	0.59	1.34	82	0.002
1179	1.67	1179	0.46	1179	0.59	1.21	77	0.002
1180	1.51	1180	0.42	1180	0.59	1.09	69	0.002
1181	1.33	1181	0.37	1181	0.59	0.96	62	0.001
1182	1.16	1182	0.32	1182	0.59	0.84	54	0.001
1183	1.00	1183	0.27	1183	0.59	0.73	47	0.001
1184	0.93	1184	0.25	1184	0.59	0.68	42	0.001
1185	0.88	1185	0.24	1185	0.59	0.64	40	0.001
1186	0.84	1186	0.23	1186	0.59	0.61	38	0.001
1187	0.82	1187	0.22	1187	0.59	0.60	36	0.001
1188	0.79	1188	0.21	1188	0.59	0.58	35	0.001
1189	0.77	1189	0.21	1189	0.59	0.56	34	0.001
1190	0.74	1190	0.20	1190	0.59	0.54	33	0.001
1191	0.72	1191	0.20	1191	0.59	0.52	32	0.001
1192	0.71	1192	0.19	1192	0.59	0.52	31	0.001
1193	0.67	1193	0.18	1193	0.59	0.49	30	0.001
1194	0.67	1194	0.18	1194	0.59	0.49	29	0.001
1195	0.67	1195	0.18	1195	0.59	0.49	29	0.001
1196	0.66	1196	0.18	1196	0.59	0.48	29	0.001
1197	0.64	1197	0.17	1197	0.59	0.47	29	0.001
1198	0.63	1198	0.17	1198	0.59	0.46	28	0.001
1199	0.61	1199	0.16	1199	0.59	0.45	27	0.001
1200	0.61	1200	0.16	1200	0.59	0.45	27	0.001
1201	0.59	1201	0.16	1201	0.59	0.43	26	0.001
1202	0.59	1202	0.16	1202	0.59	0.43	26	0.001
1203	0.58	1203	0.15		-	-	13	0.000
1204	0.58	1204	0.15		-	-	-	-
1205	0.56	1205	0.15		-	-	-	-
1206	0.56	1206	0.15		-	-	-	-
1207	0.55	1207	0.15		-	-	-	-
1208	0.55	1208	0.15		-	-	-	-
1209	0.55	1209	0.15		-	-	-	-
1210	0.53	1210	0.14		-	-	-	-
1211	0.53	1211	0.14		-	-	-	-
1212	0.53	1212	0.14		-	-	-	-
1213	0.50	1213	0.13		-	-	-	-
1214	0.50	1214	0.13		-	-	-	-

1215	0.50	1215	0.13	-	-	-	-
1216	0.50	1216	0.13	-	-	-	-
1217	0.48	1217	0.13	-	-	-	-
1218	0.48	1218	0.13	-	-	-	-
1219	0.48	1219	0.13	-	-	-	-
1220	0.48	1220	0.13	-	-	-	-
1221	0.48	1221	0.13	-	-	-	-
1222	0.47	1222	0.12	-	-	-	-
1223	0.47	1223	0.12	-	-	-	-
1224	0.45	1224	0.12	-	-	-	-
1225	0.45	1225	0.12	-	-	-	-
1226	0.45	1226	0.12	-	-	-	-
1227	0.45	1227	0.12	-	-	-	-
1228	0.43	1228	0.11	-	-	-	-
1229	0.43	1229	0.11	-	-	-	-
1230	0.43	1230	0.11	-	-	-	-
1231	0.43	1231	0.11	-	-	-	-
1232	0.43	1232	0.11	-	-	-	-
1233	0.43	1233	0.11	-	-	-	-
1234	0.42	1234	0.11	-	-	-	-
1235	0.42	1235	0.11	-	-	-	-
1236	0.42	1236	0.11	-	-	-	-
1237	0.42	1237	0.11	-	-	-	-
1238	0.40	1238	0.10	-	-	-	-
1239	0.40	1239	0.10	-	-	-	-
1240	0.40	1240	0.10	-	-	-	-
1241	0.40	1241	0.10	-	-	-	-
1242	0.40	1242	0.10	-	-	-	-
1243	0.40	1243	0.10	-	-	-	-
1244	0.40	1244	0.10	-	-	-	-
1245	0.40	1245	0.10	-	-	-	-
1246	0.40	1246	0.10	-	-	-	-
1247	0.39	1247	0.10	-	-	-	-
1248	0.39	1248	0.10	-	-	-	-
1249	0.39	1249	0.10	-	-	-	-
1250	0.39	1250	0.10	-	-	-	-
1251	0.37	1251	0.10	-	-	-	-
1252	0.39	1252	0.10	-	-	-	-
1253	0.39	1253	0.10	-	-	-	-
1254	0.37	1254	0.10	-	-	-	-
1255	0.37	1255	0.10	-	-	-	-
1256	0.37	1256	0.10	-	-	-	-
1257	0.37	1257	0.10	-	-	-	-
1258	0.37	1258	0.10	-	-	-	-
1259	0.37	1259	0.10	-	-	-	-
1260	0.37	1260	0.10	-	-	-	-
1261	0.35	1261	0.09	-	-	-	-
1262	0.35	1262	0.09	-	-	-	-
1263	0.35	1263	0.09	-	-	-	-
1264	0.35	1264	0.09	-	-	-	-
1265	0.35	1265	0.09	-	-	-	-
1266	0.35	1266	0.09	-	-	-	-
1267	0.35	1267	0.09	-	-	-	-
1268	0.35	1268	0.09	-	-	-	-

