

PRELIMINARY HYDROLOGY REPORT

For:

POPLAR SOUTH DISTRIBUTION CENTER

Project Site Location/Address:
**Rose Avenue & Catawba Avenue
Fontana, CA, 92337**

Prepared For:
Seefried industrial Properties, Inc.
**2301 Rosecrans Avenue, Suite 3165
El Segundo, CA 90245**

Prepared by:
DRC Engineering, Inc.
**160 S. Old Springs Road, Suite 210
Anaheim, CA 92808
(714) 685-6860
Brian Anderson**

June 03, 2022

Project No. 22-305

TABLE OF CONTENTS

Section I	Introduction
Section II	Hydrology Methodology
Section III	Project Description Existing Site Conditions Proposed Site Conditions
Section IV	Conclusion
Appendix A	Vicinity Map Drainage Criteria FEMA FIRM Panels Existing Hydrology Map Proposed Hydrology Map
Appendix B	Rational Method Analysis Existing Condition
Appendix C	Rational Method Analysis Proposed Condition
Appendix D	Detention Basin Calculations (Hydroflow)
Appendix E	A. Existing Storm Drain As-Built Plans B. Pipe Hydraulic Calculations

SECTION I Introduction

This hydrology report has been prepared for the proposed POPLAR SOUTH DISTRIBUTION CENTER. The project site is situated on Rose Ave. between Poplar Ave. and Catawba Ave. in Fontana, San Bernardino County, State of California, as shown on the location map in **Technical Appendix A**.

SECTION II Methodology

The hydrologic analysis was completed in accordance with the 1986 San Bernardino County Hydrology Manual and 2010 Hydrology Manual Addendum. The rational method has been used to calculate peak flows for both the existing and proposed site conditions.

The Hydrology Manual Addendum requires the use of NOAA Atlas 14 rainfall values when completing hydrologic analyses. The Addendum also requires the use of the USDA Web Soil Survey for soil type groupings. The Web Soil Survey indicates the project site is situated within an area comprised of Soboba Gravelly Loamy Fine Sand and Tujunga Gravelly Loamy Sand soils, which is identified as hydrologic soil type "A" in the Hydrology Manual.

SECTION III Project Discussion

The project site will redevelop approximately 19.05 acres of an existing residential development with a proposed dry storage warehouse, trucking dock, and parking lots. Construction activities include the construction of new buildings, parking lot pavement, concrete curbs, driveways, walkways, landscaping planters and related utilities.

Existing Condition: The existing site is developed residential. The residential area north of Rose Ave. drains southerly towards Rose Avenue. This runoff including the runoff from Rose Ave. is then conveyed along Rose Ave. towards Poplar Ave. via overland flow. The residential area south of Rose Ave. drains north-east to south-west.

The following table summarizes the data and results for the 10-year and 100-year storm events in the proposed condition. All calculations can be found in **Technical Appendix B** of this report.

EXISTING DRAINAGE SUMMARY			
SUBAREA	AREA	Q10 (cfs)	Q100 (cfs)
A1	12.57	8.58	19.29
A2	6.48	12.43	25.85
TOTALS:	19.05	21.01	45.14

Proposed Condition: The proposed development will be consistent with the existing condition in terms of the overall drainage pattern. The proposed project development will collect drainage by grate inlets and catch basins, then piped via an onsite underground storm drain system. The storm drain system will discharge to a proposed onsite underground infiltration basin to meet the regional LID structural treatment control best management practice (BMP). The proposed underground infiltration system will collect the water from a storm which will then percolate through the ground. Large storm events with water volume in excess of infiltration basin design capacity, will outfall via storm drain connection to the existing 72" storm drain line located on Poplar Ave.

The project stormwater will utilize an underground infiltration basin (ADS StormTech MC-7200 chambers) to address the regional LID structural treatment control best management practice (BMP). Water quality pre-treatment will be handled by two Barracuda ADS Max Units, one at each end of the infiltration system. Outlet of the treated stormwater will discharge to a proposed underground detention basin which maximum outlet flow rate is equal or less than the existing condition 100-year 24-hour storm event. Refer to Appendix B for more details.

The following table summarizes the data and results for the 10-year and 100-year storm events in the proposed condition. All calculations can be found in Technical Appendix C of this report.

PROPOSED DRAINAGE SUMMARY			
SUBAREA	AREA	Q10 (cfs)	Q100 (cfs)
A1	3.83	8.92	14.77
A2	2.19	5.24	8.66
A3	6.24	15.63	25.39
A4	2.27	6.45	10.48
A5	4.03	9.57	15.84
TOTAL	18.56	45.81	75.14

Flood Plain Mapping

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for floodplain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency that administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that

have a 1% chance of flooding within a given year. This is also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Insurance Rate Map (FIRM) catalog, there are FIRMs produced by FEMA for the project Site:

MAP Number: 16071C8665H

Map Revised: 08/28/2008

The entire project site is falls within the “Zone X” flood plain area. The “Zone X” is defined as area outside of the 100-year floodplain. Refer to **Technical Appendix A**.

Storm Drain Improvements

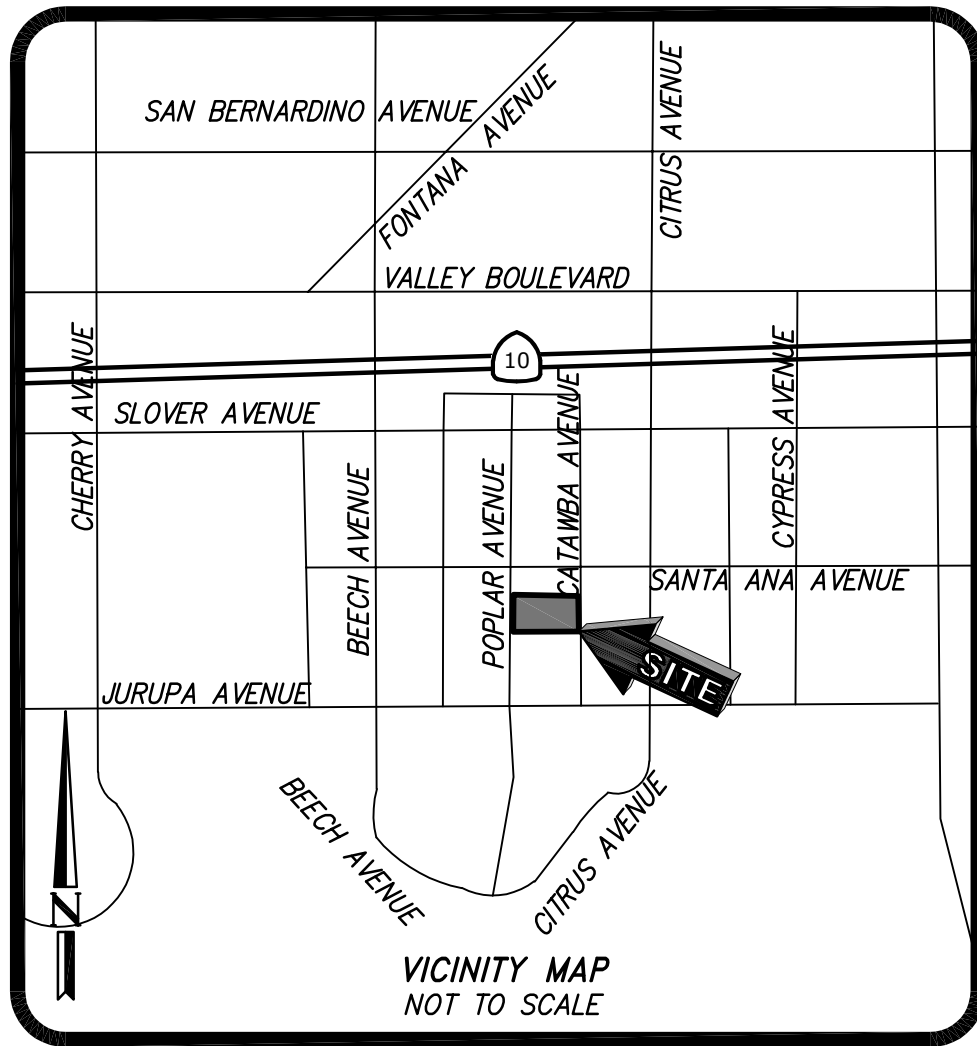
The proposed storm drain system is composed of various sized storm drain lines to pick up on-site runoff from inlet catch basins and conveyed to the proposed infiltration basin. Refer to Technical **Appendix E** for supporting preliminary pipe hydraulic calculations.

SECTION IV Conclusion

In conclusion, the proposed development will not adversely affect the existing drainage patterns in the area and will provide adequate protection for the proposed on-site improvements and structures.

Technical Appendix A

***Vicinity Map and
Drainage Criteria
FEMA FIRM Panels
Existing Hydrology Map
Proposed Hydrology Map***



National Flood Hazard Layer FIRMette



117°28'4"W 34°3'21"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
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Tract
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Tract Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		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 **3/14/2022 at 2:28 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.



NOAA Atlas 14, Volume 6, Version 2
Location name: Fontana, California, USA*
Latitude: 34.0531°, Longitude: -117.4626°
Elevation: 1009.7 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.104 (0.087-0.126)	0.136 (0.113-0.165)	0.180 (0.149-0.219)	0.216 (0.178-0.265)	0.268 (0.213-0.340)	0.309 (0.240-0.401)	0.352 (0.267-0.469)	0.398 (0.293-0.545)	0.463 (0.327-0.663)	0.516 (0.352-0.766)
10-min	0.149 (0.124-0.181)	0.195 (0.162-0.237)	0.257 (0.214-0.313)	0.310 (0.255-0.380)	0.384 (0.305-0.487)	0.443 (0.344-0.574)	0.504 (0.383-0.672)	0.570 (0.420-0.782)	0.664 (0.469-0.950)	0.740 (0.504-1.10)
15-min	0.180 (0.150-0.218)	0.236 (0.196-0.286)	0.311 (0.259-0.379)	0.375 (0.309-0.460)	0.464 (0.369-0.589)	0.535 (0.416-0.695)	0.610 (0.463-0.812)	0.690 (0.508-0.946)	0.803 (0.567-1.15)	0.895 (0.610-1.33)
30-min	0.271 (0.226-0.328)	0.354 (0.295-0.430)	0.468 (0.388-0.569)	0.563 (0.463-0.691)	0.697 (0.554-0.885)	0.804 (0.625-1.04)	0.916 (0.695-1.22)	1.04 (0.763-1.42)	1.21 (0.851-1.73)	1.34 (0.915-1.99)
60-min	0.397 (0.331-0.480)	0.519 (0.432-0.630)	0.685 (0.569-0.834)	0.825 (0.679-1.01)	1.02 (0.812-1.30)	1.18 (0.916-1.53)	1.34 (1.02-1.79)	1.52 (1.12-2.08)	1.77 (1.25-2.53)	1.97 (1.34-2.92)
2-hr	0.590 (0.492-0.715)	0.764 (0.636-0.927)	0.993 (0.825-1.21)	1.18 (0.973-1.45)	1.44 (1.15-1.83)	1.65 (1.28-2.14)	1.85 (1.41-2.47)	2.07 (1.53-2.84)	2.38 (1.68-3.40)	2.62 (1.78-3.88)
3-hr	0.748 (0.623-0.906)	0.964 (0.803-1.17)	1.25 (1.03-1.52)	1.48 (1.22-1.81)	1.79 (1.42-2.27)	2.03 (1.58-2.64)	2.28 (1.73-3.03)	2.53 (1.87-3.47)	2.88 (2.04-4.13)	3.16 (2.15-4.68)
6-hr	1.06 (0.885-1.29)	1.37 (1.14-1.66)	1.76 (1.46-2.14)	2.08 (1.71-2.55)	2.50 (1.99-3.18)	2.82 (2.19-3.66)	3.14 (2.38-4.18)	3.47 (2.56-4.76)	3.91 (2.76-5.60)	4.25 (2.89-6.30)
12-hr	1.40 (1.17-1.70)	1.82 (1.51-2.21)	2.35 (1.95-2.86)	2.77 (2.28-3.40)	3.32 (2.64-4.22)	3.73 (2.90-4.84)	4.14 (3.14-5.51)	4.55 (3.35-6.23)	5.09 (3.59-7.28)	5.50 (3.74-8.15)
24-hr	1.88 (1.66-2.16)	2.48 (2.19-2.86)	3.23 (2.85-3.74)	3.82 (3.34-4.46)	4.59 (3.89-5.54)	5.16 (4.28-6.35)	5.73 (4.64-7.21)	6.29 (4.95-8.14)	7.02 (5.31-9.46)	7.57 (5.53-10.6)
2-day	2.26 (2.00-2.61)	3.05 (2.70-3.52)	4.05 (3.57-4.69)	4.85 (4.24-5.65)	5.89 (4.99-7.10)	6.68 (5.54-8.21)	7.45 (6.04-9.39)	8.24 (6.49-10.7)	9.27 (7.01-12.5)	10.0 (7.35-14.0)
3-day	2.45 (2.17-2.82)	3.35 (2.97-3.87)	4.52 (3.98-5.23)	5.45 (4.77-6.36)	6.70 (5.67-8.07)	7.64 (6.34-9.39)	8.58 (6.95-10.8)	9.54 (7.52-12.3)	10.8 (8.18-14.6)	11.8 (8.63-16.5)
4-day	2.64 (2.34-3.04)	3.65 (3.23-4.22)	4.97 (4.38-5.75)	6.03 (5.27-7.03)	7.45 (6.31-8.98)	8.54 (7.08-10.5)	9.63 (7.80-12.1)	10.7 (8.47-13.9)	12.3 (9.27-16.5)	13.4 (9.81-18.7)
7-day	3.02 (2.67-3.48)	4.25 (3.75-4.90)	5.85 (5.16-6.77)	7.16 (6.26-8.35)	8.94 (7.57-10.8)	10.3 (8.55-12.7)	11.7 (9.47-14.7)	13.1 (10.4-17.0)	15.1 (11.4-20.3)	16.6 (12.1-23.2)
10-day	3.27 (2.89-3.77)	4.63 (4.10-5.35)	6.43 (5.67-7.44)	7.91 (6.92-9.23)	9.94 (8.42-12.0)	11.5 (9.55-14.2)	13.1 (10.6-16.5)	14.8 (11.7-19.2)	17.1 (12.9-23.1)	18.9 (13.8-26.4)
20-day	3.89 (3.45-4.49)	5.58 (4.94-6.45)	7.86 (6.93-9.10)	9.77 (8.54-11.4)	12.4 (10.5-15.0)	14.5 (12.1-17.9)	16.7 (13.5-21.1)	19.0 (15.0-24.7)	22.3 (16.9-30.0)	24.9 (18.2-34.7)
30-day	4.59 (4.07-5.30)	6.59 (5.83-7.60)	9.31 (8.21-10.8)	11.6 (10.2-13.5)	14.9 (12.6-17.9)	17.5 (14.5-21.5)	20.2 (16.4-25.5)	23.2 (18.2-30.0)	27.3 (20.7-36.8)	30.7 (22.4-42.8)
45-day	5.44 (4.82-6.27)	7.73 (6.84-8.92)	10.9 (9.61-12.6)	13.6 (11.9-15.9)	17.5 (14.8-21.1)	20.6 (17.1-25.4)	24.0 (19.4-30.2)	27.6 (21.8-35.8)	32.8 (24.8-44.3)	37.1 (27.1-51.7)
60-day	6.41 (5.67-7.38)	8.97 (7.93-10.4)	12.5 (11.1-14.5)	15.6 (13.7-18.2)	20.1 (17.0-24.2)	23.8 (19.7-29.3)	27.7 (22.5-34.9)	32.0 (25.2-41.5)	38.2 (28.9-51.6)	43.4 (31.7-60.5)

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

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

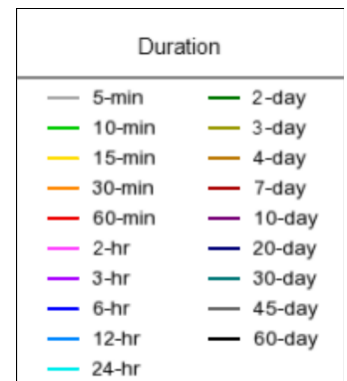
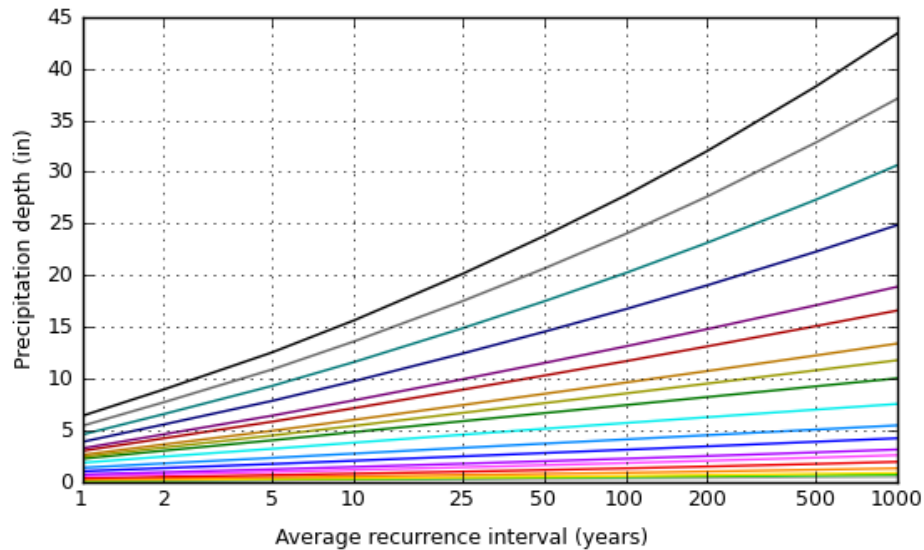
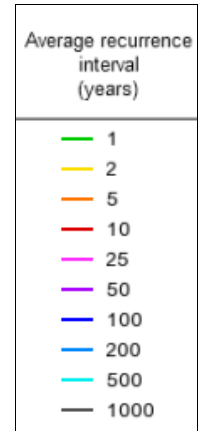
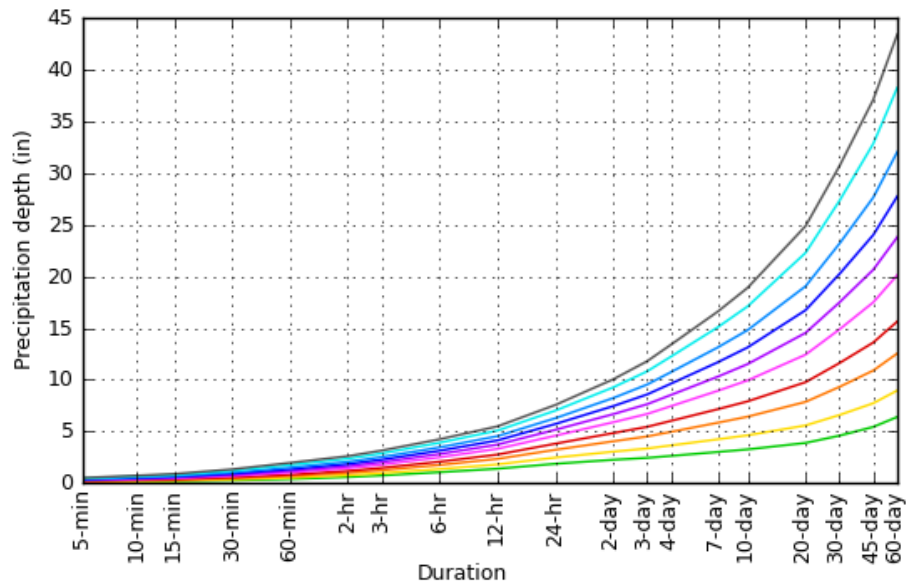
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.0531°, Longitude: -117.4626°



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Mon Mar 14 17:26:36 2022

[Back to Top](#)

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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 San Bernardino County Southwestern Part, California



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	12
Map Unit Descriptions.....	12
San Bernardino County Southwestern Part, California.....	14
TuB—Tujunga loamy sand, 0 to 5 percent slopes.....	14
References	16

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 13, Sep 13, 2021

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

Date(s) aerial images were photographed: Nov 11, 2020—Nov 15, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
TuB	Tujunga loamy sand, 0 to 5 percent slopes	21.3	100.0%
Totals for Area of Interest		21.3	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.

