PRELIMINARY DRAINAGE STUDY

100 W Sinclair St
APN # 3030-800-13, 15
Perris, Riverside County, California
September 19, 2022

Prepared for:

First Industrial Realty Trust Inc.
890 N. Sepulveda Blvd., Suite 175
El Segundo, CA 90245
310-606-1634 ph.

Report Prepared By:

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Murrieta, CA 92563

Engineer of Work/ Contact Person:
Francisco Martinez Jr., PE, QSD

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

09/19/2022

Francisco Martinez RCE Registered Civil Engineer	Date	Seal

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APPENDICES

I. PURPOSE AND SCOPE

The purpose of this study is to determine the necessary drainage and increased runoff mitigation improvements required for the proposed industrial development project referred as First Industrial Sinclair, located at 100 W. Sinclair Street, Perris CA.

The scope of the preliminary study includes the following:

1. Determination of points of flow concentration and watershed subareas for onsite and offsite areas.
2. Determination of the onsite 100-year peak storm flows based upon the post-project onsite and existing condition offsite areas utilizing the Rational Method as outlined in the Riverside County Flood Control & Conservation District Manual (ref 1).
3. Determine the onsite 100-year peak storm flows based upon the post-project condition for the 1, 3, 6, & 24-hour storm duration utilizing the Unit Hydrograph Method as outlined in the Riverside County Flood Control & Water Conservation District Hydrology Manual.
4. Determine the required facilities to mitigate the onsite 100-year peak storm flows to levels that are equal or less than the existing condition flow rates and levels that do not exceed the hydraulic capacity of the existing storm drainpipe outlet (30″x19″ arch RCP).
5. Determine the required storm drain infrastructure to flood protect the project site for the 100-year storm event.
6. Preparation of a hydrology report, which consist of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The proposed development project is comprised of two parcels with a total of 19.56 acres that currently contain two separate buildings and improvements with commercial and light industrial uses. The property will be demolished, and a parcel merger will be processed for the new development proposed as an industrial/distribution warehouse facility comprised of a single building with 427,224 square feet, 70 trailer docks, as well as trailer and auto parking, landscaped areas, storm drain infrastructure that which include dual subsurface chamber system and two bioretention basins.

The parcels are bounded by Sinclair St to the south, a vacant parcel and Perris Ave to the east, and to the north a vacant parcel and Morgan St, to the west there is an existing warehouse facility (see Figure 1). The property at 100 W. Sinclair Street is 13.66 acres (Parcel 1) with an existing 150,000 square-feet light industrial building, concrete and asphalt pavements, and minor landscaped areas. The property at 200 Sinclair Street is 5.9 acres (Parcel 2) currently operating as recycling facility with approximately 48,000 square feet building with asphalt pavement throughout and minor landscaped areas.

The existing topography for the two parcels is relatively flat and generally drains towards the east via surface improvements. In parcel 1 there are no visible onsite storm drain improvements except for an existing headwall with a single 30”x19” arch pipe that serves as an outlet to both parcels 1 and 2.

Per City record drawings, the arch pipe was designed to convey a 100-year frequency storm event flow rate of **21-cfs**, and using the parking lot to pond a maximum depth of 3-feet, which is to the top of the existing headwall of the outlet arch pipe. The outlet pipe is located near the mid-section of the easterly property line. It extends to the east across the adjoining vacant parcel for approximately 280 feet; and constructed as part of the Precise Grading plan improvements on record per City of Perris DPR no. 99-0174 and file no. P-190 (See Appendix E).

There are two drainage patterns on Parcel 2 under the existing developed conditions. The sub area to the north of approximately 2.3 acres drains on the surface in a north and east direction. Storm flows are intercepted by curb and gutter improvements along the north and east of the property and directed to a sump drop inlet and into a dual Maxwell IV drywell system located on the northeast corner within the auto parking stalls. It appears that the sump inlets and drywells are intended for water quality mitigation, therefore when storm flows exceed the capacity of the inlets, ponding would occur but eventually storm water will overtop the sump and flows would “run-on” into Parcel 1 across the parking lot towards the headwall and outlet pipe located at the low point.

The sub area to the south drains via the surface to south and to the east; roughly 2 acres drains to a trench drain at the easterly driveway, where they are directed to a second set of Maxwell IV drywell system, also assumed to be used for water quality mitigation and any excess flow (beyond the capacity of the trench drain) will be picked up and conveyed easterly by Sinclair Street (Private) via curb, and gutter improvements. Storm water developed from a small area to the west parking lot drains directly to the south towards Sinclair and appears that it is without any water quality mitigation; once on Sinclair storm flows travel east via curb and gutter improvements, and enter Parcel 1, where flows continue east until it reaches a midblock cross gutter, then they are directed to the north through Parcel 1’s parking lot and to the outlet pipe located at the low point.

Therefore, for the purposes of this study, it is assumed that the existing developed design flows (e.g., 100-year) from Parcel 2 are not contained and is tributary to the existing single 30”x19” outlet arch pipe. The storm water flows developed from the existing parcels are released into an open depressed concrete apron and collected by an existing headwall with a battery of (5) 28”x18” Corrugated Metal Pipe Arch (CMPA) that cross under Perris Boulevard as shown in the storm drain Line D improvement plans, sheet 9 of 10 with city file No. P8-1027. Storm flows continue easterly and discharged to Riverside County Flood Control District’s (RCFCD) Perris Valley Master Drainage Plan (MDP) Lateral “G-2”; which connects to the San Jacinto River and ultimately to Lake Elsinore Basin.

In the new proposed developed conditions, mitigated storm flows will be directed to the existing outlet pipe, mimicking the current conditions and mitigate runoff for the 100-year event to levels that are “at or below” the current conditions; and that it does not exceed the design flow rate of the existing outlet pipe.

III. HYDROLOGY

The Riverside County Flood Control and Water Conservation District Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the hydrology analyses. The rational method was used for the analyses and the computations were performed using the computer program developed by Civil CADD/Civil Design.

The intensity (in/hour) for the 10-year and 100-year storm frequency and the 10-minute and 60-minute duration was obtained using Plates D-4.3-4 and E-5.1-6 of the Hydrology Manual and summarized in the table below; a copy of the district's table is included in this report in Appendix E.

Rainfall Intensity Table:

Storm Event & Duration	Rainfall (inches)
2-Year, 1-Hour	0.47
100-Year, 1-Hour	1.23
2-Year, 3-Hour	0.80
100-Year, 3-Hour	1.88
2-Year, 6-Hour	1.03
100-Year, 6-Hour	2.50
2-Year, 24-Hour	1.70
100-Year, 24-Hour	4.38

The project site is underlain by A and C type soils, as show in the Onsite Hydrologic Soil Unit Exhibit (Figure 4); this GIS exhibit is based on the U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey. A Web Soil map was generated for the project site and included in Appendix E.

For all storm events, Antecedent Moisture Condition (AMC) II shall be utilized.

The hydrology utilized the following land use covers:

Land Use Cover	Runoff Index Number (Soil "A")	Pervious Ratio
Commercial	32	0.1

The existing and proposed project condition analyzed the watershed areas as commercial. The rational method analysis used a single watershed area designated as "A" with numerical sub-designations.

Rational Method Analyses

The existing and proposed project rational method hydrology calculations have been included in Appendix A and B. The existing project rational method hydrology map has been included as Figure 2, the proposed project rational method hydrology map as Figure 3.

Here below is a summary flow rate table between existing and proposed conditions:

TABLE 2. RATIONAL METHOD - ONSITE (Q_{10} YEAR, 1-HOUR)			
WATERSHED	EXISTING Q_{10} (cfs)	PROPOSED Q_{10} (cfs)	DELTA Q_{10}
A	27.4	28.3	0.9

TABLE 1. RATIONAL METHOD - ONSITE (Q_{100} YEAR, 1-HOUR)			
WATERSHED	EXISTING Q_{100} (cfs)	PROPOSED Q_{100} (cfs)	DELTA Q_{100}
A	43.8	45.3	1.5

Unit Hydrograph Analyses

To determine the increased runoff mitigation required for the project, a Unit Hydrograph calculation was performed using a lag time that was calculated using the longest water course, the upstream length of the longest water course to the centroid and the difference in elevation between the highest and lowest point on the proposed hydrology map.

The post project condition was calculated perviousness was calculated using a unit area method to determine the average perviousness for each sub area.

The following tables summarize the unit hydrograph calculations:

TABLE 3. UNIT HYDROGRAPH ANALYSIS			
WATERSHED	STORM EVENT	PROPOSED PEAK Q (cfs)	PROPOSED TOTAL VOLUME (Acres)
A	100 YEAR, 1 HR	50.11	1.79
	100 YEAR, 3 HR	28.48	2.60
	100 YEAR, 6 HR	23.88	3.41
	100 YEAR, 24 HR	9.54	5.85

IV. HYDRAULICS

The project will utilize a combination of inlets, subsurface storm drain system, above ground retention basins, underground retention and detention chambers, and storm water lift station to collect, convey, mitigate water quality and the design peak flows, including draining the detention chambers and safely discharging storm water flows from the project site without exceeding the existing conditions.

All onsite storm water will be collected via a combination of on an onsite storm drain system and two (2) above ground bio filtration basins. Flows that are collected by the storm drainpipe system will be directed to an underground bio-retention chamber system that will be used for water quality mitigation. A CDS unit will be installed upstream of the underground bio-retention chambers and serve for pretreatment, but also to help by-pass larger storm events that will be directed to a separate underground detention chamber system. This detention chamber system will be sized to help mitigate the increase storm water runoff for the 100-year event to levels that are "at or below" the current conditions; and that it does not exceed the design flow rate of the existing outlet pipe. Lastly, due to physical constraints and the depth of the underground chambers the project will require the use of a storm water lift station to be able to drain the underground detention chambers. The pump will be sized such that the underground detention chambers are drained within 48-hours but no more than 72-hours. It is currently anticipated that this flow rate will not exceed 1-cfs (450 gpm).

The two (2) above ground bio-filtration basins will collect and treat surface flows. They are designed with a maximum 6-inch ponding depth, and excess flows above the pond depth will enter the outlet structure and directed to the underground detention chamber system. Two separate underground pipe chamber systems are proposed; one system is a retention chamber for water quality mitigation and second system is a retention chamber for stormwater mitigation.

Both chamber systems are connected with a pipe and a manhole/weir structure. The weir in the vault structure is set to meet the elevation of the required water quality design capture volume (DCV); and once water rises beyond the DCV elevation it will overtop the weir and flow into the detention chamber. The DCV elevation in the retention chamber is 1451.87. The underground detention basin chambers are connected to a storm water lift station that will pump flows to a 6-inch force drain line; this line will extend and connect to an onsite manhole and a 24-inch gravity storm drain line that connects to the existing outlet arch pipe.

A WSPG analysis was done for the outlet pipe and determined that the max flow rate that the existing arch RCP outlet pipe can convey is **21.5**-cfs. Onsite street capacity calculations (See Appendix D) were also provided for sections D-D, E-E, F-F, G-G, H-H and I-I. These sections can be found on the conceptual grading plans (Figure 6). The assumption made was when the system failed the emergency overflow will be Sinclair St.

V. WATER QUALITY & INCREASED RUNOFF MITIGATION

As described under the Hydraulics section, to mitigate for water quality the project proposes to use two (2) above ground bio-filtration basins and one (1) underground bio-retention chamber system. A CDS unit will be installed upstream of the underground bio-retention chambers and serve for pretreatment. The above ground bio-filtration basins will collect and treat surface flows. They are designed with a maximum 6-inch ponding depth; excess flows above the pond depth will enter the outlet structure and directed to the underground detention chamber system.

The water quality calculations and discussion have been provided in the Water Quality Management Plan. The required water quality volume (DCV) for the project site is **185,130 ft^3 (0.84 acre-ft)**. The bio-filtration basins are providing **0.24 acre-ft** of storage, and **0.60 acre-feet** will be provided in the underground bio-retention chamber system. The calculation for the Design Capture Volume (DCV) has been included in Appendix E.

Infiltration testing was performed within the proposed basin location. The area in the proposed detention system provides a rate of approximately **3.1 in/hr**, which an average based on the recommendations from the geotechnical report, and after applying a safety factor in accordance with the technical guidance manual, the design infiltration rate is calculated to be **1.03 in/hr**, this rate was utilized in the design of the chamber system.

For increase storm water mitigation, the project will use an underground detention chamber system sized to mitigate the increase storm water runoff for the 100-year event for the 1, 3, 6 and 24-hour storm duration to levels that are "at or below" the current conditions; and that it does not exceed the design flow rate of the existing outlet arch pipe, whichever is lower. In this case, the design flow rate for the existing conditions is the lower flow rate at **21-cfs**. However, a WSPG analysis was performed for the existing arch pipe and results show that the arch pipe can convey a maximum of **21.5 cfs** (vs. 21-cfs) and it is being referred in this report as the maximum allowable flow rate.

However, a storm water lift station will be required to drain the detention system due to the existing outlet pipe being at a shallow depth compared to the onsite storm drain system. The pump will be sized such that the underground detention chambers are drained within 48-hours but no more than 72-hours. It is currently anticipated that this flow rate will not exceed 1-cfs (450 gpm), and below the maximum allowable flow rate.

Furthermore, to assure that there is enough storage to mitigate the 100-year frequency storm event, we used the results from the Unit Hydrograph analysis for each of the storm durations and compared them to determine which storm events had flow rates above the **21.5-cfs** (maximum allowable) but with larger storm volume demand. In this case, the **100-year 6-hour storm** is the critical storm that was selected.

From the recess limb of the proposed condition 100-year, 6-hour storm event, the flow rate that is equal or less than the "maximum allowable discharge" of 21.5-cfs is 14.54 cfs and producing a storm water volume for this flow rate of 3.21 ac-ft and a total storm volume of 3.41 ac-ft. The volume of the underground detention chamber is 3.46 ac-ft and will capture 100% of the total storm thus a conservative approach, knowing that increase flow mitigation will be provided.

Stormwater mitigation information for watershed "A" can be seen in the table 4 provided below:

Table 4. UNIT HYDROGRAPH VOLUME ANALYSIS

WATERSHED AREA	100 YEAR STORM DURATION (hrs)	PROPOSED PEAK Q (cfs)	PROPOSED TOTAL STORM VOLUME (AF)	*MAXIMUM ALLOWABLE DISCHARGE (cfs)	MINIMUM REQUIRED DETENTION (AF)	MAXIMUM ALLOWABLE DISCHARGE (cfs)	**PROPSOED LIFT STATION DISCHARGE (cfs)	U/G RETENETION VOLUME (AF)	STORM CAPTURE
A	1	50.11	1.79	18.10	1.62	21.50	1.00	3.46	100%
	3	28.48	2.60	14.26	2.39				100%
	6	23.88	3.41	14.87	3.21				100%
	24	9.54	5.85	-	-				59%

For the 100-year, 24-hour storm, the peak flow rate is 9.54 cfs and less than the maximum allowable of 21.5-cfs, therefore flow mitigation is not required. However, the storm volume produced at the peak flow rate is 3.79 ac-ft and total storm volume is 5.85 ac-ft which both exceed the volume provided by the underground detention chamber.

The maximum pond depth in the parking lot at the lowest point is 1.5-feet (18"), the elevation is 1659.46' and located at the mid-section of the southwest bio-filtration basin. The volume provided in the trailer parking lot based is 0.29 ac-ft, the combined total volume between parking lot and underground detention chamber is 3.75 ac-ft, and less than total storm volume produced of 5.85 ac-ft.

This will result in storm water bubbling out of the drop inlet structures at a peak flow rate of 9.54 cfs, ponding in the trailer parking lot up to a depth of 1460.99', this is the high point on Sinclair private drive, then storm water will overtop and flow easterly using Sinclair Street as an emergency overflow and ultimately flowing towards Perris Boulevard.

VI. FINDINGS

The hydrology analyses evaluated the proposed development to determine the necessary drainage improvements required to mitigate flows for increased runoff. It has been concluded that:

1. Storm water attenuation/mitigation is provided.

2. The proposed bio-filtration basins and bio-retention “infiltration type” subsurface system will adequately mitigate for water quality.

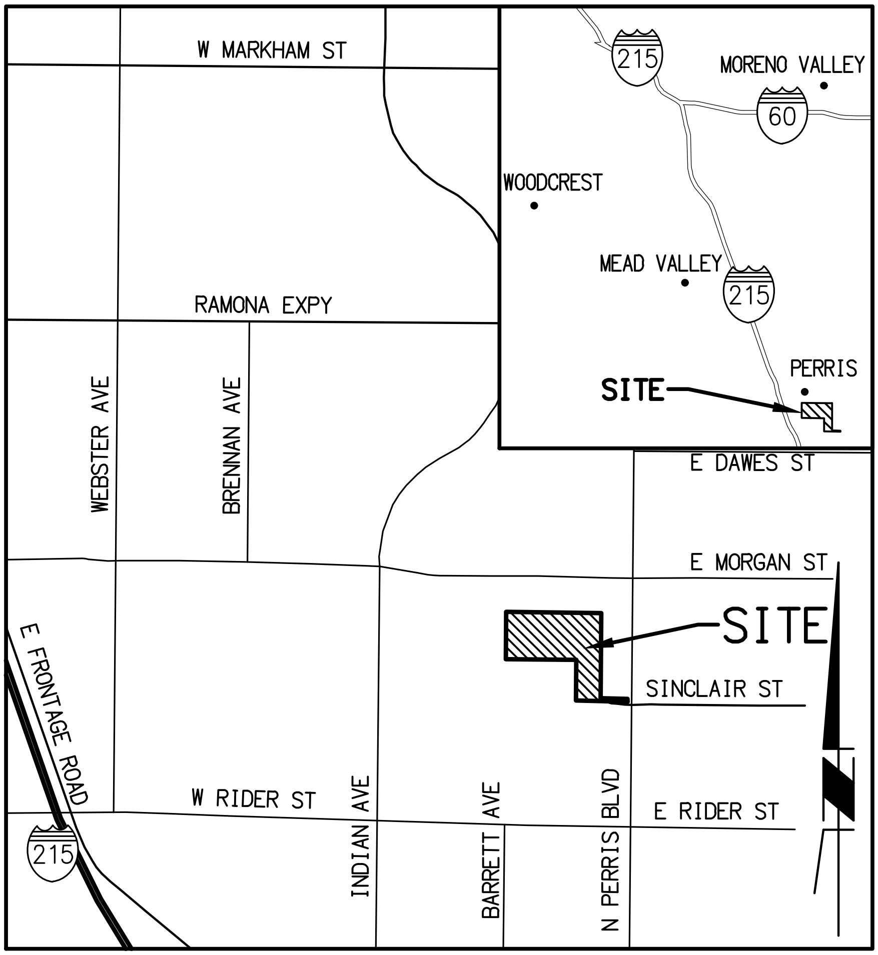
3. The proposed drainage facilities will adequately convey the 100-year flows and provide flood protection to the project site.

VII. REFERENCES

1. Riverside County Rational Method from RCFC & WCD Hydrology Manual, dated April 1978
2. CIVILDESIGN Engineering Software, 1989-2014; Riverside County Rational Method Module, version 9.0.

FIGURE 1:

VICINITY MAP



VICINITY MAP

NOT TO SCALE

FMCIVIL ENGINEERS INC.

29995 TECHNOLOGY DRIVE, SUITE 306 | MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

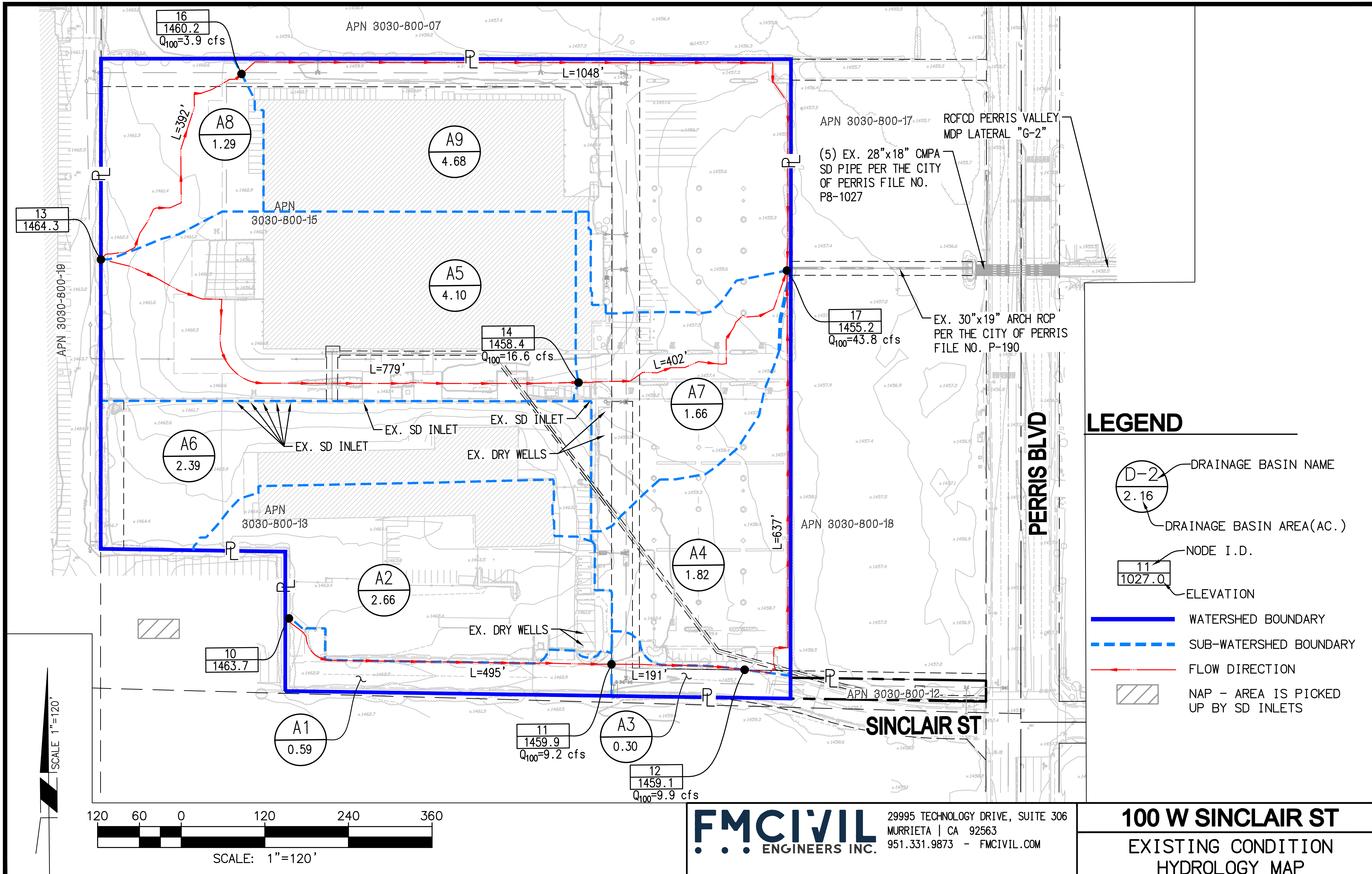
100 W SINCLAIR ST

FIGURE 1
VICINITY MAP

H:\PDATA\22-004 SINCLAIR PERRIS\DOCS\HYDRO\1. PRELIMINARY\CAD\22-004-VICINITY-MAP.DWG DANIEL 4/5/2022 9:53 AM

FIGURE 2:

