



Preliminary Drainage Analysis & Storm Water Management Calculations

for:

**17705 D Hale Avenue
Berry Court
APN 764-019-020, Morgan Hill, CA**

**6/22/2020
Job# 220052**

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17705 D Hale Av. MH, CA

Job#: 220052

Date: 6/22/2020

Drainage Synopsis

Project Description:

This project consist of the development of 0.29 acres into a commercial lot. The project is located at Hale Avenue, in Morgan Hill, California (APN 764-019-020).The existing site is undeveloped part of the Older Tract No. 5501 filed on 344 M 37 in Santa Clara County. The site is open field that drains as sheet flow toward Berry Court located west of the property.The project is located within 100 year AE zone flood plain as shown on FEMA map. The projected elevation of the flood plain is determined to be at 351.85. the finish floor is proposed to be at 352.85 providing one foot above the flood plain. The project is located within Region 3 Central Coast Monterey Bay watershed area. The initial 95 percentile of Low Impact Development (LID) runoff from this site is captured into a bio-swale planter area and after initial treatment via infiltration through the soil media is captured into a 24" perforated pipe for underground storage. Some of the excess runoff perc into the ground and the some discharge as a bubble up from a proposed inlet that is connected to under ground storage 24" perforated pipe. The discharge from the bubble up flows via existing valley gutter into an existing storm drain inlet north of the property. Due to low ground percolation at the site the project provide storage volume of 1,427 cf which is 20% over the LID required. The project area for being under 15,000 sf, it is exempt from the hydro modification requirement, however it meets the city pre-development discharge requirements for up to 100 year storm event.

Post Construction Storm Water Control Measure Calculations

Attached to this report as Section 3 are the preliminary calculations prepared to document compliance with the Central Coast Regional Water Quality Control Board's post construction requirements. Pursuant to these requirements, the drainage management area (DMA) for the project is defined and the hydraulic characteristics of the post development site have been documented to determine the required retention volumes.

Hydrology & Routing - Hydrograph Method

Attached to this report are the preliminary calculations prepared to support the project design. The tributary areas, Pre & post development runoff characteristics where calculated for input into the SCS routing software. 24 hour rainfall depth was calculated according to the NOAA 14 point precipitation estimates and the SCVWD December 1955 rainfall event was used for input into the SCS routing software. The routing includes exfiltration at an estimated average value of 0.2 in/hr. according to NRCS web soil report as attached. A summary of the SCS output indicates that the peak flow for each of the return events (10 year through 100 year) analyzed is less than the pre-development peak flow due to proposed retention ponds/ bio-swale and the underground storage pipe. The pre & post development SCS software output is attached.

Summary

This preliminary drainage report and the calculations shown herein substantiate this project's compliance with the Central Coast Regional Water Quality Control Board's post construction requirements LID requirements and the City of Hollister storm water drainage standards and the Storm Water Management requirements as described above. The drainage impacts of the proposed project on this site are effectively mitigated by the incorporation of the project storm water control measures that retains, infiltrates and detains storm water runoff from the developed site.