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.

San Bernardino County Southwestern Part, California

TuB—Tujunga loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2sx6y

Elevation: 650 to 3,110 feet

Mean annual precipitation: 10 to 25 inches

Mean annual air temperature: 62 to 65 degrees F

Frost-free period: 325 to 365 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Tujunga, loamy sand, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tujunga, Loamy Sand

Setting

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

A - 0 to 6 inches: loamy sand

C1 - 6 to 18 inches: loamy sand

C2 - 18 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: Rare

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XG912CA - Sandy Fan

Hydric soil rating: No

Minor Components

Tujunga, gravelly loamy sand

Percent of map unit: 10 percent

Landform: Alluvial fans

Landform position (three-dimensional): Tread

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hanford, sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

References

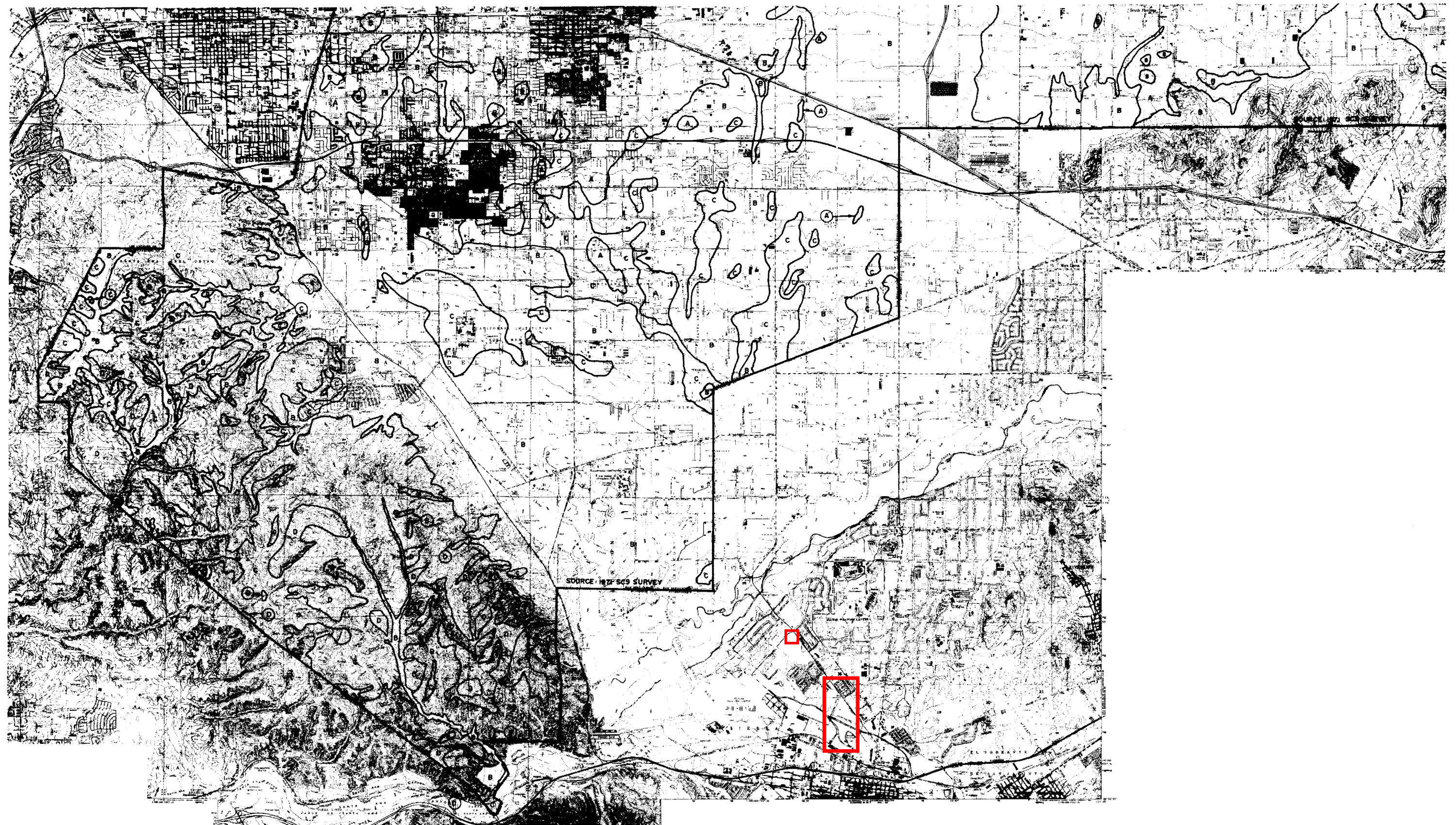
- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

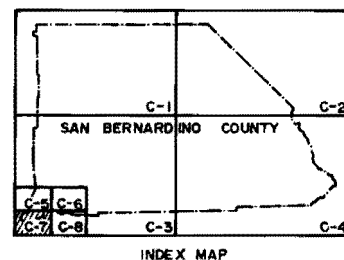
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf



SOURCE: 1:250,000 SURVEY

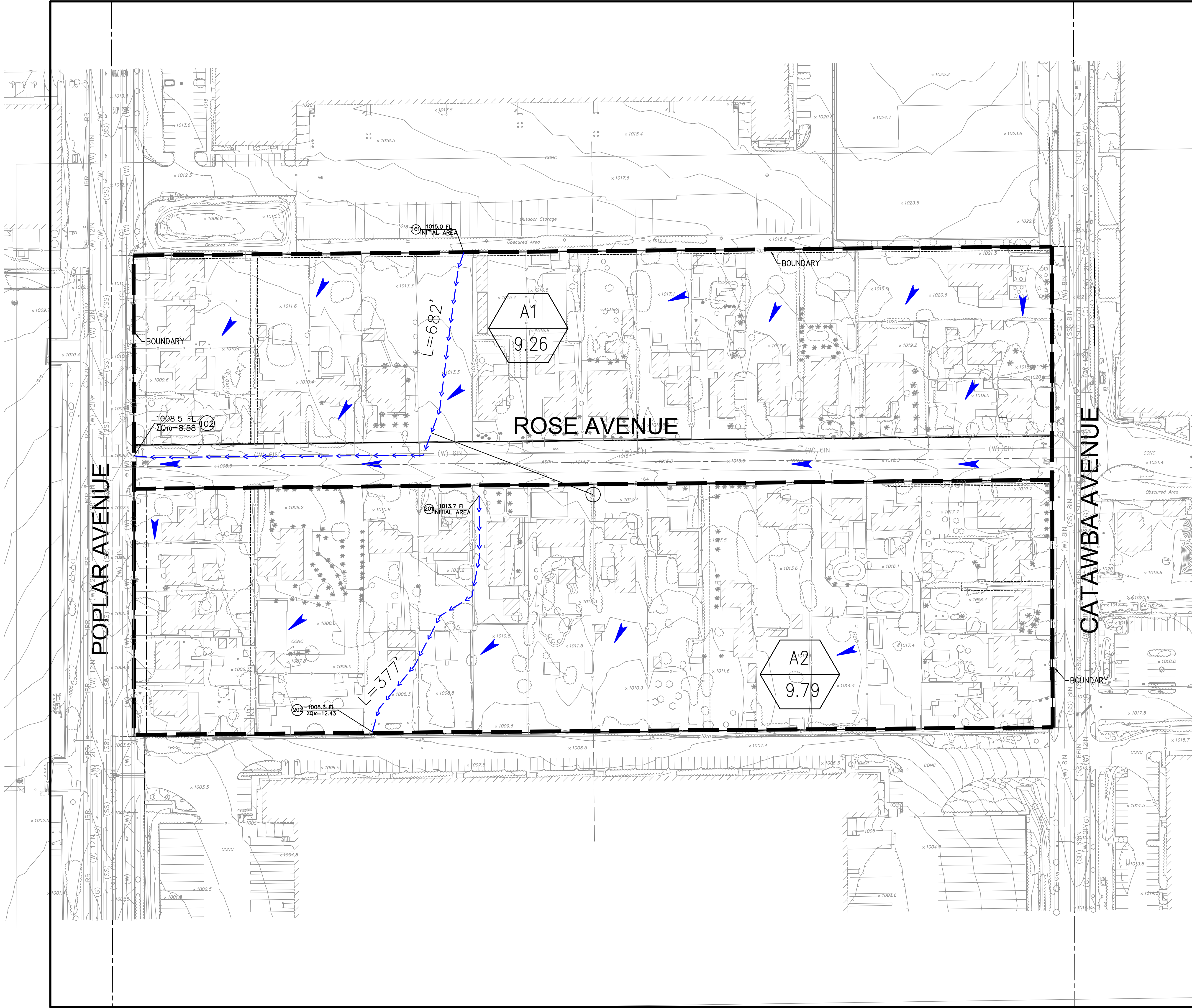
SAN BERNARDINO COUNTY HYDROLOGY MANUAL



- LEGEND
- SOIL GROUP BOUNDARY
 - A SOIL GROUP DESIGNATION
 - BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000
SCALE REDUCED BY 1/2

**HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-C AREA**



LEGEND:

A1

9.26 AC

1

1

T₁₀=10.21

Q₁₀=9.11

Q₁₀₀=15.21

849.0 FL

TIME OF CONCENTRATION IN MINUTES

RUNOFF FOR 10 YEAR STORM EVENT IN CFS

RUNOFF FOR 100 YEAR STORM EVENT IN CFS

ELEVATION

→ → →

→ → →

→ → →

→ → →

FLOW PATH

SUBAREA BOUNDARY

DRAINAGE AREA BOUNDARY

A

HYDROLOGIC SOIL GROUP

PROJECT AREA: 19.05 ACRES (TOTAL PARCEL AREA)
PRE-DEVELOPMENT
IMPERVIOUS AREA: 6.45 ACRES
PERVIOUS AREA: 12.60 ACRES

GRAPHIC SCALE: 1"=60'

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

Engineering, Inc.

Civil Engineering/Land Surveying/Land Planning

NO.	REVISION:	DATE:

PROJECT:

ISSUE:

POPLAR SOUTH DISTR. CENTER
ROSE AVE & POPLAR AVE FONTANA
FONTANA, CA

HYDROLOGY

DRAWING NAME:

DATE:

EXISTING HYDROLOGY MAP

06/03/2022

CHECKED: BA

DRAWN: FM

DRAWING FILE: 22305EXHM

PROJECT NO.: 22-305

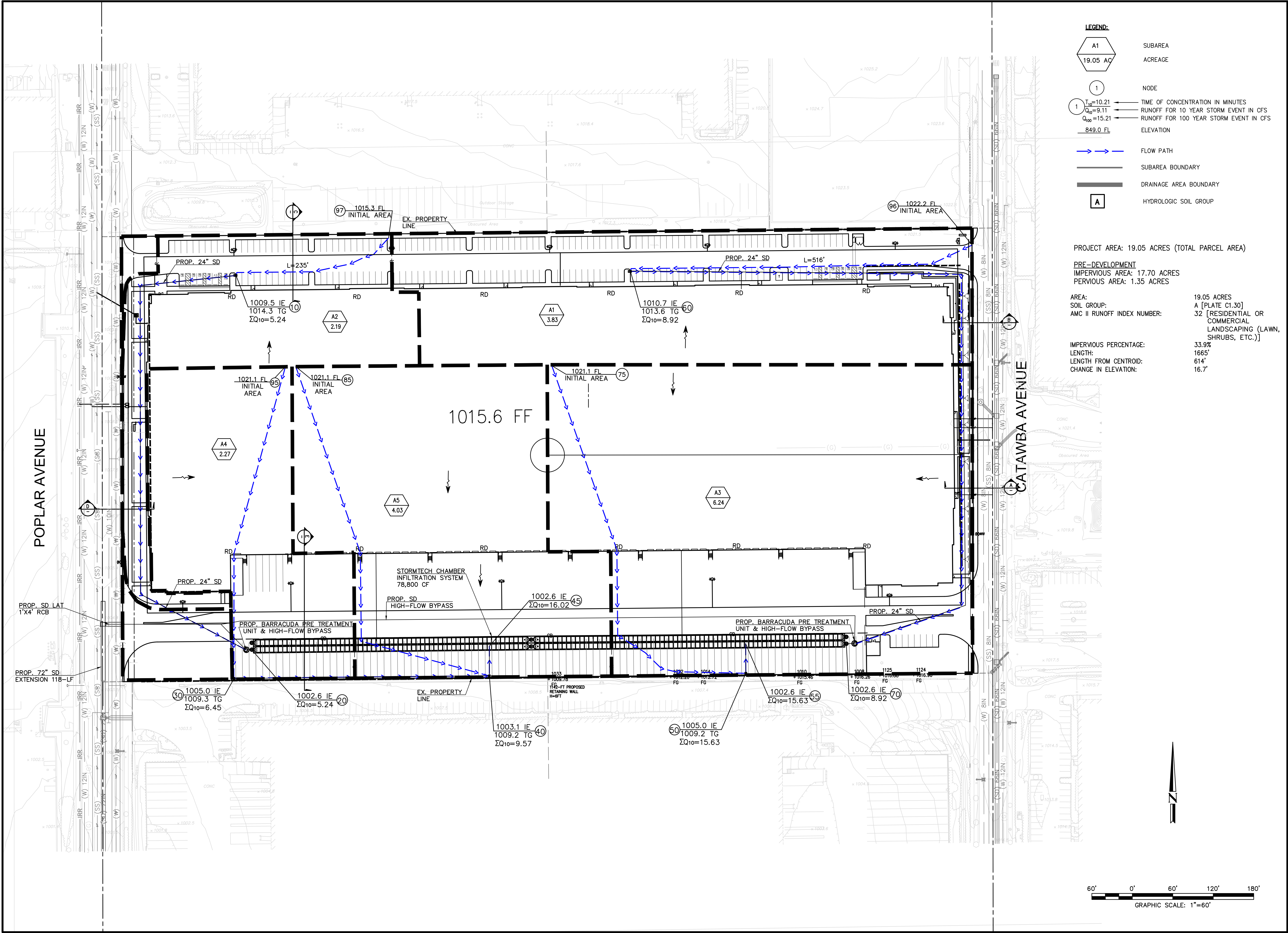
SHEET NUMBER:

1

OF 01 SHEETS

SCALE: 1" = 60'

FILENAME: M:\2022\22-305 Seefried Fontana Rose\HW\CAD\22-305 HW Existing Condition.dwg, LAST SAVED ON: Jun 04 2022 4:42pm PLOTTED BY: JESSE, ON: Jun 04 2022 4:43pm, CFG:



LEGEND:

	SUBAREA ACREAGE
	NODE
	TIME OF CONCENTRATION IN MINUTES
	RUNOFF FOR 10 YEAR STORM EVENT IN CFS
	RUNOFF FOR 100 YEAR STORM EVENT IN CFS
	ELEVATION
	FLOW PATH
	SUBAREA BOUNDARY
	DRAINAGE AREA BOUNDARY
	HYDROLOGIC SOIL GROUP

PROJECT AREA: 19.05 ACRES (TOTAL PARCEL AREA)

PRE-DEVELOPMENT
IMPERVIOUS AREA: 17.70 ACRES
PERVIOUS AREA: 1.35 ACRES

AREA:	19.05 ACRES
SOIL GROUP:	A [PLATE C1.30]
AMC II RUNOFF INDEX NUMBER:	32 [RESIDENTIAL OR COMMERCIAL LANDSCAPING (LAWN, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	33.9%
LENGTH:	1665'
LENGTH FROM CENTROID:	614'
CHANGE IN ELEVATION:	16.7'

160 S. Old Springs Road Suite 210 Anaheim Hills, CA 92808 714-685-6860	
 Civil Engineering/Land Surveying/Land Planning	
NOT FOR CONSTRUCTION	
PROJECT:	POPLAR SOUTH DISTR. CENTER ROSE AVE & POPLAR AVE FONTANA FONTANA, CA
DRAWING NAME:	PROPOSED HYDROLOGY MAP
ISSUE:	HYDROLOGY
DATE:	06/03/2022
CHECKED: BA	DRAWN: FM
DRAWING FILE:	22305PRHM
PROJECT NO.:	22-305
SHEET NUMBER:	1
OF	01 SHEETS
SCALE:	1" = 60'

FILENAME: M:\2022\22-305 Seeped Fontana Rose\HW\CAD\22-305 HW Proposed Condition.dwg, LAST SAVED ON: Jun 03 2022 4:55pm PLOTTED BY: JESSE, ON: Jun 04 2022 4:41pm, PCP:

Technical Appendix B

***Rational Method Analysis
Existing Condition***

**EXISTING CONDITION 10-YEAR STORM EVENT
RATIONAL METHOD CALCULATIONS**

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/17/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
EXISTING CONDITION
10 YEAR 1 HOUR STORM
SUB AREA A1

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 682.000(Ft.)
Top (of initial area) elevation = 1015.000(Ft.)
Bottom (of initial area) elevation = 1008.500(Ft.)
Difference in elevation = 6.500(Ft.)
Slope = 0.00953 s(%)= 0.95
 $TC = k(0.469)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 16.176 min.
Rainfall intensity = 1.811(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.511
Subarea runoff = 8.577(CFS)
Total initial stream area = 9.260(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)

+++++
Process from Point/Station 101.000 to Point/Station 102.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 9.260(Ac.)
Runoff from this stream = 8.577(CFS)
Time of concentration = 16.18 min.
Rainfall intensity = 1.811(In/Hr)
Area averaged loss rate (Fm) = 0.7822(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8000
Summary of stream data:

Stream Flow rate	Area	TC	Fm	Rainfall Intensity
------------------	------	----	----	--------------------

No.	(CFS)	(Ac.)	(min)	(In/Hr)	(In/Hr)
1	8.58	9.260	16.18	0.782	1.811

$Q_{max}(1) = 1.000 * 1.000 * 8.577 + = 8.577$

Total of 1 main streams to confluence:

Flow rates before confluence point:

9.577

Maximum flow rates at confluence using above data:

8.577

Area of streams before confluence:

9.260

Effective area values after confluence:

9.260

Results of confluence:

Total flow rate = 8.577(CFS)

Time of concentration = 16.176 min.

Effective stream area after confluence = 9.260(Ac.)

Study area average Pervious fraction(A_p) = 0.800

Study area average soil loss rate(F_m) = 0.782(In/Hr)

Study area total = 9.26(Ac.)