1269	0.35	1269	0.09	-	-	-	-
1270	0.35	1270	0.09	-	-	-	-
1271	0.34	1271	0.09	-	-	-	-
1272	0.34	1272	0.09	-	-	-	-
1273	0.35	1273	0.09	-	-	-	-
1274	0.34	1274	0.09	-	-	-	-
1275	0.34	1275	0.09	-	-	-	-
1276	0.34	1276	0.09	-	-	-	-
1277	0.34	1277	0.09	-	-	-	-
1278	0.34	1278	0.09	-	-	-	-
1279	0.34	1279	0.09	-	-	-	-
1280	0.32	1280	0.08	-	-	-	-
1281	0.34	1281	0.09	-	-	-	-
1282	0.32	1282	0.08	-	-	-	-
1283	0.32	1283	0.08	-	-	-	-
1284	0.34	1284	0.09	-	-	-	-
1285	0.32	1285	0.08	-	-	-	-
1286	0.32	1286	0.08	-	-	-	-
1287	0.32	1287	0.08	-	-	-	-
1288	0.32	1288	0.08	-	-	-	-
1289	0.32	1289	0.08	-	-	-	-
1290	0.32	1290	0.08	-	-	-	-
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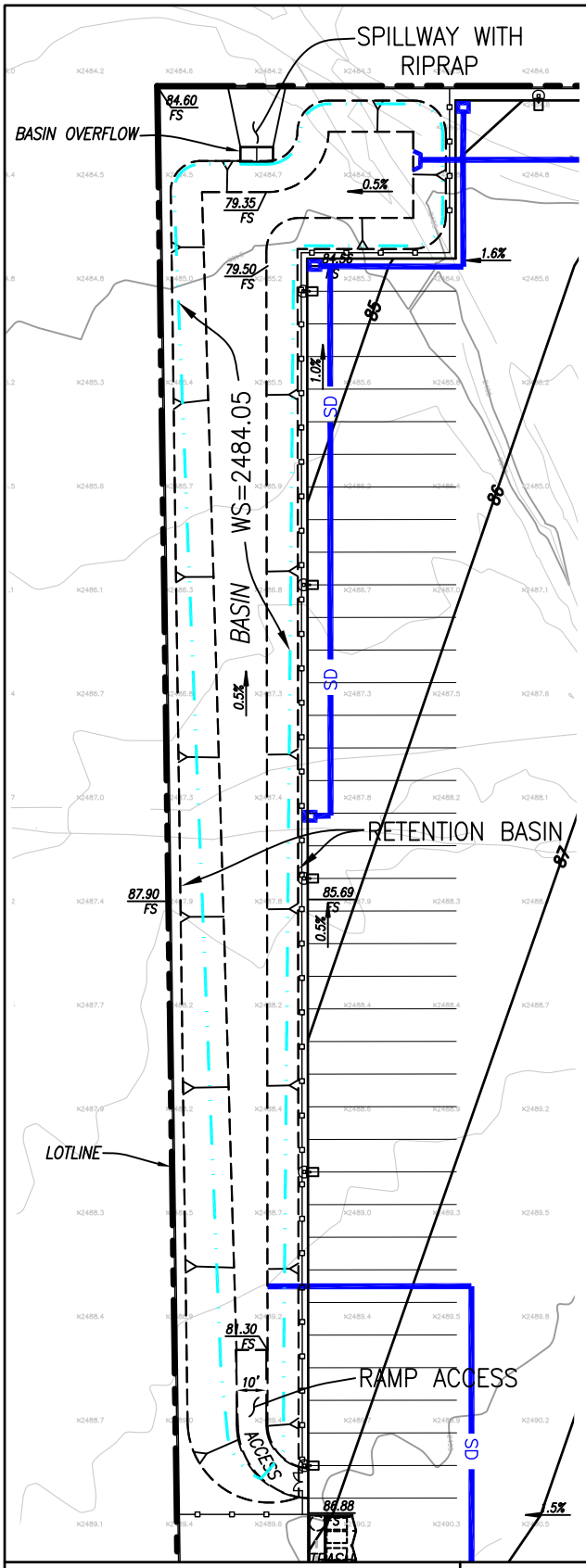
1298	0.31	1298	0.08	-	-	-	-
1299	0.31	1299	0.08	-	-	-	-
1300	0.31	1300	0.08	-	-	-	-
1310	0.31	1310	0.08	-	-	-	-
1320	0.27	1320	0.07	-	-	-	-
1330	0.27	1330	0.07	-	-	-	-
1340	0.26	1340	0.06	-	-	-	-
1350	0.27	1350	0.07	-	-	-	-
1360	0.26	1360	0.06	-	-	-	-
1370	0.26	1370	0.06	-	-	-	-
1380	0.24	1380	0.06	-	-	-	-
1390	0.24	1390	0.06	-	-	-	-
1400	0.24	1400	0.06	-	-	-	-
1420	0.22	1420	0.06	-	-	-	-
1440	0.22	1440	0.05	-	-	-	-
1460	0.07	1460	0.01	-	-	-	-
1500	-	1500	-	-	-	-	-
					Totals:	**21,442**	**0.492**



RETENTION (Private) Basin Calculations

BASIN DEPTH VS CAPACITY

Elevation	Area (ft^2)	Volume (ft^3)	Capacity (ft^3)
2479.35	-		-
2481.3	9,512	9,274	9,274
2484.6	16,740	43,316	**52,590**

BASIN CAPACITY PROVIDED

PONDING DEPTH:

Elevation	Volume
2481.3	9274.00
X	45388.00
2484.6	52590.00
X=	**2484.05**

REQ'D Q25 VOLUME

$$\frac{9274 - 45388}{9274 - 52590} = \frac{2481.3 - X}{2481.3 - 2484.6}$$

Solving for X, WSE for RETENTION:

X = 2484.05

Ponding Depth, d = 2484.05 – 2479.35

d = 4.70 ft

NORTH

PLAN

SCALE: 1" = 60'

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd., #100 Van Nuys, CA 91411
Phone: (818) 787-8550; Fax: (818) 901-7451
www.sikand.com; E-mail: info@sikand.com