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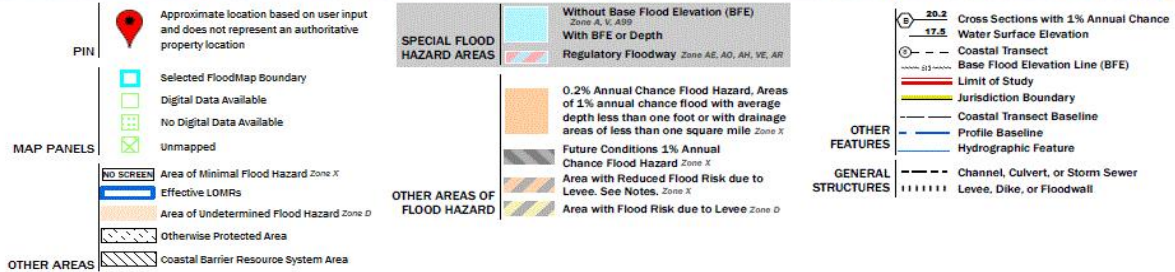
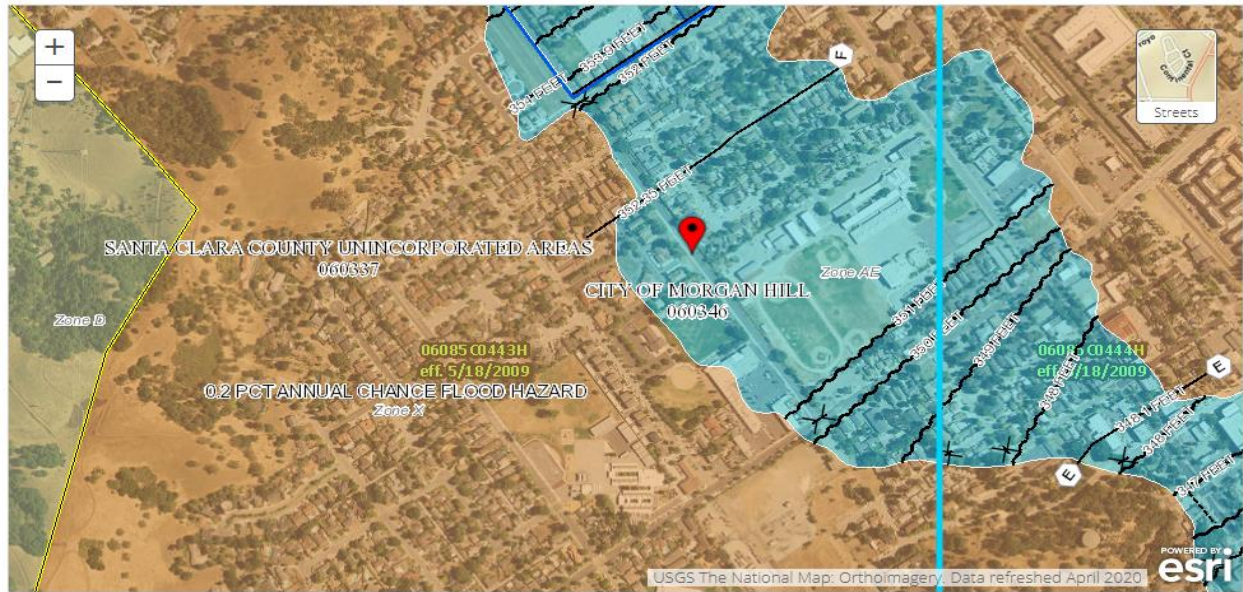
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FEMA Map: Flood Plain Elevation: 352.25 from the cross section "F" projected at the site.



Pervious & Impervious Surfaces		Proj. No. 220052		APN 764-19-20		
		Berry Court				
	Existing Condition (sq ft)	%	Proposed Condition (sq ft)	%	Difference (sq ft)	%
Site (acres):	Site (sq ft):		Site (sq ft):			
0.281	13,005	100.00%	13,005	100.00%	0	0.00%
Building Footprint(s)	0	0.00%	3,496	26.88%	3,496	26.88%
Parking	0	0.00%	4,587	35.27%	4,587	35.27%
Sidewalks, Patios, Paths, etc.	0	0.00%	1,190	9.15%	1,190	9.15%
Landscaping	0	0.00%	3,732	28.70%	3,732	28.70%
Undeveloped	13,005	100.00%	0	0.00%	-13,005	-100.00%
Permeable Pavement	0	0.00%	0	0.00%	0	0.00%
Total	13,005	100.00%	13,005	100.00%	0	0.00%
Impervious Surfaces	0	0.00%	9,273	71.30%	9,273	71.30%
Pervious Surfaces	13,005	100.00%	3,732	28.70%	-9,273	-71.30%
Total	13,005	100.00%	13,005	100.00%	0	0.00%