End of computations, Total Study Area = 9.26 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.800

Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/17/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
EXISTING CONDITION
10 YEAR 1 HOUR STORM
SUB AREA A2

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 377.000(Ft.)
Top (of initial area) elevation = 1013.700(Ft.)
Bottom (of initial area) elevation = 1008.300(Ft.)
Difference in elevation = 5.400(Ft.)
Slope = 0.01432 s(%)= 1.43
 $TC = k(0.469)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 11.762 min.
Rainfall intensity = 2.193(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.579
Subarea runoff = 12.430(CFS)
Total initial stream area = 9.790(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 9.790(Ac.)
Runoff from this stream = 12.430(CFS)
Time of concentration = 11.76 min.
Rainfall intensity = 2.193(In/Hr)
Area averaged loss rate (Fm) = 0.7822(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8000
Summary of stream data:

Stream Flow rate	Area	TC	Fm	Rainfall Intensity
------------------	------	----	----	--------------------

No.	(CFS)	(Ac.)	(min)	(In/Hr)	(In/Hr)
1	12.43	9.790	11.76	0.782	2.193

$Q_{max}(1) =$
 $1.000 * 1.000 * 12.430) + = 12.430$

Total of 1 main streams to confluence:
 Flow rates before confluence point:
 13.430
 Maximum flow rates at confluence using above data:
 12.430
 Area of streams before confluence:
 9.790
 Effective area values after confluence:
 9.790

Results of confluence:
 Total flow rate = 12.430 (CFS)
 Time of concentration = 11.762 min.
 Effective stream area after confluence = 9.790 (Ac.)
 Study area average Pervious fraction(A_p) = 0.800
 Study area average soil loss rate(F_m) = 0.782 (In/Hr)
 Study area total = 9.79 (Ac.)
 End of computations, Total Study Area = 9.79 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.
 Note: These figures do not consider reduced effective area
 effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.800
 Area averaged SCS curve number = 32.0

**EXISTING CONDITION 100-YEAR STORM EVENT
RATIONAL METHOD CALCULATIONS**

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/17/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
EXISTING CONDITION
100 YEAR 1 HOUR STORM
SUB AREA A1

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.628(In/Hr)
Initial subarea data:
Initial area flow distance = 682.000(Ft.)
Top (of initial area) elevation = 1015.000(Ft.)
Bottom (of initial area) elevation = 1008.500(Ft.)
Difference in elevation = 6.500(Ft.)
Slope = 0.00953 s(%)= 0.95
 $TC = k(0.469)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 16.176 min.
Rainfall intensity = 2.942(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.708
Subarea runoff = 19.286(CFS)
Total initial stream area = 9.260(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.628(In/Hr)

+++++
Process from Point/Station 101.000 to Point/Station 102.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 9.260(Ac.)
Runoff from this stream = 19.286(CFS)
Time of concentration = 16.18 min.
Rainfall intensity = 2.942(In/Hr)
Area averaged loss rate (Fm) = 0.6281(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
------------	-----------------	------------	----------	------------	----------------------------

1	19.29	9.260	16.18	0.628	2.942
---	-------	-------	-------	-------	-------

Qmax(1) = 1.000 * 1.000 * 19.286) + = 19.286

Total of 1 main streams to confluence:

Flow rates before confluence point:

20.286

Maximum flow rates at confluence using above data:

19.286

Area of streams before confluence:

9.260

Effective area values after confluence:

9.260

Results of confluence:

Total flow rate = 19.286(CFS)

Time of concentration = 16.176 min.

Effective stream area after confluence = 9.260(Ac.)

Study area average Pervious fraction(Ap) = 0.800

Study area average soil loss rate(Fm) = 0.628(In/Hr)

Study area total = 9.26(Ac.)

End of computations, Total Study Area = 9.26 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.800

Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/17/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
EXISTING CONDITION
100 YEAR 1 HOUR STORM
SUB AREA 2

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.628(In/Hr)
Initial subarea data:
Initial area flow distance = 377.000(Ft.)
Top (of initial area) elevation = 1013.700(Ft.)
Bottom (of initial area) elevation = 1008.300(Ft.)
Difference in elevation = 5.400(Ft.)
Slope = 0.01432 s(%)= 1.43
TC = $k(0.469)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 11.762 min.
Rainfall intensity = 3.562(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.741
Subarea runoff = 25.851(CFS)
Total initial stream area = 9.790(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.628(In/Hr)

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 9.790(Ac.)
Runoff from this stream = 25.851(CFS)
Time of concentration = 11.76 min.
Rainfall intensity = 3.562(In/Hr)
Area averaged loss rate (Fm) = 0.6281(In/Hr)
Area averaged Pervious ratio (Ap) = 0.8000
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
------------	-----------------	------------	----------	------------	----------------------------

1	25.85	9.790	11.76	0.628	3.562
---	-------	-------	-------	-------	-------

$Q_{max}(1) = 1.000 * 1.000 * 25.851 + = 25.851$

Total of 1 main streams to confluence:

Flow rates before confluence point:

26.851

Maximum flow rates at confluence using above data:

25.851

Area of streams before confluence:

9.790

Effective area values after confluence:

9.790

Results of confluence:

Total flow rate = 25.851 (CFS)

Time of concentration = 11.762 min.

Effective stream area after confluence = 9.790 (Ac.)

Study area average Pervious fraction(A_p) = 0.800

Study area average soil loss rate(F_m) = 0.628 (In/Hr)

Study area total = 9.79 (Ac.)

End of computations, Total Study Area = 9.79 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.800

Area averaged SCS curve number = 32.0

Technical Appendix C

***Rational Method Analysis
Proposed Condition***

**PROP. CONDITION 10-YEAR STORM EVENT
RATIONAL METHOD CALCULATIONS**

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
PROPOSED CONDITION
10 YEAR 1 HOUR STORM
SUB AREA 1

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 96.000 to Point/Station 60.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 516.000(Ft.)
Top (of initial area) elevation = 1022.200(Ft.)
Bottom (of initial area) elevation = 1013.600(Ft.)
Difference in elevation = 8.600(Ft.)
Slope = 0.01667 s(%)= 1.67
 $TC = k(0.304)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.386 min.
Rainfall intensity = 2.687(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.867
Subarea runoff = 8.924(CFS)
Total initial stream area = 3.830(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

+++++
Process from Point/Station 60.000 to Point/Station 70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1010.700(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 1161.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.924(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 8.924(CFS)
Normal flow depth in pipe = 11.60(In.)
Flow top width inside pipe = 23.99(In.)
Critical Depth = 12.80(In.)
Pipe flow velocity = 5.93(Ft/s)
Travel time through pipe = 3.26 min.

Time of concentration (TC) = 11.65 min.
End of computations, Total Study Area = 3.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

10 YEAR 1 HOUR STORM

A2

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 97.000 to Point/Station 10.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098 (In/Hr)
Initial subarea data:
Initial area flow distance = 235.000 (Ft.)
Top (of initial area) elevation = 1015.300 (Ft.)
Bottom (of initial area) elevation = 1014.300 (Ft.)
Difference in elevation = 1.000 (Ft.)
Slope = 0.00426 s(%) = 0.43
 $TC = k(0.304)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.045 min.
Rainfall intensity = 2.754 (In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.868
Subarea runoff = 5.236 (CFS)
Total initial stream area = 2.190 (Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098 (In/Hr)

+++++
Process from Point/Station 10.000 to Point/Station 20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1009.500 (Ft.)
Downstream point/station elevation = 1002.600 (Ft.)
Pipe length = 780.00 (Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.236 (CFS)
Given pipe size = 24.00 (In.)
Calculated individual pipe flow = 5.236 (CFS)
Normal flow depth in pipe = 8.11 (In.)
Flow top width inside pipe = 22.70 (In.)
Critical Depth = 9.67 (In.)
Pipe flow velocity = 5.60 (Ft/s)
Travel time through pipe = 2.32 min.

Time of concentration (TC) = 10.36 min.
End of computations, Total Study Area = 2.19 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

10 YEAR 1 HOUR STORM

A3

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 75.000 to Point/Station 50.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)
Initial subarea data:
Initial area flow distance = 609.000(Ft.)
Top (of initial area) elevation = 1021.100(Ft.)
Bottom (of initial area) elevation = 1009.200(Ft.)
Difference in elevation = 11.900(Ft.)
Slope = 0.01954 s(%)= 1.95
 $TC = k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.908 min.
Rainfall intensity = 2.783(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 15.629(CFS)
Total initial stream area = 6.240(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 50.000 to Point/Station 55.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1005.000(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 44.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 15.629(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 15.629(CFS)
Normal flow depth in pipe = 8.94(In.)
Flow top width inside pipe = 23.21(In.)
Critical Depth = 17.10(In.)
Pipe flow velocity = 14.64(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 7.96 min.
End of computations, Total Study Area = 6.24 (Ac.)
The following figures may

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.010
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL
PROPOSED CONDITION
10 YEAR 1 HOUR STORM
A4 & A5

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.825 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 95.000 to Point/Station 30.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 0.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)
Initial subarea data:
Initial area flow distance = 427.000(Ft.)
Top (of initial area) elevation = 1021.100(Ft.)
Bottom (of initial area) elevation = 1009.300(Ft.)
Difference in elevation = 11.800(Ft.)
Slope = 0.02763 s(%)= 2.76
TC = $k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 6.402 min.
Rainfall intensity = 3.159(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 6.454(CFS)
Total initial stream area = 2.270(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 30.000 to Point/Station 40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1005.000(Ft.)
Downstream point/station elevation = 1003.100(Ft.)
Pipe length = 379.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.454(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 6.454(CFS)
Normal flow depth in pipe = 10.59(In.)
Flow top width inside pipe = 23.83(In.)
Critical Depth = 10.81(In.)
Pipe flow velocity = 4.82(Ft/s)
Travel time through pipe = 1.31 min.
Time of concentration (TC) = 7.71 min.

+++++
Process from Point/Station 85.000 to Point/Station 40.000
**** SUBAREA FLOW ADDITION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 0.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000(In/Hr)
Time of concentration = 7.71 min.
Rainfall intensity = 2.825(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.900
Subarea runoff = 9.565(CFS) for 4.030(Ac.)
Total runoff = 16.019(CFS)
Effective area this stream = 6.30(Ac.)
Total Study Area (Main Stream No. 1) = 6.30(Ac.)
Area averaged Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 40.000 to Point/Station 45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1003.100(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 45.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.019(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 16.019(CFS)
Normal flow depth in pipe = 14.39(In.)
Flow top width inside pipe = 23.52(In.)
Critical Depth = 17.31(In.)
Pipe flow velocity = 8.14(Ft/s)
Travel time through pipe = 0.09 min.
Time of concentration (TC) = 7.80 min.
End of computations, Total Study Area = 6.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.010
Area averaged SCS curve number = 0.0

**PROP. CONDITION 100-YEAR STORM EVENT
RATIONAL METHOD CALCULATIONS**

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

100 YEAR 1 HOUR STORM

A1

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 96.000 to Point/Station 60.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 516.000(Ft.)
Top (of initial area) elevation = 1022.200(Ft.)
Bottom (of initial area) elevation = 1013.600(Ft.)
Difference in elevation = 8.600(Ft.)
Slope = 0.01667 s(%)= 1.67
TC = $k(0.304)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.386 min.
Rainfall intensity = 4.364(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 14.771(CFS)
Total initial stream area = 3.830(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

+++++
Process from Point/Station 60.000 to Point/Station 70.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1010.700(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 1161.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 14.771(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 14.771(CFS)
Normal flow depth in pipe = 15.96(In.)
Flow top width inside pipe = 22.65(In.)
Critical Depth = 16.63(In.)
Pipe flow velocity = 6.65(Ft/s)

Travel time through pipe = 2.91 min.
Time of concentration (TC) = 11.29 min.
End of computations, Total Study Area = 3.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

100 YEAR 1 HOUR STORM

A2

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 97.000 to Point/Station 10.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type

Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 235.000(Ft.)
Top (of initial area) elevation = 1015.300(Ft.)
Bottom (of initial area) elevation = 1014.300(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00426 s(%)= 0.43
 $TC = k(0.304)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.045 min.
Rainfall intensity = 4.474(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 8.663(CFS)
Total initial stream area = 2.190(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

+++++
Process from Point/Station 10.000 to Point/Station 20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1009.500(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 780.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.663(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 8.663(CFS)
Normal flow depth in pipe = 10.66(In.)
Flow top width inside pipe = 23.85(In.)
Critical Depth = 12.58(In.)
Pipe flow velocity = 6.43(Ft/s)

Travel time through pipe = 2.02 min.
Time of concentration (TC) = 10.07 min.
End of computations, Total Study Area = 2.19 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

100 YEAR 1 HOUR STORM

A3

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 75.000 to Point/Station 50.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000 (In/Hr)
Initial subarea data:
Initial area flow distance = 609.000(Ft.)
Top (of initial area) elevation = 1021.100(Ft.)
Bottom (of initial area) elevation = 1009.200(Ft.)
Difference in elevation = 11.900(Ft.)
Slope = 0.01954 s(%)= 1.95
 $TC = k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 7.908 min.
Rainfall intensity = 4.520(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 25.385(CFS)
Total initial stream area = 6.240(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 50.000 to Point/Station 55.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1005.000(Ft.)
Downstream point/station elevation = 1002.600(Ft.)
Pipe length = 44.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 25.385(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 25.385(CFS)
Normal flow depth in pipe = 11.72(In.)
Flow top width inside pipe = 23.99(In.)
Critical Depth = 21.24(In.)
Pipe flow velocity = 16.65(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 7.95 min.
End of computations, Total Study Area = 6.24 (Ac.)

The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 0.010
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2012 Version 7.2
Rational Hydrology Study Date: 03/25/22

22-305 CATAWBA AVE SPEC INDUSTRIAL

PROPOSED CONDITION

100 YEAR 1 HOUR STORM

A4 & A5

Program License Serial Number 6310

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.340 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 95.000 to Point/Station 30.000
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000 (In/Hr)
Initial subarea data:
Initial area flow distance = 427.000(Ft.)
Top (of initial area) elevation = 1021.100(Ft.)
Bottom (of initial area) elevation = 1009.300(Ft.)
Difference in elevation = 11.800(Ft.)
Slope = 0.02763 s(%)= 2.76
 $TC = k(0.277)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 6.402 min.
Rainfall intensity = 5.131(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff = 10.483(CFS)
Total initial stream area = 2.270(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.000(In/Hr)

+++++
Process from Point/Station 30.000 to Point/Station 40.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1005.000(Ft.)
Downstream point/station elevation = 1003.100(Ft.)
Pipe length = 379.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 10.483(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 10.483(CFS)
Normal flow depth in pipe = 14.16(In.)
Flow top width inside pipe = 23.61(In.)
Critical Depth = 13.91(In.)
Pipe flow velocity = 5.44(Ft/s)
Travel time through pipe = 1.16 min.
Time of concentration (TC) = 7.56 min.

+++++
Process from Point/Station 85.000 to Point/Station 40.000
**** SUBAREA FLOW ADDITION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.000 (In/Hr)
Time of concentration = 7.56 min.
Rainfall intensity = 4.642(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.900
Subarea runoff = 15.840 (CFS) for 4.030 (Ac.)
Total runoff = 26.323 (CFS)
Effective area this stream = 6.30 (Ac.)
Total Study Area (Main Stream No. 1) = 6.30 (Ac.)
Area averaged Fm value = 0.000 (In/Hr)

+++++
Process from Point/Station 40.000 to Point/Station 45.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1003.100 (Ft.)
Downstream point/station elevation = 1002.600 (Ft.)
Pipe length = 45.00 (Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 26.323 (CFS)
Given pipe size = 24.00 (In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
1.744 (Ft.) at the headworks or inlet of the pipe(s)
Pipe friction loss = 0.609 (Ft.)
Minor friction loss = 1.635 (Ft.) K-factor = 1.50
Pipe flow velocity = 8.38 (Ft/s)
Travel time through pipe = 0.09 min.
Time of concentration (TC) = 7.65 min.
End of computations, Total Study Area = 6.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.010
Area averaged SCS curve number = 32.0

Technical Appendix D

Detention Basin Calculations (Hydroflow)

UNIT HYDROGRAPH EXSTING CONDITON
100-YEAR 24-HOUR STORM EVENT

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 7.1

Study date 03/27/22

+++++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6310

22-305 CATAWBA AVE SPEC INDUSTRIAL
EXISTING CONDITION
100 YEAR 24 HOUR UH
TOTAL AREAS

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
19.05	1	1.34

Rainfall data for year 100
19.05 6 3.14

Rainfall data for year 100
19.05 24 5.73

+++++

***** Area-averaged max loss rate, Fm *****

SCS curve No. (AMCII)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	19.05	1.000	0.785	0.660	0.518

Area-averaged adjusted loss rate Fm (In/Hr) = 0.518

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
12.57	0.660	32.0	52.0	9.23	0.201
6.48	0.340	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.458

Area-averaged low loss fraction, Yb = 0.542

+++++

Watercourse length = 682.00 (Ft.)
 Length from concentration point to centroid = 229.00 (Ft.)
 Elevation difference along watercourse = 6.50 (Ft.)
 Mannings friction factor along watercourse = 0.020
 Watershed area = 19.05 (Ac.)
 Catchment Lag time = 0.032 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 262.1433
 Hydrograph baseflow = 0.00 (CFS)
 Average maximum watershed loss rate (Fm) = 0.518 (In/Hr)
 Average low loss rate fraction (Yb) = 0.542 (decimal)
 VALLEY DEVELOPED S-Graph Selected
 Computed peak 5-minute rainfall = 0.496 (In)
 Computed peak 30-minute rainfall = 1.016 (In)
 Specified peak 1-hour rainfall = 1.340 (In)
 Computed peak 3-hour rainfall = 2.259 (In)
 Specified peak 6-hour rainfall = 3.140 (In)
 Specified peak 24-hour rainfall = 5.730 (In)

Rainfall depth area reduction factors:

Using a total area of 19.05 (Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.496 (In)
30-minute factor = 0.999	Adjusted rainfall = 1.015 (In)
1-hour factor = 0.999	Adjusted rainfall = 1.339 (In)
3-hour factor = 1.000	Adjusted rainfall = 2.258 (In)
6-hour factor = 1.000	Adjusted rainfall = 3.140 (In)
24-hour factor = 1.000	Adjusted rainfall = 5.730 (In)

 Total soil rain loss = 2.81 (In)
 Total effective rainfall = 2.92 (In)
 Peak flow rate in flood hydrograph = 73.05 (CFS)

Max allowable
 discharge rate = 0.9 *
 73.05 CFS = 65.75
 CFS

 ++++++
 24 - H O U R S T O R M
 R u n o f f H y d r o g r a p h

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0038	0.55	Q					
0+10	0.0101	0.91	Q					
0+15	0.0164	0.92	Q					
0+20	0.0227	0.92	Q					
0+25	0.0290	0.92	Q					
0+30	0.0354	0.92	Q					
0+35	0.0418	0.93	Q					
0+40	0.0482	0.93	Q					
0+45	0.0546	0.93	Q					
0+50	0.0611	0.94	Q					
0+55	0.0676	0.94	Q					
1+ 0	0.0740	0.94	Q					
1+ 5	0.0805	0.94	Q					
1+10	0.0871	0.95	Q					
1+15	0.0936	0.95	Q					
1+20	0.1002	0.95	Q					
1+25	0.1068	0.96	Q					
1+30	0.1134	0.96	Q					
1+35	0.1200	0.96	QV					
1+40	0.1267	0.97	QV					
1+45	0.1334	0.97	QV					
1+50	0.1401	0.97	QV					
1+55	0.1468	0.98	QV					
2+ 0	0.1535	0.98	QV					
2+ 5	0.1603	0.98	QV					