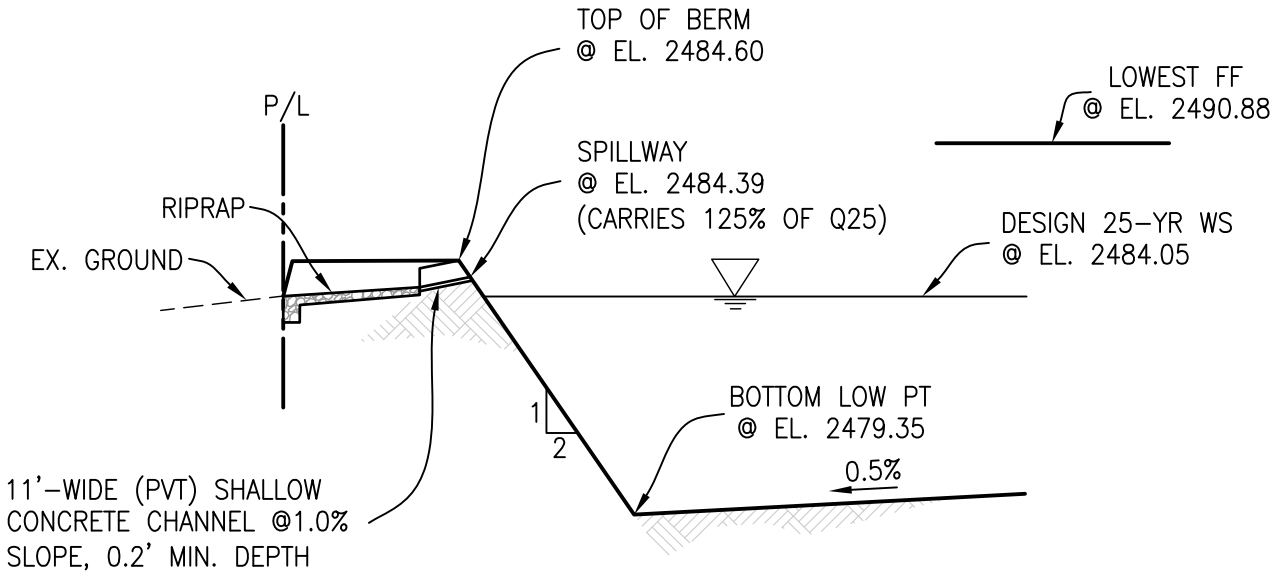
BY:	E.R.
W.O. NO.:	
DATE:	10/07/22
SCALE:	

CLIENT: **COVINGTON DEV'T PARTNERS, LLC**
3 CORPORATE PLAZA, SUITE 230
NEWPORT BEACH, CA 92660

PROJECT:
L4 WAREHOUSE INDUSTRIAL PARK
City of Lancaster, Los Angeles County

Basin Section:

NTS



INFILTRATION CALCULATION:

VOLUME REQUIRED = 45,388 CU-FT
BASIN BOTTOM AREA = 7,400 SQ-FT
INFILTRATION RATE = 5.80 IN/HR

AVE. RETENTION DEPTH = 45,388 / 7,400 = 6.13'

DRAWDOWN PERIOD = DEPTH/RATE
= 6.13 FT (12IN/FT) /5.8 IN/HR
= 12.69 HOURS

= 0.53 DAY < 7 DAYS, THEREFORE, OKAY!

SIKAND
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www.sikand.com; E-mail: info@sikand.com

BY:	E.R.
W.O. NO.:	
DATE:	10/07/22
SCALE:	NTS

CLIENT: **COVINGTON DEV'T PARTNERS, LLC**
3 CORPORATE PLAZA, SUITE 230
NEWPORT BEACH, CA 92660

PROJECT:
LANCASTER FORBES INDUSTRIAL PARK
City of Lancaster, Los Angeles County

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of two (2) infiltration test borings advanced to a depth of 12± feet below the existing site grades. The borings were logged during drilling by a member of our staff and were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers. The approximate locations of the infiltration test borings (identified as I-1 to I-2) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Native alluvium was encountered at the ground surface at both of the infiltration test locations, extending to the maximum explored depth of 12± feet below existing site grades. The alluvium generally consists of loose to medium dense fine to medium sand, with traces of silt, little coarse sand, silty fine sands, and fine to coarse sands with traces of silt. The Boring Logs, which illustrate the conditions encountered at each test location are included within this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration systems that will be used at the subject site. The infiltration testing was performed in general accordance with Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration (GS200.1) published by Los Angeles County Public Works – Geotechnical Engineering and Materials Division, dated June 30, 2021.

Pre-soaking

The infiltration test boring was pre-soaked for at least 1 hour to ensure the sand around the annulus of the perforated pipe was fully saturated. The pre-soaking procedure consisted of filling each test boring with clean potable water to an elevation of at least 12± inches above the bottom of each test boring. In accordance with the Los Angeles County guidelines, since the water in the infiltration test boring did not completely infiltrate within a 30-minute time period after filling each boring, a falling head test was the appropriate test method.

Infiltration Testing Procedure

After the completion of the pre-soaking process, SCG performed the infiltration testing. A sufficient amount of water was added to the test borings so that the water level was approximately 3 to 4± feet higher than the bottom of the borings and less than or equal to the water level used during the pre-soaking process. Readings were taken at 11-minute intervals for the infiltration tests. A stabilized rate of drop, where the highest and lowest readings from three consecutive readings are within 10 percent of each other, was obtained for each of the test borings. These water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates for the tests are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used for design. These rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-1	12	Gray Brown fine to medium Sand, trace Silt, little coarse Sand	5.8
I-2	12	Gray Brown fine to coarse Sand, trace Silt	5.8

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the base of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 and C-2 of this report.

Design Recommendations

Two (2) infiltration tests were performed at the eastern region of the subject site. The measured infiltration rate at the infiltration test locations were 17.4 and 17.5 inches per hour for both. The Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, GS200.1 prepared by the County of Los Angeles, Department of Public Works, Geotechnical and Materials Division (GMED) on June 30, 2021 dictate that a reduction factor be utilized in the design infiltration rate. The following reduction factors are considered in the design infiltration rate (DIR):

Reduction Factors	
Small Diameter Boring	$RF_t = 1$
Site Variability, number of tests, and thoroughness of subsurface investigation	$RF_v = 1$
Long-term siltation plugging and maintenance	$RF_s = 1$
Total Reduction Factor, $RF = RF_t + RF_v + RF_s$	RF = 3
Design Infiltration Rate (DIR) = Measured Percolation Rate/RF	DIR = See Below

Based on the results of the infiltration testing, the design infiltration rate for the proposed infiltration system should be 5.8 inches per hour.