" APN 764-019-020" LID - BMP Sizing Calcs							6/19/2020
Proposed BMP No.	BMP Impervious Area with Adjusted C factor 0.59		95th Percentile (1.85" Rain) First Flush Volume to Treat (Cu. Ft.)	Proposed BMP Volume (Cu. Ft.)	Native Soil Infiltration Rate (In/Hr.)	BMP Loading Depth (Inches)	BMP Infiltration Duration (Hrs.) ≤ 72
	Public Hardscape (S.F.)	Private Hardscape (S.F.)					
1	0	13,005	1,183	1,427	0.12	30	250
Building Area: 3,496 sf		Landscape Area: 3,732 sf		Pavement Area: 4,587 sf		Sidewalk Area: 1,190 sf	
Total Area: 13,005 sf							

Underground 24" perforated pipe and drain rock = 120 ft X 3.14 sf pipe - (4 ft X 4 ft - 3.14 sf pipe) (0.4 void ratio) (120 ft) = 994 ft³

Soil Media: 57 ft X 2 ft X 4 ft X 0.42 = 192 ft³

Bio-swale Surface Pond: 57 ft X 4 ft X 0.5 ft + 46 side slope = 160 ft³ 2 Catch basin: 2.5 ft X 2.5 ft X 6 ft X 2 = 75 ft³ 3 inlets: 1 X 1 X 3 X 2 = 6 ft³

Total Volume of bio-swale: 994 cf + 192 cf + 160 cf + 81 cf = 1,427 cf

Summary for Subcatchment 1S: Pre-development

Runoff = 0.26 cfs @ 18.07 hrs, Volume= 0.165 af, Depth= 6.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
SCVWD 1956 Storm 100 Rainfall=6.87"

Area (sf)	CN	Description
13,005	98	Water Surface, HSG A
13,005		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, travel time

Summary for Subcatchment 2S: Post-Development

Runoff = 0.23 cfs @ 18.32 hrs, Volume= 0.145 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
SCVWD 1956 Storm 100 Rainfall=6.87"

Area (sf)	CN	Description
9,273	98	Paved parking, HSG D
3,732	74	>75% Grass cover, Good, HSG C
13,005	91	Weighted Average
3,732		28.70% Pervious Area
9,273		71.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					Direct Entry, time travel



Summary for Pond 3P: Retention Pond

Inflow Area = 0.299 ac, 71.30% Impervious, Inflow Depth = 5.81" for 100 event
 Inflow = 0.23 cfs @ 18.32 hrs, Volume= 0.145 af
 Outflow = 0.23 cfs @ 18.33 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.4 min
 Discarded = 0.01 cfs @ 18.33 hrs, Volume= 0.034 af
 Primary = 0.22 cfs @ 18.33 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Peak Elev= 349.26' @ 18.33 hrs Surf.Area= 0.028 ac Storage= 0.014 af