2+10	0.1671	0.99	QV				
2+15	0.1739	0.99	QV				
2+20	0.1807	0.99	QV				
2+25	0.1876	1.00	QV				
2+30	0.1945	1.00	QV				
2+35	0.2014	1.00	QV				
2+40	0.2083	1.01	QV				
2+45	0.2153	1.01	QV				
2+50	0.2222	1.01	QV				
2+55	0.2292	1.02	QV				
3+ 0	0.2363	1.02	Q V				
3+ 5	0.2433	1.02	Q V				
3+10	0.2504	1.03	Q V				
3+15	0.2575	1.03	Q V				
3+20	0.2647	1.04	Q V				
3+25	0.2718	1.04	Q V				
3+30	0.2790	1.04	Q V				
3+35	0.2862	1.05	Q V				
3+40	0.2935	1.05	Q V				
3+45	0.3007	1.06	Q V				
3+50	0.3080	1.06	Q V				
3+55	0.3153	1.06	Q V				
4+ 0	0.3227	1.07	Q V				
4+ 5	0.3301	1.07	Q V				
4+10	0.3375	1.08	Q V				
4+15	0.3449	1.08	Q V				
4+20	0.3524	1.08	Q V				
4+25	0.3599	1.09	Q V				
4+30	0.3674	1.09	Q V				
4+35	0.3750	1.10	Q V				
4+40	0.3826	1.10	Q V				
4+45	0.3902	1.11	Q V				
4+50	0.3979	1.11	Q V				
4+55	0.4056	1.12	Q V				
5+ 0	0.4133	1.12	Q V				
5+ 5	0.4210	1.13	Q V				
5+10	0.4288	1.13	Q V				
5+15	0.4366	1.14	Q V				
5+20	0.4445	1.14	Q V				
5+25	0.4524	1.15	Q V				
5+30	0.4603	1.15	Q V				
5+35	0.4683	1.16	Q V				
5+40	0.4763	1.16	Q V				
5+45	0.4843	1.17	Q V				
5+50	0.4924	1.17	Q V				
5+55	0.5005	1.18	Q V				
6+ 0	0.5086	1.18	Q V				
6+ 5	0.5168	1.19	Q V				
6+10	0.5250	1.19	Q V				
6+15	0.5333	1.20	Q V				
6+20	0.5416	1.21	Q V				
6+25	0.5499	1.21	Q V				
6+30	0.5583	1.22	Q V				
6+35	0.5667	1.22	Q V				
6+40	0.5752	1.23	Q V				
6+45	0.5837	1.24	Q V				
6+50	0.5923	1.24	Q V				
6+55	0.6009	1.25	Q V				
7+ 0	0.6095	1.25	Q V				
7+ 5	0.6182	1.26	Q V				
7+10	0.6269	1.27	Q V				
7+15	0.6357	1.27	Q V				
7+20	0.6445	1.28	Q V				
7+25	0.6534	1.29	Q V				
7+30	0.6623	1.30	Q V				
7+35	0.6713	1.30	Q V				
7+40	0.6803	1.31	Q V				
7+45	0.6894	1.32	Q V				
7+50	0.6985	1.32	Q V				
7+55	0.7077	1.33	Q V				

8+ 0	0.7169	1.34	Q	V				
8+ 5	0.7262	1.35	Q	V				
8+10	0.7355	1.36	Q	V				
8+15	0.7449	1.36	Q	V				
8+20	0.7544	1.37	Q	V				
8+25	0.7639	1.38	Q	V				
8+30	0.7735	1.39	Q	V				
8+35	0.7831	1.40	Q	V				
8+40	0.7928	1.41	Q	V				
8+45	0.8025	1.42	Q	V				
8+50	0.8123	1.42	Q	V				
8+55	0.8222	1.43	Q	V				
9+ 0	0.8322	1.44	Q	V				
9+ 5	0.8422	1.45	Q	V				
9+10	0.8522	1.46	Q	V				
9+15	0.8624	1.47	Q	V				
9+20	0.8726	1.48	Q	V				
9+25	0.8829	1.49	Q	V				
9+30	0.8933	1.50	Q	V				
9+35	0.9037	1.52	Q	V				
9+40	0.9142	1.53	Q	V				
9+45	0.9248	1.54	Q	V				
9+50	0.9355	1.55	Q	V				
9+55	0.9462	1.56	Q	V				
10+ 0	0.9571	1.57	Q	V				
10+ 5	0.9680	1.59	Q	V				
10+10	0.9790	1.60	Q	V				
10+15	0.9901	1.61	Q	V				
10+20	1.0013	1.62	Q	V				
10+25	1.0125	1.64	Q	V				
10+30	1.0239	1.65	Q	V				
10+35	1.0354	1.67	Q	V				
10+40	1.0469	1.68	Q	V				
10+45	1.0586	1.69	Q	V				
10+50	1.0704	1.71	Q	V				
10+55	1.0823	1.73	Q	V				
11+ 0	1.0943	1.74	Q	V				
11+ 5	1.1064	1.76	Q	V				
11+10	1.1186	1.77	Q	V				
11+15	1.1309	1.79	Q	V				
11+20	1.1434	1.81	Q	V				
11+25	1.1560	1.83	Q	V				
11+30	1.1687	1.84	Q	V				
11+35	1.1815	1.87	Q	V				
11+40	1.1945	1.88	Q	V				
11+45	1.2076	1.91	Q	V				
11+50	1.2209	1.93	Q	V				
11+55	1.2343	1.95	Q	V				
12+ 0	1.2479	1.97	Q	V				
12+ 5	1.2624	2.11	IQ	V				
12+10	1.2776	2.21	IQ	IV				
12+15	1.2930	2.23	IQ	IV				
12+20	1.3085	2.26	IQ	IV				
12+25	1.3242	2.29	IQ	IV				
12+30	1.3402	2.31	IQ	IV				
12+35	1.3563	2.34	IQ	IV				
12+40	1.3726	2.37	IQ	IV				
12+45	1.3892	2.40	IQ	IV				
12+50	1.4059	2.43	IQ	V				
12+55	1.4229	2.47	IQ	V				
13+ 0	1.4401	2.50	IQ	V				
13+ 5	1.4576	2.54	IQ	V				
13+10	1.4753	2.57	IQ	V				
13+15	1.4933	2.62	IQ	V				
13+20	1.5116	2.65	IQ	V				
13+25	1.5302	2.70	IQ	V				
13+30	1.5491	2.74	IQ	V				
13+35	1.5683	2.79	IQ	V				
13+40	1.5879	2.84	IQ	V				
13+45	1.6078	2.89	IQ	V				

13+50	1.6281	2.95	Q		V			
13+55	1.6488	3.01	Q		V			
14+ 0	1.6699	3.07	Q		V			
14+ 5	1.6915	3.14	Q		V			
14+10	1.7136	3.21	Q		V			
14+15	1.7362	3.29	Q		V			
14+20	1.7594	3.36	Q		V			
14+25	1.7831	3.45	Q		V			
14+30	1.8075	3.54	Q		V			
14+35	1.8326	3.65	Q		V			
14+40	1.8584	3.75	Q		V			
14+45	1.8851	3.88	Q		V			
14+50	1.9127	4.00	Q		V			
14+55	1.9413	4.16	Q		V			
15+ 0	1.9709	4.30	Q		V			
15+ 5	2.0019	4.50	Q		V			
15+10	2.0342	4.69	Q		V			
15+15	2.0683	4.95	Q		V			
15+20	2.1041	5.20	Q		V			
15+25	2.1386	5.01	Q		V			
15+30	2.1730	5.00	Q		V			
15+35	2.2110	5.52	Q		V			
15+40	2.2528	6.07	Q		V			
15+45	2.3012	7.02	Q		V			
15+50	2.3575	8.18	Q		V			
15+55	2.4497	13.38	Q		V			
16+ 0	2.6049	22.53	Q		V			
16+ 5	3.1080	73.05	←		V			
16+10	3.4439	48.77			V			
16+15	3.5042	8.76	Q		V			
16+20	3.5454	5.98	Q		V			
16+25	3.5830	5.46	Q		V			
16+30	3.6184	5.14	Q		V			
16+35	3.6504	4.64	Q		V			
16+40	3.6798	4.27	Q		V			
16+45	3.7071	3.97	Q		V			
16+50	3.7327	3.72	Q		V			
16+55	3.7570	3.52	Q		V			
17+ 0	3.7800	3.34	Q		V			
17+ 5	3.8019	3.19	Q		V			
17+10	3.8229	3.05	Q		V			
17+15	3.8431	2.93	Q		V			
17+20	3.8626	2.83	Q		V			
17+25	3.8814	2.73	Q		V			
17+30	3.8996	2.64	Q		V			
17+35	3.9172	2.56	Q		V			
17+40	3.9344	2.49	Q		V			
17+45	3.9511	2.42	Q		V			
17+50	3.9674	2.36	Q		V			
17+55	3.9832	2.30	Q		V			
18+ 0	3.9987	2.25	Q		V			
18+ 5	4.0131	2.09	Q		V			
18+10	4.0266	1.96	Q		V			
18+15	4.0399	1.92	Q		V			
18+20	4.0528	1.88	Q		V			
18+25	4.0655	1.84	Q		V			
18+30	4.0779	1.80	Q		V			
18+35	4.0901	1.77	Q		V			
18+40	4.1020	1.74	Q		V			
18+45	4.1138	1.71	Q		V			
18+50	4.1253	1.68	Q		V			
18+55	4.1367	1.65	Q		V			
19+ 0	4.1478	1.62	Q		V			
19+ 5	4.1588	1.59	Q		V			
19+10	4.1696	1.57	Q		V			
19+15	4.1803	1.55	Q		V			
19+20	4.1907	1.52	Q		V			
19+25	4.2011	1.50	Q		V			
19+30	4.2113	1.48	Q		V			
19+35	4.2213	1.46	Q		V			

Max allowable
discharge rate = $0.9 * 73.05$
CFS = 65.75
CFS

19+40	4.2313	1.44	Q				V	
19+45	4.2411	1.42	Q				V	
19+50	4.2507	1.40	Q				V	
19+55	4.2603	1.39	Q				V	
20+ 0	4.2697	1.37	Q				V	
20+ 5	4.2790	1.35	Q				V	
20+10	4.2882	1.34	Q				V	
20+15	4.2974	1.32	Q				V	
20+20	4.3064	1.31	Q				V	
20+25	4.3153	1.29	Q				V	
20+30	4.3241	1.28	Q				V	
20+35	4.3328	1.27	Q				V	
20+40	4.3414	1.25	Q				V	
20+45	4.3500	1.24	Q				V	
20+50	4.3584	1.23	Q				V	
20+55	4.3668	1.22	Q				V	
21+ 0	4.3751	1.20	Q				V	
21+ 5	4.3833	1.19	Q				V	
21+10	4.3914	1.18	Q				V	
21+15	4.3995	1.17	Q				V	
21+20	4.4075	1.16	Q				V	
21+25	4.4154	1.15	Q				V	
21+30	4.4232	1.14	Q				V	
21+35	4.4310	1.13	Q				V	
21+40	4.4387	1.12	Q				V	
21+45	4.4464	1.11	Q				V	
21+50	4.4539	1.10	Q				V	
21+55	4.4615	1.09	Q				V	
22+ 0	4.4689	1.08	Q				V	
22+ 5	4.4763	1.07	Q				V	
22+10	4.4837	1.07	Q				V	
22+15	4.4910	1.06	Q				V	
22+20	4.4982	1.05	Q				V	
22+25	4.5054	1.04	Q				V	
22+30	4.5125	1.03	Q				V	
22+35	4.5196	1.03	Q				V	
22+40	4.5266	1.02	Q				V	
22+45	4.5336	1.01	Q				V	
22+50	4.5405	1.01	Q				V	
22+55	4.5474	1.00	Q				V	
23+ 0	4.5542	0.99	Q				V	
23+ 5	4.5610	0.98	Q				V	
23+10	4.5677	0.98	Q				V	
23+15	4.5744	0.97	Q				V	
23+20	4.5811	0.97	Q				V	
23+25	4.5877	0.96	Q				V	
23+30	4.5942	0.95	Q				V	
23+35	4.6008	0.95	Q				V	
23+40	4.6072	0.94	Q				V	
23+45	4.6137	0.94	Q				V	
23+50	4.6201	0.93	Q				V	
23+55	4.6264	0.92	Q				V	
24+ 0	4.6328	0.92	Q				V	
24+ 5	4.6353	0.37	Q				V	

UNIT HYDROGRAPH PROP. CONDITON
100-YEAR 24-HOUR STORM EVENT

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2012, Version 7.1

Study date 03/27/22

+++++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6310

22-305 CATAWBA AVE SPEC INDUSTRIAL
PROPOSED CONDITION
100 YEAR 24 HOUR UH
TOTAL AREAS

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
19.05	1	1.34

Rainfall data for year 100
19.05 6 3.14

Rainfall data for year 100
19.05 24 5.73

+++++

***** Area-averaged max loss rate, Fm *****

SCS curve No. (AMCII)	SCS curve NO. (AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	19.05	1.000	0.785	0.070	0.055

Area-averaged adjusted loss rate Fm (In/Hr) = 0.055

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.33	0.070	32.0	52.0	9.23	0.201
17.72	0.930	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.905

Area-averaged low loss fraction, Yb = 0.095

+++++

Watercourse length = 1677.00(Ft.)
 Length from concentration point to centroid = 1268.00(Ft.)
 Elevation difference along watercourse = 16.70(Ft.)
 Mannings friction factor along watercourse = 0.015
 Watershed area = 19.05(Ac.)
 Catchment Lag time = 0.064 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 130.6669
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.055(In/Hr)
 Average low loss rate fraction (Yb) = 0.095 (decimal)
 VALLEY DEVELOPED S-Graph Selected
 Computed peak 5-minute rainfall = 0.496(In)
 Computed peak 30-minute rainfall = 1.016(In)
 Specified peak 1-hour rainfall = 1.340(In)
 Computed peak 3-hour rainfall = 2.259(In)
 Specified peak 6-hour rainfall = 3.140(In)
 Specified peak 24-hour rainfall = 5.730(In)

Rainfall depth area reduction factors:

Using a total area of 19.05(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.496(In)
30-minute factor = 0.999	Adjusted rainfall = 1.015(In)
1-hour factor = 0.999	Adjusted rainfall = 1.339(In)
3-hour factor = 1.000	Adjusted rainfall = 2.258(In)
6-hour factor = 1.000	Adjusted rainfall = 3.140(In)
24-hour factor = 1.000	Adjusted rainfall = 5.730(In)

 Total soil rain loss = 0.47(In)
 Total effective rainfall = 5.26(In)
 Peak flow rate in flood hydrograph = 80.76(CFS)

+-----+
 24 - H O U R S T O R M
 R u n o f f H y d r o g r a p h

 Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	22.5	45.0	67.5	90.0
0+ 5	0.0035	0.50	Q					
0+10	0.0148	1.65	Q					
0+15	0.0273	1.81	Q					
0+20	0.0398	1.81	Q					
0+25	0.0523	1.82	Q					
0+30	0.0649	1.82	Q					
0+35	0.0775	1.83	Q					
0+40	0.0901	1.84	Q					
0+45	0.1028	1.84	Q					
0+50	0.1155	1.85	Q					
0+55	0.1283	1.85	Q					
1+ 0	0.1411	1.86	Q					
1+ 5	0.1539	1.86	Q					
1+10	0.1668	1.87	Q					
1+15	0.1797	1.88	Q					
1+20	0.1927	1.88	Q					
1+25	0.2057	1.89	Q					
1+30	0.2187	1.89	QV					
1+35	0.2318	1.90	QV					
1+40	0.2449	1.91	QV					
1+45	0.2581	1.91	QV					
1+50	0.2713	1.92	QV					
1+55	0.2846	1.92	QV					
2+ 0	0.2979	1.93	QV					
2+ 5	0.3112	1.94	QV					

2+10	0.3246	1.94	QV				
2+15	0.3381	1.95	QV				
2+20	0.3516	1.96	QV				
2+25	0.3651	1.96	QV				
2+30	0.3787	1.97	QV				
2+35	0.3923	1.98	QV				
2+40	0.4060	1.99	QV				
2+45	0.4197	1.99	Q V				
2+50	0.4334	2.00	Q V				
2+55	0.4473	2.01	Q V				
3+ 0	0.4611	2.01	Q V				
3+ 5	0.4750	2.02	Q V				
3+10	0.4890	2.03	Q V				
3+15	0.5030	2.04	Q V				
3+20	0.5171	2.04	Q V				
3+25	0.5312	2.05	Q V				
3+30	0.5454	2.06	Q V				
3+35	0.5596	2.07	Q V				
3+40	0.5739	2.07	Q V				
3+45	0.5882	2.08	Q V				
3+50	0.6026	2.09	Q V				
3+55	0.6171	2.10	Q V				
4+ 0	0.6316	2.11	Q V				
4+ 5	0.6461	2.11	Q V				
4+10	0.6608	2.12	Q V				
4+15	0.6754	2.13	Q V				
4+20	0.6902	2.14	Q V				
4+25	0.7050	2.15	Q V				
4+30	0.7198	2.16	Q V				
4+35	0.7347	2.16	Q V				
4+40	0.7497	2.17	Q V				
4+45	0.7647	2.18	Q V				
4+50	0.7798	2.19	Q V				
4+55	0.7950	2.20	Q V				
5+ 0	0.8102	2.21	Q V				
5+ 5	0.8255	2.22	Q V				
5+10	0.8409	2.23	Q V				
5+15	0.8563	2.24	Q V				
5+20	0.8718	2.25	Q V				
5+25	0.8873	2.26	IQ V				
5+30	0.9030	2.27	IQ V				
5+35	0.9187	2.28	IQ V				
5+40	0.9344	2.29	IQ V				
5+45	0.9503	2.30	IQ V				
5+50	0.9662	2.31	IQ V				
5+55	0.9822	2.32	IQ V				
6+ 0	0.9982	2.33	IQ V				
6+ 5	1.0144	2.34	IQ V				
6+10	1.0306	2.35	IQ V				
6+15	1.0469	2.36	IQ V				
6+20	1.0632	2.38	IQ V				
6+25	1.0797	2.39	IQ V				
6+30	1.0962	2.40	IQ V				
6+35	1.1128	2.41	IQ V				
6+40	1.1295	2.42	IQ V				
6+45	1.1463	2.43	IQ V				
6+50	1.1631	2.45	IQ V				
6+55	1.1801	2.46	IQ V				
7+ 0	1.1971	2.47	IQ V				
7+ 5	1.2142	2.49	IQ V				
7+10	1.2314	2.50	IQ V				
7+15	1.2487	2.51	IQ V				
7+20	1.2661	2.53	IQ V				
7+25	1.2836	2.54	IQ V				
7+30	1.3012	2.55	IQ V				
7+35	1.3189	2.57	IQ V				
7+40	1.3367	2.58	IQ V				
7+45	1.3545	2.60	IQ V				
7+50	1.3725	2.61	IQ V				
7+55	1.3906	2.62	IQ V				