EXISTING CONDITION HYDROLOGY MAP



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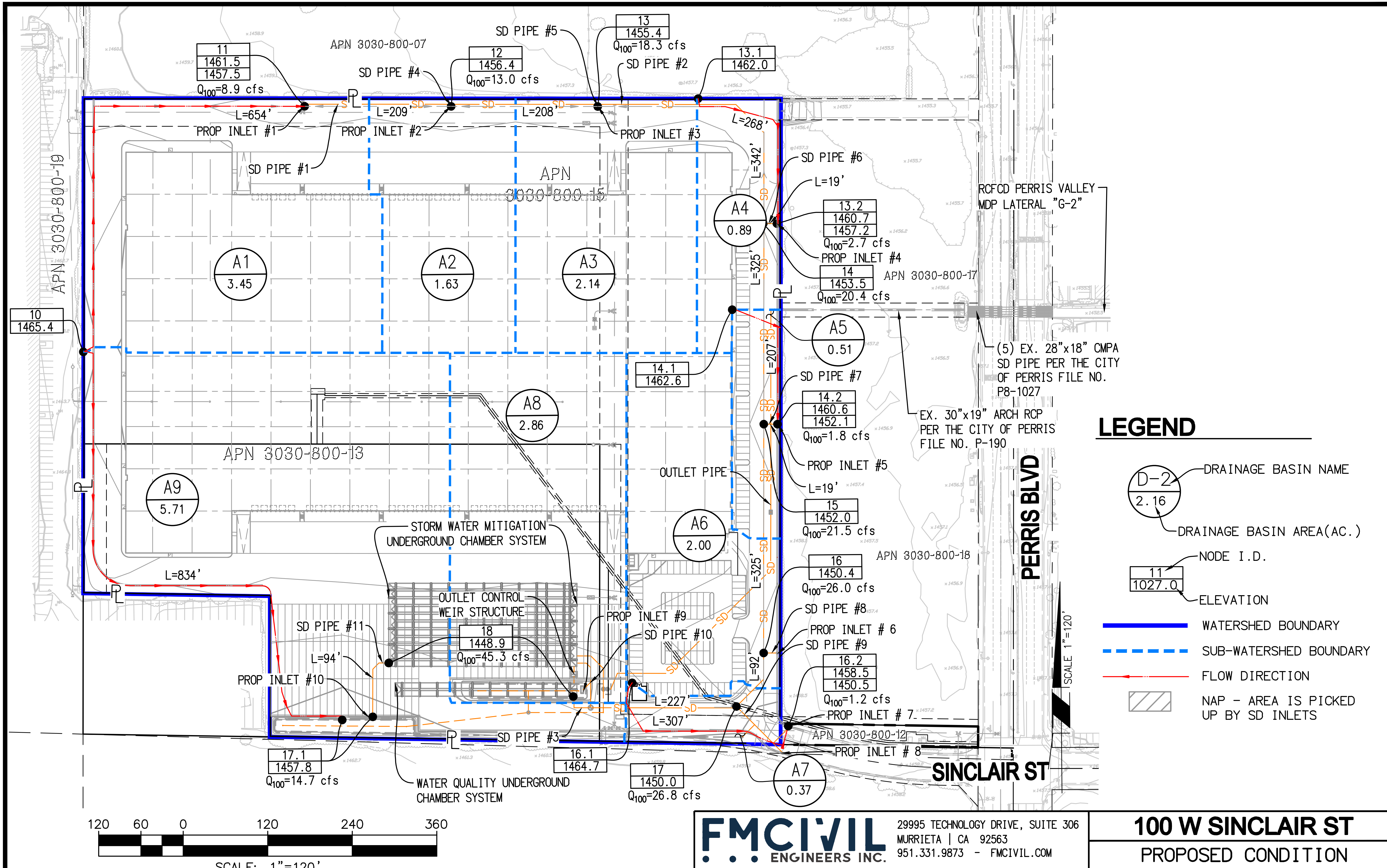
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

100 W SINCLAIR ST

EXISTING CONDITION
HYDROLOGY MAP

FIGURE 3:

PROPOSED CONDITION HYDROLOGY MAP



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MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

100 W SINCLAIR ST

PROPOSED CONDITION
HYDROLOGY MAP

FIGURE 4:

ONSITE HYDROLOGICAL SOIL UNIT EXHIBIT

Planning Application No.
APPLICANT / LANDOWNER:
FIRST INDUSTRIAL REALTY TRUST, INC.
ONE NORTH WACKER DRIVE, SUITE 4200, CHICAGO ILLINOIS 60606
(312) 344-4300

HYDROLOGIC SOIL GROUP

- A
- C
- PROJECT BOUNDARY

0 300 600 ft

FMCIVIL ENGINEERS INC.

Source: USDA Web Soil Survey

100 W Sinclair Street

Onsite Hydrologic Soil Unit Exhibit

FIGURE 5:

HYDROLOGICAL SOIL UNIT EXHIBIT (DRAINAGE AREA)

Planning Application No.
APPLICANT / LANDOWNER:
FIRST INDUSTRIAL REALTY TRUST, INC.
ONE NORTH WACKER DRIVE, SUITE 4200, CHICAGO ILLINOIS 60606
(312) 344-4300

HYDROLOGIC SOIL GROUP

- A
- C
- Drainage Boundary

0 300 600 ft

FMCIVIL ENGINEERS INC.

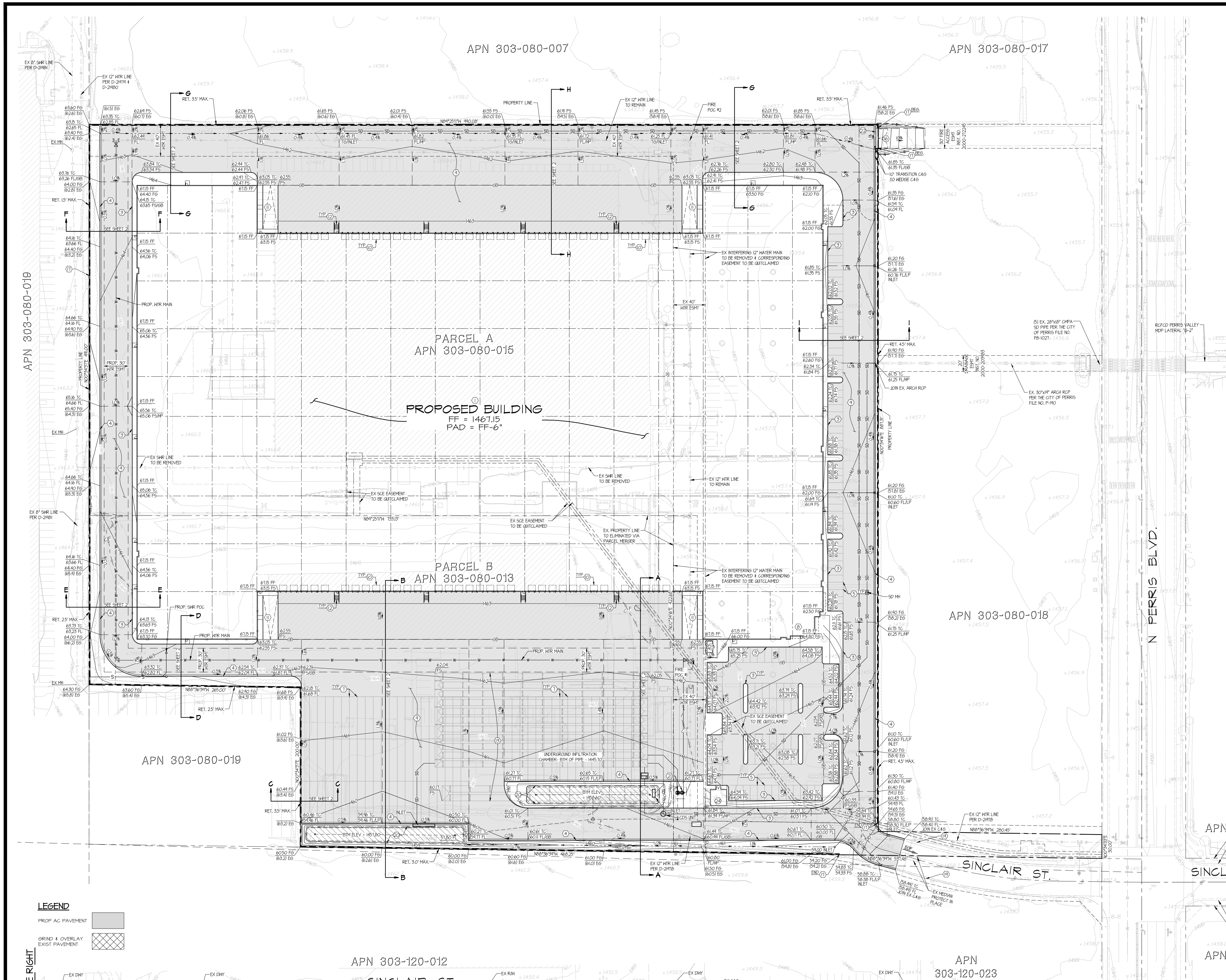
Source: USDA Web Soil Survey

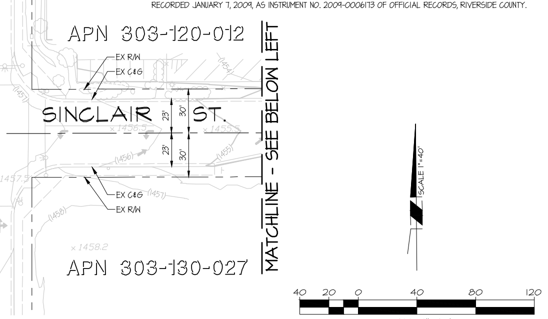
100 W Sinclair Street

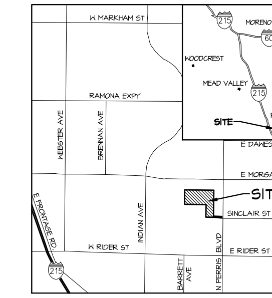
Onsite Hydrologic Soil Unit Exhibit

FIGURE 6:

CONCEPTUAL GRADING







VICINITY MAP

NOT TO SCALE

APPLICANT/DEVELOPER

FIRST INDUSTRIAL REALTY TRUST INC.
890 N. SEPULVEDA BLVD., SUITE 175
EL SEGUNDO, CA 90245
CONTACT: MICHAEL GOODWIN
(TEL)310-414-5400

ARCHITECT

HPA ARCHITECTURE
18831 BARDEEN AVE., SUITE #100
IRVINE, CA 92612
CONTACT: STEVE HONG
(TEL)949-863-1770

ENGINEER

FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA, CA. 92563
(TEL)951-973-0201
CONTACT: FRANCISCO MARTINEZ JR., P.E.

SOURCE OF TOPOGRAPHY

INLAND AERIAL SURVEYS, INC.
7117 ARLINGTON AVE., SUITE A
RIVERSIDE, CA 92503
(TEL)951-687-4252
COMPILED FROM AERIAL DATED: 01-27-22

LEGEND

RIGHT OF WAY — ROW
CENTERLINE — ℄
DAYLIGHT
EXIST. RIGHT OF WAY
EXIST. CENTERLINE
EXIST. TOP OF CURB
CUT/FILL LINE
FENCE — X
EMERGENCY OVERFLOW — EOF
PROP. EDGE OF PAVEMENT
PROPOSED CONTOUR — 830
EXIST. CONTOUR — (830)
RIDGE LINE — R/L
PROPOSED WATER LINE — W
PROPOSED SEWER LINE — S
PROPOSED STORM DRAIN — SD
EXIST. DOMESTIC WATER — W
EXIST. SEWER LINE — S
EXIST. STORM DRAIN — SD
EXIST. ELECTRIC — E
EXIST. OVERHEAD LINES — OHL

ABBREVIATIONS

BC	BEGIN CURB	FS	FINISH SURFACE	RW	RECYCLE WATER
BEG	BEGIN	GB	GRADE BREAK	ROW, R/W	RIGHT-OF-WAY
CB	CATCH BASIN	HP	HIGH POINT	SD	STORM DRAIN
CL	CENTERLINE	INST	INSTRUMENT	SS	SANITARY SEWER
DW	DOMESTIC WATER	INV	INVERT	TC	TOP OF CURB
EG	EXISTING GROUND	NO	NUMBER	TF	TOP OF FOOTING
EOF	EMERGENCY OVERFLOW	PAD	PAD ELEVATION	TG	TOP OF GRATE
EX	EXISTING	PVMT	PAVEMENT	TW	TOP OF WALL
FF	FINISH FLOOR ELEVATION	PL	PROPERTY LINE	TYP	TYPICAL
FG	FINISH GRADE	PROP	PROPOSED	VAR	VARIES
FL	FLOWLINE	RL, R/L	RIDGE LINE		

SITE PLAN KEYNOTES

1. PAINTED CONCRETE TILT-UP WAREHOUSE / OFFICE / MANUFACTURING FACILITY. BUILDING TO BE DESIGNED PER ARCHITECT'S PLANS
2. ON SITE ACCESSIBLE SIDEWALK AND CURB RAMPS.
3. CONCRETE CURB
4. CONCRETE CURB & GUTTER
5. STANDARD PARKING STALL MIN. 9' X 19' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
6. HANDICAP PARKING STALL MIN. 9' X 19' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
7. TRAILER PARKING STALL MIN. 10' X 53' - STRIPE PER STANDARDS SHOWN ON ARCHITECT'S PLANS
8. ACCESSIBLE BUILDING ENTRY WITH ADJACENT BICYCLE RACKS PER ARCHITECT'S PLANS
9. PORTLAND CONC. CEMENT (PCC) PAVED TRUCK YARD ARCHITECT'S PLANS
10. DOCK HIGH TRUCK DOOR PER ARCHITECT'S PLANS
11. GRADE LEVEL RAMP DOOR PER ARCHITECT'S PLANS
12. EXTERIOR MAN DOOR AND STAIRS W/GUARD POST PER ARCHITECT'S PLANS
13. UNDERGROUND STORM WATER CHAMBER SYSTEM
14. LANDSCAPE AREA PER LANDSCAPE ARCHITECT'S PLANS
15. APPROXIMATE LOCATION OF TRASH ENCLOSURE PER ARCHITECT'S PLANS
16. METAL, MANUAL OPERATED SECURITY GATE WITH KNOX-PAD LOCK FOR FIRE DEPARTMENT ACCESS PER ARCHITECT'S PLANS
17. COMBINATION RETAINING WALL & TUBE STEEL FENCE PER ARCHITECT'S PLANS
18. TUBE STEEL FENCE PER ARCHITECT'S PLANS
19. EXISTING CURB & GUTTER, PROTECT IN PLACE
20. PROPOSED WATER QUALITY BIO-RETENTION BASIN
21. PROPOSED STORM WATER LIFT STATION
22. CONCRETE WEDGE CURB & GUTTER
23. APPROXIMATE LOCATION OF TRASH ENCLOSURE PER ARCHITECT'S PLANS
24. PUMP HOUSE

EARTHWORK QUANTITIES

DESCRIPTION	CUT (CY)	FILL (CY)	NET (CY)
RAW	14,190	121,160	106,970 (IMPORT)

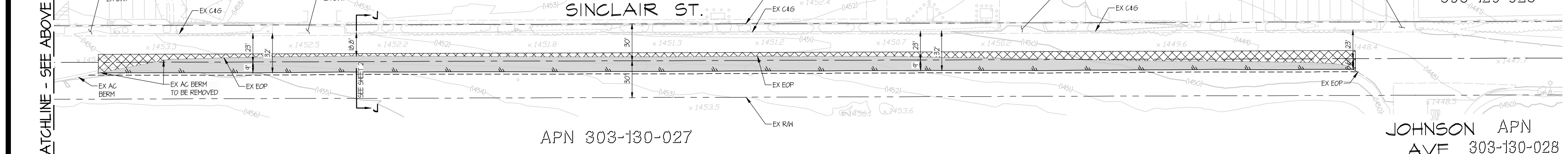
NOTE: THESE EARTHWORK QUANTITIES ARE RAW AND FOR REFERENCE ONLY.

ASSESSOR'S PARCEL NUMBERS

303-080-013 & 303-080-015

LEGAL DESCRIPTION

PARCELS A AND B OF LLA NO. 08-10-0001, IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, RECORDED JANUARY 7, 2009, AS INSTRUMENT NO. 2009-0006173 OF OFFICIAL RECORDS, RIVERSIDE COUNTY.



BENCHMARK

NGS BM BM436 PID DX5444 NAVD88 EL. = 1557.17 FEET

3-1/4" ALUMINUM DISK SET FLUSH IN FOOTING OF POWER POLE 705640/01 AT NE CORNER OF CAJALCO ROAD AND SEATON AVE.

BASIS OF BEARING

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, ZONE VI, NAD83 (EPOCH 2010.00) AS DETERMINED LOCALLY BY A LINE BETWEEN CONTINUOUS OPERATING REFERENCE STATIONS (CORS) MLFP AND PPBF BEING N53-20-17.63W AS DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) AND/OR NATIONAL GEODETIC SURVEY (NGS), RESPECTIVELY.

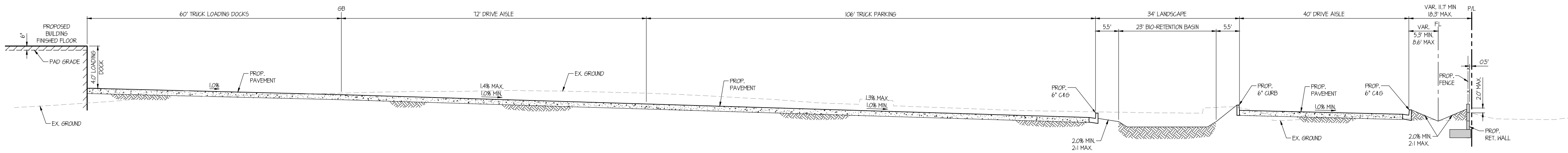
CITY OF PERRIS

100 W. SINCLAIR STREET
SITE PLAN / CONCEPTUAL GRADING EXHIBIT

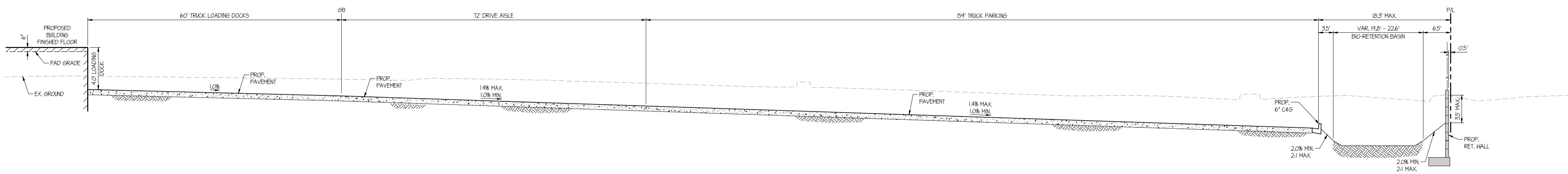
SCALE: AS SHOWN
DATE: SEPT. 2022
DESIGNED: AJ
CHECKED: FM
PLN CK REF:

FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

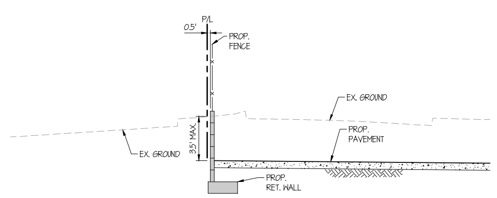
SHEET 1 OF 2 SHEETS



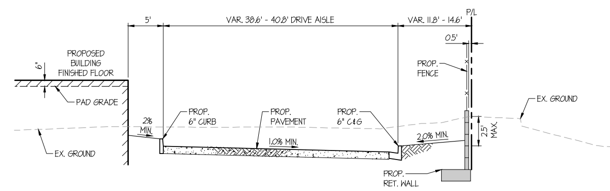
SECTION A-A
N.T.S.



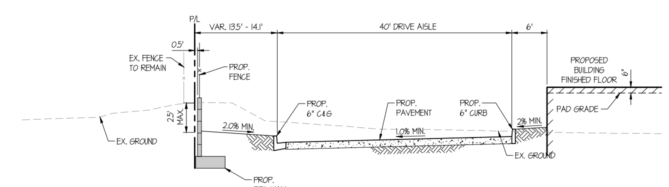
SECTION B-B
N.T.S.



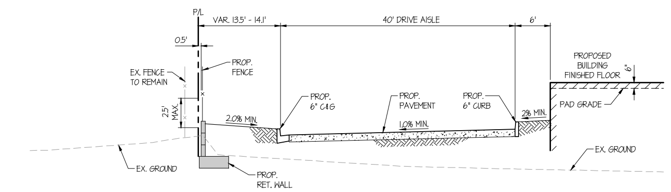
SECTION C-C
N.T.S.



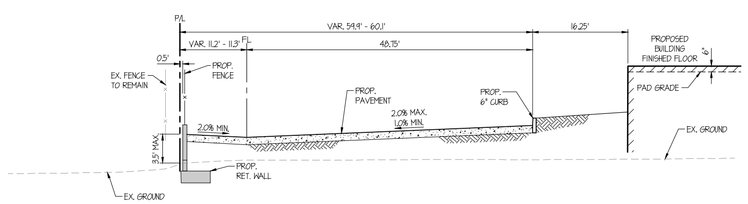
SECTION D-D
N.T.S.



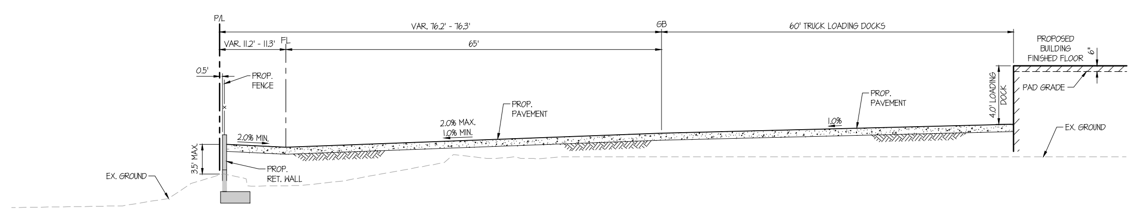
SECTION E-E
N.T.S.



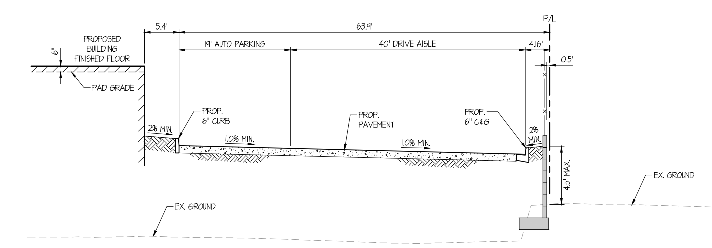
SECTION F-F
N.T.S.



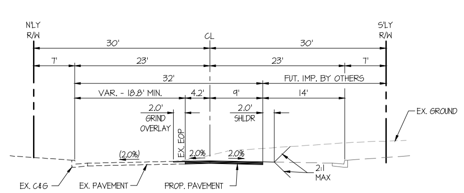
SECTION G-G
N.T.S.



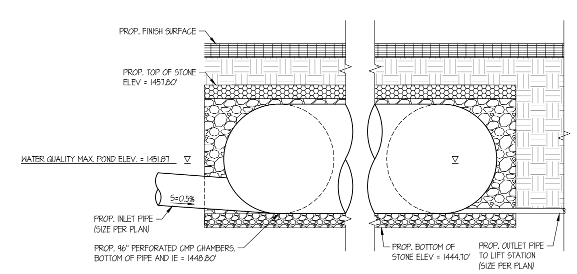
SECTION H-H
N.T.S.