The design of the proposed storm water infiltration system should be performed by the project civil engineer, in accordance with the City of Lancaster and/or County of Los Angeles guidelines. However, it is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rate recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rate is based on infiltration testing at two (2) discrete locations and the overall infiltration rate of the storm water infiltration system could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein was determined in accordance with the Los Angeles County guidelines and are considered valid only for the time and place of the actual test. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration system can significantly reduce the infiltration ability of the chambers. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

SECTION 6

NUISANCE WATER CALCULATIONS

HydroCalc 0.75” Q Result
Product Brochure

Peak Flow Hydrologic Analysis

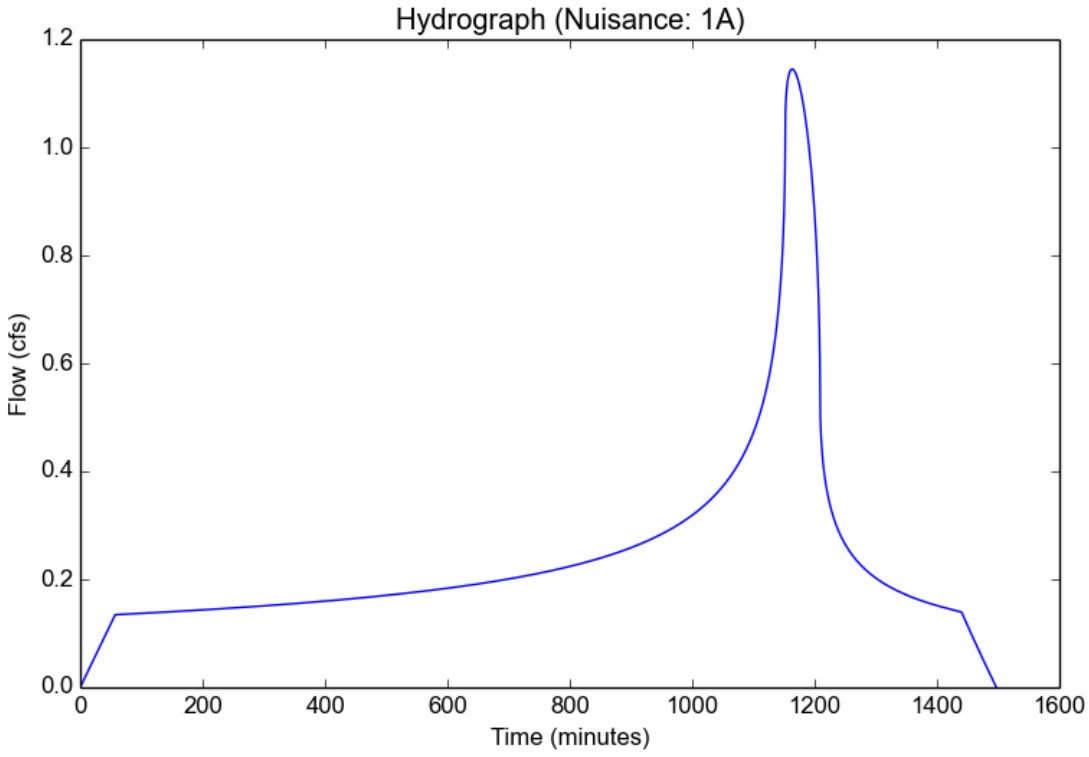
File location: D:/SikandEngineering&Associates (SEA)/22005_LANCASTER Ave L4 Warehouse/HYDRO_HYDRA/TC/PR_ONSITE Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

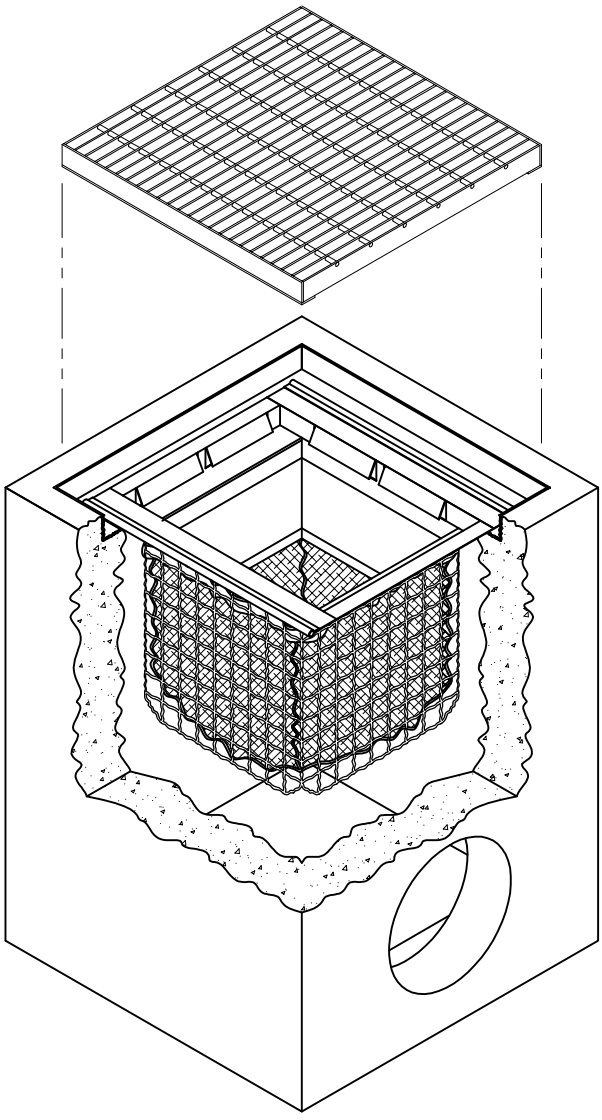
Project Name	Nuisance
Subarea ID	1A
Area (ac)	9.7
Flow Path Length (ft)	1222.0
Flow Path Slope (vft/hft)	0.007
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.91
Soil Type	124
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