8+ 0	1.4088	2.64	Q	V				
8+ 5	1.4271	2.66	Q	V				
8+10	1.4455	2.67	Q	V				
8+15	1.4640	2.69	Q	V				
8+20	1.4826	2.70	Q	V				
8+25	1.5014	2.72	Q	V				
8+30	1.5202	2.74	Q	V				
8+35	1.5392	2.75	Q	V				
8+40	1.5583	2.77	Q	V				
8+45	1.5775	2.79	Q	V				
8+50	1.5968	2.81	Q	V				
8+55	1.6163	2.82	Q	V				
9+ 0	1.6359	2.85	Q	V				
9+ 5	1.6556	2.86	Q	V				
9+10	1.6754	2.88	Q	V				
9+15	1.6954	2.90	Q	V				
9+20	1.7156	2.92	Q	V				
9+25	1.7358	2.94	Q	V				
9+30	1.7562	2.96	Q	V				
9+35	1.7768	2.98	Q	V				
9+40	1.7975	3.01	Q	V				
9+45	1.8184	3.03	Q	V				
9+50	1.8394	3.05	Q	V				
9+55	1.8605	3.07	Q	V				
10+ 0	1.8819	3.10	Q	V				
10+ 5	1.9034	3.12	Q	V				
10+10	1.9251	3.15	Q	V				
10+15	1.9469	3.17	Q	V				
10+20	1.9689	3.20	Q	V				
10+25	1.9911	3.22	Q	V				
10+30	2.0135	3.25	Q	V				
10+35	2.0361	3.28	Q	V				
10+40	2.0589	3.31	Q	V				
10+45	2.0818	3.33	Q	V				
10+50	2.1050	3.37	Q	V				
10+55	2.1284	3.39	Q	V				
11+ 0	2.1520	3.43	Q	V				
11+ 5	2.1758	3.46	Q	V				
11+10	2.1999	3.49	Q	V				
11+15	2.2241	3.52	Q	V				
11+20	2.2486	3.56	Q	V				
11+25	2.2734	3.59	Q	V				
11+30	2.2984	3.63	Q	V				
11+35	2.3237	3.67	Q	V				
11+40	2.3492	3.71	Q	V				
11+45	2.3750	3.74	Q	V				
11+50	2.4011	3.79	Q	V				
11+55	2.4275	3.83	Q	V				
12+ 0	2.4541	3.88	Q	V				
12+ 5	2.4818	4.02	Q	V				
12+10	2.5115	4.31	Q	V				
12+15	2.5418	4.39	Q	V				
12+20	2.5724	4.44	Q	V				
12+25	2.6033	4.49	Q	V				
12+30	2.6346	4.55	Q	V				
12+35	2.6663	4.60	Q	V				
12+40	2.6984	4.66	Q	V				
12+45	2.7309	4.72	Q	V				
12+50	2.7638	4.78	Q	V				
12+55	2.7972	4.84	Q	V				
13+ 0	2.8310	4.92	Q	V				
13+ 5	2.8653	4.98	Q	V				
13+10	2.9002	5.06	Q	V				
13+15	2.9355	5.13	Q	V				
13+20	2.9714	5.22	Q	V				
13+25	3.0079	5.29	Q	V				
13+30	3.0449	5.39	Q	V				
13+35	3.0826	5.47	Q	V				
13+40	3.1210	5.57	Q	V				
13+45	3.1600	5.67	Q	V				

13+50	3.1999	5.78	Q		V			
13+55	3.2404	5.89	Q		V			
14+ 0	3.2818	6.02	Q		V			
14+ 5	3.3241	6.13	Q		V			
14+10	3.3673	6.29	Q		V			
14+15	3.4116	6.42	Q		V			
14+20	3.4569	6.59	Q		V			
14+25	3.5033	6.74	Q		V			
14+30	3.5510	6.93	Q		V			
14+35	3.6000	7.11	Q		V			
14+40	3.6505	7.33	Q		V			
14+45	3.7024	7.54	Q		V			
14+50	3.7562	7.81	Q		V			
14+55	3.8118	8.07	Q		V			
15+ 0	3.8696	8.40	Q		V			
15+ 5	3.9296	8.71	Q		V			
15+10	3.9924	9.13	Q		V			
15+15	4.0581	9.54	Q		V			
15+20	4.1276	10.09	Q		V			
15+25	4.1976	10.16	Q		V			
15+30	4.2650	9.78	Q		V			
15+35	4.3371	10.47	Q		V			
15+40	4.4180	11.75	Q		V			
15+45	4.5094	13.28	Q		V			
15+50	4.6179	15.74	Q		V			
15+55	4.7525	19.55	Q		V			
16+ 0	4.9424	27.58		Q	V			
16+ 5	5.3300	56.27			Q			
16+10	5.8862	80.76			V		Q	
16+15	6.0681	26.41		Q	V			
16+20	6.1613	13.53	Q		V			
16+25	6.2375	11.07	Q		V			
16+30	6.3103	10.57	Q		V			
16+35	6.3761	9.55	Q		V			
16+40	6.4361	8.72	Q		V			
16+45	6.4917	8.07	Q		V			
16+50	6.5436	7.54	Q		V			
16+55	6.5925	7.11	Q		V			
17+ 0	6.6389	6.74	Q		V			
17+ 5	6.6831	6.41	Q		V			
17+10	6.7253	6.13	Q		V			
17+15	6.7658	5.88	Q		V			
17+20	6.8049	5.66	Q		V			
17+25	6.8425	5.47	Q		V			
17+30	6.8789	5.29	Q		V			
17+35	6.9142	5.13	Q		V			
17+40	6.9485	4.98	Q		V			
17+45	6.9819	4.84	Q		V			
17+50	7.0143	4.72	Q		V			
17+55	7.0460	4.60	Q		V			
18+ 0	7.0769	4.49	Q		V			
18+ 5	7.1064	4.28	Q		V			
18+10	7.1336	3.95	Q		V			
18+15	7.1600	3.83	Q		V			
18+20	7.1857	3.74	Q		V			
18+25	7.2110	3.67	Q		V			
18+30	7.2357	3.59	Q		V			
18+35	7.2600	3.52	Q		V			
18+40	7.2838	3.46	Q		V			
18+45	7.3071	3.39	Q		V			
18+50	7.3301	3.33	Q		V			
18+55	7.3527	3.28	Q		V			
19+ 0	7.3748	3.22	Q		V			
19+ 5	7.3967	3.17	Q		V			
19+10	7.4182	3.12	Q		V			
19+15	7.4393	3.07	Q		V			
19+20	7.4602	3.03	Q		V			
19+25	7.4807	2.98	Q		V			
19+30	7.5010	2.94	Q		V			
19+35	7.5210	2.90	Q		V			

19+40	7.5407	2.86	IQ				V	
19+45	7.5601	2.82	IQ				V	
19+50	7.5793	2.79	IQ				V	
19+55	7.5983	2.75	IQ				V	
20+ 0	7.6170	2.72	IQ				V	
20+ 5	7.6355	2.69	IQ				V	
20+10	7.6538	2.65	IQ				V	
20+15	7.6719	2.62	IQ				V	
20+20	7.6897	2.59	IQ				V	
20+25	7.7074	2.57	IQ				V	
20+30	7.7249	2.54	IQ				V	
20+35	7.7422	2.51	IQ				V	
20+40	7.7593	2.48	IQ				V	
20+45	7.7762	2.46	IQ				V	
20+50	7.7930	2.43	IQ				V	
20+55	7.8096	2.41	IQ				V	
21+ 0	7.8260	2.39	IQ				V	
21+ 5	7.8423	2.36	IQ				V	
21+10	7.8585	2.34	IQ				V	
21+15	7.8744	2.32	IQ				V	
21+20	7.8903	2.30	IQ				V	
21+25	7.9060	2.28	IQ				V	
21+30	7.9215	2.26	IQ				V	
21+35	7.9369	2.24	Q				V	
21+40	7.9522	2.22	Q				V	
21+45	7.9674	2.20	Q				V	
21+50	7.9824	2.18	Q				V	
21+55	7.9973	2.16	Q				V	
22+ 0	8.0121	2.15	Q				V	
22+ 5	8.0268	2.13	Q				V	
22+10	8.0413	2.11	Q				V	
22+15	8.0558	2.10	Q				V	
22+20	8.0701	2.08	Q				V	
22+25	8.0843	2.07	Q				V	
22+30	8.0984	2.05	Q				V	
22+35	8.1125	2.03	Q				V	
22+40	8.1264	2.02	Q				V	
22+45	8.1402	2.01	Q				V	
22+50	8.1539	1.99	Q				V	
22+55	8.1675	1.98	Q				V	
23+ 0	8.1810	1.96	Q				V	
23+ 5	8.1945	1.95	Q				V	
23+10	8.2078	1.94	Q				V	
23+15	8.2211	1.92	Q				V	
23+20	8.2343	1.91	Q				V	
23+25	8.2473	1.90	Q				V	
23+30	8.2603	1.89	Q				V	
23+35	8.2732	1.88	Q				V	
23+40	8.2861	1.86	Q				V	
23+45	8.2988	1.85	Q				V	
23+50	8.3115	1.84	Q				V	
23+55	8.3241	1.83	Q				V	
24+ 0	8.3366	1.82	Q				V	
24+ 5	8.3456	1.31	Q				V	
24+10	8.3467	0.15	Q				V	

HYDRAFLOW CALCULATIONS

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	73.05	5	965	201,921	-----	-----	-----	Existing 24 hour storm
3	Manual	80.76	5	970	363,567	-----	-----	-----	Proposed 24 hour storm
4	Diversion1	2.890	5	880	217,305	3	-----	-----	Infiltration
5	Diversion2	77.87	5	970	146,262	3	-----	-----	<no description>
6	Reservoir	16.67	5	980	61,344	5	1007.45	110,689	Prop new 24hr infiltra
Hydroflow infiltration calcs_manual input with infiltration period: 100 Year					Friday, 04 / 1 / 2022				

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

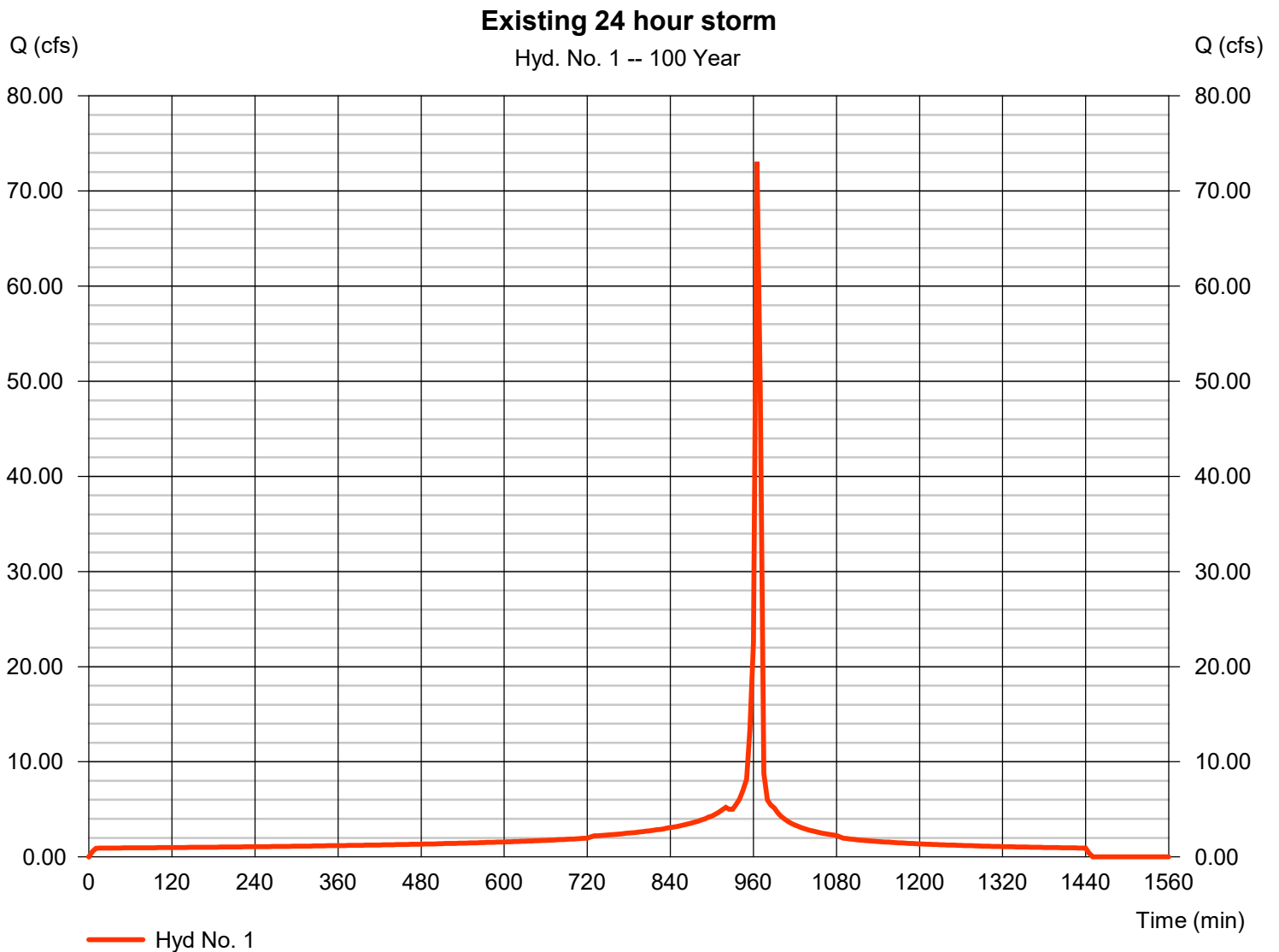
Friday, 04 / 1 / 2022

Hyd. No. 1

Existing 24 hour storm

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 5 min

Peak discharge = 73.05 cfs
Time to peak = 965 min
Hyd. volume = 201,921 cuft

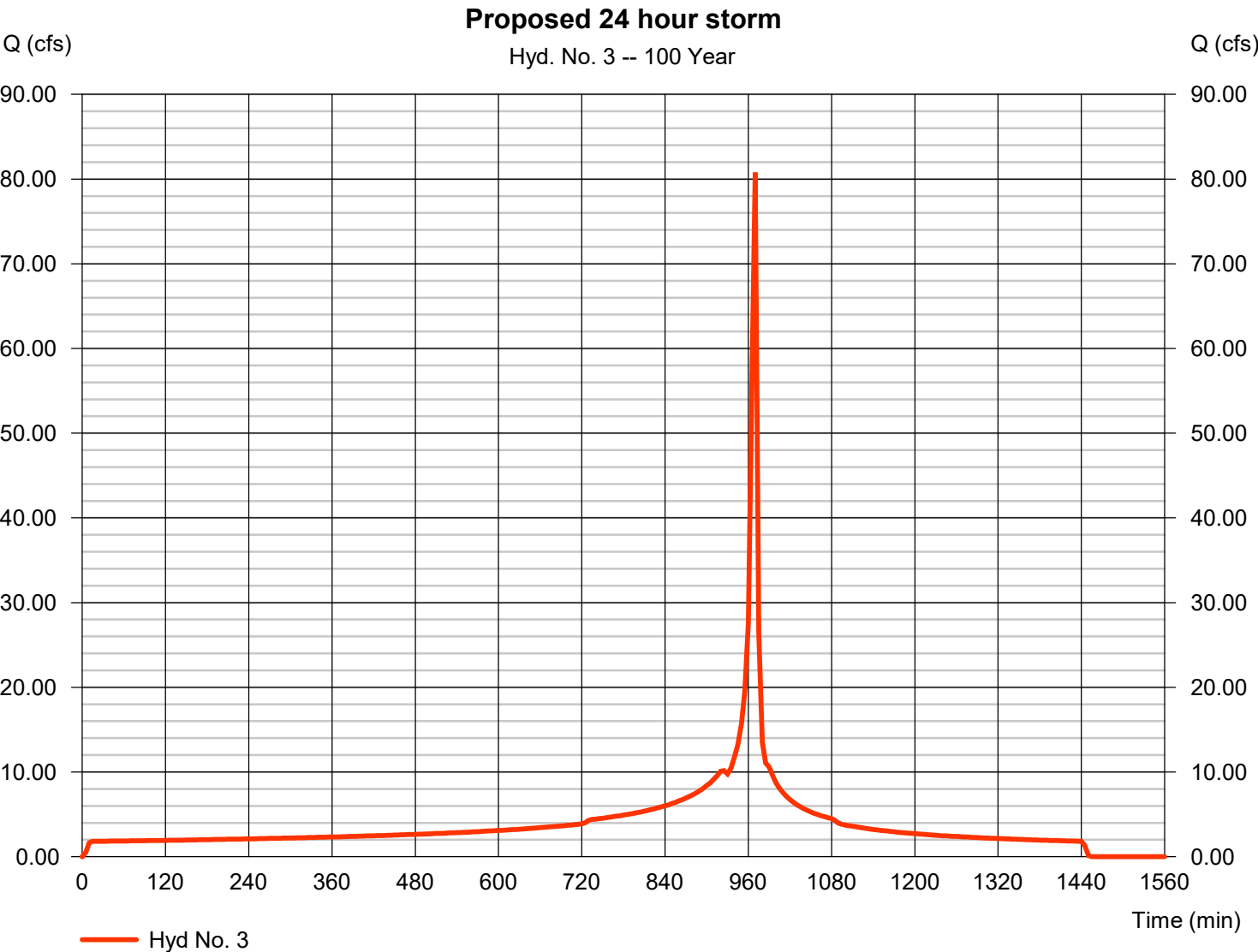


Hydrograph Report

Hyd. No. 3

Proposed 24 hour storm

Hydrograph type	= Manual	Peak discharge	= 80.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 970 min
Time interval	= 5 min	Hyd. volume	= 363,567 cuft

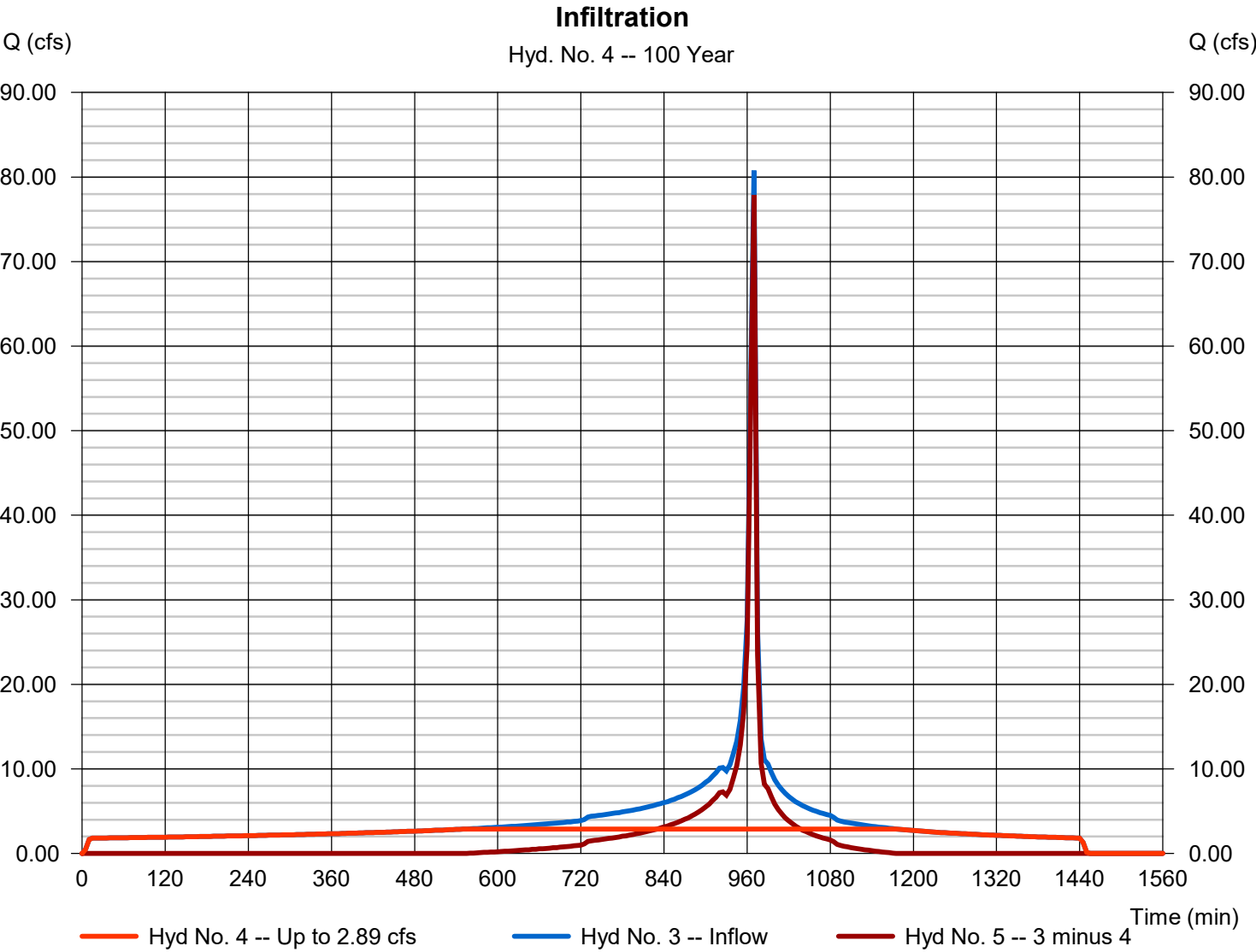


Hydrograph Report

Hyd. No. 4

Infiltration

Hydrograph type	=	Diversion1	Peak discharge	=	2.890 cfs
Storm frequency	=	100 yrs	Time to peak	=	880 min
Time interval	=	5 min	Hyd. volume	=	217,305 cuft
Inflow hydrograph	=	3 - Proposed 24 hour storm	2nd diverted hyd.	=	5
Diversion method	=	Constant Q	Constant Q	=	2.89 cfs