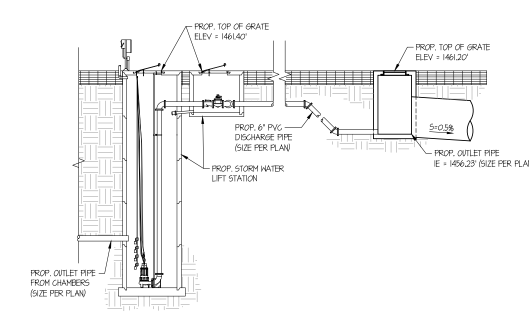
SECTION I-I
N.T.S.



SECTION J-J - SINCLAIR STREET
HOR. SCALE: 1"=10'



UNDERGROUND CHAMBERS DETAIL
N.T.S.



STORM WATER LIFT STATION OUTLET DETAIL
N.T.S.

BENCHMARK

NGS BM BM436 PID DX5444 NAVD88 EL. = 1557.17 FEET

3-1/4" ALUMINUM DISK SET FLUSH IN FOOTING OF POWER POLE 705640/01 AT NE CORNER OF CAJALCO ROAD AND SEATON AVE.

BASIS OF BEARING

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, ZONE VI, NAD83 (EPOCH 2010.00) AS DETERMINED LOCALLY BY A LINE BETWEEN CONTINUOUS OPERATING REFERENCE STATIONS (CORS) MLFP AND PPBF BEING N53-20-17.63W AS DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) AND/OR NATIONAL GEODETIC SURVEY (NGS), RESPECTIVELY.

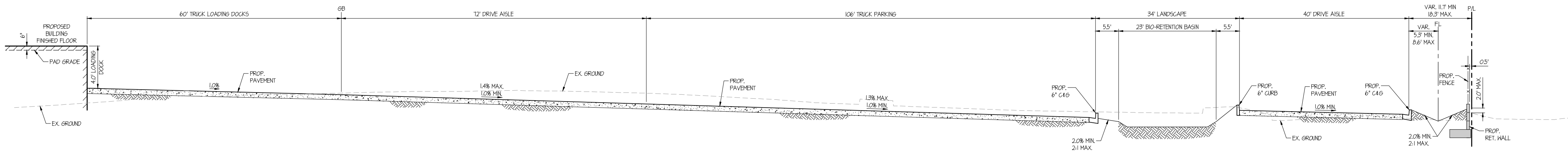
CITY OF PERRIS

100 W. SINCLAIR STREET
SITE PLAN / CONCEPTUAL GRADING TYPICAL SECTIONS

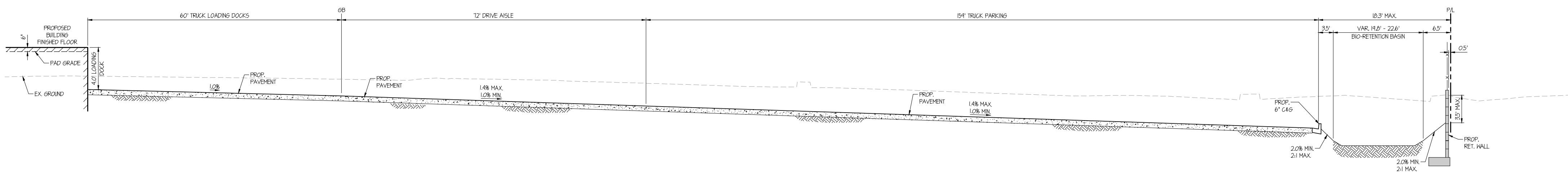
SCALE:	AS SHOWN
DATE:	SEPT. 2022
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

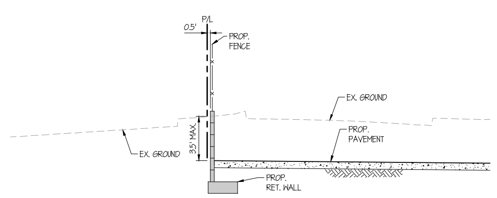
SHEET 2 OF 2 SHEETS



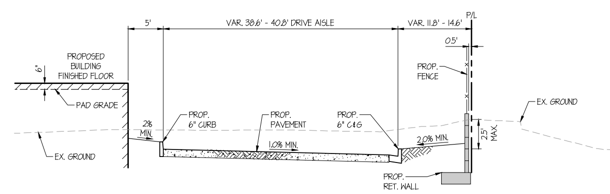
SECTION A-A
N.T.S.



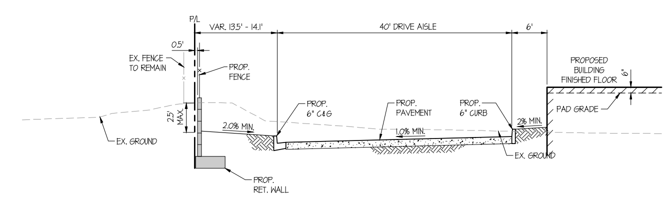
SECTION B-B
N.T.S.



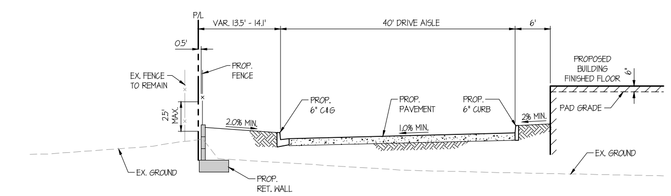
SECTION C-C
N.T.S.



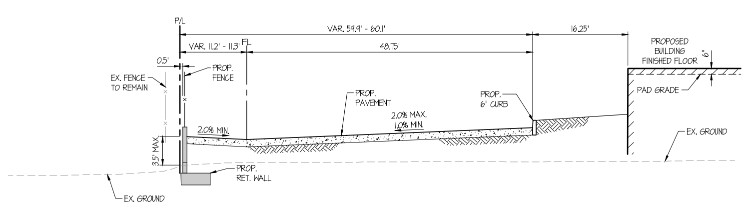
SECTION D-D
N.T.S.



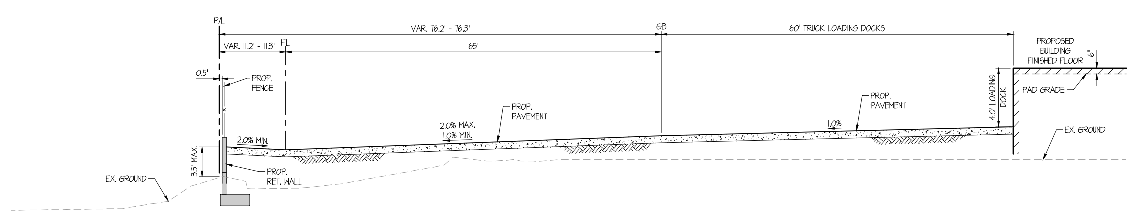
SECTION E-E
N.T.S.



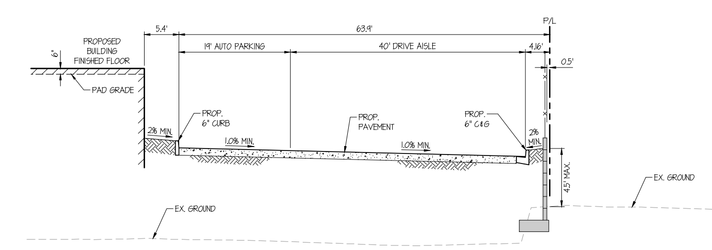
SECTION F-F
N.T.S.



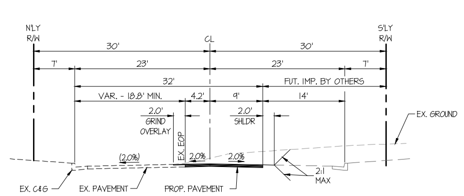
SECTION G-G
N.T.S.



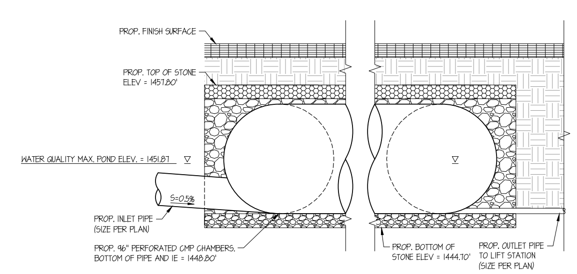
SECTION H-H
N.T.S.



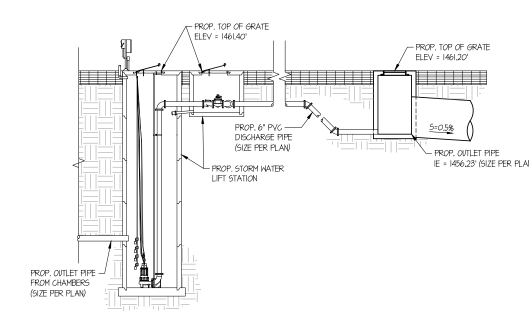
SECTION I-I
N.T.S.



SECTION J-J - SINCLAIR STREET
HOR. SCALE: 1"=10'



UNDERGROUND CHAMBERS DETAIL
N.T.S.



STORM WATER LIFT STATION OUTLET DETAIL
N.T.S.

BENCHMARK
NGS BM BM436 PID DX5444 NAVD88 EL. = 1557.17 FEET

3-1/4" ALUMINUM DISK SET FLUSH IN FOOTING OF POWER POLE 705640/01 AT NE CORNER OF CAJALCO ROAD AND SEATON AVE.

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CITY OF PERRIS

100 W. SINCLAIR STREET
SITE PLAN / CONCEPTUAL GRADING
TYPICAL SECTIONS

SCALE:	AS SHOWN
DATE:	SEPT. 2022
DESIGNED:	AJ
CHECKED:	FM
PLN CK REF:	

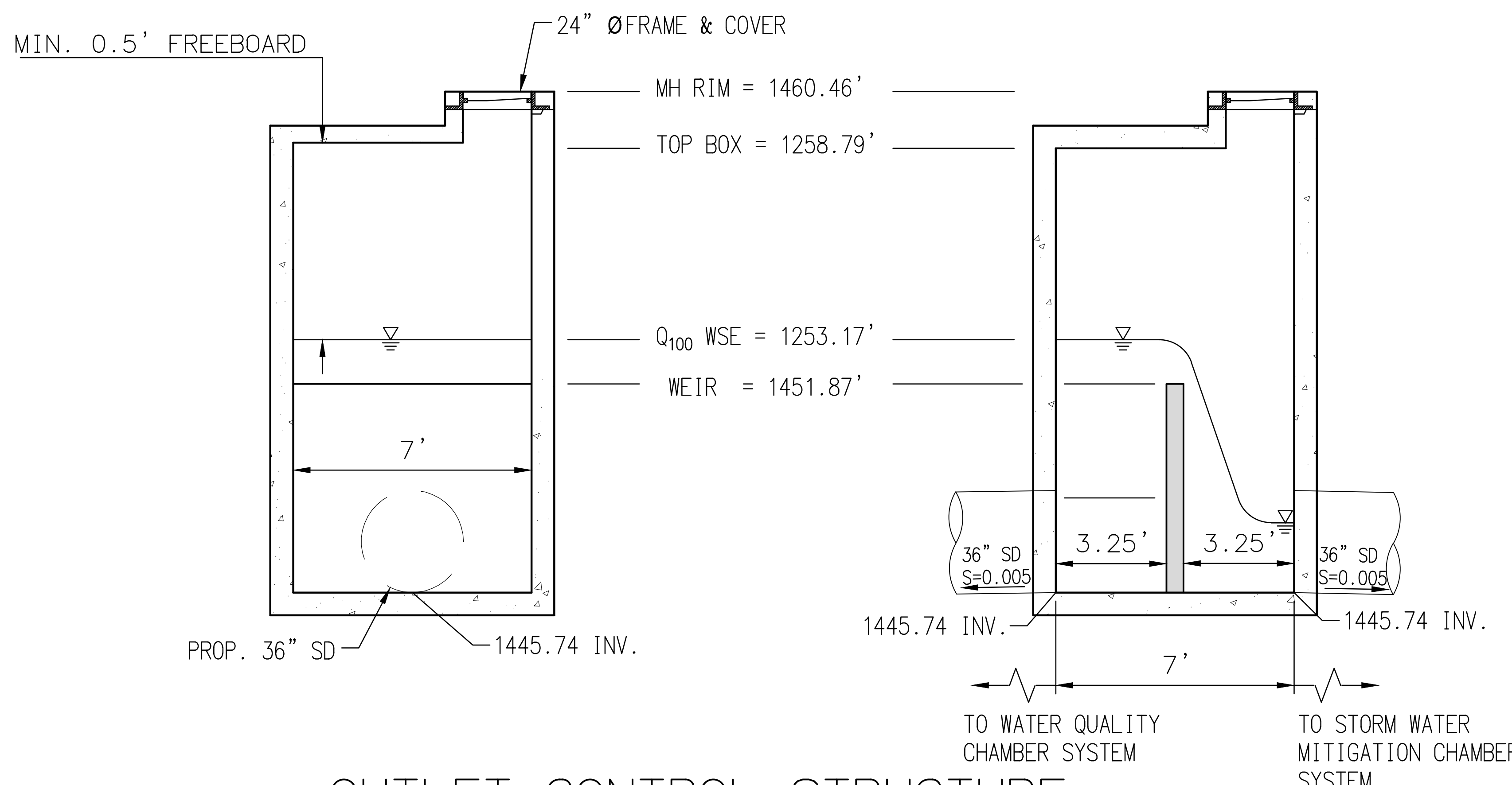
FMCIVIL ENGINEERS INC.
29995 TECHNOLOGY DRIVE, SUITE 306
MURRIETA | CA 92563
951.331.9873 - FMCIVIL.COM

SHEET 2 OF 2 SHEETS

H:\PDATA\22-004 SINCLAIR PERRIS\DWGS\PLNG\ENTITLEMENT\CONCEPT\SITE-3\22-004-CG3-001.DWG

FIGURE 7:

OUTLET CONTROL STRUCTURE



OUTLET CONTROL STRUCTURE

UNDERGROUND CHAMBER SYSTEM BOTTOM = 1455.70

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W 100 SINCLAIR ST

OUTLET CONTROL STRUCTURE DETAIL

1

OF 1 SHEETS

APPENDIX A

EXISTING CONDITION RATIONAL METHOD HYDROLOGY (ONSITE AND OFFSITE)

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
      Rational Hydrology Study       Date: 09/05/22  File:x100.out
------------------------------------------------------------------------
-
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
-


100 W SINCLAIR ST
EXISTING CONDITION
100-YEAR STORM ANALYSIS
------------------------------------------------------------------------
-



Program License Serial Number 6405

------------------------------------------------------------------------
-
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.300(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.300(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   495.000(Ft.)
Top (of initial area) elevation =  1463.700(Ft.)
Bottom (of initial area) elevation =  1459.900(Ft.)
Difference in elevation =     3.800(Ft.)
Slope =    0.00768  s(percent)=      0.77
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.504 min.
Rainfall intensity =      3.266(In/Hr) for a   100.0 year storm
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.858
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.654(CFS)
Total initial stream area =        0.590(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      11.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.858
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.50 min.
Rainfall intensity =      3.266(In/Hr) for a   100.0 year storm
Subarea runoff =      7.456(CFS) for      2.660(Ac.)
Total runoff =      9.110(CFS)      Total area =       3.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      12.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1459.900(Ft.)
End of street segment elevation =  1459.100(Ft.)
Length of street segment  =   191.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.531(CFS)
Depth of flow =   0.437(Ft.), Average velocity =   1.880(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.518(Ft.)
Flow velocity =   1.88(Ft/s)
Travel time =    1.69 min.     TC =   11.20  min.
```

```
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      3.009(In/Hr) for a   100.0 year storm
Subarea runoff =      0.773(CFS) for      0.300(Ac.)
Total runoff =      9.883(CFS)      Total area =       3.550(Ac.)
Street flow at end of street =      9.883(CFS)
Half street flow at end of street =      4.942(CFS)
Depth of flow =   0.442(Ft.), Average velocity =   1.897(Ft/s)
Flow width (from curb towards crown)=  15.745(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1459.100(Ft.)
Downstream point elevation =  1455.200(Ft.)
Channel length thru subarea  =   637.000(Ft.)
Channel base width      =  100.000(Ft.)
Slope or 'Z' of left channel bank =   0.020
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =     11.743(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    3.000(Ft.)
Flow(q) thru subarea =     11.743(CFS)
Depth of flow =   0.081(Ft.), Average velocity =   1.449(Ft/s)
Channel flow top width =  100.083(Ft.)
Flow Velocity =    1.45(Ft/s)
Travel time  =    7.32 min.
Time of concentration =   18.52 min.

Sub-Channel No. 1 Critical depth =      0.075(Ft.)
  '     '      '     Critical flow top width =    100.077(Ft.)
  '     '      '     Critical flow velocity=    1.561(Ft/s)
  '     '      '     Critical flow area =      7.522(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.976
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.024
RI index for soil(AMC 2)  =  33.03
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.340(In/Hr) for a   100.0 year storm
Subarea runoff =      3.627(CFS) for      1.820(Ac.)
Total runoff =     13.510(CFS)      Total area =       5.370(Ac.)
Depth of flow =   0.088(Ft.), Average velocity =   1.533(Ft/s)
```

```
Sub-Channel No. 1 Critical depth =      0.083(Ft.)
  '     '       '     Critical flow top width =    100.085(Ft.)
  '     '       '     Critical flow velocity=    1.627(Ft/s)
  '     '       '     Critical flow area =      8.304(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.370(Ac.)
Runoff from this stream =     13.510(CFS)
Time of concentration =   18.52 min.
Rainfall intensity =     2.340(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.000 to Point/Station      14.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   779.000(Ft.)
Top (of initial area) elevation =  1464.300(Ft.)
Bottom (of initial area) elevation =  1458.400(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.00757  s(percent)=      0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.425 min.
Rainfall intensity =      2.979(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.457(CFS)
Total initial stream area =       4.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
Time of concentration =    11.43 min.
Rainfall intensity =      2.979(In/Hr) for a   100.0 year storm
Subarea runoff =      6.096(CFS) for      2.390(Ac.)
Total runoff =     16.553(CFS)      Total area =       6.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1458.400(Ft.)
Downstream point elevation =  1455.200(Ft.)
Channel length thru subarea  =   402.000(Ft.)
Channel base width      =  100.000(Ft.)
Slope or 'Z' of left channel bank =   0.020
Slope or 'Z' of right channel bank =   0.020
Estimated mean flow rate at midpoint of channel =     18.429(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    3.000(Ft.)
Flow(q) thru subarea =     18.429(CFS)
Depth of flow =   0.098(Ft.), Average velocity =   1.878(Ft/s)
Channel flow top width =  100.004(Ft.)
Flow Velocity =    1.88(Ft/s)
Travel time  =    3.57 min.
Time of concentration =   14.99 min.

Sub-Channel No. 1 Critical depth =      0.102(Ft.)
  '     '       '     Critical flow top width =    100.004(Ft.)
  '     '       '     Critical flow velocity=    1.815(Ft/s)
  '     '       '     Critical flow area =     10.156(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.853
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.601(In/Hr) for a   100.0 year storm
Subarea runoff =      3.683(CFS) for      1.660(Ac.)
Total runoff =     20.235(CFS)      Total area =       8.150(Ac.)
Depth of flow =   0.104(Ft.), Average velocity =   1.949(Ft/s)

Sub-Channel No. 1 Critical depth =      0.108(Ft.)
  '     '       '     Critical flow top width =    100.004(Ft.)
  '     '       '     Critical flow velocity=    1.867(Ft/s)
  '     '       '     Critical flow area =     10.840(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
```

```
In Main Stream number: 2
Stream flow area =      8.150(Ac.)
Runoff from this stream =     20.235(CFS)
Time of concentration =   14.99 min.
Rainfall intensity =     2.601(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.000 to Point/Station      16.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   392.000(Ft.)
Top (of initial area) elevation =  1464.300(Ft.)
Bottom (of initial area) elevation =  1460.200(Ft.)
Difference in elevation =     4.100(Ft.)
Slope =    0.01046  s(percent)=      1.05
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.138 min.
Rainfall intensity =      3.530(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.916(CFS)
Total initial stream area =       1.290(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1460.200(Ft.)
End of street segment elevation =  1455.200(Ft.)
Length of street segment  =  1048.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  25.000(Ft.)
Distance from crown to crossfall grade break  =  24.990(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.010(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.914(CFS)
Depth of flow =   0.570(Ft.), Average velocity =   2.120(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    3.52(Ft.)
```

```
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.199(Ft.)
Flow velocity =   2.12(Ft/s)
Travel time =    8.24 min.     TC =   16.38  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.852
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.488(In/Hr) for a   100.0 year storm
Subarea runoff =      9.923(CFS) for      4.680(Ac.)
Total runoff =     13.838(CFS)      Total area =       5.970(Ac.)
Street flow at end of street =     13.838(CFS)
Half street flow at end of street =     13.838(CFS)
Depth of flow =   0.638(Ft.), Average velocity =   2.292(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    6.90(Ft.)
Flow width (from curb towards crown)=  23.580(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      5.970(Ac.)
Runoff from this stream =     13.838(CFS)
Time of concentration =   16.38 min.
Rainfall intensity =     2.488(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       13.510     18.52              2.340
2       20.235     14.99              2.601
3       13.838     16.38              2.488
Largest stream flow has longer or shorter time of concentration
Qp =     20.235 + sum of
        Qa           Tb/Ta
        13.510 *    0.809 =     10.936
        Qa           Tb/Ta
        13.838 *    0.915 =     12.669
Qp =     43.840

Total of 3 main streams to confluence:
Flow rates before confluence point:
      13.510      20.235      13.838
Area of streams before confluence:
        5.370        8.150        5.970
```

Results of confluence:
Total flow rate =   43.840(CFS)
Time of concentration =   14.993 min.
Effective stream area after confluence =   19.490(Ac.)
End of computations, total study area =   19.49 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 32.1

```
                Riverside County Rational Hydrology Program

     CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
           Rational Hydrology Study        Date: 09/05/22  File:x10.out
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      *********   Hydrology Study Control Information **********

      English (in-lb) Units used in input data file

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-


     100 W SINCLAIR ST
     EXISTING CONDITION
     10-YEAR STORM ANALYSIS
     ------------------------------------------------------------------------
-



     Program License Serial Number 6405

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-
     Rational Method Hydrology Program based on
     Riverside County Flood Control & Water Conservation District
     1978 hydrology manual

     Storm event (year) =   10.00 Antecedent Moisture Condition = 2

     2 year, 1 hour precipitation =  0.500(In.)
     100 year, 1 hour precipitation =  1.300(In.)