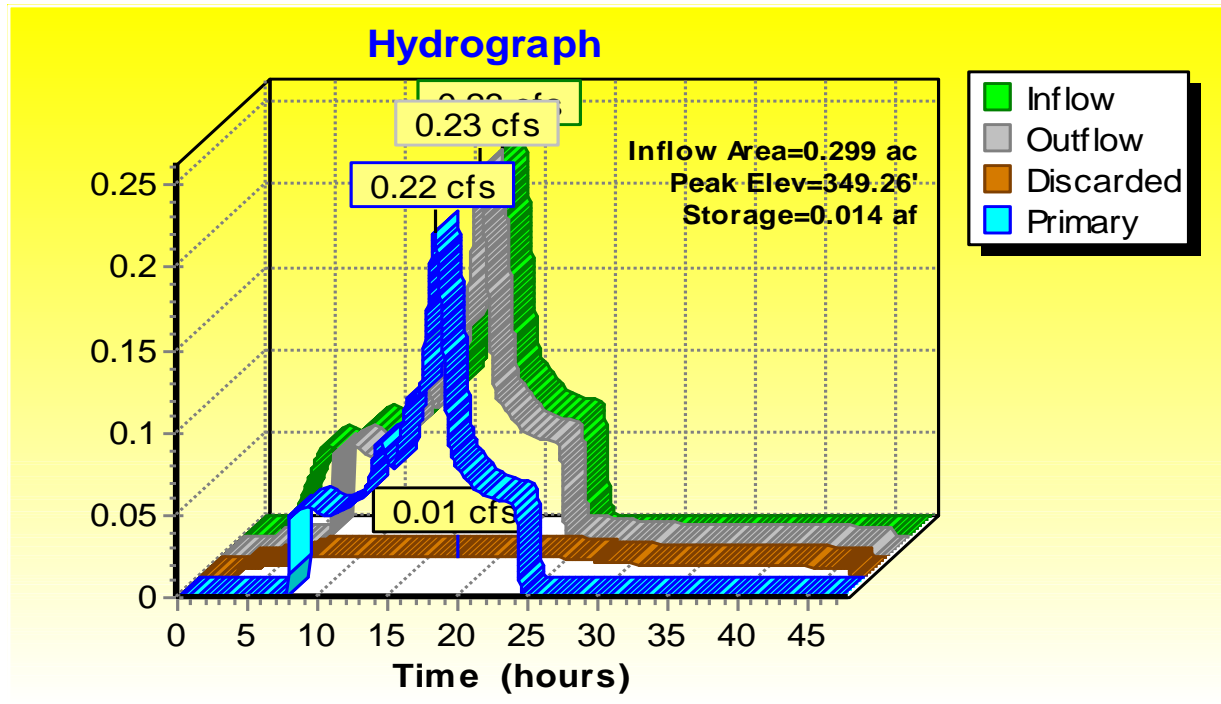
Plug-Flow detention time= 163.3 min calculated for 0.145 af (100% of inflow)
 Center-of-Mass det. time= 163.7 min (1,088.3 - 924.6)

Volume	Invert	Avail.Storage	Storage Description
#1	344.00'	0.000 af	8.00'W x 120.00'L x 4.00'H Drain Rock 0.088 af Overall - 0.009 af Embedded = 0.079 af x 0.4% Voids
#2	345.00'	0.009 af	24.0" Round CMP_Round 24" Inside #1 L= 120.0'
#3	348.00'	0.004 af	4.00'W x 57.00'L x 2.00'H Soil Media 0.010 af Overall x 42.0% Voids
#4	344.00'	0.003 af	2.50'W x 2.50'L x 6.00'H 30" by 30" Inlet x 3
#5	348.00'	0.000 af	1.00'W x 1.00'L x 2.00'H 12" by 12" inlet x 3
#6	348.50'	0.000 af	0.5" Round 6" SD pipe L= 76.0'
#7	349.50'	0.004 af	4.00'W x 57.00'L x 0.70'H Pond Surface
		0.020 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	349.20'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height
#2	Discarded	344.00'	0.200 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.01 cfs @ 18.33 hrs HW=349.26' (Free Discharge)
 ↑2=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.22 cfs @ 18.33 hrs HW=349.26' (Free Discharge)
 ↑1=Sharp-Crested Rectangular Weir (Weir Controls 0.22 cfs @ 0.84 fps)



Events for Subcatchment 1S: Pre-development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95 percentile	1.85	0.07	0.040	1.63
10	4.23	0.16	0.099	3.99
25	5.23	0.19	0.124	4.99
100	6.87	0.26	0.165	6.63



Events for Subcatchment 2S: Post-Development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95 percentile	1.85	0.05	0.026	1.03
10	4.23	0.14	0.081	3.24
25	5.23	0.18	0.105	4.21
100	6.87	0.23	0.145	5.81

Events for Pond 3P: Retention Pond

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
95 percentile	0.05	0.01	0.01	0.00	349.20	0.014
10	0.14	0.14	0.01	0.13	349.24	0.014
25	0.18	0.18	0.01	0.16	349.25	0.014
100	0.23	0.23	0.01	0.22	349.26	0.014



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Project Hydrologic Soils Group was determined from the NRCS Web Soil Survey



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

Custom Soil Resource Report for Eastern Santa Clara Area, California



June 21, 2020





Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrA	Cropley clay, 0 to 2 percent slopes, MLRA 14	0.2	100.0%
Totals for Area of Interest		0.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.



Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



Custom Soil Resource Report

Eastern Santa Clara Area, California

CrA—Cropley clay, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2tb9f
Elevation: 20 to 2,040 feet
Mean annual precipitation: 12 to 27 inches
Mean annual air temperature: 56 to 60 degrees F
Frost-free period: 275 to 360 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Cropley

Setting

Landform: Terraces, alluvial fans
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from calcareous shale

Typical profile

A1 - 0 to 13 inches: clay
Bss - 13 to 32 inches: clay
Bk - 32 to 36 inches: sandy clay loam
BCk2 - 36 to 52 inches: sandy clay loam
BCk2 - 52 to 79 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (1.0 to 3.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: CLAYEY (R014XD001CA)



Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Clear lake

Percent of map unit: 4 percent
Landform: Basin floors
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Salinas

Percent of map unit: 3 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Diablo

Percent of map unit: 3 percent
Landform: Low hills
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Concepcion

Percent of map unit: 3 percent
Landform: Marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sorrento

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No



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



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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.122 (0.104-0.144)	0.154 (0.131-0.182)	0.198 (0.168-0.235)	0.235 (0.198-0.282)	0.289 (0.233-0.361)	0.332 (0.262-0.425)	0.378 (0.289-0.498)	0.427 (0.316-0.583)	0.497 (0.351-0.713)	0.555 (0.376-0.828)
10-min	0.175 (0.149-0.207)	0.221 (0.188-0.261)	0.284 (0.241-0.337)	0.337 (0.284-0.405)	0.414 (0.335-0.517)	0.476 (0.375-0.610)	0.542 (0.415-0.714)	0.612 (0.453-0.835)	0.713 (0.503-1.02)	0.795 (0.539-1.19)
15-min	0.212 (0.181-0.250)	0.267 (0.228-0.316)	0.343 (0.292-0.408)	0.408 (0.343-0.490)	0.501 (0.405-0.625)	0.575 (0.454-0.737)	0.655 (0.501-0.864)	0.740 (0.548-1.01)	0.862 (0.608-1.24)	0.962 (0.651-1.44)
30-min	0.294 (0.252-0.348)	0.372 (0.317-0.440)	0.478 (0.406-0.567)	0.568 (0.478-0.681)	0.697 (0.563-0.870)	0.801 (0.631-1.03)	0.912 (0.698-1.20)	1.03 (0.763-1.41)	1.20 (0.846-1.72)	1.34 (0.907-2.00)
60-min	0.439 (0.375-0.519)	0.554 (0.473-0.656)	0.712 (0.605-0.846)	0.847 (0.713-1.02)	1.04 (0.840-1.30)	1.19 (0.942-1.53)	1.36 (1.04-1.79)	1.54 (1.14-2.10)	1.79 (1.26-2.57)	2.00 (1.35-2.98)