Hydrograph Report

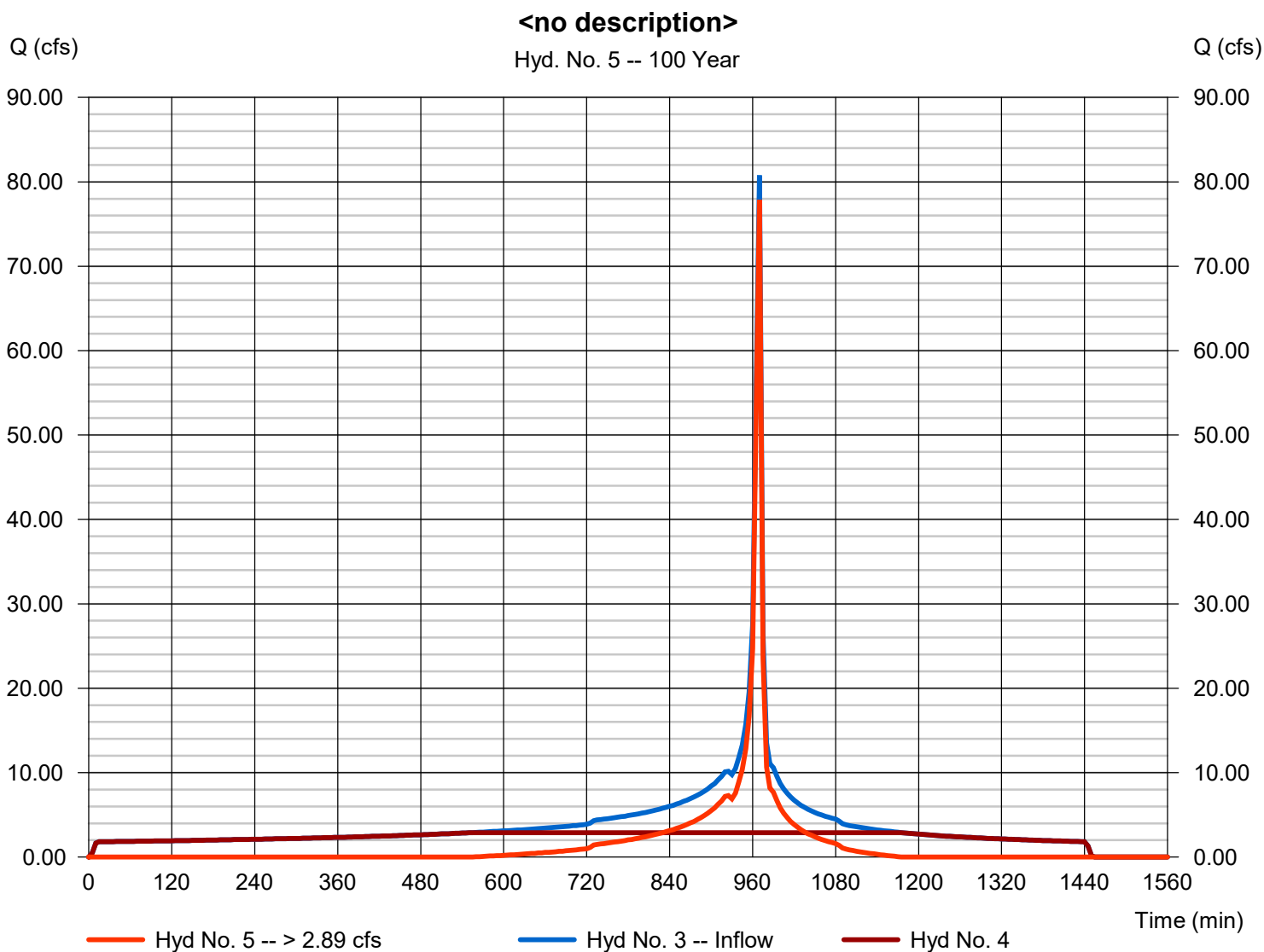
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Friday, 04 / 1 / 2022

Hyd. No. 5

<no description>

Hydrograph type	= Diversion2	Peak discharge	= 77.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 970 min
Time interval	= 5 min	Hyd. volume	= 146,262 cuft
Inflow hydrograph	= 3 - Proposed 24 hour storm	2nd diverted hyd.	= 4
Diversion method	= Constant Q	Constant Q	= 2.89 cfs



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

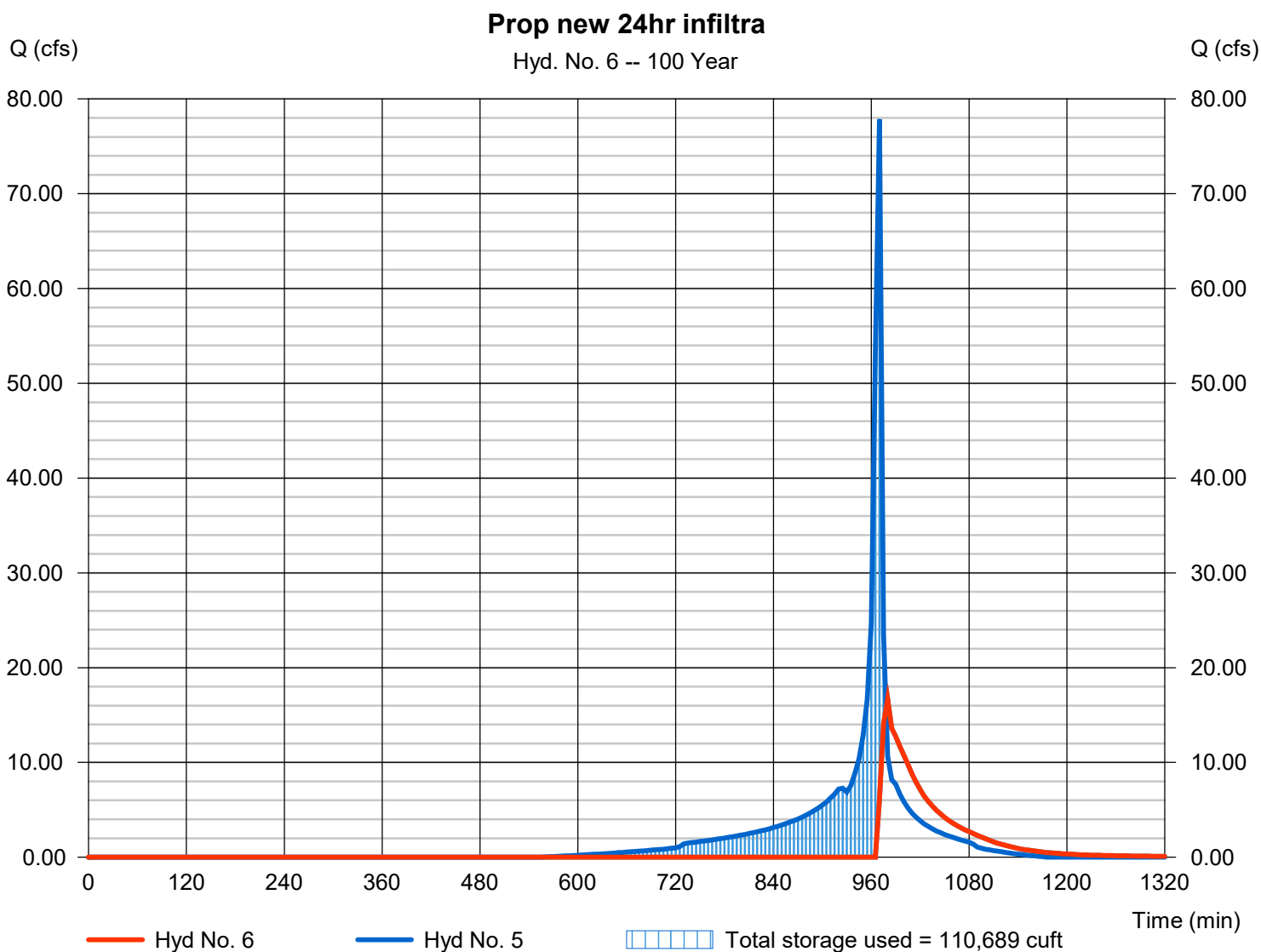
Friday, 04 / 1 / 2022

Hyd. No. 6

Prop new 24hr infiltra

Hydrograph type	= Reservoir	Peak discharge	= 16.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 980 min
Time interval	= 5 min	Hyd. volume	= 61,344 cuft
Inflow hyd. No.	= 5 - <no description>	Max. Elevation	= 1007.45 ft
Reservoir name	= Infiltration Basin	Max. Storage	= 110,689 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 1 - Infiltration Basin

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1001.85	n/a	0	0
0.75	1002.60	n/a	8,357	8,357
1.25	1003.10	n/a	12,414	20,771
1.75	1003.60	n/a	12,238	33,010
2.25	1004.10	n/a	12,002	45,012
2.75	1004.60	n/a	11,692	56,704
3.25	1005.10	n/a	11,294	67,998
3.75	1005.60	n/a	10,799	78,797
4.25	1006.10	n/a	10,171	88,968
4.75	1006.60	n/a	9,350	98,318
5.25	1007.10	n/a	8,123	106,441
5.75	1007.60	n/a	6,145	112,586
6.75	1008.60	n/a	11,147	123,733
7.35	1009.20	n/a	1	123,734
7.37	1009.22	n/a	1	123,735
7.87	1009.72	n/a	1	123,736

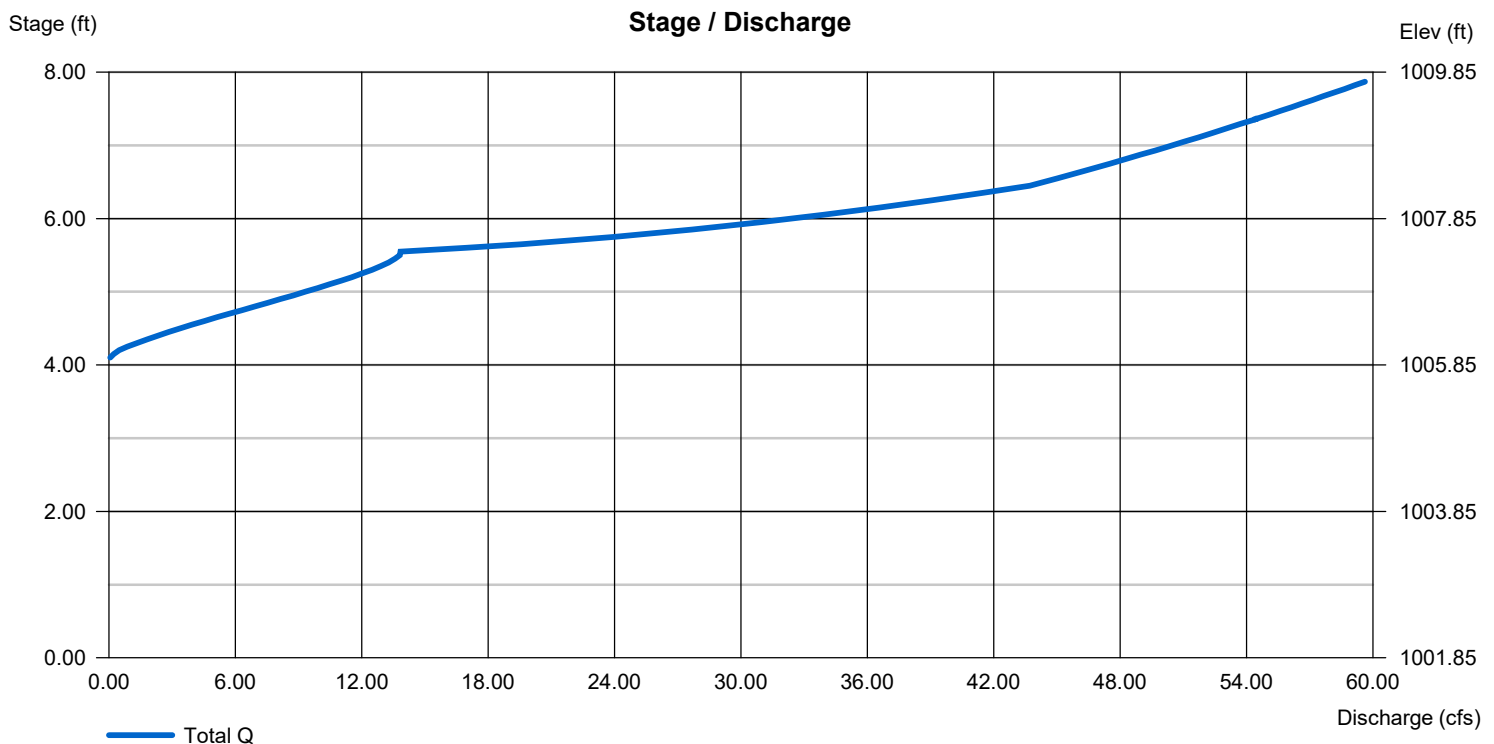
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 4	0	0	0
Invert El. (ft)	= 1005.90	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 1007.30	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 6.570 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



LID BMP Performance Criteria for Design Capture Volume1-hour rainfall depth (in) for a 2-year return period from http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca =

0.519

DA#	Area		Pervious Area			Impervious Area			Runoff Coefficient t (Rc)	Mean 6-hr Precipitation P ₆ (in)	Drawdown Rate	Design Capture Vol. DCV (ft ³)
	s.f.	acres	s.f.	acres	%	s.f.	acres	%				
DMA-1	808,578	18.56	58,481	1.34	7.23%	750,097	17.22	92.77%	0.772	0.77	48-hrs	78,445
Total	808,578		58,481			750,097						78,445

Note:

See Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume for more information.

BMP Sizing Calculation**Total Volume Provided 78,797 CF. Refer to manufacturer Cutsheet Attacehd.**

DRAW-DOWN TIME CALCULATION

PROJECT: 22-305 CATAWBA AVE SPEC INDUSTRIAL

PERCOLATION LOCATION: Basin A

Total Storage Volume	Percolation Rate (1)	Area (2)	Infiltration Rate	Draw Down Time
CF	Inch/Hour	SF	CFS	Hour
78,797	4.38	28,416	2.88	7.60

< 48 Hours

-- Green Cells are output

Note:

- 1.) See Appendix C for Percolation Test Results
- 2.) Footprint of proposed underground basin per BMP sizing calculations

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	.25
		Predominant soil texture	0.25	1	.25
		Site soil variability	0.25	1	.25
		Depth to groundwater / impervious layer	0.25	1	.25
		Suitability Assessment Safety Factor, S _A = Σp			
B	Design	Tributary area size	0.25	3	.75
		Level of pretreatment/ expected sediment loads	0.25	3	.75
		Redundancy	0.25	3	.75
		Compaction during construction	0.25	3	.75
		Design Safety Factor, S _B = Σp			
Combined Safety Factor, S _{TOT} = S _A x S _B				3	
Measured Infiltration Rate, inch/hr, K _M (corrected for test-specific bias)				13.13	
Design Infiltration Rate, in/hr, K _{DESIGN} = ~~S_{TOT} × K_M~~ Stot/Km				4.38	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms:					

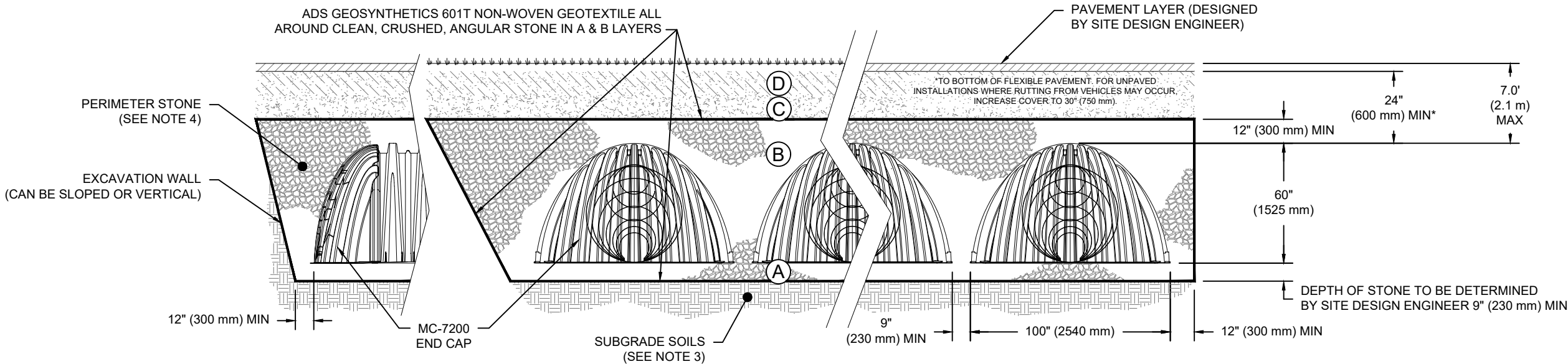
Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

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

PLEASE NOTE:

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



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

22-305 CATAWBA & ROSE

FONTANA, CA

DRAWN: JL

DATE:

CHECKED: N/A

PROJECT #:

DESCRIPTION

ЧК

DRW

ATE

StormTech®
Chamber System

888-892-2694 | WWW.STORMTECH.COM

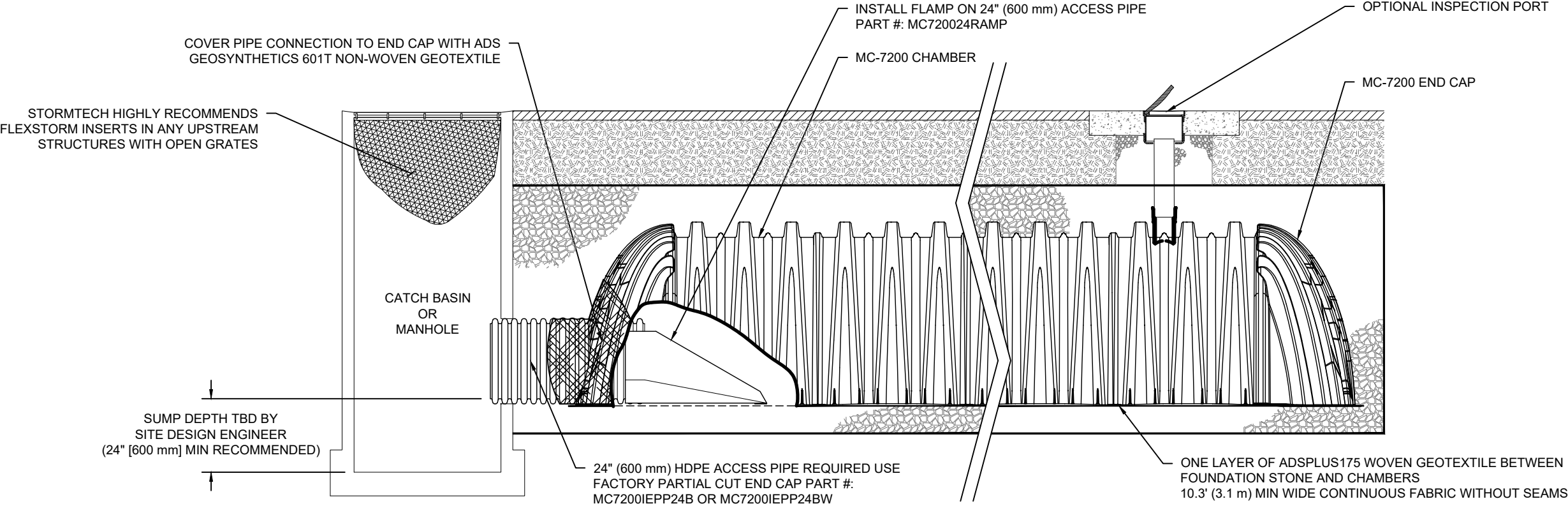
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



SHEET

3 OF 5

THIS DRAWING WAS PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PROPOSED CONSTRUCTION AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.