     Storm event year =  10.0
     Calculated rainfall intensity data:
     1 hour intensity =  0.829(In/Hr)
     Slope of intensity duration curve = 0.5000




     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     Process from Point/Station       10.000 to Point/Station      11.000
     **** INITIAL AREA EVALUATION ****
     ______________________________________________________________________
     Initial area flow distance =   495.000(Ft.)
     Top (of initial area) elevation =  1463.700(Ft.)
     Bottom (of initial area) elevation =  1459.900(Ft.)
     Difference in elevation =     3.800(Ft.)
     Slope =    0.00768  s(percent)=       0.77
     TC = k(0.300)*[(length^3)/(elevation change)]^0.2
     Initial area time of concentration =    9.504 min.
     Rainfall intensity =      2.083(In/Hr) for a    10.0 year storm
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.848
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.042(CFS)
Total initial stream area =        0.590(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       11.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.848
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.50 min.
Rainfall intensity =      2.083(In/Hr) for a    10.0 year storm
Subarea runoff =      4.700(CFS) for      2.660(Ac.)
Total runoff =      5.742(CFS)      Total area =       3.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1459.900(Ft.)
End of street segment elevation =  1459.100(Ft.)
Length of street segment  =   191.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.007(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   1.683(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.876(Ft.)
Flow velocity =   1.68(Ft/s)
Travel time =    1.89 min.     TC =   11.40  min.
```

```
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.902(In/Hr) for a    10.0 year storm
Subarea runoff =      0.483(CFS) for      0.300(Ac.)
Total runoff =      6.225(CFS)      Total area =       3.550(Ac.)
Street flow at end of street =      6.225(CFS)
Half street flow at end of street =      3.113(CFS)
Depth of flow =   0.388(Ft.), Average velocity =   1.697(Ft/s)
Flow width (from curb towards crown)=  13.066(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1459.100(Ft.)
Downstream point elevation =  1455.200(Ft.)
Channel length thru subarea  =   637.000(Ft.)
Channel base width      =  100.000(Ft.)
Slope or 'Z' of left channel bank =   0.020
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      7.351(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    3.000(Ft.)
Flow(q) thru subarea =      7.351(CFS)
Depth of flow =   0.061(Ft.), Average velocity =   1.202(Ft/s)
Channel flow top width =  100.062(Ft.)
Flow Velocity =    1.20(Ft/s)
Travel time  =    8.83 min.
Time of concentration =   20.23 min.

Sub-Channel No. 1 Critical depth =      0.055(Ft.)
  '     '       '     Critical flow top width =    100.056(Ft.)
  '     '       '     Critical flow velocity=    1.332(Ft/s)
  '     '       '     Critical flow area =      5.519(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.976
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.024
RI index for soil(AMC 2)  =  33.03
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.428(In/Hr) for a    10.0 year storm
Subarea runoff =      2.186(CFS) for      1.820(Ac.)
Total runoff =      8.411(CFS)      Total area =       5.370(Ac.)
Depth of flow =   0.066(Ft.), Average velocity =   1.269(Ft/s)
```

```
Sub-Channel No. 1 Critical depth =      0.061(Ft.)
  '     '       '     Critical flow top width =    100.062(Ft.)
  '     '       '     Critical flow velocity=    1.389(Ft/s)
  '     '       '     Critical flow area =      6.057(Sq.Ft)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.370(Ac.)
Runoff from this stream =      8.411(CFS)
Time of concentration =   20.23 min.
Rainfall intensity =     1.428(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.000 to Point/Station      14.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   779.000(Ft.)
Top (of initial area) elevation =  1464.300(Ft.)
Bottom (of initial area) elevation =  1458.400(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.00757  s(percent)=      0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.425 min.
Rainfall intensity =      1.900(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.591(CFS)
Total initial stream area =       4.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      14.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
```

```
Time of concentration =    11.43 min.
Rainfall intensity =      1.900(In/Hr) for a    10.0 year storm
Subarea runoff =      3.842(CFS) for      2.390(Ac.)
Total runoff =     10.434(CFS)      Total area =       6.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      17.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1458.400(Ft.)
Downstream point elevation =  1455.200(Ft.)
Channel length thru subarea  =   402.000(Ft.)
Channel base width      =  100.000(Ft.)
Slope or 'Z' of left channel bank =   0.020
Slope or 'Z' of right channel bank =   0.020
Estimated mean flow rate at midpoint of channel =     11.592(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    3.000(Ft.)
Flow(q) thru subarea =     11.592(CFS)
Depth of flow =   0.074(Ft.), Average velocity =   1.560(Ft/s)
Channel flow top width =  100.003(Ft.)
Flow Velocity =    1.56(Ft/s)
Travel time  =    4.29 min.
Time of concentration =   15.72 min.

Sub-Channel No. 1 Critical depth =      0.075(Ft.)
  '     '       '     Critical flow top width =    100.003(Ft.)
  '     '       '     Critical flow velocity=    1.542(Ft/s)
  '     '       '     Critical flow area =      7.520(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.843
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.620(In/Hr) for a    10.0 year storm
Subarea runoff =      2.266(CFS) for      1.660(Ac.)
Total runoff =     12.700(CFS)      Total area =       8.150(Ac.)
Depth of flow =   0.078(Ft.), Average velocity =   1.618(Ft/s)

Sub-Channel No. 1 Critical depth =      0.079(Ft.)
  '     '       '     Critical flow top width =    100.003(Ft.)
  '     '       '     Critical flow velocity=    1.606(Ft/s)
  '     '       '     Critical flow area =      7.910(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
```

```
In Main Stream number: 2
Stream flow area =      8.150(Ac.)
Runoff from this stream =     12.700(CFS)
Time of concentration =   15.72 min.
Rainfall intensity =     1.620(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.000 to Point/Station      16.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   392.000(Ft.)
Top (of initial area) elevation =  1464.300(Ft.)
Bottom (of initial area) elevation =  1460.200(Ft.)
Difference in elevation =     4.100(Ft.)
Slope =    0.01046  s(percent)=      1.05
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.138 min.
Rainfall intensity =      2.251(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.850
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.468(CFS)
Total initial stream area =       1.290(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1460.200(Ft.)
End of street segment elevation =  1455.200(Ft.)
Length of street segment  =  1048.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  25.000(Ft.)
Distance from crown to crossfall grade break  =  24.990(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.010(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.602(CFS)
Depth of flow =   0.500(Ft.), Average velocity =   2.019(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.655(Ft.)
```

```
Flow velocity =   2.02(Ft/s)
Travel time =    8.65 min.     TC =   16.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.842
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.567(In/Hr) for a    10.0 year storm
Subarea runoff =      6.177(CFS) for      4.680(Ac.)
Total runoff =      8.645(CFS)      Total area =       5.970(Ac.)
Street flow at end of street =      8.645(CFS)
Half street flow at end of street =      8.645(CFS)
Depth of flow =   0.566(Ft.), Average velocity =   2.110(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    3.29(Ft.)
Flow width (from curb towards crown)=  19.969(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      5.970(Ac.)
Runoff from this stream =      8.645(CFS)
Time of concentration =   16.79 min.
Rainfall intensity =     1.567(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        8.411     20.23               1.428
2       12.700     15.72               1.620
3        8.645     16.79               1.567
Largest stream flow has longer or shorter time of concentration
Qp =     12.700 + sum of
        Qa           Tb/Ta
         8.411 *    0.777 =      6.536
        Qa           Tb/Ta
         8.645 *    0.936 =      8.093
Qp =     27.329

Total of 3 main streams to confluence:
Flow rates before confluence point:
       8.411      12.700       8.645
Area of streams before confluence:
        5.370        8.150        5.970


Results of confluence:
```

Total flow rate =   27.329(CFS)
Time of concentration =   15.719 min.
Effective stream area after confluence =   19.490(Ac.)
End of computations, total study area =   19.49 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 32.1

APPENDIX B

PROPOSED CONDITION RATIONAL METHOD HYDROLOGY (ONSITE AND OFFSITE)

B.1: PROPOSED CONDITION-100 YR

B.2: PROPOSED CONDITION-10 YR

```
              Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
      Rational Hydrology Study        Date: 09/12/22  File:1.out
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-
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

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100 W SINCLAIR ST
PROPOSED CONDITION
100-YEAR STORM ANALYSIS
------------------------------------------------------------------------
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Program License Serial Number 6405

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-
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.300(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.300(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   654.000(Ft.)
Top (of initial area) elevation =  1465.400(Ft.)
Bottom (of initial area) elevation =  1461.500(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.00596  s(percent)=       0.60
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.175 min.
Rainfall intensity =      3.012(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
```

```
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.900(CFS)
Total initial stream area =       3.450(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      11.000 to Point/Station      12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.500(Ft.)
Downstream point/station elevation =  1456.400(Ft.)
Pipe length  =   209.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.900(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.900(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   19.89(In.)
Critical Depth =   13.31(In.)
Pipe flow velocity =      5.28(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =    11.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.84 min.
Rainfall intensity =      2.927(In/Hr) for a   100.0 year storm
Subarea runoff =      4.083(CFS) for      1.630(Ac.)
Total runoff =     12.982(CFS)      Total area =       5.080(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      12.000 to Point/Station      13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1456.400(Ft.)
Downstream point/station elevation =  1455.400(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.982(CFS)
Nearest computed pipe diameter  =     24.00(In.)
```

```
Calculated individual pipe flow  =    12.982(CFS)
Normal flow depth in pipe =   16.66(In.)
Flow top width inside pipe =   22.11(In.)
Critical Depth =   15.54(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =    12.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.855
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    12.46 min.
Rainfall intensity =      2.853(In/Hr) for a   100.0 year storm
Subarea runoff =      5.221(CFS) for      2.140(Ac.)
Total runoff =     18.204(CFS)      Total area =       7.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1455.400(Ft.)
Downstream point/station elevation =  1453.500(Ft.)
Pipe length  =   342.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.204(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    18.204(CFS)
Normal flow depth in pipe =   18.07(In.)
Flow top width inside pipe =   25.41(In.)
Critical Depth =   17.91(In.)
Pipe flow velocity =      6.43(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    13.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.220(Ac.)
Runoff from this stream =     18.204(CFS)
Time of concentration =   13.34 min.
Rainfall intensity =     2.757(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.100 to Point/Station      13.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   268.000(Ft.)
Top (of initial area) elevation =  1462.000(Ft.)
Bottom (of initial area) elevation =  1460.700(Ft.)
Difference in elevation =     1.300(Ft.)
Slope =    0.00485  s(percent)=       0.49
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.151 min.
Rainfall intensity =      3.527(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.699(CFS)
Total initial stream area =       0.890(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.200 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.200(Ft.)
Downstream point/station elevation =  1453.500(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.699(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.699(CFS)
Normal flow depth in pipe =    3.79(In.)
Flow top width inside pipe =    8.89(In.)
Critical Depth =    8.47(In.)
Pipe flow velocity =     15.28(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.200 to Point/Station      14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.890(Ac.)
Runoff from this stream =      2.699(CFS)
Time of concentration =    8.17 min.
Rainfall intensity =     3.523(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                 (In/Hr)


1       18.204     13.34               2.757
2        2.699      8.17               3.523
Largest stream flow has longer time of concentration
Qp =     18.204 + sum of
        Qb         Ia/Ib
         2.699 *    0.783 =      2.112
Qp =     20.316

Total of 2 main streams to confluence:
Flow rates before confluence point:
      18.204      2.699
Area of streams before confluence:
        7.220       0.890


Results of confluence:
Total flow rate =     20.316(CFS)
Time of concentration =    13.343 min.
Effective stream area after confluence  =      8.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1453.500(Ft.)
Downstream point/station elevation =  1452.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.316(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    20.316(CFS)
Normal flow depth in pipe =   21.33(In.)
Flow top width inside pipe =   22.00(In.)
Critical Depth =   18.92(In.)
Pipe flow velocity =      6.03(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =    14.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.110(Ac.)
Runoff from this stream =     20.316(CFS)
Time of concentration =   14.24 min.
Rainfall intensity =     2.668(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       14.100 to Point/Station       14.200
```

```
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   207.000(Ft.)
Top (of initial area) elevation =  1462.600(Ft.)
Bottom (of initial area) elevation =  1460.600(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00966  s(percent)=       0.97
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.405 min.
Rainfall intensity =      3.979(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.910
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.090
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  35.33
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.757(CFS)
Total initial stream area =        0.510(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      14.200 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1452.100(Ft.)
Downstream point/station elevation =  1452.000(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.757(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.757(CFS)
Normal flow depth in pipe =    7.25(In.)
Flow top width inside pipe =   11.74(In.)
Critical Depth =    6.76(In.)
Pipe flow velocity =      3.54(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     6.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.200 to Point/Station      15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.510(Ac.)
Runoff from this stream =      1.757(CFS)
Time of concentration =    6.49 min.
Rainfall intensity =     3.951(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)
```

```
1       20.316     14.24               2.668
2        1.757      6.49               3.951
Largest stream flow has longer time of concentration
Qp =     20.316 + sum of
        Qb         Ia/Ib
         1.757 *    0.675 =      1.186
Qp =     21.503

Total of 2 main streams to confluence:
Flow rates before confluence point:
      20.316      1.757
Area of streams before confluence:
        8.110       0.510


Results of confluence:
Total flow rate =     21.503(CFS)
Time of concentration =    14.241 min.
Effective stream area after confluence  =      8.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1452.000(Ft.)
Downstream point/station elevation =  1450.400(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.503(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    21.503(CFS)
Normal flow depth in pipe =   21.89(In.)
Flow top width inside pipe =   21.15(In.)
Critical Depth =   19.47(In.)
Pipe flow velocity =      6.23(Ft/s)
Travel time through pipe =    0.87 min.
Time of concentration (TC) =    15.11 min.


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Process from Point/Station      16.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.853
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.11 min.
Rainfall intensity =      2.590(In/Hr) for a   100.0 year storm
Subarea runoff =      4.419(CFS) for      2.000(Ac.)
Total runoff =     25.922(CFS)      Total area =      10.620(Ac.)
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Process from Point/Station      16.000 to Point/Station      17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1450.400(Ft.)
Downstream point/station elevation =  1450.000(Ft.)
Pipe length  =    92.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    25.922(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    25.922(CFS)
Normal flow depth in pipe =   23.53(In.)
Flow top width inside pipe =   24.68(In.)
Critical Depth =   20.84(In.)
Pipe flow velocity =      6.27(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    15.35 min.


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Process from Point/Station      16.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.620(Ac.)
Runoff from this stream =     25.922(CFS)
Time of concentration =   15.35 min.
Rainfall intensity =     2.570(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      16.100 to Point/Station      16.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   307.000(Ft.)
Top (of initial area) elevation =  1464.700(Ft.)
Bottom (of initial area) elevation =  1458.500(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.02020  s(percent)=       2.02
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.966 min.
Rainfall intensity =      3.815(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.823
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      1.162(CFS)
Total initial stream area =       0.370(Ac.)
Pervious area fraction = 0.200


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Process from Point/Station       16.200 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1450.500(Ft.)
Downstream point/station elevation =  1450.000(Ft.)
Pipe length  =   105.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.162(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.162(CFS)
Normal flow depth in pipe =    5.81(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    5.45(In.)
Pipe flow velocity =      3.09(Ft/s)
Travel time through pipe =    0.57 min.
Time of concentration (TC) =     7.53 min.


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Process from Point/Station       16.200 to Point/Station       17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.370(Ac.)
Runoff from this stream =      1.162(CFS)
Time of concentration =    7.53 min.
Rainfall intensity =     3.669(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       25.922     15.35              2.570
2        1.162      7.53              3.669
Largest stream flow has longer time of concentration
Qp =     25.922 + sum of
        Qb          Ia/Ib
         1.162 *    0.700 =      0.814
Qp =     26.736

Total of 2 main streams to confluence:
Flow rates before confluence point:
      25.922       1.162
Area of streams before confluence:
       10.620        0.370


Results of confluence:
Total flow rate =     26.736(CFS)
Time of concentration =    15.355 min.
Effective stream area after confluence  =     10.990(Ac.)


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Process from Point/Station       17.000 to Point/Station       18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

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________________________________________________________________________
Upstream point/station elevation =  1450.000(Ft.)
Downstream point/station elevation =  1448.900(Ft.)
Pipe length  =   227.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.736(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    26.736(CFS)
Normal flow depth in pipe =   23.02(In.)
Flow top width inside pipe =   25.36(In.)
Critical Depth =   21.16(In.)
Pipe flow velocity =      6.61(Ft/s)
Travel time through pipe =    0.57 min.
Time of concentration (TC) =    15.93 min.


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Process from Point/Station      18.000 to Point/Station      18.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.852
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.93 min.
Rainfall intensity =      2.523(In/Hr) for a   100.0 year storm
Subarea runoff =      6.151(CFS) for      2.860(Ac.)
Total runoff =     32.887(CFS)      Total area =      13.850(Ac.)


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Process from Point/Station      18.000 to Point/Station      18.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.850(Ac.)
Runoff from this stream =     32.887(CFS)
Time of concentration =   15.93 min.
Rainfall intensity =     2.523(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      17.100
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   834.000(Ft.)
Top (of initial area) elevation =  1465.400(Ft.)
Bottom (of initial area) elevation =  1457.800(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.00911  s(percent)=      0.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.315 min.
```

```
Rainfall intensity =      2.994(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.856
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     14.636(CFS)
Total initial stream area =       5.710(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      17.100 to Point/Station      18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.800(Ft.)
Downstream point/station elevation =  1448.900(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.636(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    14.636(CFS)
Normal flow depth in pipe =    7.31(In.)
Flow top width inside pipe =   11.71(In.)
Critical depth could not be calculated.
Pipe flow velocity =     29.18(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.33 min.


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Process from Point/Station      18.000 to Point/Station      18.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.710(Ac.)
Runoff from this stream =     14.636(CFS)
Time of concentration =   11.33 min.
Rainfall intensity =     2.992(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       32.887     15.93               2.523
2       14.636     11.33               2.992
Largest stream flow has longer time of concentration
Qp =     32.887 + sum of
        Qb          Ia/Ib
        14.636 *    0.843 =     12.344
Qp =     45.231