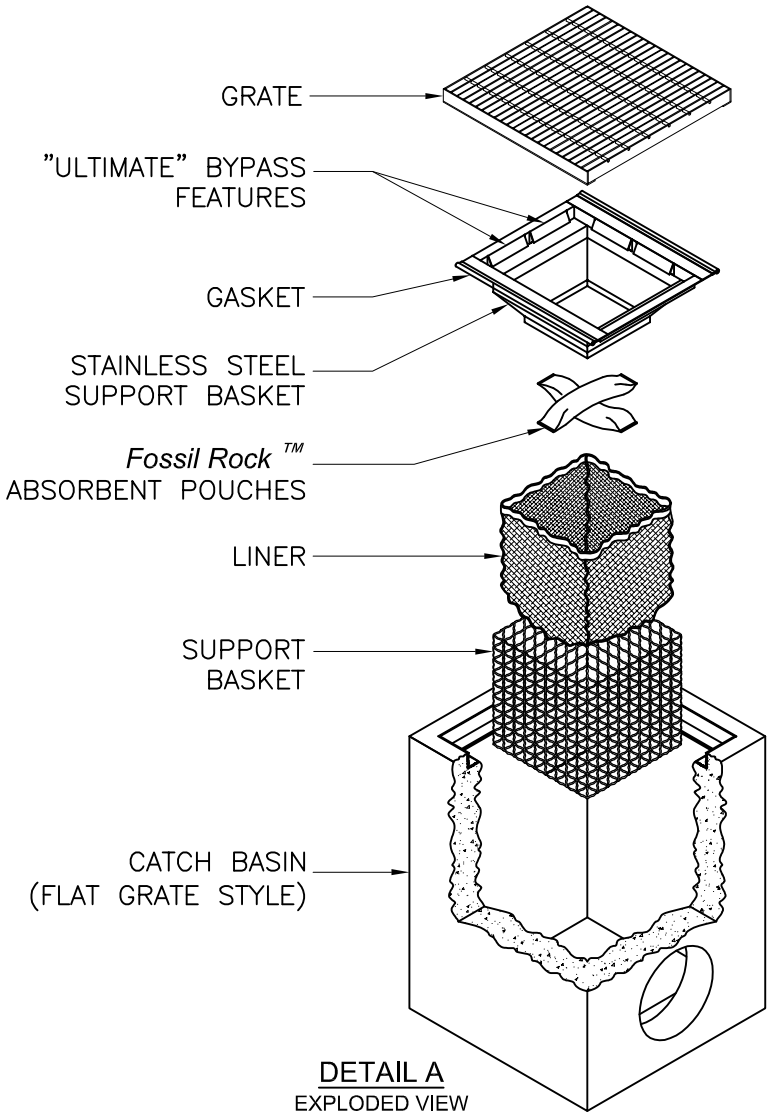
Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1426
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.828
Time of Concentration (min)	57.0
Clear Peak Flow Rate (cfs)	1.145
Burned Peak Flow Rate (cfs)	1.145
24-Hr Clear Runoff Volume (ac-ft)	0.4978
24-Hr Clear Runoff Volume (cu-ft)	21686.2349



FGP-0001





DETAIL A
EXPLODED VIEW

FloGard® FILTER
-INSTALLED INTO CATCH BASIN-

U.S. PATENT # 6,00,023 & 6,877,029

NOTES:

1. Filter insert shall have a high flow bypass feature.
2. Filter support frame shall be constructed from stainless steel Type 304.
3. Filter medium shall be *Fossil Rock* ™, installed and maintained in accordance with manufacturer specifications.
4. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.

Inlet Filtration

FloGard®

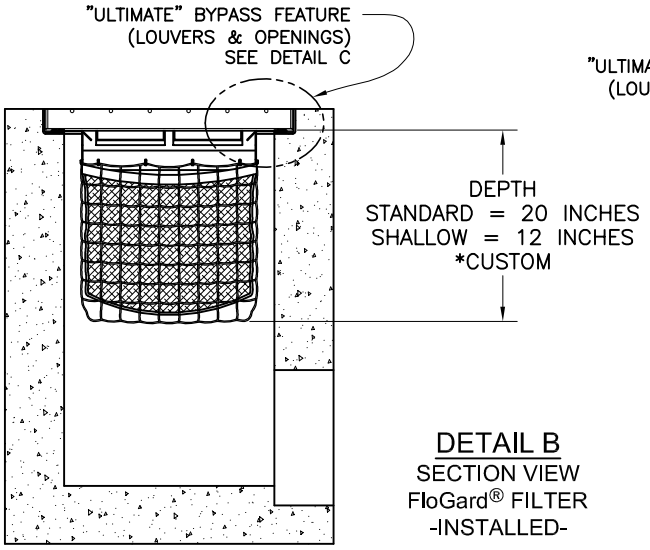
Catch Basin Insert Filter

Grated Inlet Style

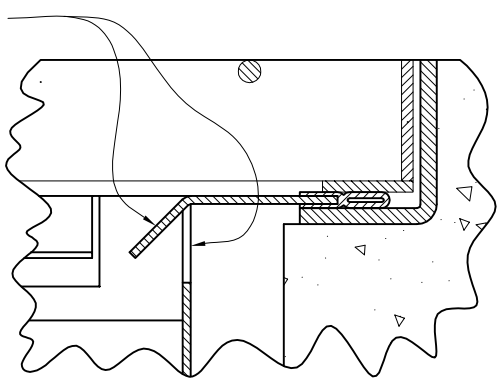
Oldcastle® Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0001	G	ECO-0142 JPR 7/13/16	JPR 11/3/06	SHEET 1 OF 2

U.S. PATENT # 6,00,023 & 6,877,029



DETAIL B
SECTION VIEW
FloGard® FILTER
-INSTALLED-



DETAIL C
"ULTIMATE"
BYPASS FEATURES

* MANY OTHER STANDARD & CUSTOM SIZES & DEPTHS AVAILABLE UPON REQUEST.

SPECIFIER CHART

MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data In these columes Is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-	
	INLET ID Inside Dimension (inch x inch)	GRATE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	.4
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18F8	.45	.4
FGP-1824F	16 X 22	18 X 24	5.0	1.5	1.2	FGP-1824F8	.85	.7
FGP-1836F	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836F8	1.3	.9
FGP-2024F	18 X 22	20 X 24	5.9	1.2	1.0	FGP-2024F8	.7	.55
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85
FGP-2430F	24 X 30	26 X 30	7.0	2.8	1.8	FGP-2430F8	1.6	1.05
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15
FGP-2448F	24 X 48	26 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35
FGP-28F	28 X 28	32 X 32	6.3	2.2	1.5	FGP-28F8	1.25	.85
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30F8	2.05	1.15
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36F8	2.65	1.35
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25
FGP-SD24F	24 X 24	28 X 28	6.1	2.2	1.5	FGP-SD24F8	1.25	.85

Inlet Filtration

FloGard®

Catch Basin Insert Filter

Grated Inlet Style

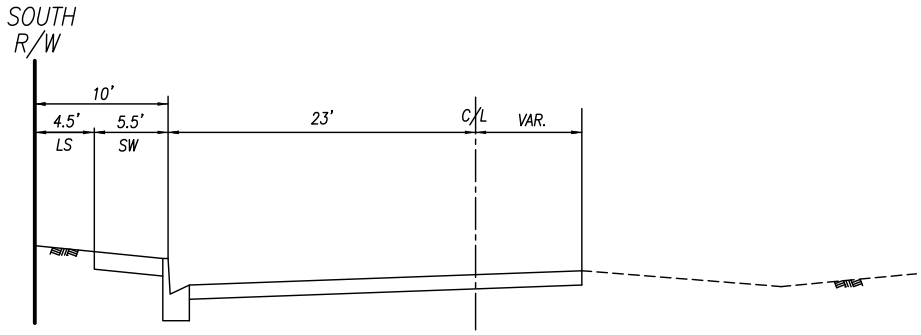
Oldcastle® Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0001	G	ECO-0142 JPR 7/13/16	JPR 11/3/06	SHEET 2 OF 2