MC-7200 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
 - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
 - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
 - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
 - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
 - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
 - B. ALL ISOLATOR PLUS ROWS
 - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
 - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
 - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
 - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
 - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
 - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
 - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

22-305 CATAWBA & ROSE

FONTANA, CA

DRAWN: JL

CHECKED: N/A

DATE:

PROJECT #:

DESCRIPTION

CHK

DRW

DATE

StormTech®
Chamber System

888-892-2694 | WWW.STORMTECH.COM

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

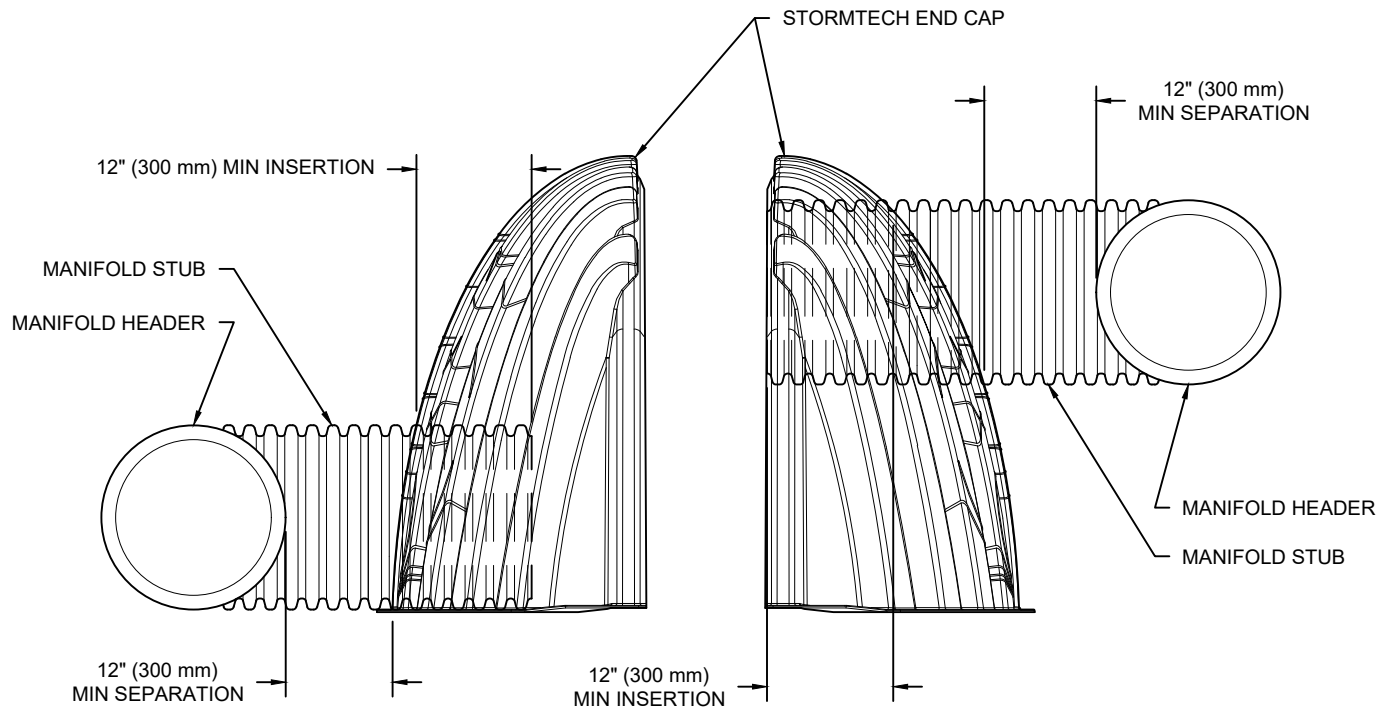
ADS

SHEET

4 OF 5

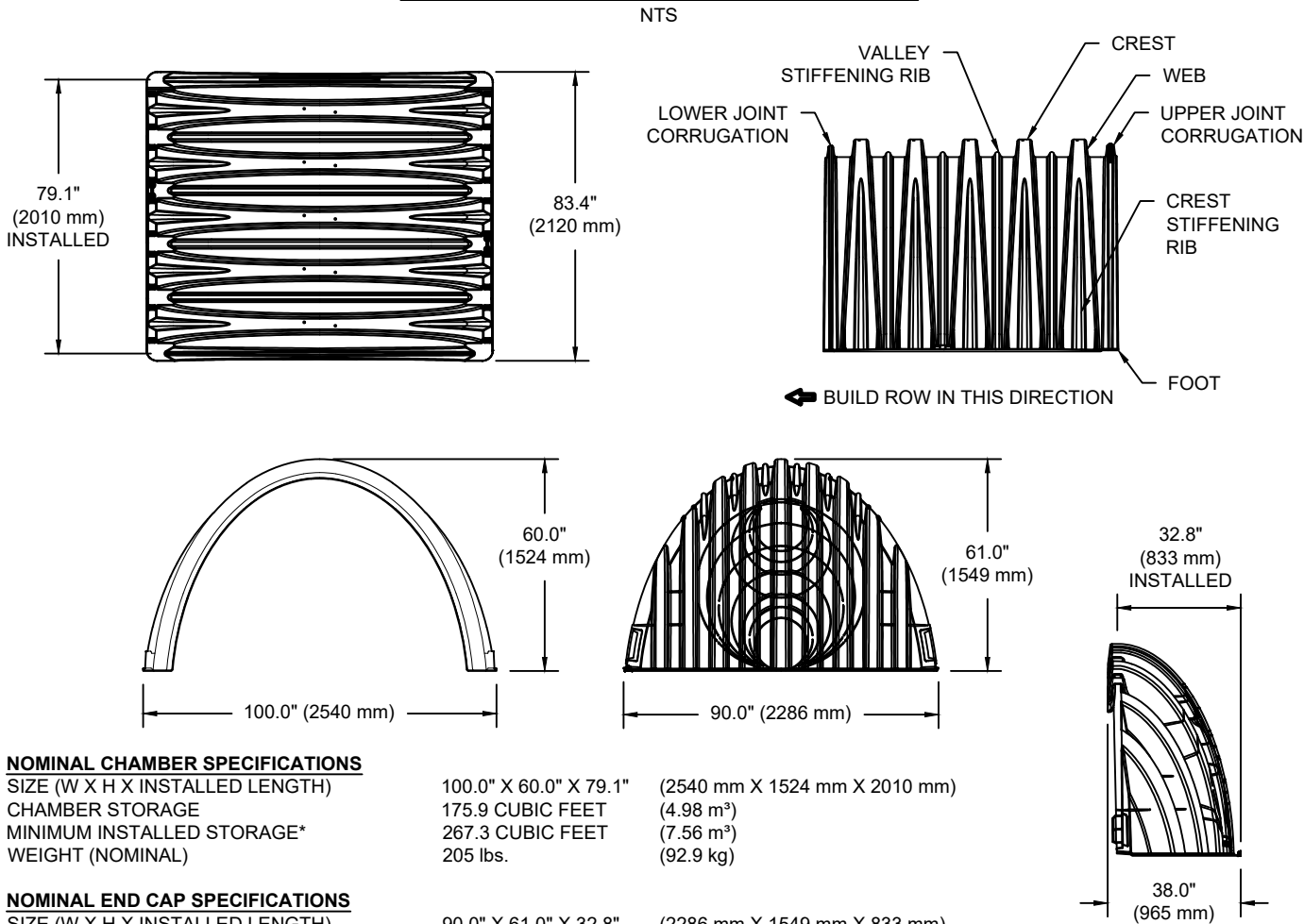
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

MC-SERIES END CAP INSERTION DETAIL



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

MC-7200 TECHNICAL SPECIFICATION



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

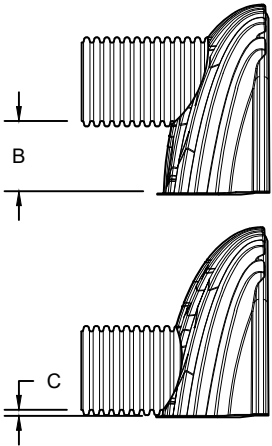
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

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

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200IEPP06B		---	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200IEPP08B		---	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200IEPP10B		---	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200IEPP12B		---	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200IEPP15B		---	1.70" (43 mm)
MC7200IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC7200IEPP18TW		---	1.97" (50 mm)
MC7200IEPP18B			
MC7200IEPP18BW	24" (600 mm)	23.05" (585 mm)	---
MC7200IEPP24T			
MC7200IEPP24TW		---	2.26" (57 mm)
MC7200IEPP24B			
MC7200IEPP24BW	30" (750 mm)	---	2.95" (75 mm)
MC7200IEPP30BW			
MC7200IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

22-305 CATAWBA & ROSE

FONTANA, CA

DRAWN: JL

CHECKED: N/A

DATE:

PROJECT #:

DESCRIPTION

CHK

DATE

DRW

DATE

CHK

DATE

DATE

DATE

DATE

DATE

DATE

StormTech®
Chamber System

888-892-2694 | WWW.STORMTECH.COM

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

ADS

SHEET

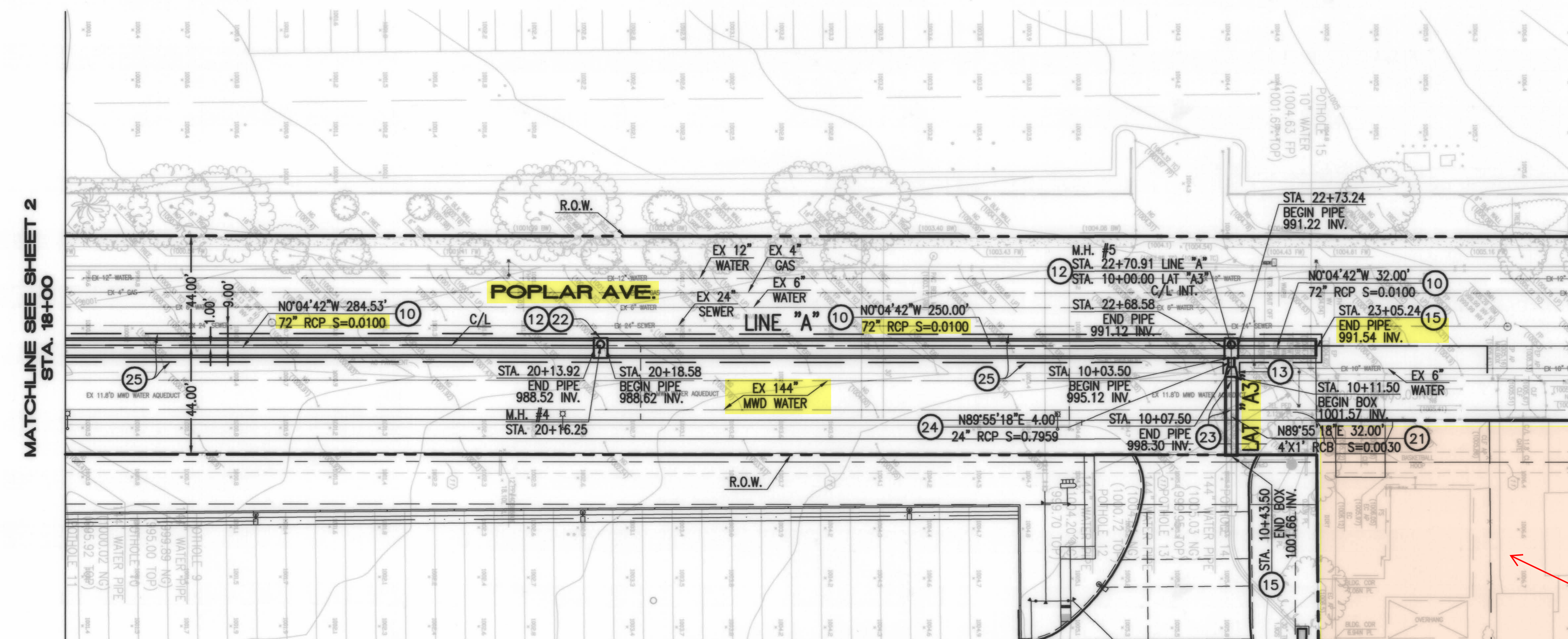
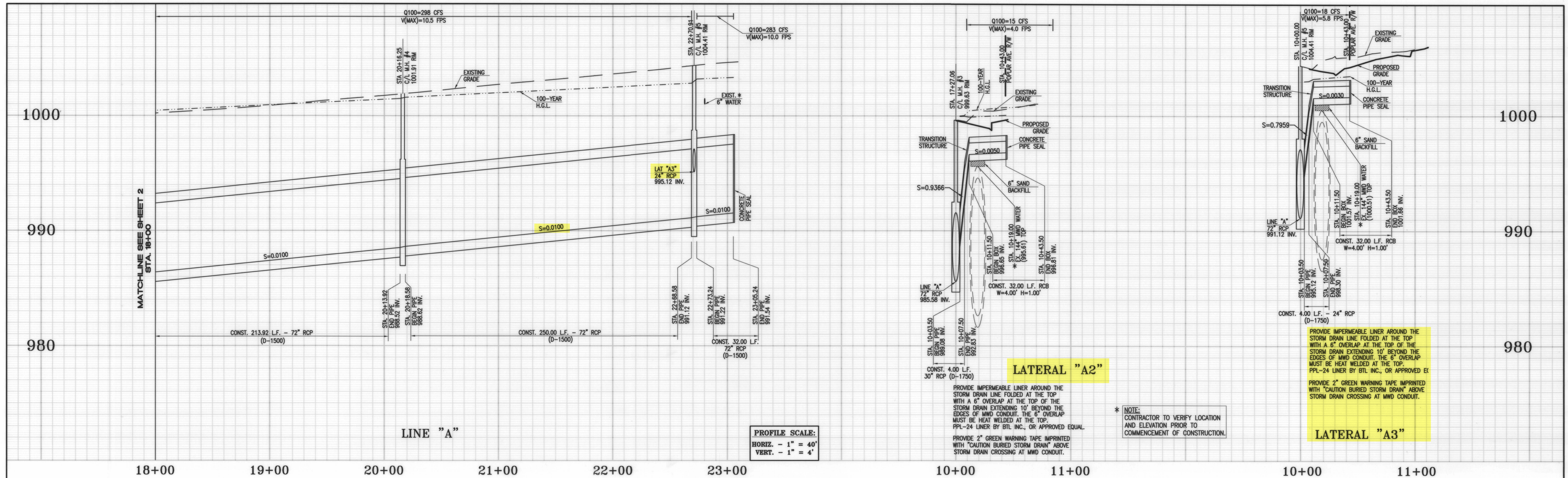
5 OF 5

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

Technical Appendix E

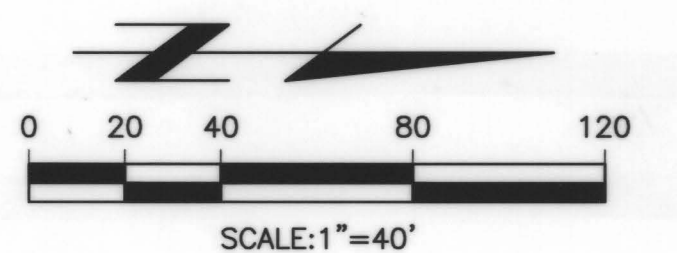
A. Existing Storm Drain As-Built Plans

B. Pipe Hydraulic Calculations



STORM DRAIN CONSTRUCTION NOTES

10. CONSTRUCT 72" R.C.P., D-1500, BEDDING PER CITY OF FONTANA DETAIL ON SHEET 4.
12. CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN NO. 3012.
13. CONSTRUCT TRANSITION STRUCTURE RCB TO PIPE PER S.P.P.W.C. STD. PLAN NO. 342-2.
15. CONSTRUCT PIPE SEAL PER S.B.C.F.C.D. STD. PLAN NO. S.P. 176.
21. CONSTRUCT REINFORCED CONCRETE BOX CULVERT PER L.A.C.D.P.W. STD. PLAN NO. 3053-0, SIZE PER PLAN. SEE DETAIL ON SHEET 4.
22. CONSTRUCT PRESSURE MANHOLE SHAFT PER CITY OF FONTANA STD. PLAN NO. 3016 PRESSURE FRAME AND COVER PER CITY STD. PLAN NO. 3018.
23. PROVIDE 6" BACKFILL LAYER OF SAND BETWEEN STORM DRAIN AND MWD PIPELINE.
24. CONSTRUCT 24" R.C.P., D-1750, BEDDING PER CITY OF FONTANA DETAIL ON SHEET 4.
25. SAWCUT, REMOVE AND REPLACE EXISTING PAVEMENT PER CITY OF FONTANA STD. PLAN NO. 1008.