Total of 2 main streams to confluence:
```

Flow rates before confluence point:
32.887 14.636
Area of streams before confluence:
13.850 5.710

Results of confluence:
Total flow rate = 45.231(CFS)
Time of concentration = 15.927 min.
Effective stream area after confluence = 19.560(Ac.)
End of computations, total study area = 19.56 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.102
Area averaged RI index number = 32.1

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             Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
      Rational Hydrology Study       Date: 09/12/22  File:10.out
------------------------------------------------------------------------
-
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
-


100 W SINCLAIR ST
PROPOSED CONDITION
10-YEAR STORM ANALYSIS
------------------------------------------------------------------------
-



Program License Serial Number 6405

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-
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.300(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.829(In/Hr)
Slope of intensity duration curve = 0.5000




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Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   654.000(Ft.)
Top (of initial area) elevation =  1465.400(Ft.)
Bottom (of initial area) elevation =  1461.500(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.00596  s(percent)=      0.60
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.175 min.
Rainfall intensity =      1.921(In/Hr) for a    10.0 year storm
```

```
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.610(CFS)
Total initial stream area =        3.450(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.500(Ft.)
Downstream point/station elevation =  1456.400(Ft.)
Pipe length  =   209.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.610(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.610(CFS)
Normal flow depth in pipe =   11.48(In.)
Flow top width inside pipe =   17.30(In.)
Critical Depth =   10.95(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.74 min.
Time of concentration (TC) =    11.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       12.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.91 min.
Rainfall intensity =      1.861(In/Hr) for a    10.0 year storm
Subarea runoff =      2.565(CFS) for      1.630(Ac.)
Total runoff =      8.175(CFS)      Total area =       5.080(Ac.)


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Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1456.400(Ft.)
Downstream point/station elevation =  1455.400(Ft.)
Pipe length  =   208.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.175(CFS)
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Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.175(CFS)
Normal flow depth in pipe =   13.50(In.)
Flow top width inside pipe =   20.12(In.)
Critical Depth =   12.73(In.)
Pipe flow velocity =      5.01(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    12.61 min.


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Process from Point/Station       13.000 to Point/Station      13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.845
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    12.61 min.
Rainfall intensity =      1.809(In/Hr) for a    10.0 year storm
Subarea runoff =      3.271(CFS) for      2.140(Ac.)
Total runoff =     11.446(CFS)      Total area =       7.220(Ac.)


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Process from Point/Station       13.000 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1455.400(Ft.)
Downstream point/station elevation =  1453.500(Ft.)
Pipe length  =   342.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.446(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.446(CFS)
Normal flow depth in pipe =   16.64(In.)
Flow top width inside pipe =   17.03(In.)
Critical Depth =   15.14(In.)
Pipe flow velocity =      5.59(Ft/s)
Travel time through pipe =    1.02 min.
Time of concentration (TC) =    13.63 min.


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Process from Point/Station       13.000 to Point/Station      14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.220(Ac.)
Runoff from this stream =     11.446(CFS)
Time of concentration =   13.63 min.
Rainfall intensity =     1.740(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.100 to Point/Station      13.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   268.000(Ft.)
Top (of initial area) elevation =  1462.000(Ft.)
Bottom (of initial area) elevation =  1460.700(Ft.)
Difference in elevation =     1.300(Ft.)
Slope =    0.00485  s(percent)=      0.49
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.151 min.
Rainfall intensity =      2.250(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.850
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.701(CFS)
Total initial stream area =       0.890(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.200 to Point/Station      14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.200(Ft.)
Downstream point/station elevation =  1453.500(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.701(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.701(CFS)
Normal flow depth in pipe =    3.65(In.)
Flow top width inside pipe =    5.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.59(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      13.200 to Point/Station      14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.890(Ac.)
Runoff from this stream =      1.701(CFS)
Time of concentration =    8.17 min.
Rainfall intensity =     2.246(In/Hr)
Summary of stream data:
```

```
Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       11.446     13.63              1.740
2        1.701      8.17              2.246
Largest stream flow has longer time of concentration
Qp =     11.446 + sum of
        Qb          Ia/Ib
         1.701 *    0.775 =      1.318
Qp =     12.764

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.446      1.701
Area of streams before confluence:
        7.220        0.890


Results of confluence:
Total flow rate =     12.764(CFS)
Time of concentration =    13.625 min.
Effective stream area after confluence  =      8.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1453.500(Ft.)
Downstream point/station elevation =  1452.000(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.764(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    12.764(CFS)
Normal flow depth in pipe =   16.69(In.)
Flow top width inside pipe =   22.09(In.)
Critical Depth =   15.43(In.)
Pipe flow velocity =      5.47(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    14.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      14.000 to Point/Station      15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.110(Ac.)
Runoff from this stream =     12.764(CFS)
Time of concentration =   14.62 min.
Rainfall intensity =     1.680(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       14.100 to Point/Station       14.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   207.000(Ft.)
Top (of initial area) elevation =  1462.600(Ft.)
Bottom (of initial area) elevation =  1460.600(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00966  s(percent)=       0.97
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.405 min.
Rainfall intensity =      2.538(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.910
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.090
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  35.33
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.108(CFS)
Total initial stream area =        0.510(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.200 to Point/Station       15.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1452.100(Ft.)
Downstream point/station elevation =  1452.000(Ft.)
Pipe length  =    19.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.108(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.108(CFS)
Normal flow depth in pipe =    6.82(In.)
Flow top width inside pipe =    7.71(In.)
Critical Depth =    5.80(In.)
Pipe flow velocity =      3.08(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     6.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.200 to Point/Station       15.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.510(Ac.)
Runoff from this stream =      1.108(CFS)
Time of concentration =    6.51 min.
Rainfall intensity =     2.518(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1       12.764     14.62               1.680
2        1.108      6.51               2.518
Largest stream flow has longer time of concentration
Qp =     12.764 + sum of
        Qb         Ia/Ib
         1.108 *    0.667 =      0.739
Qp =     13.503

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.764      1.108
Area of streams before confluence:
        8.110       0.510


Results of confluence:
Total flow rate =     13.503(CFS)
Time of concentration =    14.616 min.
Effective stream area after confluence  =      8.620(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1452.000(Ft.)
Downstream point/station elevation =  1450.400(Ft.)
Pipe length  =   325.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.503(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.503(CFS)
Normal flow depth in pipe =   17.02(In.)
Flow top width inside pipe =   21.80(In.)
Critical Depth =   15.88(In.)
Pipe flow velocity =      5.67(Ft/s)
Travel time through pipe =    0.95 min.
Time of concentration (TC) =    15.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.843
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.57 min.
Rainfall intensity =      1.628(In/Hr) for a    10.0 year storm
Subarea runoff =      2.744(CFS) for      2.000(Ac.)
Total runoff =     16.246(CFS)      Total area =      10.620(Ac.)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1450.400(Ft.)
Downstream point/station elevation =  1450.000(Ft.)
Pipe length  =    92.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.246(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.246(CFS)
Normal flow depth in pipe =   18.19(In.)
Flow top width inside pipe =   25.32(In.)
Critical Depth =   16.88(In.)
Pipe flow velocity =      5.70(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =    15.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.620(Ac.)
Runoff from this stream =     16.246(CFS)
Time of concentration =   15.84 min.
Rainfall intensity =     1.614(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      16.100 to Point/Station      16.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   307.000(Ft.)
Top (of initial area) elevation =  1464.700(Ft.)
Bottom (of initial area) elevation =  1458.500(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.02020  s(percent)=      2.02
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.966 min.
Rainfall intensity =      2.433(In/Hr) for a    10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.803
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      0.723(CFS)
Total initial stream area =       0.370(Ac.)
Pervious area fraction = 0.200
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.200 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1450.500(Ft.)
Downstream point/station elevation =  1450.000(Ft.)
Pipe length  =   105.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.723(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.723(CFS)
Normal flow depth in pipe =    5.20(In.)
Flow top width inside pipe =    8.89(In.)
Critical Depth =    4.65(In.)
Pipe flow velocity =      2.74(Ft/s)
Travel time through pipe =    0.64 min.
Time of concentration (TC) =     7.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.200 to Point/Station       17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.370(Ac.)
Runoff from this stream =      0.723(CFS)
Time of concentration =    7.61 min.
Rainfall intensity =     2.329(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.246     15.84              1.614
2        0.723      7.61              2.329
Largest stream flow has longer time of concentration
Qp =     16.246 + sum of
        Qb          Ia/Ib
         0.723 *    0.693 =      0.501
Qp =     16.747

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.246       0.723
Area of streams before confluence:
       10.620        0.370


Results of confluence:
Total flow rate =     16.747(CFS)
Time of concentration =    15.840 min.
Effective stream area after confluence  =     10.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1450.000(Ft.)
Downstream point/station elevation =  1448.900(Ft.)
Pipe length  =   227.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.747(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.747(CFS)
Normal flow depth in pipe =   17.88(In.)
Flow top width inside pipe =   25.54(In.)
Critical Depth =   17.15(In.)
Pipe flow velocity =      5.99(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =    16.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       18.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.842
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    16.47 min.
Rainfall intensity =      1.582(In/Hr) for a    10.0 year storm
Subarea runoff =      3.812(CFS) for      2.860(Ac.)
Total runoff =     20.559(CFS)      Total area =      13.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       18.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.850(Ac.)
Runoff from this stream =     20.559(CFS)
Time of concentration =   16.47 min.
Rainfall intensity =     1.582(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       17.100
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   834.000(Ft.)
Top (of initial area) elevation =  1465.400(Ft.)
Bottom (of initial area) elevation =  1457.800(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.00911  s(percent)=      0.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   11.315 min.
Rainfall intensity =      1.909(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
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
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.226(CFS)
Total initial stream area =        5.710(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      17.100 to Point/Station      18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1457.800(Ft.)
Downstream point/station elevation =  1448.900(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.226(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     9.226(CFS)
Normal flow depth in pipe =    6.90(In.)
Flow top width inside pipe =    7.61(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.39(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    11.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      18.000 to Point/Station      18.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.710(Ac.)
Runoff from this stream =      9.226(CFS)
Time of concentration =   11.33 min.
Rainfall intensity =     1.908(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       20.559     16.47              1.582
2        9.226     11.33              1.908
Largest stream flow has longer time of concentration
Qp =     20.559 + sum of
        Qb          Ia/Ib
         9.226 *    0.829 =      7.652
Qp =     28.211
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
20.559 9.226
Area of streams before confluence:
13.850 5.710

Results of confluence:
Total flow rate = 28.211(CFS)
Time of concentration = 16.471 min.
Effective stream area after confluence = 19.560(Ac.)
End of computations, total study area = 19.56 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.102
Area averaged RI index number = 32.1

APPENDIX C

Hydraulic Calculations

C.1: UNIT HYDROGRAPH ANALYSIS, 100 YEAR, 1 HOUR STORM DURATION, AREA "A"

C.2: UNIT HYDROGRAPH ANALYSIS, 100 YEAR, 3 HOUR STORM DURATION, AREA "A

C.3: UNIT HYDROGRAPH ANALYSIS, 100 YEAR, 6 HOUR STORM DURATION, AREA "A

C.4: UNIT HYDROGRAPH ANALYSIS, 100 YEAR, 24 HOUR STORM DURATION, AREA "A

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 09/09/22 File: 21100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

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100 W SINCLAIR ST
ONSITE PROPOSED CONDITION
100-YEAR, 1-HOUR STORM EVENT ANALYSIS

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 19.56(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.56(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 2845.00(Ft.)
Length along longest watercourse measured to centroid = 1734.00(Ft.)
Length along longest watercourse = 0.539 Mi.
Length along longest watercourse measured to centroid = 0.328 Mi.
Difference in elevation = 16.50(Ft.)
Slope along watercourse = 30.6221 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.097 Hr.
Lag time = 5.84 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.34 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	0.47	9.19

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	1.23	24.06

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.470(In)
Area Averaged 100-Year Rainfall = 1.230(In)

Point rain (area averaged) = 1.230(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 1.230(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.560	32.10	0.898

Total Area Entered = 19.56(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
32.1	32.1	0.741	0.898	0.142	1.000	0.142
					Sum (F) =	0.142

Area averaged mean soil loss (F) (In/Hr) = 0.142
Minimum soil loss rate ((In/Hr)) = 0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.182

Slope of intensity-duration curve for a 1 hour storm =0.5000

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	85.640	14.902	2.938
2	0.167	171.279	46.109	9.089
3	0.250	256.919	18.421	3.631
4	0.333	342.559	7.891	1.555
5	0.417	428.198	4.672	0.921
6	0.500	513.838	2.920	0.576
7	0.583	599.478	2.073	0.409
8	0.667	685.117	1.374	0.271
9	0.750	770.757	0.916	0.181
10	0.833	856.396	0.721	0.142
			Sum = 100.000	Sum= 19.713

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	4.20	0.620	(0.142)	0.113	0.507
2	0.17	4.30	0.635	(0.142)	0.115	0.519
3	0.25	5.00	0.738	(0.142)	0.134	0.604
4	0.33	5.00	0.738	(0.142)	0.134	0.604
5	0.42	5.80	0.856	0.142	(0.155)	0.714
6	0.50	6.50	0.959	0.142	(0.174)	0.817
7	0.58	7.40	1.092	0.142	(0.198)	0.950
8	0.67	8.60	1.269	0.142	(0.230)	1.127
9	0.75	12.30	1.815	0.142	(0.330)	1.673
10	0.83	29.10	4.294	0.142	(0.780)	4.152
11	0.92	6.80	1.004	0.142	(0.182)	0.861
12	1.00	5.00	0.738	(0.142)	0.134	0.604

(Loss Rate Not Used)

Sum = 100.0 Sum = 13.1

Flood volume = Effective rainfall 1.09(In)
times area 19.6(Ac.)/[(In)/(Ft.)] = 1.8(Ac.Ft)
Total soil loss = 0.14(In)
Total soil loss = 0.221(Ac.Ft)
Total rainfall = 1.23(In)
Flood volume = 77704.3 Cubic Feet
Total soil loss = 9613.7 Cubic Feet

```
--------------------------------------------------------------------
 Peak flow rate of this hydrograph =     50.110(CFS)
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    1 - 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       15.0      30.0      45.0      60.0
-----------------------------------------------------------------------
  0+ 5       0.0103      1.49  Q         |         |         |         |
  0+10       0.0526      6.14  |V  Q     |         |         |         |
  0+15       0.1100      8.34  | V  Q    |         |         |         |
  0+20       0.1785      9.94  |   V Q   |         |         |         |
  0+25       0.2546     11.06  |    V Q  |         |         |         |
  0+30       0.3428     12.80  |      VQ |         |         |         |
  0+35       0.4448     14.82  |        Q|         |         |         |
  0+40       0.5639     17.28  |         |QV       |         |         |
  0+45       0.7111     21.37  |         |   QV    |         |         |
  0+50       0.9503     34.73  |         |         |V Q      |         |
  0+55       1.2954     50.11  |         |         |        V|  Q      |
  1+ 0       1.4993     29.61  |         |        Q|         |  V      |
  1+ 5       1.6239     18.10  |         | Q       |         |     V   |
  1+10       1.6879      9.29  |     Q   |         |         |      V  |
  1+15       1.7251      5.40  |  Q      |         |         |       V |
  1+20       1.7495      3.54  | Q       |         |         |        V|
  1+25       1.7653      2.29  |Q        |         |         |        V|
  1+30       1.7754      1.47  Q         |         |         |        V|
  1+35       1.7817      0.91  Q         |         |         |        V|
  1+40       1.7833      0.23  Q         |         |         |        V|
  1+45       1.7838      0.09  Q         |         |         |         V
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 09/09/22 File: 23100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

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100 W SINCLAIR ST
ONSITE PROPOSED CONDITION
100-YEAR, 3-HOUR STORM EVENT ANALYSIS

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 19.56(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.56(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 2845.00(Ft.)
Length along longest watercourse measured to centroid = 1734.00(Ft.)
Length along longest watercourse = 0.539 Mi.
Length along longest watercourse measured to centroid = 0.328 Mi.
Difference in elevation = 16.50(Ft.)
Slope along watercourse = 30.6221 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.097 Hr.
Lag time = 5.84 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.34 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	0.80	15.65

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	1.88	36.77

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 1.880(In)

Point rain (area averaged) = 1.880(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.880(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.560	32.10	0.898

Total Area Entered = 19.56(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
32.1	32.1	0.741	0.898	0.142	1.000	0.142
					Sum (F) =	0.142

Area averaged mean soil loss (F) (In/Hr) = 0.142
Minimum soil loss rate ((In/Hr)) = 0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.182

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	85.640	14.902	2.938
2	0.167	171.279	46.109	9.089
3	0.250	256.919	18.421	3.631
4	0.333	342.559	7.891	1.555
5	0.417	428.198	4.672	0.921
6	0.500	513.838	2.920	0.576
7	0.583	599.478	2.073	0.409
8	0.667	685.117	1.374	0.271
9	0.750	770.757	0.916	0.181
10	0.833	856.396	0.721	0.142
			Sum = 100.000	Sum= 19.713

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time   Pattern   Storm Rain   Loss rate(In./Hr)   Effective

	(Hr.)	Percent	(In/Hr)	Max	Low	(In/Hr)
1	0.08	1.30	0.293	(0.142)	0.053	0.240
2	0.17	1.30	0.293	(0.142)	0.053	0.240
3	0.25	1.10	0.248	(0.142)	0.045	0.203
4	0.33	1.50	0.338	(0.142)	0.061	0.277
5	0.42	1.50	0.338	(0.142)	0.061	0.277
6	0.50	1.80	0.406	(0.142)	0.074	0.332
7	0.58	1.50	0.338	(0.142)	0.061	0.277
8	0.67	1.80	0.406	(0.142)	0.074	0.332
9	0.75	1.80	0.406	(0.142)	0.074	0.332
10	0.83	1.50	0.338	(0.142)	0.061	0.277
11	0.92	1.60	0.361	(0.142)	0.066	0.295
12	1.00	1.80	0.406	(0.142)	0.074	0.332
13	1.08	2.20	0.496	(0.142)	0.090	0.406
14	1.17	2.20	0.496	(0.142)	0.090	0.406
15	1.25	2.20	0.496	(0.142)	0.090	0.406
16	1.33	2.00	0.451	(0.142)	0.082	0.369
17	1.42	2.60	0.587	(0.142)	0.107	0.480
18	1.50	2.70	0.609	(0.142)	0.111	0.498
19	1.58	2.40	0.541	(0.142)	0.098	0.443
20	1.67	2.70	0.609	(0.142)	0.111	0.498
21	1.75	3.30	0.744	(0.142)	0.135	0.609
22	1.83	3.10	0.699	(0.142)	0.127	0.572
23	1.92	2.90	0.654	(0.142)	0.119	0.535
24	2.00	3.00	0.677	(0.142)	0.123	0.554
25	2.08	3.10	0.699	(0.142)	0.127	0.572
26	2.17	4.20	0.947	0.142	(0.172)	0.805
27	2.25	5.00	1.128	0.142	(0.205)	0.986
28	2.33	3.50	0.790	0.142	(0.143)	0.647
29	2.42	6.80	1.534	0.142	(0.279)	1.392
30	2.50	7.30	1.647	0.142	(0.299)	1.505
31	2.58	8.20	1.850	0.142	(0.336)	1.708
32	2.67	5.90	1.331	0.142	(0.242)	1.189
33	2.75	2.00	0.451	(0.142)	0.082	0.369
34	2.83	1.80	0.406	(0.142)	0.074	0.332
35	2.92	1.80	0.406	(0.142)	0.074	0.332
36	3.00	0.60	0.135	(0.142)	0.025	0.111

(Loss Rate Not Used)

Sum = 100.0 Sum = 19.1

Flood volume = Effective rainfall 1.60(In)
times area 19.6(Ac.)/[(In)/(Ft.)] = 2.6(Ac.Ft)
Total soil loss = 0.28(In)
Total soil loss = 0.464(Ac.Ft)
Total rainfall = 1.88(In)
Flood volume = 113261.4 Cubic Feet
Total soil loss = 20212.5 Cubic Feet

Peak flow rate of this hydrograph = 28.481(CFS)

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3 - 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 7.5 15.0 22.5 30.0

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 -----------------------------------------------------------------------
   0+ 5       0.0049      0.71  Q         |         |         |         |
   0+10       0.0247      2.89  V  Q      |         |         |         |
   0+15       0.0499      3.65  V   Q     |         |         |         |
   0+20       0.0768      3.91  |V   Q    |         |         |         |
   0+25       0.1089      4.66  |V    Q   |         |         |         |
   0+30       0.1446      5.18  | V   Q   |         |         |         |
   0+35       0.1838      5.70  | V    Q  |         |         |         |
   0+40       0.2228      5.67  |  V   Q  |         |         |         |
   0+45       0.2651      6.13  |   V   Q |         |         |         |
   0+50       0.3077      6.19  |   V   Q |         |         |         |
   0+55       0.3477      5.82  |    V Q  |         |         |         |
   1+ 0       0.3886      5.94  |    V Q  |         |         |         |
   1+ 5       0.4335      6.51  |     V Q |         |         |         |
   1+10       0.4838      7.31  |      V Q|         |         |         |
   1+15       0.5364      7.64  |       V Q         |         |         |
   1+20       0.5892      7.67  |        VQ         |         |         |
   1+25       0.6425      7.75  |        VQ         |         |         |
   1+30       0.7026      8.73  |         VQ        |         |         |
   1+35       0.7654      9.11  |         |VQ       |         |         |
   1+40       0.8274      9.00  |         | Q       |         |         |
   1+45       0.8946      9.76  |         |  Q      |         |         |
   1+50       0.9694     10.85  |         |   Q     |         |         |
   1+55       1.0444     10.89  |         |   Q V   |         |         |
   2+ 0       1.1180     10.70  |         |   Q  V  |         |         |
   2+ 5       1.1928     10.86  |         |   Q   V |         |         |
   2+10       1.2739     11.78  |         |    Q   V|         |         |
   2+15       1.3739     14.52  |         |        Q|V        |         |
   2+20       1.4845     16.05  |         |         |QV       |         |
   2+25       1.5962     16.21  |         |         |Q  V     |         |
   2+30       1.7518     22.60  |         |         |     V   Q         |
   2+35       1.9357     26.70  |         |         |        V|    Q    |
   2+40       2.1318     28.48  |         |         |         | V    Q  |
   2+45       2.2896     22.90  |         |         |         Q    V    |
   2+50       2.3878     14.26  |         |        Q|         |     V   |
   2+55       2.4612     10.67  |         |   Q     |         |      V  |
   3+ 0       2.5195      8.46  |         |Q        |         |       V |
   3+ 5       2.5553      5.21  |     Q   |         |         |        V|
   3+10       2.5750      2.86  |  Q      |         |         |        V|
   3+15       2.5865      1.67  | Q       |         |         |        V|
   3+20       2.5933      0.99  |Q        |         |         |        V|
   3+25       2.5969      0.53  Q         |         |         |        V|
   3+30       2.5986      0.25  Q         |         |         |        V|
   3+35       2.5996      0.14  Q         |         |         |        V|
   3+40       2.6000      0.07  Q         |         |         |        V|
   3+45       2.6001      0.02  Q         |         |         |        V|
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 09/09/22 File: 26100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

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100 W SINCLAIR ST
ONSITE PROPOSED CONDITION
100-YEAR, 6-HOUR STORM EVENT ANALYSIS

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 19.56(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.56(Ac.) =
0.031 Sq. Mi.
Length along longest watercourse = 2845.00(Ft.)
Length along longest watercourse measured to centroid = 1734.00(Ft.)
Length along longest watercourse = 0.539 Mi.
Length along longest watercourse measured to centroid = 0.328 Mi.
Difference in elevation = 16.50(Ft.)
Slope along watercourse = 30.6221 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.097 Hr.
Lag time = 5.84 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.34 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	1.03	20.15

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	2.50	48.90

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.030(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.560	32.10	0.898

Total Area Entered = 19.56(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
32.1	32.1	0.741	0.898	0.142	1.000	0.142
					Sum (F) =	0.142

Area averaged mean soil loss (F) (In/Hr) = 0.142
Minimum soil loss rate ((In/Hr)) = 0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.182

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	85.640	14.902	2.938
2	0.167	171.279	46.109	9.089
3	0.250	256.919	18.421	3.631
4	0.333	342.559	7.891	1.555
5	0.417	428.198	4.672	0.921
6	0.500	513.838	2.920	0.576
7	0.583	599.478	2.073	0.409
8	0.667	685.117	1.374	0.271
9	0.750	770.757	0.916	0.181
10	0.833	856.396	0.721	0.142
			Sum = 100.000	Sum= 19.713

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time   Pattern   Storm Rain   Loss rate(In./Hr)   Effective

	(Hr.)	Percent	(In/Hr)	Max |	Low	(In/Hr)
1	0.08	0.50	0.150	(0.142)	0.027	0.123
2	0.17	0.60	0.180	(0.142)	0.033	0.147
3	0.25	0.60	0.180	(0.142)	0.033	0.147
4	0.33	0.60	0.180	(0.142)	0.033	0.147
5	0.42	0.60	0.180	(0.142)	0.033	0.147
6	0.50	0.70	0.210	(0.142)	0.038	0.172
7	0.58	0.70	0.210	(0.142)	0.038	0.172
8	0.67	0.70	0.210	(0.142)	0.038	0.172
9	0.75	0.70	0.210	(0.142)	0.038	0.172
10	0.83	0.70	0.210	(0.142)	0.038	0.172
11	0.92	0.70	0.210	(0.142)	0.038	0.172
12	1.00	0.80	0.240	(0.142)	0.044	0.196
13	1.08	0.80	0.240	(0.142)	0.044	0.196
14	1.17	0.80	0.240	(0.142)	0.044	0.196
15	1.25	0.80	0.240	(0.142)	0.044	0.196
16	1.33	0.80	0.240	(0.142)	0.044	0.196
17	1.42	0.80	0.240	(0.142)	0.044	0.196
18	1.50	0.80	0.240	(0.142)	0.044	0.196
19	1.58	0.80	0.240	(0.142)	0.044	0.196
20	1.67	0.80	0.240	(0.142)	0.044	0.196
21	1.75	0.80	0.240	(0.142)	0.044	0.196
22	1.83	0.80	0.240	(0.142)	0.044	0.196
23	1.92	0.80	0.240	(0.142)	0.044	0.196
24	2.00	0.90	0.270	(0.142)	0.049	0.221
25	2.08	0.80	0.240	(0.142)	0.044	0.196
26	2.17	0.90	0.270	(0.142)	0.049	0.221
27	2.25	0.90	0.270	(0.142)	0.049	0.221
28	2.33	0.90	0.270	(0.142)	0.049	0.221
29	2.42	0.90	0.270	(0.142)	0.049	0.221
30	2.50	0.90	0.270	(0.142)	0.049	0.221
31	2.58	0.90	0.270	(0.142)	0.049	0.221
32	2.67	0.90	0.270	(0.142)	0.049	0.221
33	2.75	1.00	0.300	(0.142)	0.054	0.246
34	2.83	1.00	0.300	(0.142)	0.054	0.246
35	2.92	1.00	0.300	(0.142)	0.054	0.246
36	3.00	1.00	0.300	(0.142)	0.054	0.246
37	3.08	1.00	0.300	(0.142)	0.054	0.246
38	3.17	1.10	0.330	(0.142)	0.060	0.270
39	3.25	1.10	0.330	(0.142)	0.060	0.270
40	3.33	1.10	0.330	(0.142)	0.060	0.270
41	3.42	1.20	0.360	(0.142)	0.065	0.295
42	3.50	1.30	0.390	(0.142)	0.071	0.319
43	3.58	1.40	0.420	(0.142)	0.076	0.344
44	3.67	1.40	0.420	(0.142)	0.076	0.344
45	3.75	1.50	0.450	(0.142)	0.082	0.368
46	3.83	1.50	0.450	(0.142)	0.082	0.368
47	3.92	1.60	0.480	(0.142)	0.087	0.393
48	4.00	1.60	0.480	(0.142)	0.087	0.393
49	4.08	1.70	0.510	(0.142)	0.093	0.417
50	4.17	1.80	0.540	(0.142)	0.098	0.442
51	4.25	1.90	0.570	(0.142)	0.104	0.466
52	4.33	2.00	0.600	(0.142)	0.109	0.491
53	4.42	2.10	0.630	(0.142)	0.114	0.516
54	4.50	2.10	0.630	(0.142)	0.114	0.516
55	4.58	2.20	0.660	(0.142)	0.120	0.540
56	4.67	2.30	0.690	(0.142)	0.125	0.565