SECTION 7

HYDRAULIC CALCULATIONS

Street Sections
10-yr Dry Lane
25-yr Spillway to Outlet
50-yr Driveway WS vs Proposed Finish Floor
Grating Inlet Capacity Calculation
Pipe Hydraulics

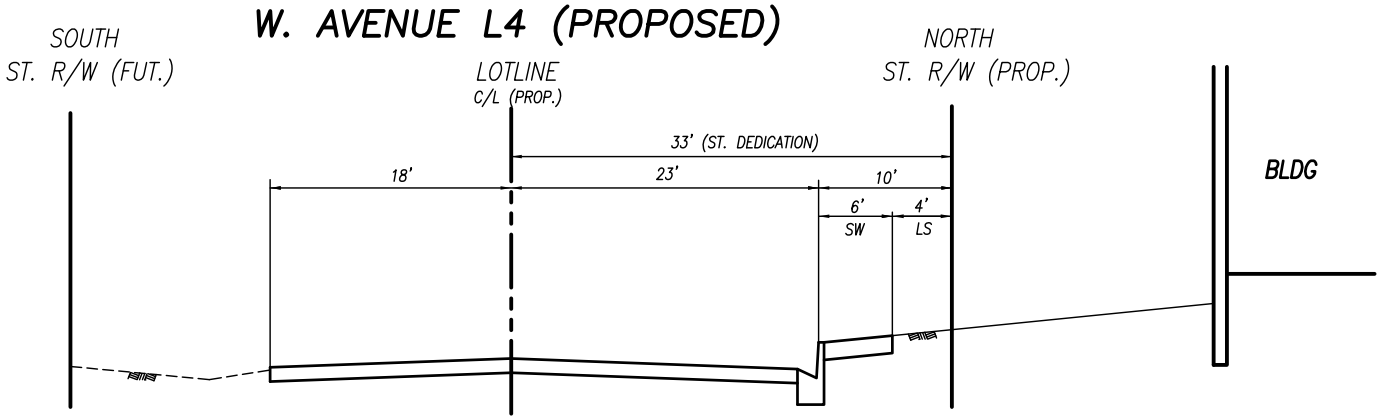


SECTION A–A

NO SCALE

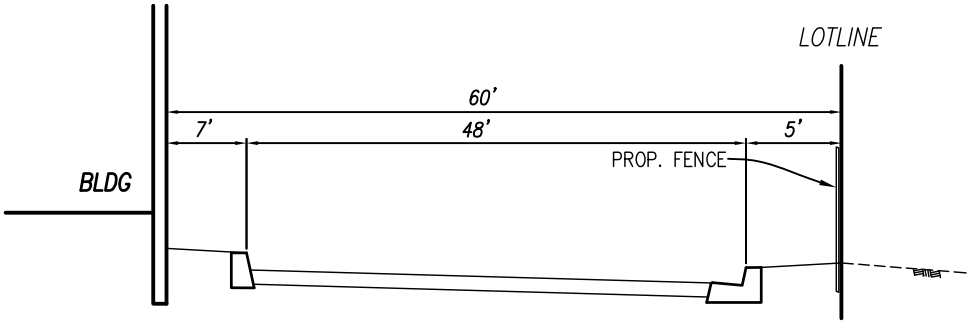
W. AVENUE L4 (EXISTING)