Last Update: 3/26/15
C:\3200-3299\3212\STORM DRAIN\3212SD-03.dwg

WDID# 8-36C371179



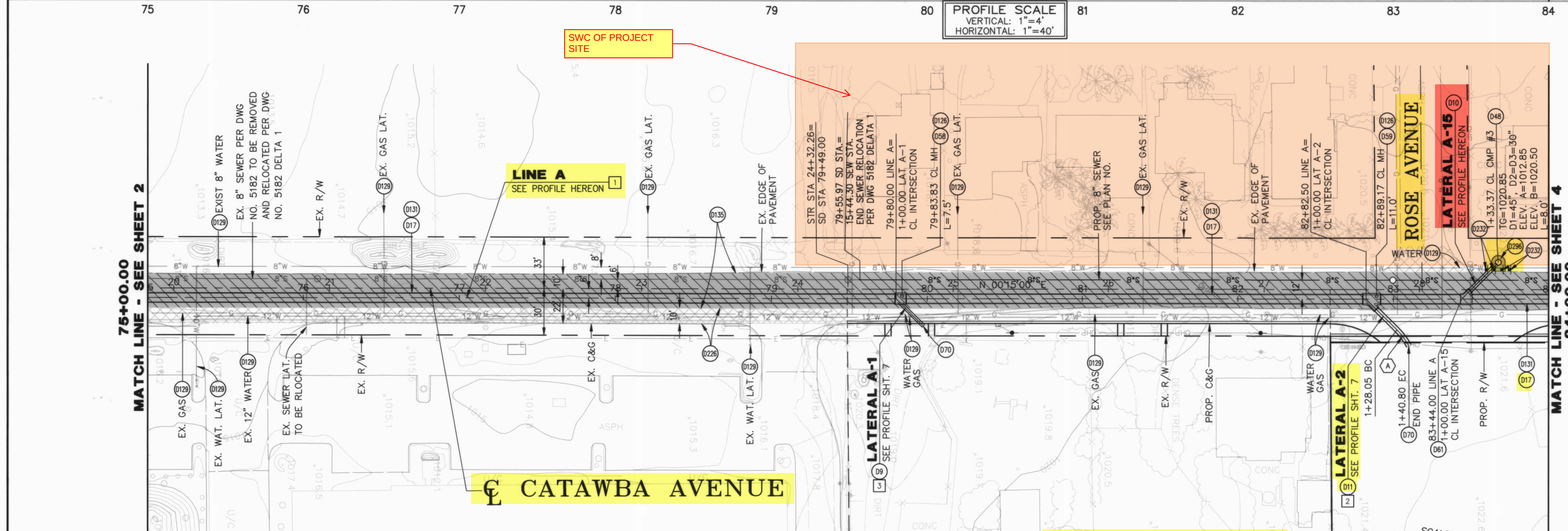
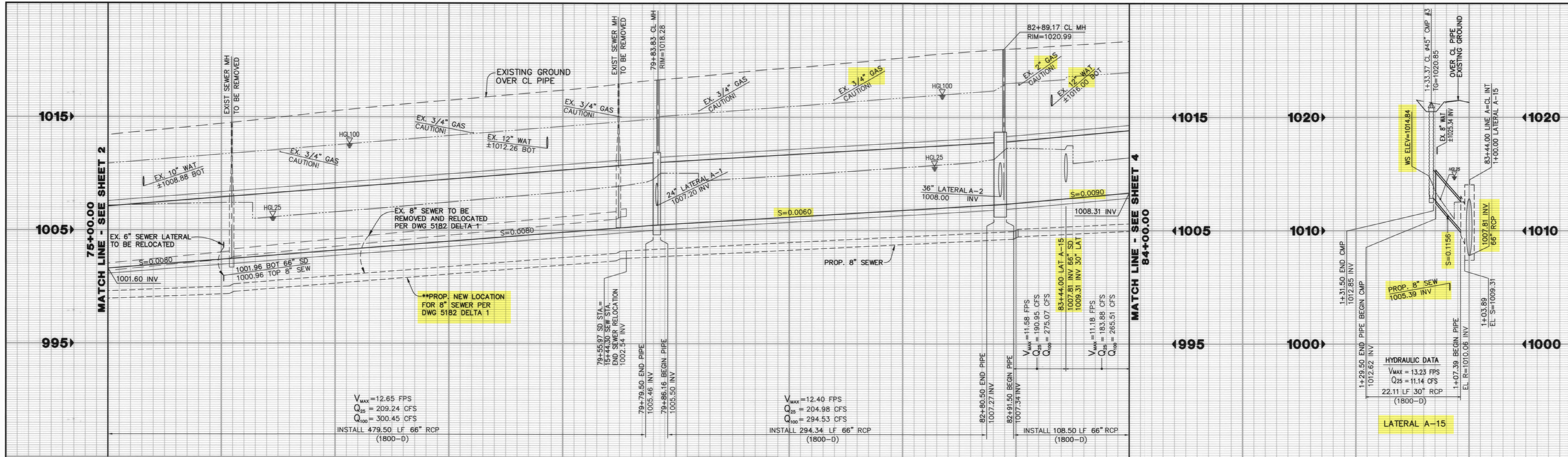
REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.



Prepared Under The Supervision Of :
Thienes Engineering, Inc.
CIVIL ENGINEERING & LAND SURVEYING
14345 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH: (714) 521-4611 FAX: (714) 521-4173
Date: 4/1/15
REINHARD STENZEL R.C.E. NO. 56155

CITY OF FONTANA, CALIFORNIA			
STORM DRAIN PLAN			
POPLAR AVENUE			
STORM DRAIN			
PLAN AND PROFILE			
DRAWN BY: RH	DESIGNED BY: BW	CHECKED BY: RCS	APPROVED BY: [Signature] DATE: 4-6-15
SCALE: AS SHOWN	DATE: 4-6-15	DRAWING NO.: 5228	3/5



- ### CONSTRUCTION NOTES
- (09) INSTALL 24" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
 - (010) INSTALL 30" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
 - (011) INSTALL 36" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
 - (017) INSTALL 66" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
 - (048) CONSTRUCT CMP INLET PER DETAIL ON SHEET 1
 - (058) CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN 3012
 - (059) CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN 3011
 - (061) CONSTRUCT JUNCTION PIPE TO PIPE PER CITY OF FONTANA STD. PLAN 3010
 - (070) CONSTRUCT PIPE PLUG PER DETAIL ON SHEET 1
 - (072) ADJUST MANHOLE RIM TO GRADE AFTER FINAL SURFACE HAS BEEN INSTALLED
 - (073) PROTECT IN PLACE (ITEM AS INDICATED ON PLANS)
 - (0131) SAWCUT AND REMOVE EXISTING AC/AB, LIMITS AND TRENCH PER CITY OF FONTANA STD. PLAN 1008 AND AS INDICATED ON PLAN
 - (0133) CONSTRUCT AC/AB PAVEMENT REPLACEMENT PER CITY OF FONTANA STD. PLAN 1008 AND AS INDICATED ON PLAN
 - (0226) COLD PLANE EXISTING AC MINIMUM 0.15' DEPTH & AC OVERLAY TO MATCH EXISTING
 - (0227) INSTALL TYPE F DELINEATOR ON FLEXIBLE POST 5' ON CENTER PER MUTCD FIGURE 3F-101(CA) CLASS 1
 - (0296) CONSTRUCT 4" THICK AC LOCAL DEPRESSION AROUND CMP INLET PER DETAIL ON SHEET 1

LEGEND

- (0131) SAWCUT & REMOVE EXISTING PAVEMENT
- (0133) CONSTRUCT AC/AB PAVEMENT REPLACEMENT
- (0226) GRIND EXISTING AC MINIMUM 0.15' DEPTH CONSTRUCT VARIABLE DEPTH AC (MIN. 0.15')

SEE STREET IMPROVEMENT PLANS FOR STREET GRADE AND PAVEMENT SECTION FROM STR. STATION 24+32.26 TO STR. STATION 37+51.97

S.D. MAINLINE STA.	STRUCTURE TYPE	LATERAL	ANGLE "A"	B	C	D1	D2	EL. S	EL. R
82+89.17	MH	A-2	45°00'00"	48"	5.0'	66"	66"	1008.00	1008.05

	R	L	T	
A	51°53'36"	45.00'	10.43'	5.24'

	BEARING	DISTANCE
1	N00°15'00"E	-
2	N45°15'00"E	**28.05'
3	N44°45'00"W	**33.37'

**TOTAL LENGTH

DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2800
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

BASIS OF BEARINGS
THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF CATAWBA AVENUE BEING NORTH 00°15'00" EAST PER R.S.B. 79/56.

BENCHMARK 289 ELEV. 1032.22
LOCATION: CITY OF FONTANA
FOUND RAILROAD SPIKE IN POWER POLE #61319, NE CORNER CATAWBA AVENUE & SANTA ANA AVENUE.

* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

RECORD DRAWINGS

THESE RECORD DRAWINGS HAVE BEEN PREPARED. IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THESE DOCUMENTS AS A RESULT THEREOF.

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

HUITT-ZOLLARS
Huitt-Zollars, Inc. Ontario
3990 CONCOURS, #330 • ONTARIO, CALIFORNIA 91761 • (909) 941-7799

APPROVED BY: MAURICE H. MURAD R.C.E. EXPIRES DATE
33366 6-30-16 2/2/16

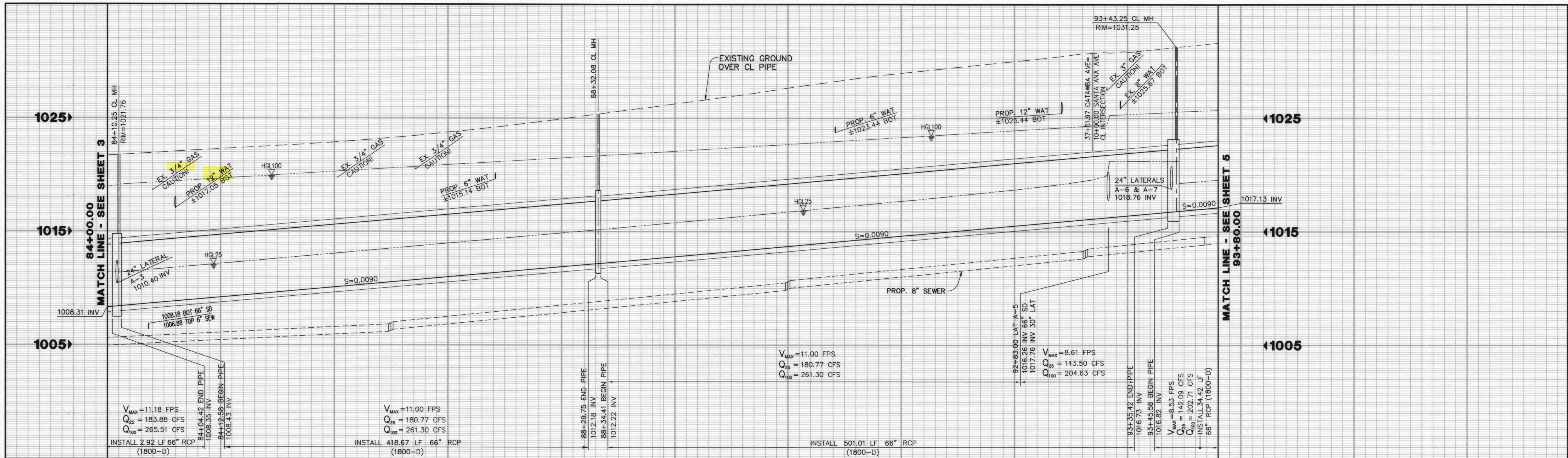
NO.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING (NOT INC.)	2/6/17	JM	PS	3-30-17

CITY OF FONTANA, CALIFORNIA

STORM DRAIN IMPROVEMENT PLANS

DRAWN BY: H-Z STAFF	MASTER S.D. LINE, DZ-9 CATAWBA AVENUE STA 75+00.00 TO STA 84+00.00	SCALE: AS SHOWN
DESIGNED BY: J.M.		DATE: 2-2016
CHECKED BY: M.H.M.		DWG. NO.: 5414

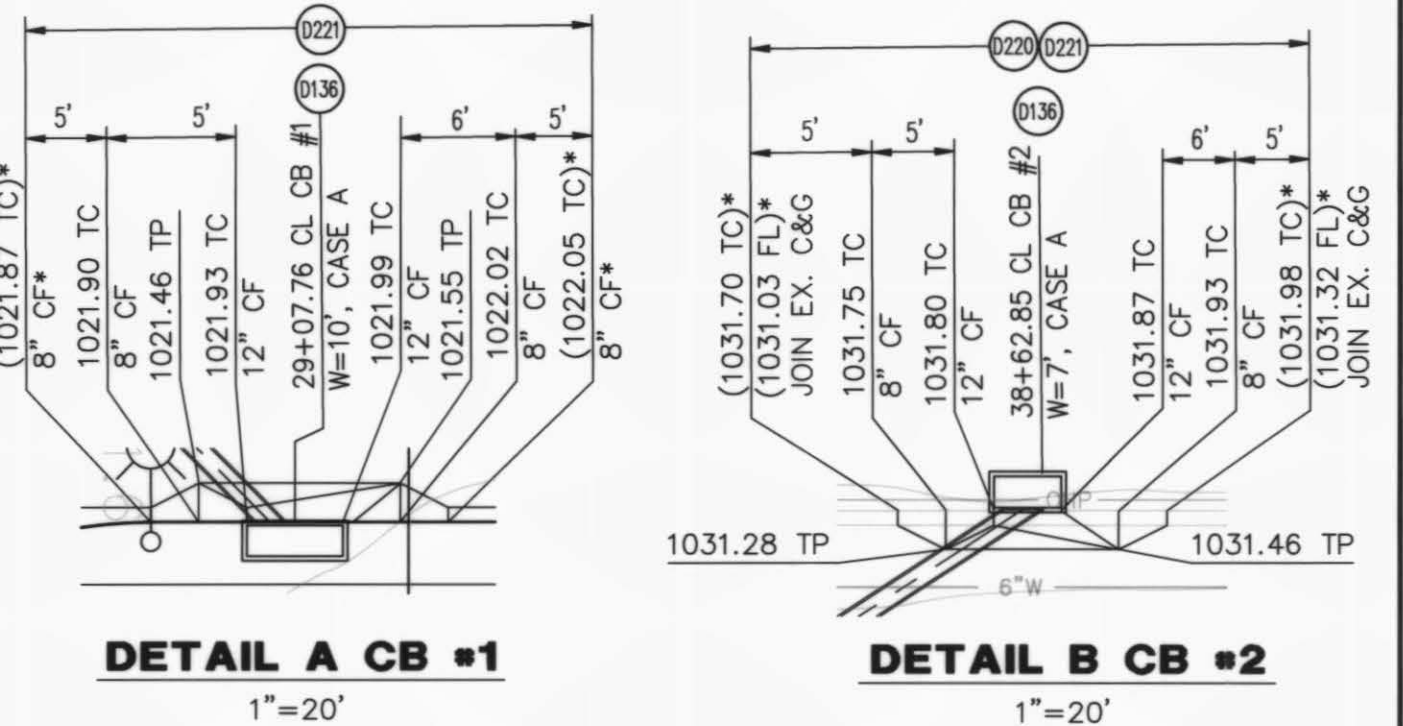
APPROVED BY:
CITY ENGINEER R.C.E. 51152 DATE: 2-19-16



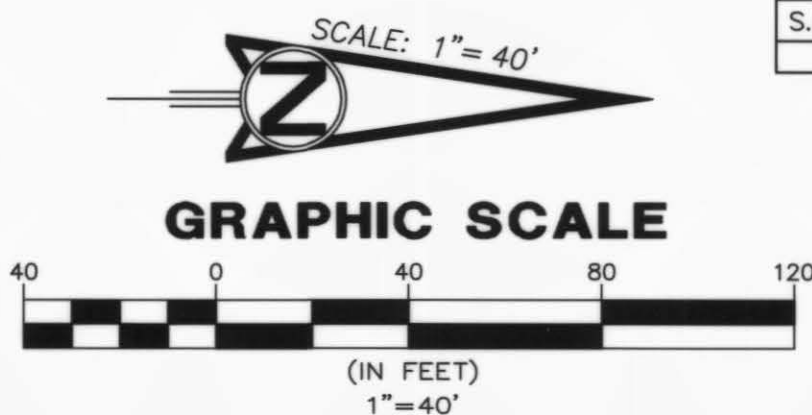
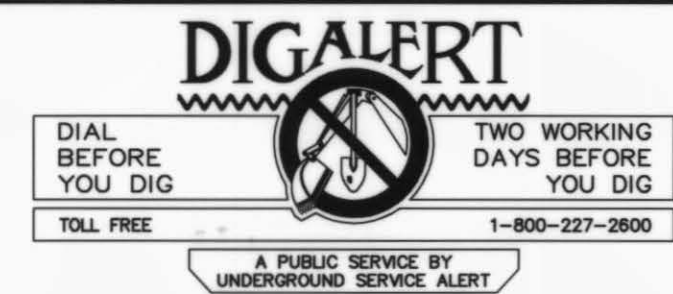
NWC OF PROJECT SITE

CONSTRUCTION NOTES

- (09) INSTALL 24" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
- (10) INSTALL 30" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
- (11) INSTALL 66" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
- (12) CONSTRUCT CMP INLET PER DETAIL ON SHEET 1
- (13) CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STD. PLAN 3004 (WIDTH & V-DEPTH PER PLAN)
- (14) CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN 3012
- (15) CONSTRUCT JUNCTION PIPE TO PIPE PER CITY OF FONTANA STD. PLAN 3010
- (16) CONSTRUCT PIPE PLUG PER DETAIL ON SHEET 1
- (17) ADJUST MANHOLE RIM TO GRADE AFTER FINAL SURFACE HAS BEEN INSTALLED
- (18) REMOVE EXISTING HEADWALL STRUCTURE
- (19) PROTECT IN PLACE (ITEM AS INDICATED ON PLANS)
- (20) SAWCUT AND REMOVE EXISTING AC/AB, LIMITS AND TRENCH PER CITY OF FONTANA STD. PLAN 1008 AND AS INDICATED ON PLAN
- (21) CONSTRUCT AC/AB PAVEMENT REPLACEMENT PER CITY OF FONTANA STD. PLAN 1008 AND AS INDICATED ON PLAN
- (22) CONSTRUCT LOCAL DEPRESSION AT CATCH BASIN PER CITY OF FONTANA STD. PLAN 3003 (CASE A), H=4"
- (23) REMOVE EXISTING PIPE
- (24) SAWCUT AND REMOVE EXISTING CURB & GUTTER (LIMITS AS INDICATED ON PLAN)
- (25) USE EXTREME CAUTION AND PROTECT EXISTING UTILITIES IN PLACE WHILE WORKING IN THIS AREA
- (26) INSTALL TYPE F DELINEATOR ON FLEXIBLE POST 5' ON CENTER PER MUTCD FIGURE 3F-101(CA) CLASS 1
- (27) CONSTRUCT 4" THICK AC LOCAL DEPRESSION AROUND CMP INLET PER DETAIL ON SHEET 1



* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.



MANHOLE & JUNCTION STRUCTURE DATA TABLE									
S.D. MAINLINE STA.	STRUCTURE TYPE	LATERAL ANGLE "A"	B	C	D1	D2	EL. S	EL. R	
92+83.00	JS	A-5	45°00'00"	30"	3.5'	66"	1017.76	1018.51	

RECORD DRAWINGS

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THESE DOCUMENTS AS A RESULT THEREOF.

SEE STREET IMPROVEMENT PLANS FOR STREET GRADE AND PAVEMENT SECTION FROM STA. STATION 24+32.26 TO STA. STATION 37+51.97

LEGEND

- (013) SAWCUT & REMOVE EXISTING PAVEMENT
- (0135) CONSTRUCT AC/AB PAVEMENT REPLACEMENT

COURSE DATA

	BEARING	DISTANCE
1	N00°15'00"E	
2	N45°15'00"E	**22.74'
4	N45°15'00"E	**18.41'
5	N30°15'00"E	**15.00'
6	N52°50'48"W	**51.39'

**TOTAL LENGTH

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.



HUITT-ZOLLARS
Huitt-Zollars, Inc. Ontario
3990 CONCOURS, #330 • ONTARIO, CALIFORNIA 91761 • (909) 941-7799

APPROVED BY: MAURICE H. MURAD R.C.E. EXPIRES DATE
33366 6-30-16 2/2/16

CITY OF FONTANA, CALIFORNIA

STORM DRAIN IMPROVEMENT PLANS

DRAWN BY: H-Z STAFF
DESIGNED BY: J.M.
CHECKED BY: M.H.M.

**MASTER S.D. LINE, DZ-9
CATAWBA AVENUE
STA 84+00.00 TO STA 93+80.00**
APPROVED BY: [Signature] DATE: 2-19-16
CITY ENGINEER R.C.E. 51152

SCALE: AS SHOWN
DATE: 2-2016
DWG. NO.: 5414
4/8

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF CATAWBA AVENUE BEING NORTH 00°15'00" EAST PER R.S.B. 79/56.

BENCHMARK 289 ELEV. 1032.22
LOCATION: CITY OF FONTANA
FOUND RAILROAD SPIKE IN POWER POLE #61319, NE CORNER CATAWBA AVENUE & SANTA ANA AVENUE.

NO.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING (NOT INC. A)	2/4/17	JM		3-30-17