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57   4.75     2.40      0.720       (  0.142)       0.131         0.589
58   4.83     2.40      0.720       (  0.142)       0.131         0.589
59   4.92     2.50      0.750       (  0.142)       0.136         0.614
60   5.00     2.60      0.780       (  0.142)       0.142         0.638
61   5.08     3.10      0.930          0.142    (  0.169)         0.788
62   5.17     3.60      1.080          0.142    (  0.196)         0.938
63   5.25     3.90      1.170          0.142    (  0.212)         1.028
64   5.33     4.20      1.260          0.142    (  0.229)         1.118
65   5.42     4.70      1.410          0.142    (  0.256)         1.268
66   5.50     5.60      1.680          0.142    (  0.305)         1.538
67   5.58     1.90      0.570       (  0.142)       0.104         0.466
68   5.67     0.90      0.270       (  0.142)       0.049         0.221
69   5.75     0.60      0.180       (  0.142)       0.033         0.147
70   5.83     0.50      0.150       (  0.142)       0.027         0.123
71   5.92     0.30      0.090       (  0.142)       0.016         0.074
72   6.00     0.20      0.060       (  0.142)       0.011         0.049
           (Loss Rate Not Used)
   Sum =     100.0                               Sum =    25.1
    Flood volume = Effective rainfall      2.09(In)
     times area      19.6(Ac.)/[(In)/(Ft.)] =       3.4(Ac.Ft)
    Total soil loss =      0.41(In)
    Total soil loss =     0.670(Ac.Ft)
    Total rainfall =      2.50(In)
    Flood volume =      148306.2 Cubic Feet
    Total soil loss =       29188.9 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     23.878(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                       6 - 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        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0025      0.36  Q         |         |         |         |
  0+10       0.0132      1.55  V Q       |         |         |         |
  0+15       0.0284      2.22  V Q       |         |         |         |
  0+20       0.0456      2.50  V  Q      |         |         |         |
  0+25       0.0639      2.65  V  Q      |         |         |         |
  0+30       0.0833      2.82  V  Q      |         |         |         |
  0+35       0.1047      3.10  |V  Q     |         |         |         |
  0+40       0.1269      3.24  |V  Q     |         |         |         |
  0+45       0.1497      3.30  |V  Q     |         |         |         |
  0+50       0.1727      3.35  | V Q     |         |         |         |
  0+55       0.1959      3.36  | V Q     |         |         |         |
  1+ 0       0.2197      3.45  | V Q     |         |         |         |
  1+ 5       0.2450      3.68  | V Q     |         |         |         |
  1+10       0.2709      3.77  |  V Q    |         |         |         |
  1+15       0.2972      3.81  |  V Q    |         |         |         |
  1+20       0.3236      3.83  |  V Q    |         |         |         |
  1+25       0.3501      3.85  |   VQ    |         |         |         |
  1+30       0.3767      3.86  |   VQ    |         |         |         |
  1+35       0.4033      3.87  |   VQ    |         |         |         |
  1+40       0.4300      3.87  |    Q    |         |         |         |
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1+45       0.4567       3.87   |    Q    |         |         |         |
1+50       0.4833       3.87   |    Q    |         |         |         |
1+55       0.5100       3.87   |    Q    |         |         |         |
2+ 0       0.5372       3.95   |    QV   |         |         |         |
2+ 5       0.5654       4.10   |    QV   |         |         |         |
2+10       0.5932       4.04   |    QV   |         |         |         |
2+15       0.6222       4.21   |    Q V  |         |         |         |
2+20       0.6516       4.28   |    Q V  |         |         |         |
2+25       0.6813       4.31   |    Q  V |         |         |         |
2+30       0.7111       4.33   |    Q  V |         |         |         |
2+35       0.7410       4.34   |    Q  V |         |         |         |
2+40       0.7710       4.35   |    Q   V|         |         |         |
2+45       0.8015       4.43   |    Q   V|         |         |         |
2+50       0.8335       4.65   |     Q  V|         |         |         |
2+55       0.8661       4.74   |     Q   V         |         |         |
3+ 0       0.8991       4.78   |     Q   V         |         |         |
3+ 5       0.9322       4.80   |     Q   V         |         |         |
3+10       0.9658       4.89   |     Q   |V        |         |         |
3+15       1.0011       5.12   |     Q   |V        |         |         |
3+20       1.0370       5.22   |     Q   | V       |         |         |
3+25       1.0738       5.33   |      Q  | V       |         |         |
3+30       1.1127       5.66   |      Q  |  V      |         |         |
3+35       1.1544       6.05   |       Q |  V      |         |         |
3+40       1.1986       6.41   |       Q |   V     |         |         |
3+45       1.2444       6.64   |       Q |   V     |         |         |
3+50       1.2922       6.95   |        Q|    V    |         |         |
3+55       1.3415       7.16   |        Q|    V    |         |         |
4+ 0       1.3928       7.45   |        Q|     V   |         |         |
4+ 5       1.4455       7.66   |         Q     V   |         |         |
4+10       1.5007       8.02   |         Q      V  |         |         |
4+15       1.5589       8.44   |         |Q      V |         |         |
4+20       1.6201       8.89   |         |Q       V|         |         |
4+25       1.6845       9.35   |         | Q      V|         |         |
4+30       1.7516       9.75   |         | Q       V         |         |
4+35       1.8205      10.00   |         |  Q      |V        |         |
4+40       1.8920      10.39   |         |  Q      | V       |         |
4+45       1.9666      10.83   |         |   Q     |  V      |         |
4+50       2.0439      11.22   |         |   Q     |   V     |         |
4+55       2.1229      11.47   |         |    Q    |   V     |         |
5+ 0       2.2045      11.85   |         |    Q    |    V    |         |
5+ 5       2.2917      12.66   |         |     Q   |     V   |         |
5+10       2.3924      14.62   |         |        Q|       V |         |
5+15       2.5086      16.87   |         |         | Q      V|         |
5+20       2.6380      18.79   |         |         |    Q    V         |
5+25       2.7811      20.78   |         |         |      Q  | V       |
5+30       2.9439      23.64   |         |         |         |Q  V     |
5+35       3.1084      23.88   |         |         |         |Q    V   |
5+40       3.2108      14.87   |         |        Q|         |      V  |
5+45       3.2745       9.25   |         | Q       |         |       V |
5+50       3.3185       6.39   |       Q |         |         |       V |
5+55       3.3507       4.67   |     Q   |         |         |        V|
6+ 0       3.3733       3.28   |   Q     |         |         |        V|
6+ 5       3.3882       2.16   | Q       |         |         |        V|
6+10       3.3962       1.17   |Q        |         |         |        V|
6+15       3.4006       0.64   Q         |         |         |        V|
6+20       3.4026       0.28   Q         |         |         |        V|
6+25       3.4036       0.15   Q         |         |         |        V|
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   6+30        3.4042      0.08  Q         |         |         |        V|
   6+35        3.4045      0.04  Q         |         |         |        V|
   6+40        3.4046      0.02  Q         |         |         |        V|
   6+45        3.4046      0.01  Q         |         |         |         V
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U n i t   H y d r o g r a p h   A n a l y s i s

Study date 09/09/22 File: 224100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6405

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100 W SINCLAIR ST
ONSITE PROPOSED CONDITION
100-YEAR, 24-HOUR STORM EVENT ANALYSIS

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Drainage Area = 19.56(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 19.56(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 2845.00(Ft.)
Length along longest watercourse measured to centroid = 1734.00(Ft.)
Length along longest watercourse = 0.539 Mi.
Length along longest watercourse measured to centroid = 0.328 Mi.
Difference in elevation = 16.50(Ft.)
Slope along watercourse = 30.6221 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.097 Hr.
Lag time = 5.84 Min.
25% of lag time = 1.46 Min.
40% of lag time = 2.34 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	1.70	33.25

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
19.56	4.38	85.67

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.700(In)
Area Averaged 100-Year Rainfall = 4.380(In)

Point rain (area averaged) = 4.380(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 4.380(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
19.560	32.10	0.898

Total Area Entered = 19.56(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
32.1	32.1	0.741	0.898	0.142	1.000	0.142
					Sum (F) =	0.142

Area averaged mean soil loss (F) (In/Hr) = 0.142
Minimum soil loss rate ((In/Hr)) = 0.071
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.182

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	85.640	14.902	2.938
2	0.167	171.279	46.109	9.089
3	0.250	256.919	18.421	3.631
4	0.333	342.559	7.891	1.555
5	0.417	428.198	4.672	0.921
6	0.500	513.838	2.920	0.576
7	0.583	599.478	2.073	0.409
8	0.667	685.117	1.374	0.271
9	0.750	770.757	0.916	0.181
10	0.833	856.396	0.721	0.142
			Sum = 100.000	Sum= 19.713

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time   Pattern   Storm Rain   Loss rate(In./Hr)   Effective

	(Hr.)	Percent	(In/Hr)	Max |	Low	(In/Hr)
1	0.08	0.07	0.035	(0.252)	0.006	0.029
2	0.17	0.07	0.035	(0.251)	0.006	0.029
3	0.25	0.07	0.035	(0.250)	0.006	0.029
4	0.33	0.10	0.053	(0.249)	0.010	0.043
5	0.42	0.10	0.053	(0.248)	0.010	0.043
6	0.50	0.10	0.053	(0.247)	0.010	0.043
7	0.58	0.10	0.053	(0.246)	0.010	0.043
8	0.67	0.10	0.053	(0.245)	0.010	0.043
9	0.75	0.10	0.053	(0.244)	0.010	0.043
10	0.83	0.13	0.070	(0.243)	0.013	0.057
11	0.92	0.13	0.070	(0.242)	0.013	0.057
12	1.00	0.13	0.070	(0.241)	0.013	0.057
13	1.08	0.10	0.053	(0.240)	0.010	0.043
14	1.17	0.10	0.053	(0.239)	0.010	0.043
15	1.25	0.10	0.053	(0.239)	0.010	0.043
16	1.33	0.10	0.053	(0.238)	0.010	0.043
17	1.42	0.10	0.053	(0.237)	0.010	0.043
18	1.50	0.10	0.053	(0.236)	0.010	0.043
19	1.58	0.10	0.053	(0.235)	0.010	0.043
20	1.67	0.10	0.053	(0.234)	0.010	0.043
21	1.75	0.10	0.053	(0.233)	0.010	0.043
22	1.83	0.13	0.070	(0.232)	0.013	0.057
23	1.92	0.13	0.070	(0.231)	0.013	0.057
24	2.00	0.13	0.070	(0.230)	0.013	0.057
25	2.08	0.13	0.070	(0.229)	0.013	0.057
26	2.17	0.13	0.070	(0.228)	0.013	0.057
27	2.25	0.13	0.070	(0.227)	0.013	0.057
28	2.33	0.13	0.070	(0.226)	0.013	0.057
29	2.42	0.13	0.070	(0.225)	0.013	0.057
30	2.50	0.13	0.070	(0.224)	0.013	0.057
31	2.58	0.17	0.088	(0.224)	0.016	0.072
32	2.67	0.17	0.088	(0.223)	0.016	0.072
33	2.75	0.17	0.088	(0.222)	0.016	0.072
34	2.83	0.17	0.088	(0.221)	0.016	0.072
35	2.92	0.17	0.088	(0.220)	0.016	0.072
36	3.00	0.17	0.088	(0.219)	0.016	0.072
37	3.08	0.17	0.088	(0.218)	0.016	0.072
38	3.17	0.17	0.088	(0.217)	0.016	0.072
39	3.25	0.17	0.088	(0.216)	0.016	0.072
40	3.33	0.17	0.088	(0.215)	0.016	0.072
41	3.42	0.17	0.088	(0.214)	0.016	0.072
42	3.50	0.17	0.088	(0.214)	0.016	0.072
43	3.58	0.17	0.088	(0.213)	0.016	0.072
44	3.67	0.17	0.088	(0.212)	0.016	0.072
45	3.75	0.17	0.088	(0.211)	0.016	0.072
46	3.83	0.20	0.105	(0.210)	0.019	0.086
47	3.92	0.20	0.105	(0.209)	0.019	0.086
48	4.00	0.20	0.105	(0.208)	0.019	0.086
49	4.08	0.20	0.105	(0.207)	0.019	0.086
50	4.17	0.20	0.105	(0.206)	0.019	0.086
51	4.25	0.20	0.105	(0.206)	0.019	0.086
52	4.33	0.23	0.123	(0.205)	0.022	0.100
53	4.42	0.23	0.123	(0.204)	0.022	0.100
54	4.50	0.23	0.123	(0.203)	0.022	0.100
55	4.58	0.23	0.123	(0.202)	0.022	0.100
56	4.67	0.23	0.123	(0.201)	0.022	0.100

57	4.75	0.23	0.123	(0.200)	0.022	0.100
58	4.83	0.27	0.140	(0.200)	0.025	0.115
59	4.92	0.27	0.140	(0.199)	0.025	0.115
60	5.00	0.27	0.140	(0.198)	0.025	0.115
61	5.08	0.20	0.105	(0.197)	0.019	0.086
62	5.17	0.20	0.105	(0.196)	0.019	0.086
63	5.25	0.20	0.105	(0.195)	0.019	0.086
64	5.33	0.23	0.123	(0.194)	0.022	0.100
65	5.42	0.23	0.123	(0.194)	0.022	0.100
66	5.50	0.23	0.123	(0.193)	0.022	0.100
67	5.58	0.27	0.140	(0.192)	0.025	0.115
68	5.67	0.27	0.140	(0.191)	0.025	0.115
69	5.75	0.27	0.140	(0.190)	0.025	0.115
70	5.83	0.27	0.140	(0.189)	0.025	0.115
71	5.92	0.27	0.140	(0.188)	0.025	0.115
72	6.00	0.27	0.140	(0.188)	0.025	0.115
73	6.08	0.30	0.158	(0.187)	0.029	0.129
74	6.17	0.30	0.158	(0.186)	0.029	0.129
75	6.25	0.30	0.158	(0.185)	0.029	0.129
76	6.33	0.30	0.158	(0.184)	0.029	0.129
77	6.42	0.30	0.158	(0.183)	0.029	0.129
78	6.50	0.30	0.158	(0.183)	0.029	0.129
79	6.58	0.33	0.175	(0.182)	0.032	0.143
80	6.67	0.33	0.175	(0.181)	0.032	0.143
81	6.75	0.33	0.175	(0.180)	0.032	0.143
82	6.83	0.33	0.175	(0.179)	0.032	0.143
83	6.92	0.33	0.175	(0.179)	0.032	0.143
84	7.00	0.33	0.175	(0.178)	0.032	0.143
85	7.08	0.33	0.175	(0.177)	0.032	0.143
86	7.17	0.33	0.175	(0.176)	0.032	0.143
87	7.25	0.33	0.175	(0.175)	0.032	0.143
88	7.33	0.37	0.193	(0.175)	0.035	0.158
89	7.42	0.37	0.193	(0.174)	0.035	0.158
90	7.50	0.37	0.193	(0.173)	0.035	0.158
91	7.58	0.40	0.210	(0.172)	0.038	0.172
92	7.67	0.40	0.210	(0.171)	0.038	0.172
93	7.75	0.40	0.210	(0.171)	0.038	0.172
94	7.83	0.43	0.228	(0.170)	0.041	0.186
95	7.92	0.43	0.228	(0.169)	0.041	0.186
96	8.00	0.43	0.228	(0.168)	0.041	0.186
97	8.08	0.50	0.263	(0.167)	0.048	0.215
98	8.17	0.50	0.263	(0.167)	0.048	0.215
99	8.25	0.50	0.263	(0.166)	0.048	0.215
100	8.33	0.50	0.263	(0.165)	0.048	0.215
101	8.42	0.50	0.263	(0.164)	0.048	0.215
102	8.50	0.50	0.263	(0.164)	0.048	0.215
103	8.58	0.53	0.280	(0.163)	0.051	0.229
104	8.67	0.53	0.280	(0.162)	0.051	0.229
105	8.75	0.53	0.280	(0.161)	0.051	0.229
106	8.83	0.57	0.298	(0.161)	0.054	0.244
107	8.92	0.57	0.298	(0.160)	0.054	0.244
108	9.00	0.57	0.298	(0.159)	0.054	0.244
109	9.08	0.63	0.333	(0.158)	0.060	0.272
110	9.17	0.63	0.333	(0.157)	0.060	0.272
111	9.25	0.63	0.333	(0.157)	0.060	0.272
112	9.33	0.67	0.350	(0.156)	0.064	0.287
113	9.42	0.67	0.350	(0.155)	0.064	0.287

114	9.50	0.67	0.350	(| 0.155)	0.064	0.287
115	9.58	0.70	0.368	(| 0.154)	0.067	0.301
116	9.67	0.70	0.368	(| 0.153)	0.067	0.301
117	9.75	0.70	0.368	(| 0.152)	0.067	0.301
118	9.83	0.73	0.385	(| 0.152)	0.070	0.315
119	9.92	0.73	0.385	(| 0.151)	0.070	0.315
120	10.00	0.73	0.385	(| 0.150)	0.070	0.315
121	10.08	0.50	0.263	(| 0.149)	0.048	0.215
122	10.17	0.50	0.263	(| 0.149)	0.048	0.215
123	10.25	0.50	0.263	(| 0.148)	0.048	0.215
124	10.33	0.50	0.263	(| 0.147)	0.048	0.215
125	10.42	0.50	0.263	(| 0.146)	0.048	0.215
126	10.50	0.50	0.263	(| 0.146)	0.048	0.215
127	10.58	0.67	0.350	(| 0.145)	0.064	0.287
128	10.67	0.67	0.350	(| 0.144)	0.064	0.287
129	10.75	0.67	0.350	(| 0.144)	0.064	0.287
130	10.83	0.67	0.350	(| 0.143)	0.064	0.287
131	10.92	0.67	0.350	(| 0.142)	0.064	0.287
132	11.00	0.67	0.350	(| 0.142)	0.064	0.287
133	11.08	0.63	0.333	(| 0.141)	0.060	0.272
134	11.17	0.63	0.333	(| 0.140)	0.060	0.272
135	11.25	0.63	0.333	(| 0.139)	0.060	0.272
136	11.33	0.63	0.333	(| 0.139)	0.060	0.272
137	11.42	0.63	0.333	(| 0.138)	0.060	0.272
138	11.50	0.63	0.333	(| 0.137)	0.060	0.272
139	11.58	0.57	0.298	(| 0.137)	0.054	0.244
140	11.67	0.57	0.298	(| 0.136)	0.054	0.244
141	11.75	0.57	0.298	(| 0.135)	0.054	0.244
142	11.83	0.60	0.315	(| 0.135)	0.057	0.258
143	11.92	0.60	0.315	(| 0.134)	0.057	0.258
144	12.00	0.60	0.315	(| 0.133)	0.057	0.258
145	12.08	0.83	0.438	(| 0.133)	0.080	0.358
146	12.17	0.83	0.438	(| 0.132)	0.080	0.358
147	12.25	0.83	0.438	(| 0.131)	0.080	0.358
148	12.33	0.87	0.456	(| 0.131)	0.083	0.373
149	12.42	0.87	0.456	(| 0.130)	0.083	0.373
150	12.50	0.87	0.456	(| 0.129)	0.083	0.373
151	12.58	0.93	0.491	(| 0.129)	0.089	0.401
152	12.67	0.93	0.491	(| 0.128)	0.089	0.401
153	12.75	0.93	0.491	(| 0.127)	0.089	0.401
154	12.83	0.97	0.508	(| 0.127)	0.092	0.416
155	12.92	0.97	0.508	(| 0.126)	0.092	0.416
156	13.00	0.97	0.508	(| 0.126)	0.092	0.416
157	13.08	1.13	0.596	(| 0.125)	0.108	0.487
158	13.17	1.13	0.596	(| 0.124)	0.108	0.487
159	13.25	1.13	0.596	(| 0.124)	0.108	0.487
160	13.33	1.13	0.596	(| 0.123)	0.108	0.487
161	13.42	1.13	0.596	(| 0.122)	0.108	0.487
162	13.50	1.13	0.596	(| 0.122)	0.108	0.487
163	13.58	0.77	0.403	(| 0.121)	0.073	0.330
164	13.67	0.77	0.403	(| 0.121)	0.073	0.330
165	13.75	0.77	0.403	(| 0.120)	0.073	0.330
166	13.83	0.77	0.403	(| 0.119)	0.073	0.330
167	13.92	0.77	0.403	(| 0.119)	0.073	0.330
168	14.00	0.77	0.403	(| 0.118)	0.073	0.330
169	14.08	0.90	0.473	(| 0.117)	0.086	0.387
170	14.17	0.90	0.473	(| 0.117)	0.086	0.387

171	14.25	0.90	0.473	(0.116)	0.086	0.387
172	14.33	0.87	0.456	(0.116)	0.083	0.373
173	14.42	0.87	0.456	(0.115)	0.083	0.373
174	14.50	0.87	0.456	(0.114)	0.083	0.373
175	14.58	0.87	0.456	(0.114)	0.083	0.373
176	14.67	0.87	0.456	(0.113)	0.083	0.373
177	14.75	0.87	0.456	(0.113)	0.083	0.373
178	14.83	0.83	0.438	(0.112)	0.080	0.358
179	14.92	0.83	0.438	(0.112)	0.080	0.358
180	15.00	0.83	0.438	(0.111)	0.080	0.358
181	15.08	0.80	0.420	(0.110)	0.076	0.344
182	15.17	0.80	0.420	(0.110)	0.076	0.344
183	15.25	0.80	0.420	(0.109)	0.076	0.344
184	15.33	0.77	0.403	(0.109)	0.073	0.330
185	15.42	0.77	0.403	(0.108)	0.073	0.330
186	15.50	0.77	0.403	(0.108)	0.073	0.330
187	15.58	0.63	0.333	(0.107)	0.060	0.272
188	15.67	0.63	0.333	(0.107)	0.060	0.272
189	15.75	0.63	0.333	(0.106)	0.060	0.272
190	15.83	0.63	0.333	(0.105)	0.060	0.272
191	15.92	0.63	0.333	(0.105)	0.060	0.272
192	16.00	0.63	0.333	(0.104)	0.060	0.272
193	16.08	0.13	0.070	(0.104)	0.013	0.057
194	16.17	0.13	0.070	(0.103)	0.013	0.057
195	16.25	0.13	0.070	(0.103)	0.013	0.057
196	16.33	0.13	0.070	(0.102)	0.013	0.057
197	16.42	0.13	0.070	(0.102)	0.013	0.057
198	16.50	0.13	0.070	(0.101)	0.013	0.057
199	16.58	0.10	0.053	(0.101)	0.010	0.043
200	16.67	0.10	0.053	(0.100)	0.010	0.043
201	16.75	0.10	0.053	(0.100)	0.010	0.043
202	16.83	0.10	0.053	(0.099)	0.010	0.043
203	16.92	0.10	0.053	(0.099)	0.010	0.043
204	17.00	0.10	0.053	(0.098)	0.010	0.043
205	17.08	0.17	0.088	(0.098)	0.016	0.072
206	17.17	0.17	0.088	(0.097)	0.016	0.072
207	17.25	0.17	0.088	(0.097)	0.016	0.072
208	17.33	0.17	0.088	(0.096)	0.016	0.072
209	17.42	0.17	0.088	(0.096)	0.016	0.072
210	17.50	0.17	0.088	(0.095)	0.016	0.072
211	17.58	0.17	0.088	(0.095)	0.016	0.072
212	17.67	0.17	0.088	(0.094)	0.016	0.072
213	17.75	0.17	0.088	(0.094)	0.016	0.072
214	17.83	0.13	0.070	(0.093)	0.013	0.057
215	17.92	0.13	0.070	(0.093)	0.013	0.057
216	18.00	0.13	0.070	(0.092)	0.013	0.057
217	18.08	0.13	0.070	(0.092)	0.013	0.057
218	18.17	0.13	0.070	(0.092)	0.013	0.057
219	18.25	0.13	0.070	(0.091)	0.013	0.057
220	18.33	0.13	0.070	(0.091)	0.013	0.057
221	18.42	0.13	0.070	(0.090)	0.013	0.057
222	18.50	0.13	0.070	(0.090)	0.013	0.057
223	18.58	0.10	0.053	(0.089)	0.010	0.043
224	18.67	0.10	0.053	(0.089)	0.010	0.043
225	18.75	0.10	0.053	(0.088)	0.010	0.043
226	18.83	0.07	0.035	(0.088)	0.006	0.029
227	18.92	0.07	0.035	(0.088)	0.006	0.029