W. AVENUE L4 (PROPOSED)



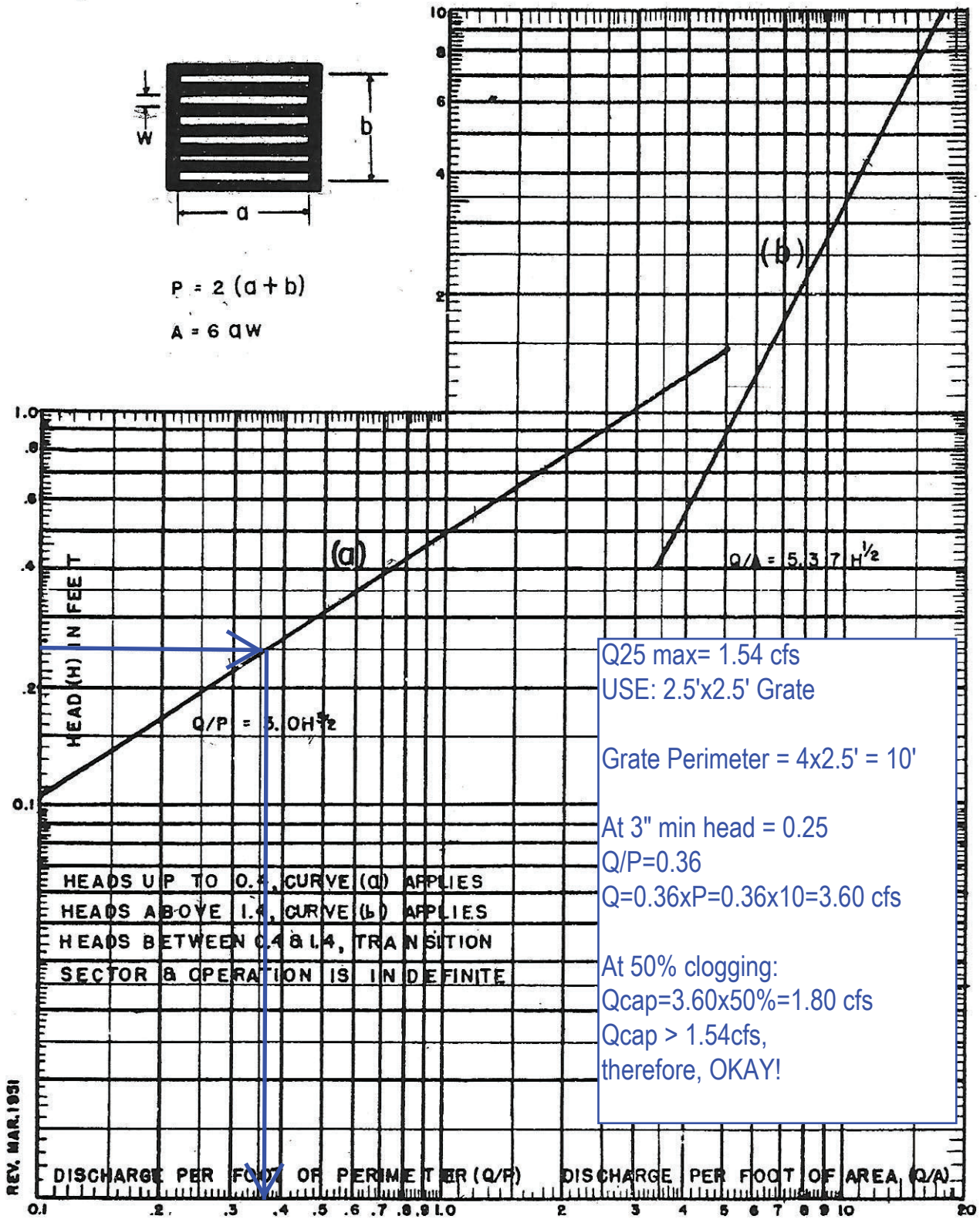
SECTION B–B

NO SCALE



PRIVATE DRIVE
SECTION C–C

NOT TO SCALE



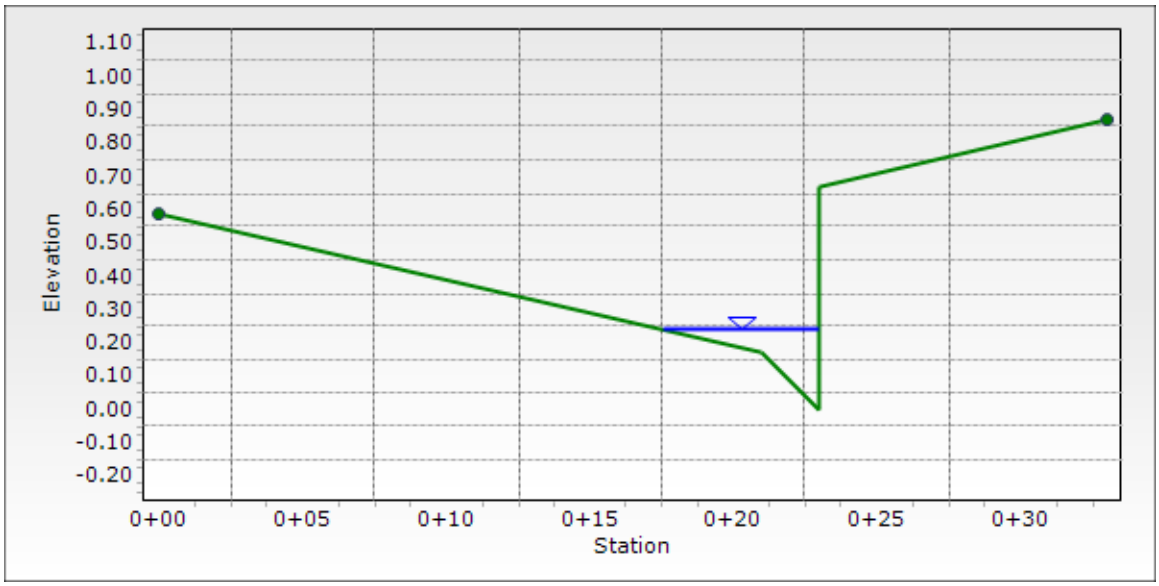
INLET CAPACITY OF GRATE AT SAG

Plate 2.6-0658

Cross Section for L4_10yr Dry Lane

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Normal Depth	2.9 in
Discharge	0.47 cfs



Worksheet for L4_10yr Dry Lane

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.004 ft/ft
Discharge	0.47 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.59
0+21.00	0.17
0+23.00	0.00
0+23.00	0.67
0+33.00	0.87

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.59)	(0+33.00, 0.87)	0.015

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	2.9 in
Roughness Coefficient	0.015
Elevation	0.24 ft
Elevation Range	0.000 to 0.870 ft
Flow Area	0.4 ft²
Wetted Perimeter	5.649 ft
Hydraulic Radius	0.9 in
Top Width	5.40 ft
Normal Depth	2.9 in
Critical Depth	2.6 in
Critical Slope	0.008 ft/ft
Velocity	1.11 ft/s
Velocity Head	0.02 ft
Specific Energy	0.26 ft
Froude Number	0.703
Flow Type	Subcritical

Worksheet for L4_10yr Dry Lane

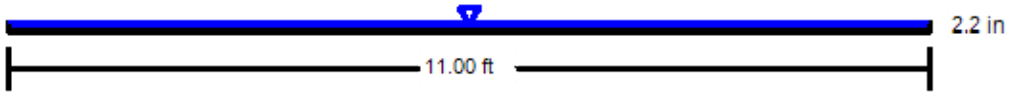
GVF Input Data	
Downstream Depth	0.0 in
Length	0.000 ft
Number Of Steps	0

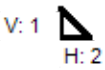
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.9 in
Critical Depth	2.6 in
Channel Slope	0.004 ft/ft
Critical Slope	0.008 ft/ft

Cross Section for 125%Q25 OVERFLOW_Parkway Drain

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Normal Depth	2.2 in
Bottom Width	11.00 ft
Discharge	7.33 cfs





Worksheet for 125%Q25 OVERFLOW_Parkway Drain

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.010	ft/ft
Bottom Width	11.00	ft
Discharge	7.33	cfs

Results		
Normal Depth	2.2	in
Flow Area	2.0	ft²
Wetted Perimeter	11.368	ft
Hydraulic Radius	2.1	in
Top Width	11.00	ft
Critical Depth	2.9	in
Critical Slope	0.004	ft/ft
Velocity	3.62	ft/s
Velocity Head	0.20	ft
Specific Energy	0.39	ft
Froude Number	1.487	
Flow Type	Supercritical	