2-hr	0.673 (0.575-0.795)	0.849 (0.724-1.00)	1.09 (0.927-1.30)	1.30 (1.09-1.56)	1.59 (1.29-1.99)	1.83 (1.44-2.34)	2.08 (1.59-2.74)	2.35 (1.74-3.20)	2.73 (1.92-3.91)	3.04 (2.06-4.53)
3-hr	0.844 (0.721-0.998)	1.07 (0.909-1.26)	1.37 (1.16-1.63)	1.63 (1.37-1.95)	2.00 (1.61-2.50)	2.29 (1.81-2.94)	2.61 (2.00-3.44)	2.95 (2.18-4.02)	3.42 (2.41-4.91)	3.81 (2.59-5.69)
6-hr	1.20 (1.02-1.41)	1.51 (1.29-1.79)	1.95 (1.68-2.32)	2.32 (1.96-2.79)	2.85 (2.31-3.56)	3.28 (2.58-4.20)	3.73 (2.85-4.92)	4.21 (3.12-5.74)	4.89 (3.45-7.01)	5.44 (3.69-8.12)
12-hr	1.60 (1.37-1.90)	2.05 (1.75-2.43)	2.67 (2.27-3.17)	3.19 (2.68-3.82)	3.93 (3.18-4.91)	4.52 (3.57-5.80)	5.15 (3.95-6.80)	5.83 (4.32-7.95)	6.78 (4.78-9.72)	7.56 (5.12-11.3)
24-hr	2.08 (1.84-2.39)	2.69 (2.38-3.10)	3.53 (3.12-4.08)	4.23 (3.71-4.93)	5.23 (4.45-6.28)	6.03 (5.03-7.37)	6.87 (5.61-8.59)	7.77 (6.18-9.96)	9.03 (6.92-12.0)	10.1 (7.46-13.8)
2-day	2.65 (2.34-3.04)	3.45 (3.06-3.98)	4.54 (4.01-5.24)	5.44 (4.77-6.34)	6.71 (5.70-8.04)	7.70 (6.43-9.41)	8.73 (7.13-10.9)	9.82 (7.82-12.6)	11.3 (8.68-15.1)	12.5 (9.30-17.2)
3-day	2.97 (2.63-3.42)	3.89 (3.44-4.48)	5.12 (4.52-5.91)	6.13 (5.38-7.14)	7.53 (6.41-9.04)	8.63 (7.20-10.5)	9.75 (7.96-12.2)	10.9 (8.69-14.0)	12.5 (9.61-16.7)	13.8 (10.3-19.0)
4-day	3.26 (2.89-3.76)	4.29 (3.79-4.94)	5.64 (4.98-6.52)	6.75 (5.92-7.86)	8.28 (7.04-9.93)	9.46 (7.90-11.6)	10.7 (8.71-13.3)	11.9 (9.49-15.3)	13.7 (10.5-18.2)	15.0 (11.1-20.6)
7-day	3.99 (3.54-4.60)	5.24 (4.64-6.04)	6.87 (6.07-7.94)	8.21 (7.19-9.55)	10.0 (8.52-12.0)	11.4 (9.52-13.9)	12.8 (10.5-16.0)	14.3 (11.3-18.3)	16.2 (12.4-21.6)	17.7 (13.2-24.4)
10-day	4.43 (3.92-5.10)	5.80 (5.14-6.69)	7.60 (6.71-8.78)	9.05 (7.93-10.5)	11.0 (9.36-13.2)	12.5 (10.4-15.3)	14.0 (11.4-17.5)	15.5 (12.3-19.9)	17.6 (13.4-23.4)	19.1 (14.2-26.3)
20-day	5.63 (4.99-6.49)	7.41 (6.56-8.54)	9.66 (8.54-11.2)	11.4 (10.0-13.3)	13.8 (11.7-16.5)	15.5 (13.0-19.0)	17.2 (14.1-21.6)	19.0 (15.1-24.3)	21.2 (16.2-28.2)	22.8 (17.0-31.4)
30-day	6.84 (6.06-7.87)	8.99 (7.96-10.4)	11.7 (10.3-13.5)	13.8 (12.1-16.0)	16.5 (14.0-19.7)	18.4 (15.4-22.5)	20.3 (16.6-25.4)	22.2 (17.7-28.5)	24.6 (18.9-32.6)	26.4 (19.6-36.3)
45-day	8.46 (7.50-9.74)	11.1 (9.80-12.8)	14.3 (12.6-16.5)	16.7 (14.6-19.4)	19.8 (16.8-23.7)	22.0 (18.4-26.9)	24.1 (19.7-30.2)	26.2 (20.8-33.6)	28.8 (22.0-38.3)	30.6 (22.7-42.1)
60-day	9.96 (8.83-11.5)	12.9 (11.5-14.9)	16.5 (14.6-19.1)	19.2 (16.9-22.4)	22.6 (19.3-27.2)	25.0 (20.9-30.6)	27.3 (22.3-34.2)	29.5 (23.5-37.8)	32.2 (24.7-42.9)	34.1 (25.3-46.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.