228	19.00	0.07	0.035	(0.087)	0.006	0.029
229	19.08	0.10	0.053	(0.087)	0.010	0.043
230	19.17	0.10	0.053	(0.086)	0.010	0.043
231	19.25	0.10	0.053	(0.086)	0.010	0.043
232	19.33	0.13	0.070	(0.086)	0.013	0.057
233	19.42	0.13	0.070	(0.085)	0.013	0.057
234	19.50	0.13	0.070	(0.085)	0.013	0.057
235	19.58	0.10	0.053	(0.084)	0.010	0.043
236	19.67	0.10	0.053	(0.084)	0.010	0.043
237	19.75	0.10	0.053	(0.084)	0.010	0.043
238	19.83	0.07	0.035	(0.083)	0.006	0.029
239	19.92	0.07	0.035	(0.083)	0.006	0.029
240	20.00	0.07	0.035	(0.083)	0.006	0.029
241	20.08	0.10	0.053	(0.082)	0.010	0.043
242	20.17	0.10	0.053	(0.082)	0.010	0.043
243	20.25	0.10	0.053	(0.081)	0.010	0.043
244	20.33	0.10	0.053	(0.081)	0.010	0.043
245	20.42	0.10	0.053	(0.081)	0.010	0.043
246	20.50	0.10	0.053	(0.080)	0.010	0.043
247	20.58	0.10	0.053	(0.080)	0.010	0.043
248	20.67	0.10	0.053	(0.080)	0.010	0.043
249	20.75	0.10	0.053	(0.079)	0.010	0.043
250	20.83	0.07	0.035	(0.079)	0.006	0.029
251	20.92	0.07	0.035	(0.079)	0.006	0.029
252	21.00	0.07	0.035	(0.078)	0.006	0.029
253	21.08	0.10	0.053	(0.078)	0.010	0.043
254	21.17	0.10	0.053	(0.078)	0.010	0.043
255	21.25	0.10	0.053	(0.078)	0.010	0.043
256	21.33	0.07	0.035	(0.077)	0.006	0.029
257	21.42	0.07	0.035	(0.077)	0.006	0.029
258	21.50	0.07	0.035	(0.077)	0.006	0.029
259	21.58	0.10	0.053	(0.076)	0.010	0.043
260	21.67	0.10	0.053	(0.076)	0.010	0.043
261	21.75	0.10	0.053	(0.076)	0.010	0.043
262	21.83	0.07	0.035	(0.076)	0.006	0.029
263	21.92	0.07	0.035	(0.075)	0.006	0.029
264	22.00	0.07	0.035	(0.075)	0.006	0.029
265	22.08	0.10	0.053	(0.075)	0.010	0.043
266	22.17	0.10	0.053	(0.075)	0.010	0.043
267	22.25	0.10	0.053	(0.074)	0.010	0.043
268	22.33	0.07	0.035	(0.074)	0.006	0.029
269	22.42	0.07	0.035	(0.074)	0.006	0.029
270	22.50	0.07	0.035	(0.074)	0.006	0.029
271	22.58	0.07	0.035	(0.073)	0.006	0.029
272	22.67	0.07	0.035	(0.073)	0.006	0.029
273	22.75	0.07	0.035	(0.073)	0.006	0.029
274	22.83	0.07	0.035	(0.073)	0.006	0.029
275	22.92	0.07	0.035	(0.073)	0.006	0.029
276	23.00	0.07	0.035	(0.072)	0.006	0.029
277	23.08	0.07	0.035	(0.072)	0.006	0.029
278	23.17	0.07	0.035	(0.072)	0.006	0.029
279	23.25	0.07	0.035	(0.072)	0.006	0.029
280	23.33	0.07	0.035	(0.072)	0.006	0.029
281	23.42	0.07	0.035	(0.072)	0.006	0.029
282	23.50	0.07	0.035	(0.072)	0.006	0.029
283	23.58	0.07	0.035	(0.071)	0.006	0.029
284	23.67	0.07	0.035	(0.071)	0.006	0.029

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285  23.75     0.07      0.035       (  0.071)       0.006        0.029
286  23.83     0.07      0.035       (  0.071)       0.006        0.029
287  23.92     0.07      0.035       (  0.071)       0.006        0.029
288  24.00     0.07      0.035       (  0.071)       0.006        0.029
            (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    43.0
     Flood volume = Effective rainfall      3.58(In)
      times area      19.6(Ac.)/[(In)/(Ft.)] =       5.8(Ac.Ft)
     Total soil loss =      0.80(In)
     Total soil loss =     1.296(Ac.Ft)
     Total rainfall =      4.38(In)
     Flood volume =      254506.3 Cubic Feet
     Total soil loss =       56474.0 Cubic Feet
     --------------------------------------------------------------------
      Peak flow rate of this hydrograph =      9.541(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        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5       0.0006      0.08  Q         |         |         |         |
   0+10       0.0030      0.35  VQ        |         |         |         |
   0+15       0.0061      0.45  VQ        |         |         |         |
   0+20       0.0097      0.54  V Q       |         |         |         |
   0+25       0.0145      0.69  V Q       |         |         |         |
   0+30       0.0198      0.76  V  Q      |         |         |         |
   0+35       0.0252      0.80  V  Q      |         |         |         |
   0+40       0.0309      0.82  V  Q      |         |         |         |
   0+45       0.0366      0.83  V  Q      |         |         |         |
   0+50       0.0426      0.88  V  Q      |         |         |         |
   0+55       0.0496      1.02  V   Q     |         |         |         |
   1+ 0       0.0570      1.07  V   Q     |         |         |         |
   1+ 5       0.0643      1.05  V   Q     |         |         |         |
   1+10       0.0707      0.94  V  Q      |         |         |         |
   1+15       0.0769      0.89  V  Q      |         |         |         |
   1+20       0.0829      0.88  V  Q      |         |         |         |
   1+25       0.0889      0.87  V  Q      |         |         |         |
   1+30       0.0948      0.86  V  Q      |         |         |         |
   1+35       0.1007      0.86  V  Q      |         |         |         |
   1+40       0.1066      0.85  V  Q      |         |         |         |
   1+45       0.1124      0.85  V  Q      |         |         |         |
   1+50       0.1186      0.89  V  Q      |         |         |         |
   1+55       0.1256      1.02  V   Q     |         |         |         |
   2+ 0       0.1330      1.07  V   Q     |         |         |         |
   2+ 5       0.1405      1.10  V   Q     |         |         |         |
   2+10       0.1482      1.11  |V  Q     |         |         |         |
   2+15       0.1558      1.12  |V  Q     |         |         |         |
   2+20       0.1636      1.12  |V  Q     |         |         |         |
   2+25       0.1713      1.13  |V  Q     |         |         |         |
   2+30       0.1791      1.13  |V  Q     |         |         |         |
   2+35       0.1872      1.17  |V  Q     |         |         |         |
   2+40       0.1962      1.30  |V   Q    |         |         |         |
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2+45       0.2055       1.36  |V   Q    |         |         |         |
2+50       0.2150       1.38  |V   Q    |         |         |         |
2+55       0.2246       1.39  |V   Q    |         |         |         |
3+ 0       0.2342       1.40  |V   Q    |         |         |         |
3+ 5       0.2439       1.41  |V   Q    |         |         |         |
3+10       0.2536       1.41  |V   Q    |         |         |         |
3+15       0.2633       1.41  |V   Q    |         |         |         |
3+20       0.2731       1.41  |V   Q    |         |         |         |
3+25       0.2828       1.41  |V   Q    |         |         |         |
3+30       0.2925       1.41  | V  Q    |         |         |         |
3+35       0.3023       1.41  | V  Q    |         |         |         |
3+40       0.3120       1.41  | V  Q    |         |         |         |
3+45       0.3218       1.41  | V  Q    |         |         |         |
3+50       0.3318       1.46  | V  Q    |         |         |         |
3+55       0.3427       1.59  | V   Q   |         |         |         |
4+ 0       0.3540       1.64  | V   Q   |         |         |         |
4+ 5       0.3654       1.66  | V   Q   |         |         |         |
4+10       0.3770       1.67  | V   Q   |         |         |         |
4+15       0.3885       1.68  | V   Q   |         |         |         |
4+20       0.4005       1.73  | V   Q   |         |         |         |
4+25       0.4133       1.86  | V    Q  |         |         |         |
4+30       0.4265       1.92  | V    Q  |         |         |         |
4+35       0.4399       1.94  |  V   Q  |         |         |         |
4+40       0.4534       1.96  |  V   Q  |         |         |         |
4+45       0.4669       1.97  |  V   Q  |         |         |         |
4+50       0.4808       2.01  |  V    Q |         |         |         |
4+55       0.4956       2.15  |  V    Q |         |         |         |
5+ 0       0.5107       2.20  |  V    Q |         |         |         |
5+ 5       0.5255       2.14  |  V    Q |         |         |         |
5+10       0.5385       1.89  |  V   Q  |         |         |         |
5+15       0.5509       1.80  |  V   Q  |         |         |         |
5+20       0.5633       1.80  |  V   Q  |         |         |         |
5+25       0.5765       1.91  |  V   Q  |         |         |         |
5+30       0.5899       1.95  |   V  Q  |         |         |         |
5+35       0.6037       2.00  |   V   Q |         |         |         |
5+40       0.6184       2.14  |   V   Q |         |         |         |
5+45       0.6335       2.19  |   V   Q |         |         |         |
5+50       0.6488       2.22  |   V   Q |         |         |         |
5+55       0.6642       2.24  |   V   Q |         |         |         |
6+ 0       0.6797       2.25  |   V   Q |         |         |         |
6+ 5       0.6955       2.30  |   V    Q|         |         |         |
6+10       0.7122       2.43  |   V    Q|         |         |         |
6+15       0.7293       2.48  |   V    Q|         |         |         |
6+20       0.7466       2.51  |    V    Q         |         |         |
6+25       0.7640       2.52  |    V    Q         |         |         |
6+30       0.7814       2.53  |    V    Q         |         |         |
6+35       0.7992       2.58  |    V    Q         |         |         |
6+40       0.8179       2.71  |    V    Q         |         |         |
6+45       0.8369       2.77  |    V    |Q        |         |         |
6+50       0.8562       2.79  |    V    |Q        |         |         |
6+55       0.8755       2.81  |    V    |Q        |         |         |
7+ 0       0.8949       2.81  |     V   |Q        |         |         |
7+ 5       0.9143       2.82  |     V   |Q        |         |         |
7+10       0.9337       2.82  |     V   |Q        |         |         |
7+15       0.9532       2.83  |     V   |Q        |         |         |
7+20       0.9729       2.87  |     V   |Q        |         |         |
7+25       0.9936       3.00  |     V   | Q       |         |         |
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 7+30       1.0146      3.05  |     V   | Q       |         |         |
 7+35       1.0361      3.12  |      V  | Q       |         |         |
 7+40       1.0585      3.26  |      V  |  Q      |         |         |
 7+45       1.0814      3.32  |      V  |  Q      |         |         |
 7+50       1.1048      3.39  |      V  |  Q      |         |         |
 7+55       1.1291      3.54  |      V  |   Q     |         |         |
 8+ 0       1.1540      3.60  |      V  |   Q     |         |         |
 8+ 5       1.1795      3.72  |       V |   Q     |         |         |
 8+10       1.2071      3.99  |       V |    Q    |         |         |
 8+15       1.2353      4.11  |       V |     Q   |         |         |
 8+20       1.2640      4.16  |       V |     Q   |         |         |
 8+25       1.2929      4.19  |       V |     Q   |         |         |
 8+30       1.3219      4.21  |        V|     Q   |         |         |
 8+35       1.3513      4.27  |        V|      Q  |         |         |
 8+40       1.3816      4.41  |        V|      Q  |         |         |
 8+45       1.4123      4.46  |        V|      Q  |         |         |
 8+50       1.4435      4.53  |        V|       Q |         |         |
 8+55       1.4757      4.67  |         V       Q |         |         |
 9+ 0       1.5083      4.73  |         V       Q |         |         |
 9+ 5       1.5417      4.85  |         V        Q|         |         |
 9+10       1.5770      5.13  |         V         Q         |         |
 9+15       1.6131      5.24  |         |V        Q         |         |
 9+20       1.6499      5.33  |         |V        |Q        |         |
 9+25       1.6877      5.50  |         |V        |Q        |         |
 9+30       1.7260      5.57  |         |V        | Q       |         |
 9+35       1.7649      5.64  |         | V       | Q       |         |
 9+40       1.8048      5.80  |         | V       |  Q      |         |
 9+45       1.8452      5.86  |         | V       |  Q      |         |
 9+50       1.8861      5.94  |         | V       |  Q      |         |
 9+55       1.9280      6.08  |         |  V      |   Q     |         |
10+ 0       1.9703      6.15  |         |  V      |   Q     |         |
10+ 5       2.0108      5.88  |         |  V      |  Q      |         |
10+10       2.0452      4.99  |         |   V    Q|         |         |
10+15       2.0771      4.63  |         |   V   Q |         |         |
10+20       2.1080      4.48  |         |   V  Q  |         |         |
10+25       2.1382      4.40  |         |   V  Q  |         |         |
10+30       2.1681      4.34  |         |   V  Q  |         |         |
10+35       2.1992      4.51  |         |    V  Q |         |         |
10+40       2.2346      5.14  |         |    V    Q         |         |
10+45       2.2716      5.38  |         |    V    |Q        |         |
10+50       2.3093      5.48  |         |    V    |Q        |         |
10+55       2.3475      5.54  |         |     V   | Q       |         |
11+ 0       2.3860      5.58  |         |     V   | Q       |         |
11+ 5       2.4243      5.57  |         |     V   | Q       |         |
11+10       2.4619      5.46  |         |     V   |Q        |         |
11+15       2.4993      5.42  |         |      V  |Q        |         |
11+20       2.5365      5.41  |         |      V  |Q        |         |
11+25       2.5737      5.40  |         |      V  |Q        |         |
11+30       2.6108      5.39  |         |      V  |Q        |         |
11+35       2.6473      5.30  |         |       V |Q        |         |
11+40       2.6819      5.03  |         |       V Q         |         |
11+45       2.7159      4.93  |         |       VQ|         |         |
11+50       2.7497      4.92  |         |       VQ|         |         |
11+55       2.7844      5.03  |         |        VQ         |         |
12+ 0       2.8192      5.06  |         |        VQ         |         |
12+ 5       2.8562      5.37  |         |        V|Q        |         |
12+10       2.8994      6.28  |         |        V|    Q    |         |
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12+15       2.9453      6.65  |         |         V     Q   |         |
12+20       2.9925      6.85  |         |         V      Q  |         |
12+25       3.0412      7.08  |         |         V       Q |         |
12+30       3.0907      7.19  |         |         |V      Q |         |
12+35       3.1413      7.34  |         |         |V       Q|         |
12+40       3.1939      7.64  |         |         |V        Q         |
12+45       3.2475      7.77  |         |         | V       |Q        |
12+50       3.3017      7.88  |         |         | V       |Q        |
12+55       3.3571      8.04  |         |         | V       | Q       |
13+ 0       3.4130      8.11  |         |         |  V      | Q       |
13+ 5       3.4705      8.36  |         |         |  V      |  Q      |
13+10       3.5327      9.03  |         |         |   V     |     Q   |
13+15       3.5968      9.31  |         |         |   V     |      Q  |
13+20       3.6618      9.43  |         |         |    V    |      Q  |
13+25       3.7272      9.50  |         |         |    V    |      Q  |
13+30       3.7929      9.54  |         |         |    V    |       Q |
13+35       3.8556      9.11  |         |         |     V   |     Q   |
13+40       3.9086      7.69  |         |         |     V   Q         |
13+45       3.9577      7.13  |         |         |      VQ |         |
13+50       4.0052      6.90  |         |         |      Q  |         |
13+55       4.0517      6.75  |         |         |      Q  |         |
14+ 0       4.0976      6.66  |         |         |     Q V |         |
14+ 5       4.1442      6.77  |         |         |      QV |         |
14+10       4.1941      7.25  |         |         |       Q |         |
14+15       4.2452      7.42  |         |         |        Q|         |
14+20       4.2966      7.45  |         |         |        Q|         |
14+25       4.3473      7.37  |         |         |        Q|         |
14+30       4.3980      7.35  |         |         |        QV         |
14+35       4.4486      7.35  |         |         |        QV         |
14+40       4.4993      7.36  |         |         |        QV         |
14+45       4.5500      7.36  |         |         |        Q|V        |
14+50       4.6004      7.32  |         |         |        Q|V        |
14+55       4.6498      7.18  |         |         |       Q |V        |
15+ 0       4.6989      7.13  |         |         |       Q | V       |
15+ 5       4.7476      7.06  |         |         |       Q | V       |
15+10       4.7952      6.92  |         |         |      Q  | V       |
15+15       4.8425      6.86  |         |         |      Q  |  V      |
15+20       4.8892      6.79  |         |         |      Q  |  V      |
15+25       4.9350      6.64  |         |         |     Q   |  V      |
15+30       4.9803      6.58  |         |         |     Q   |   V     |
15+35       5.0242      6.38  |         |         |    Q    |   V     |
15+40       5.0645      5.84  |         |         |  Q      |   V     |
15+45       5.1032      5.62  |         |         | Q       |   V     |
15+50       5.1412      5.52  |         |         | Q       |    V    |
15+55       5.1789      5.47  |         |         |Q        |    V    |
16+ 0       5.2163      5.43  |         |         |Q        |    V    |
16+ 5       5.2492      4.77  |         |        Q|         |    V    |
16+10       5.2685      2.80  |         |Q        |         |     V   |
16+15       5.2823      2.01  |       Q |         |         |     V   |
16+20       5.2938      1.67  |     Q   |         |         |     V   |
16+25       5.3040      1.47  |    Q    |         |         |     V   |
16+30       5.3132      1.35  |    Q    |         |         |     V   |
16+35       5.3216      1.22  |   Q     |         |         |     V   |
16+40       5.3287      1.03  |   Q     |         |         |     V   |
16+45       5.3352      0.94  |  Q      |         |         |     V   |
16+50       5.3412      0.88  |  Q      |         |         |     V   |
16+55       5.3472      0.87  |  Q      |         |         |     V   |
```