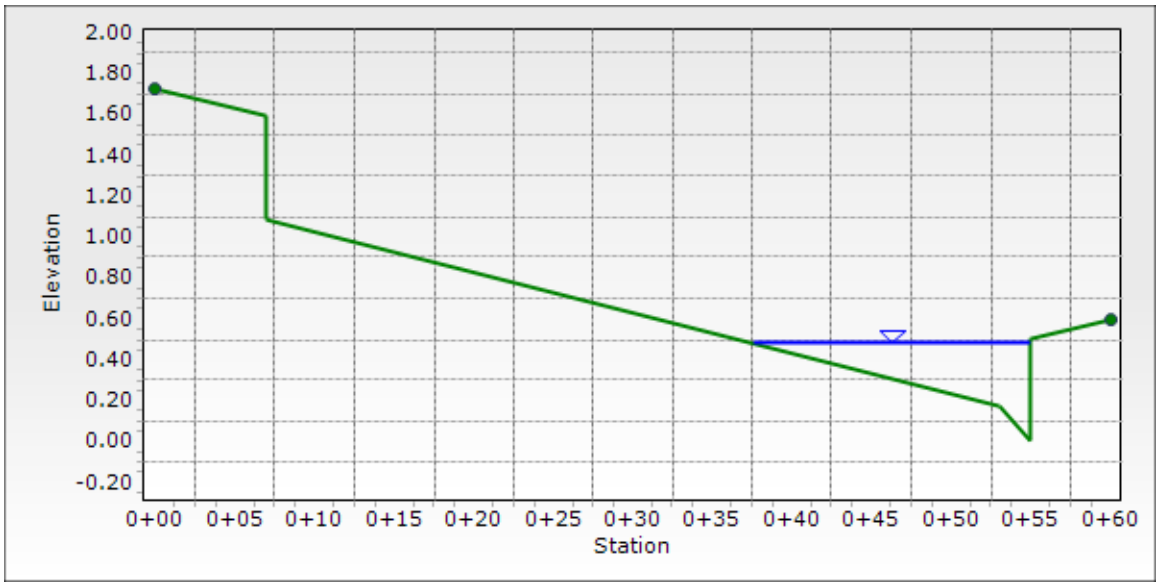
GVF Input Data		
Downstream Depth	0.0	in
Length	0.000	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.2	in
Critical Depth	2.9	in
Channel Slope	0.010	ft/ft
Critical Slope	0.004	ft/ft

Cross Section for Private Driveway_50yr to FF

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005 ft/ft
Normal Depth	5.7 in
Discharge	6.93 cfs



Worksheet for Private Driveway_50yr to FF

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005 ft/ft
Discharge	6.93 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1.73
0+07.00	1.59
0+07.00	1.09
0+53.00	0.17
0+55.00	0.00
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1.73)	(0+60.00, 0.60)	0.015

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	5.7 in
Roughness Coefficient	0.015
Elevation	0.48 ft
Elevation Range	0.000 to 1.730 ft
Flow Area	3.1 ft²
Wetted Perimeter	17.859 ft
Hydraulic Radius	2.1 in
Top Width	17.37 ft
Normal Depth	5.7 in
Critical Depth	5.6 in
Critical Slope	0.006 ft/ft
Velocity	2.20 ft/s
Velocity Head	0.08 ft
Specific Energy	0.55 ft

Worksheet for Private Driveway_50yr to FF

Results	
Froude Number	0.912
Flow Type	Subcritical

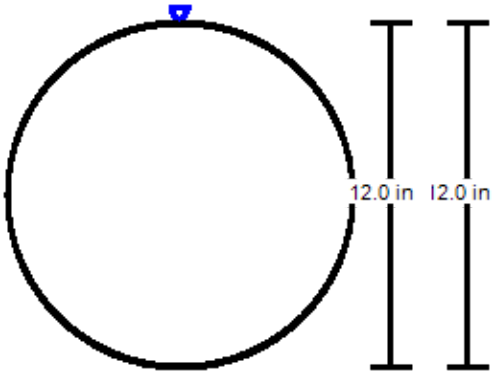
GVF Input Data	
Downstream Depth	0.0 in
Length	0.000 ft
Number Of Steps	0

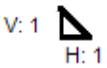
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.7 in
Critical Depth	5.6 in
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for 12"D Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	12.0 in
Diameter	12.0 in
Discharge	2.52 cfs





Worksheet for 12"D Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	12.0 in
Diameter	12.0 in
Discharge	2.52 cfs

Results	
Discharge	2.52 cfs
Normal Depth	12.0 in
Flow Area	0.8 ft²
Wetted Perimeter	3.142 ft
Hydraulic Radius	3.0 in
Top Width	0.00 ft
Critical Depth	8.2 in
Percent Full	100.0 %
Critical Slope	0.008 ft/ft
Velocity	3.21 ft/s
Velocity Head	0.16 ft
Specific Energy	1.16 ft
Froude Number	(N/A)
Maximum Discharge	2.71 cfs
Discharge Full	2.52 cfs
Slope Full	0.005 ft/ft
Flow Type	Undefined

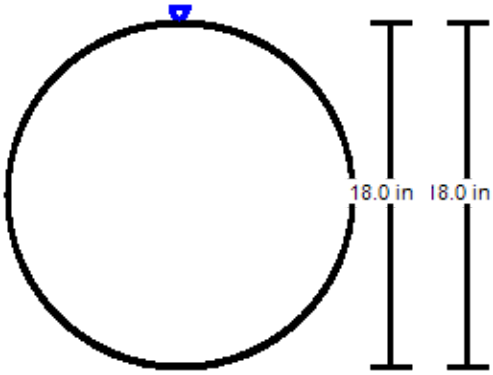
GVF Input Data	
Downstream Depth	0.0 in
Length	0.000 ft
Number Of Steps	0

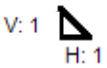
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	12.0 in
Critical Depth	8.2 in
Channel Slope	0.005 ft/ft
Critical Slope	0.008 ft/ft

Cross Section for 18"D Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	7.43 cfs





Worksheet for 18"D Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data	
Roughness Coefficient	0.013
Channel Slope	0.005 ft/ft
Normal Depth	18.0 in
Diameter	18.0 in
Discharge	7.43 cfs

Results	
Discharge	7.43 cfs
Normal Depth	18.0 in
Flow Area	1.8 ft²
Wetted Perimeter	4.712 ft
Hydraulic Radius	4.5 in
Top Width	0.00 ft
Critical Depth	12.7 in
Percent Full	100.0 %
Critical Slope	0.007 ft/ft
Velocity	4.20 ft/s
Velocity Head	0.27 ft
Specific Energy	1.77 ft
Froude Number	(N/A)
Maximum Discharge	7.99 cfs
Discharge Full	7.43 cfs
Slope Full	0.005 ft/ft
Flow Type	Undefined

GVF Input Data	
Downstream Depth	0.0 in
Length	0.000 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	0.0 %
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	18.0 in
Critical Depth	12.7 in
Channel Slope	0.005 ft/ft
Critical Slope	0.007 ft/ft