```
17+ 0       5.3532      0.86  |  Q      |         |         |     V   |
17+ 5       5.3597      0.94  |  Q      |         |         |     V   |
17+10       5.3679      1.20  |   Q     |         |         |     V   |
17+15       5.3769      1.30  |    Q    |         |         |     V   |
17+20       5.3861      1.34  |    Q    |         |         |     V   |
17+25       5.3955      1.37  |    Q    |         |         |     V   |
17+30       5.4051      1.39  |    Q    |         |         |      V  |
17+35       5.4147      1.40  |    Q    |         |         |      V  |
17+40       5.4244      1.40  |    Q    |         |         |      V  |
17+45       5.4341      1.41  |    Q    |         |         |      V  |
17+50       5.4435      1.37  |    Q    |         |         |      V  |
17+55       5.4521      1.24  |   Q     |         |         |      V  |
18+ 0       5.4603      1.19  |   Q     |         |         |      V  |
18+ 5       5.4683      1.17  |   Q     |         |         |      V  |
18+10       5.4763      1.15  |   Q     |         |         |      V  |
18+15       5.4841      1.15  |   Q     |         |         |      V  |
18+20       5.4920      1.14  |   Q     |         |         |      V  |
18+25       5.4998      1.14  |   Q     |         |         |      V  |
18+30       5.5076      1.13  |   Q     |         |         |      V  |
18+35       5.5151      1.09  |   Q     |         |         |      V  |
18+40       5.5217      0.96  |  Q      |         |         |      V  |
18+45       5.5280      0.91  |  Q      |         |         |      V  |
18+50       5.5338      0.84  |  Q      |         |         |      V  |
18+55       5.5386      0.70  | Q       |         |         |      V  |
19+ 0       5.5430      0.64  | Q       |         |         |      V  |
19+ 5       5.5475      0.65  | Q       |         |         |      V  |
19+10       5.5527      0.77  |  Q      |         |         |       V |
19+15       5.5583      0.81  |  Q      |         |         |       V |
19+20       5.5642      0.86  |  Q      |         |         |       V |
19+25       5.5711      1.00  |   Q     |         |         |       V |
19+30       5.5784      1.06  |   Q     |         |         |       V |
19+35       5.5856      1.04  |   Q     |         |         |       V |
19+40       5.5921      0.93  |  Q      |         |         |       V |
19+45       5.5982      0.89  |  Q      |         |         |       V |
19+50       5.6039      0.83  |  Q      |         |         |       V |
19+55       5.6087      0.69  | Q       |         |         |       V |
20+ 0       5.6131      0.64  | Q       |         |         |       V |
20+ 5       5.6176      0.65  | Q       |         |         |       V |
20+10       5.6228      0.77  |  Q      |         |         |       V |
20+15       5.6284      0.81  |  Q      |         |         |       V |
20+20       5.6341      0.82  |  Q      |         |         |       V |
20+25       5.6398      0.83  |  Q      |         |         |       V |
20+30       5.6455      0.84  |  Q      |         |         |       V |
20+35       5.6513      0.84  |  Q      |         |         |       V |
20+40       5.6571      0.84  |  Q      |         |         |       V |
20+45       5.6630      0.85  |  Q      |         |         |       V |
20+50       5.6685      0.81  |  Q      |         |         |       V |
20+55       5.6732      0.68  | Q       |         |         |       V |
21+ 0       5.6775      0.62  | Q       |         |         |       V |
21+ 5       5.6819      0.64  | Q       |         |         |       V |
21+10       5.6871      0.76  |  Q      |         |         |       V |
21+15       5.6927      0.80  |  Q      |         |         |       V |
21+20       5.6980      0.78  |  Q      |         |         |        V|
21+25       5.7026      0.66  | Q       |         |         |        V|
21+30       5.7068      0.61  | Q       |         |         |        V|
21+35       5.7111      0.64  | Q       |         |         |        V|
21+40       5.7164      0.76  |  Q      |         |         |        V|
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  21+45        5.7219       0.80  |  Q       |         |         |         V|
  21+50        5.7272       0.78  |  Q       |         |         |         V|
  21+55        5.7318       0.66  | Q        |         |         |         V|
  22+ 0        5.7360       0.61  | Q        |         |         |         V|
  22+ 5        5.7404       0.64  | Q        |         |         |         V|
  22+10        5.7456       0.76  |  Q       |         |         |         V|
  22+15        5.7511       0.80  |  Q       |         |         |         V|
  22+20        5.7565       0.78  |  Q       |         |         |         V|
  22+25        5.7610       0.66  | Q        |         |         |         V|
  22+30        5.7652       0.61  | Q        |         |         |         V|
  22+35        5.7693       0.59  | Q        |         |         |         V|
  22+40        5.7733       0.58  | Q        |         |         |         V|
  22+45        5.7773       0.58  | Q        |         |         |         V|
  22+50        5.7812       0.57  | Q        |         |         |         V|
  22+55        5.7852       0.57  | Q        |         |         |         V|
  23+ 0        5.7891       0.57  | Q        |         |         |         V|
  23+ 5        5.7930       0.57  | Q        |         |         |         V|
  23+10        5.7969       0.57  | Q        |         |         |         V|
  23+15        5.8008       0.57  | Q        |         |         |         V|
  23+20        5.8047       0.57  | Q        |         |         |         V|
  23+25        5.8085       0.57  | Q        |         |         |         V|
  23+30        5.8124       0.57  | Q        |         |         |         V|
  23+35        5.8163       0.57  | Q        |         |         |         V|
  23+40        5.8202       0.57  | Q        |         |         |         V|
  23+45        5.8241       0.57  | Q        |         |         |         V|
  23+50        5.8280       0.57  | Q        |         |         |         V|
  23+55        5.8319       0.57  | Q        |         |         |         V|
  24+ 0        5.8358       0.57  | Q        |         |         |         V|
  24+ 5        5.8391       0.48  |Q         |         |         |         V|
  24+10        5.8406       0.22  Q          |         |         |         V|
  24+15        5.8414       0.12  Q          |         |         |         V|
  24+20        5.8419       0.07  Q          |         |         |         V|
  24+25        5.8423       0.05  Q          |         |         |         V|
  24+30        5.8425       0.03  Q          |         |         |         V|
  24+35        5.8426       0.02  Q          |         |         |         V|
  24+40        5.8426       0.01  Q          |         |         |         V|
  24+45        5.8427       0.00  Q          |         |         |          V
-----------------------------------------------------------------------
```

APPENDIX D

Hydraulic Calculations

D.1: PIPE HYDRAULICS CALCULATIONS

D.2: STREET CAPACITY CALCULATIONS

D.3: INLET CALCULATIONS

D.4: OUTLET CONTROL – WEIR CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD PIPE #1

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 13.0000 cfs

Result Parameters

Depth: 1.5375 ft

Area of Flow: 2.5915 ft^2

Wetted Perimeter: 4.2766 ft

Hydraulic Radius: 0.6060 ft

Average Velocity: 5.0163 ft/s

Top Width: 1.6865 ft

Froude Number: 0.7131

Critical Depth: 1.2969 ft

Critical Velocity: 6.0305 ft/s

Critical Slope: 0.0077 ft/ft

Critical Top Width: 1.91 ft

Calculated Max Shear Stress: 0.4797 lb/ft^2

Calculated Avg Shear Stress: 0.1891 lb/ft^2

Channel Analysis: SD PIPE #2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 26.8000 cfs

Result Parameters

Depth: 2.2520 ft

Area of Flow: 4.6563 ft^2

Wetted Perimeter: 6.2520 ft

Hydraulic Radius: 0.7448 ft

Average Velocity: 5.7557 ft/s

Top Width: 1.4946 ft

Froude Number: 0.5747

Critical Depth: 1.7651 ft

Critical Velocity: 7.2339 ft/s

Critical Slope: 0.0079 ft/ft

Critical Top Width: 2.28 ft

Calculated Max Shear Stress: 0.7026 lb/ft^2

Calculated Avg Shear Stress: 0.2324 lb/ft^2

Channel Analysis: SD PIPE #3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 3.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 32.9000 cfs

Result Parameters

Depth: 2.0389 ft

Area of Flow: 5.1154 ft^2

Wetted Perimeter: 5.8148 ft

Hydraulic Radius: 0.8797 ft

Average Velocity: 6.4315 ft/s

Top Width: 2.7997 ft

Froude Number: 0.8385

Critical Depth: 1.8618 ft

Critical Velocity: 7.1380 ft/s

Critical Slope: 0.0065 ft/ft

Critical Top Width: 2.91 ft

Calculated Max Shear Stress: 0.6361 lb/ft^2

Calculated Avg Shear Stress: 0.2745 lb/ft^2

Channel Analysis: SD PIPE #4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 4.1000 cfs

Result Parameters

Depth: 0.8695 ft

Area of Flow: 1.0621 ft^2

Wetted Perimeter: 2.5963 ft

Hydraulic Radius: 0.4091 ft

Average Velocity: 3.8603 ft/s

Top Width: 1.4808 ft

Froude Number: 0.8033

Critical Depth: 0.7756 ft

Critical Velocity: 4.4468 ft/s

Critical Slope: 0.0072 ft/ft

Critical Top Width: 1.50 ft

Calculated Max Shear Stress: 0.2713 lb/ft^2

Calculated Avg Shear Stress: 0.1276 lb/ft^2

Channel Analysis: SD PIPE #5

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 5.2200 cfs

Result Parameters

Depth: 1.0250 ft

Area of Flow: 1.2867 ft^2

Wetted Perimeter: 2.9194 ft

Hydraulic Radius: 0.4407 ft

Average Velocity: 4.0570 ft/s

Top Width: 1.3955 ft

Froude Number: 0.7446

Critical Depth: 0.8796 ft

Critical Velocity: 4.8465 ft/s

Critical Slope: 0.0078 ft/ft

Critical Top Width: 1.48 ft

Calculated Max Shear Stress: 0.3198 lb/ft^2

Calculated Avg Shear Stress: 0.1375 lb/ft^2

Channel Analysis: SD PIPE #6

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 2.7000 cfs

Result Parameters

Depth: 0.6777 ft

Area of Flow: 0.7753 ft^2

Wetted Perimeter: 2.2113 ft

Hydraulic Radius: 0.3506 ft

Average Velocity: 3.4827 ft/s

Top Width: 1.4930 ft

Froude Number: 0.8517

Critical Depth: 0.6233 ft

Critical Velocity: 3.8882 ft/s

Critical Slope: 0.0067 ft/ft

Critical Top Width: 1.48 ft

Calculated Max Shear Stress: 0.2114 lb/ft^2

Calculated Avg Shear Stress: 0.1094 lb/ft^2

Channel Analysis: SD PIPE #7

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 1.8000 cfs

Result Parameters

Depth: 0.6919 ft

Area of Flow: 0.5797 ft^2

Wetted Perimeter: 1.9646 ft

Hydraulic Radius: 0.2951 ft

Average Velocity: 3.1048 ft/s

Top Width: 0.9235 ft

Froude Number: 0.6906

Critical Depth: 0.5713 ft

Critical Velocity: 3.8814 ft/s

Critical Slope: 0.0088 ft/ft

Critical Top Width: 0.99 ft

Calculated Max Shear Stress: 0.2159 lb/ft^2

Calculated Avg Shear Stress: 0.0921 lb/ft^2

Channel Analysis: SD PIPE #8

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 4.4000 cfs

Result Parameters

Depth: 0.9103 ft

Area of Flow: 1.1221 ft^2

Wetted Perimeter: 2.6792 ft

Hydraulic Radius: 0.4188 ft

Average Velocity: 3.9212 ft/s

Top Width: 1.4654 ft

Froude Number: 0.7897

Critical Depth: 0.8042 ft

Critical Velocity: 4.5605 ft/s

Critical Slope: 0.0074 ft/ft

Critical Top Width: 1.50 ft

Calculated Max Shear Stress: 0.2840 lb/ft^2

Calculated Avg Shear Stress: 0.1307 lb/ft^2

Channel Analysis: SD PIPE #9

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 1.2000 cfs

Result Parameters

Depth: 0.5290 ft

Area of Flow: 0.4217 ft^2

Wetted Perimeter: 1.6289 ft

Hydraulic Radius: 0.2589 ft

Average Velocity: 2.8456 ft/s

Top Width: 0.9983 ft

Froude Number: 0.7716

Critical Depth: 0.4619 ft

Critical Velocity: 3.3836 ft/s

Critical Slope: 0.0079 ft/ft

Critical Top Width: 1.00 ft

Calculated Max Shear Stress: 0.1651 lb/ft^2

Calculated Avg Shear Stress: 0.0808 lb/ft^2

Channel Analysis: SD PIPE #10

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 6.2000 cfs

Result Parameters

Depth: 1.1825 ft

Area of Flow: 1.4943 ft^2

Wetted Perimeter: 3.2781 ft

Hydraulic Radius: 0.4558 ft

Average Velocity: 4.1492 ft/s

Top Width: 1.2255 ft

Froude Number: 0.6622

Critical Depth: 0.9624 ft

Critical Velocity: 5.1759 ft/s

Critical Slope: 0.0084 ft/ft

Critical Top Width: 1.44 ft

Calculated Max Shear Stress: 0.3689 lb/ft^2

Calculated Avg Shear Stress: 0.1422 lb/ft^2

Channel Analysis: SD PIPE #11

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Flow: 14.7000 cfs

Result Parameters

Depth: 1.7795 ft

Area of Flow: 2.9530 ft^2

Wetted Perimeter: 4.9295 ft

Hydraulic Radius: 0.5991 ft

Average Velocity: 4.9780 ft/s

Top Width: 1.2527 ft

Froude Number: 0.5714

Critical Depth: 1.3818 ft

Critical Velocity: 6.3486 ft/s

Critical Slope: 0.0083 ft/ft

Critical Top Width: 1.85 ft

Calculated Max Shear Stress: 0.5552 lb/ft^2

Calculated Avg Shear Stress: 0.1869 lb/ft^2

Program Package Serial Number: 7182
WATER SURFACE PROFILE LISTING Date: 5-12-2022 Time: 2:20:50

OUTLET PIPE ANALYSIS

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	53.540	1.659	55.199	21.50	7.72	.93	56.12	.00	1.66	1.50	2.000	.000	.00	1 .0
3.013	.0045					.0085	.03	1.66	1.00	2.00	.013	.00	.00	PIPE
1003.013	53.554	1.755	55.308	21.50	7.36	.84	56.15	.00	1.66	1.31	2.000	.000	.00	1 .0
13.726	.0045					.0080	.11	1.75	.87	2.00	.013	.00	.00	PIPE
1016.739	53.615	1.879	55.494	21.50	7.02	.76	56.26	.00	1.66	.95	2.000	.000	.00	1 .0
22.784	.0045					.0081	.19	1.88	.69	2.00	.013	.00	.00	PIPE
1039.522	53.717	2.000	55.717	21.50	6.84	.73	56.44	.00	1.66	.00	2.000	.000	.00	1 .0
225.648	.0045					.0088	1.98	2.00	.00	2.00	.013	.00	.00	PIPE
1265.170	54.730	3.025	57.755	21.50	6.84	.73	58.48	.00	1.66	.00	2.000	.000	.00	1 .0
TRANS STR	.0061					.0068	.03	3.03	.00		.014	.00	.00	PIPE
1270.070	54.760	3.501	58.261	21.50	4.38	.30	58.56	.00	1.58	.00	2.500	.000	.00	1 .0
2.500	.0040					.0032	.01	3.50	.00	1.84	.014	.00	.00	PIPE
1272.570	54.770	3.499	58.269	21.50	4.38	.30	58.57	.00	1.58	.00	2.500	.000	.00	1 .0
2.500	.0040					.0027	.01	3.50	.00	1.74	.013	.00	.00	PIPE
1275.070	54.780	3.599	58.379	21.50	4.38	.30	58.68	.00	1.58	.00	2.500	.000	.00	1 .0
174.950	.0050					.0027	.48	3.60	.00	1.60	.013	.00	.00	PIPE
1450.020	55.660	3.289	58.949	21.50	4.38	.30	59.25	.00	1.58	.00	2.500	.000	.00	1 .0
13.250	.0045					.0027	.04	3.29	.00	1.66	.013	.00	.00	PIPE

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1463.270	55.720	3.354	59.074	21.50	4.38	.30	59.37	.00	1.58	.00	2.500	.000	.00	1 .0

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section D

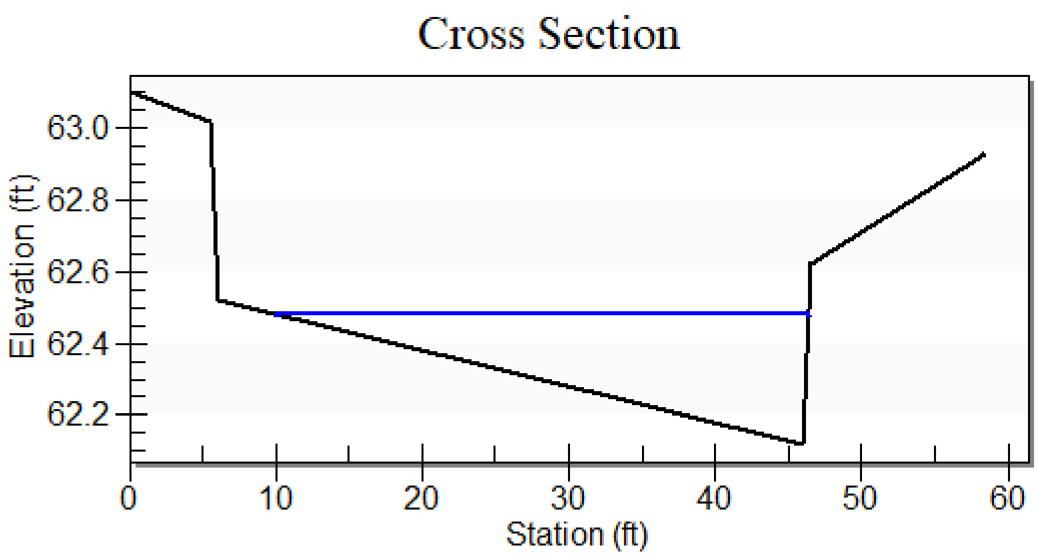
Notes: See Figure 6 for Section Lines

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	63.10	0.0150
5.53	63.02	0.0150
6.03	62.52	0.0150
46.03	62.12	0.0150
46.53	62.62	0.0150
58.42	62.93	-----



Longitudinal Slope: 0.0050 ft/ft

Flow: 14.6000 cfs

Result Parameters

Depth: 0.3602 ft

Area of Flow: 6.5530 ft^2

Wetted Perimeter: 36.5339 ft

Hydraulic Radius: 0.1794 ft

Average Velocity: 2.2280 ft/s

Top Width: 36.3829 ft

Froude Number: 0.9251

Critical Depth: 0.3492 ft

Critical Velocity: 2.3711 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width: 35.27 ft

Calculated Max Shear Stress: 0.1124 lb/ft^2

Calculated Avg Shear Stress: 0.0560 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section E

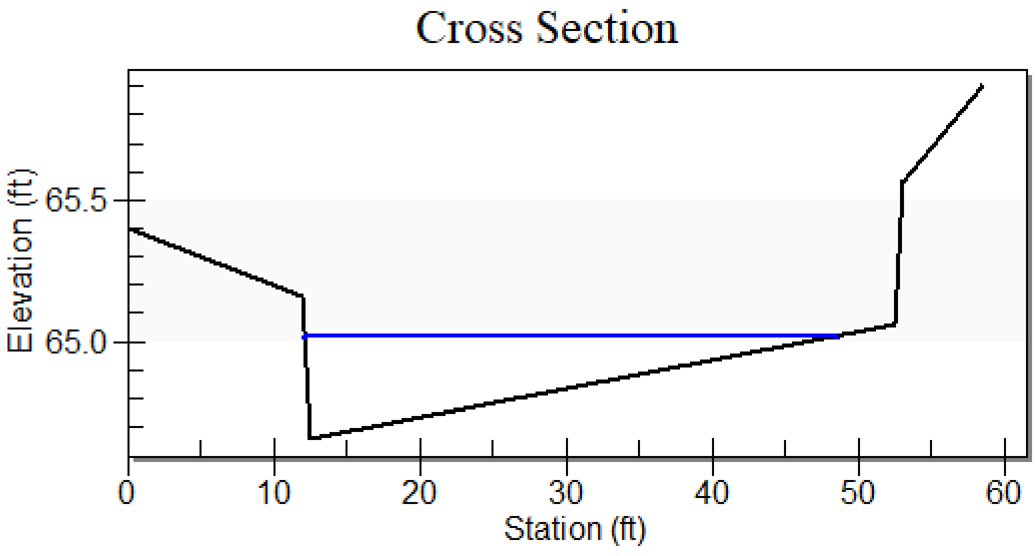
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	65.40	0.0150
12.03	65.16	0.0150
12.53	64.66	0.0150
52.53	65.06	0.0150
53.03	65.56	0.0150
58.53	65.90	-----



Longitudinal Slope: 0.0050 ft/ft

Flow: 14.6000 cfs

Result Parameters

Depth: 0.3602 ft

Area of Flow: 6.5530 ft^2

Wetted Perimeter: 36.5339 ft

Hydraulic Radius: 0.1794 ft

Average Velocity: 2.2280 ft/s

Top Width: 36.3829 ft

Froude Number: 0.9251

Critical Depth: 0.3491 ft

Critical Velocity: 2.3726 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width: 35.26 ft

Calculated Max Shear Stress: 0.1124 lb/ft^2

Calculated Avg Shear Stress: 0.0560 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section G

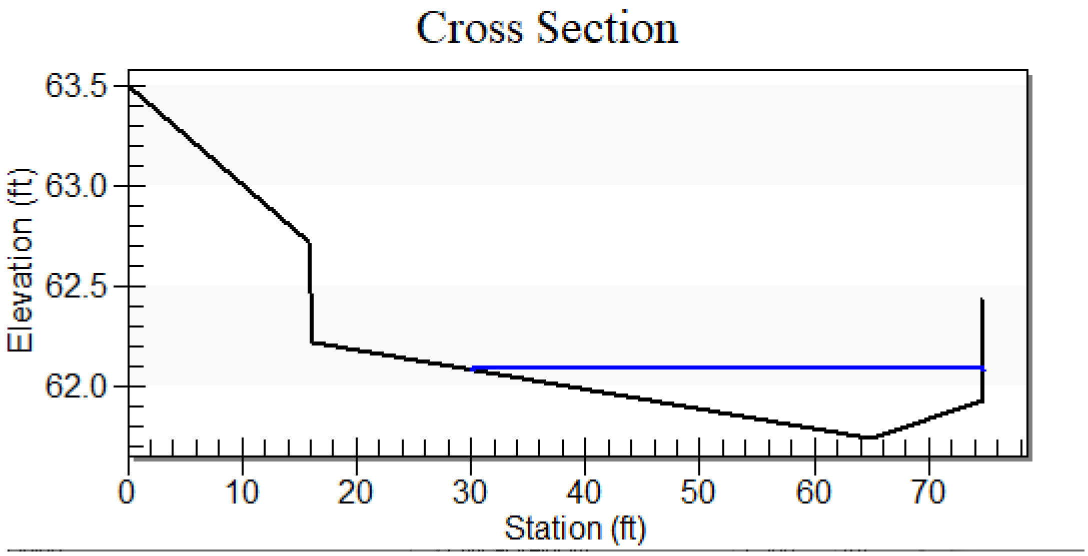
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	63.50	0.0150
15.76	62.72	0.0150
16.26	62.22	0.0150
65.00	61.74	0.0150
74.76	61.93	0.0150
74.77	62.43	-----



Longitudinal Slope: 0.0040 ft/ft

Flow: 17.3000 cfs

Result Parameters

Depth: 0.3435 ft

Area of Flow: 8.4170 ft^2

Wetted Perimeter: 44.7986 ft

Hydraulic Radius: 0.1879 ft

Average Velocity: 2.0554 ft/s

Top Width: 44.6446 ft

Froude Number: 0.8342

Critical Depth: 0.3180 ft

Critical Velocity: 2.3661 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width: 42.05 ft

Calculated Max Shear Stress: 0.0857 lb/ft^2

Calculated Avg Shear Stress: 0.0469 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section H

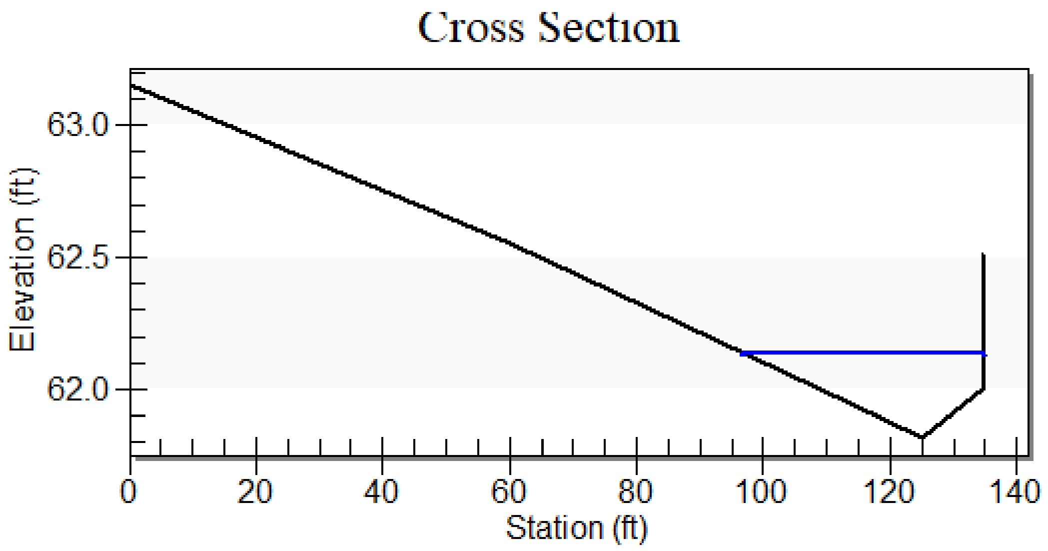
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	63.15	0.0150
60.00	62.55	0.0150
125.00	61.82	0.0150
134.84	62.01	0.0150
134.90	62.51	-----



Longitudinal Slope: 0.0040 ft/ft

Flow: 13.0000 cfs

Result Parameters

Depth: 0.3168 ft

Area of Flow: 6.6515 ft^2

Wetted Perimeter: 38.1793 ft

Hydraulic Radius: 0.1742 ft

Average Velocity: 1.9544 ft/s

Top Width: 38.0632 ft

Froude Number: 0.8239

Critical Depth: 0.2918 ft

Critical Velocity: 2.2702 ft/s

Critical Slope: 0.0061 ft/ft

Critical Top Width: 35.83 ft

Calculated Max Shear Stress: 0.0791 lb/ft^2

Calculated Avg Shear Stress: 0.0435 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section I

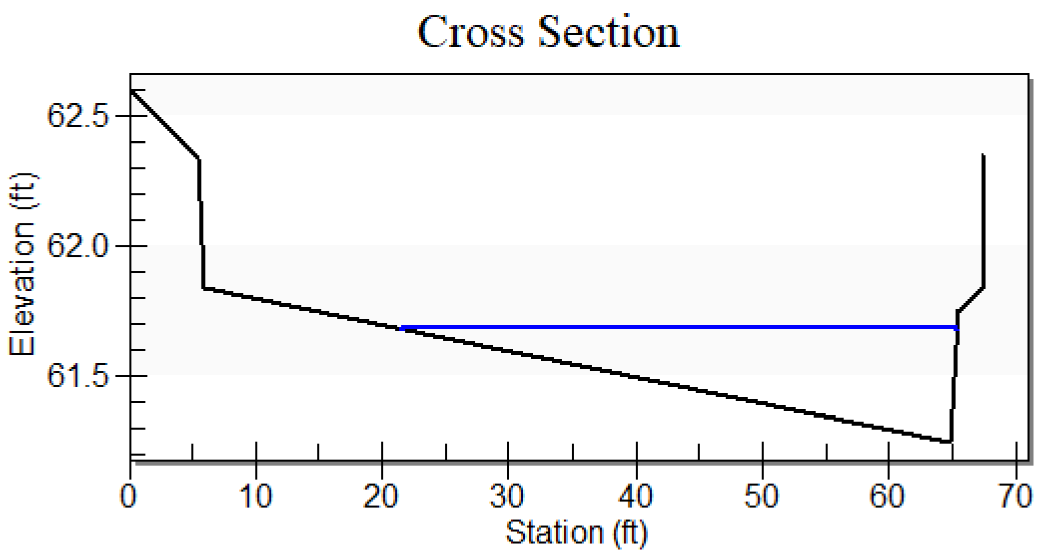
Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	62.60	0.0150
5.42	62.34	0.0150
5.92	61.84	0.0150
24.92	61.65	0.0150
64.92	61.25	0.0150
65.42	61.75	0.0150
67.54	61.85	0.0150
67.55	62.35	-----



Longitudinal Slope: 0.0040 ft/ft

Flow: 21.5000 cfs

Result Parameters

Depth: 0.4343 ft

Area of Flow: 9.5246 ft^2

Wetted Perimeter: 44.0452 ft

Hydraulic Radius: 0.2162 ft

Average Velocity: 2.2573 ft/s

Top Width: 43.8631 ft

Froude Number: 0.8537

Critical Depth: 0.4077 ft

Critical Velocity: 2.5619 ft/s

Critical Slope: 0.0056 ft/ft

Critical Top Width: 41.17 ft

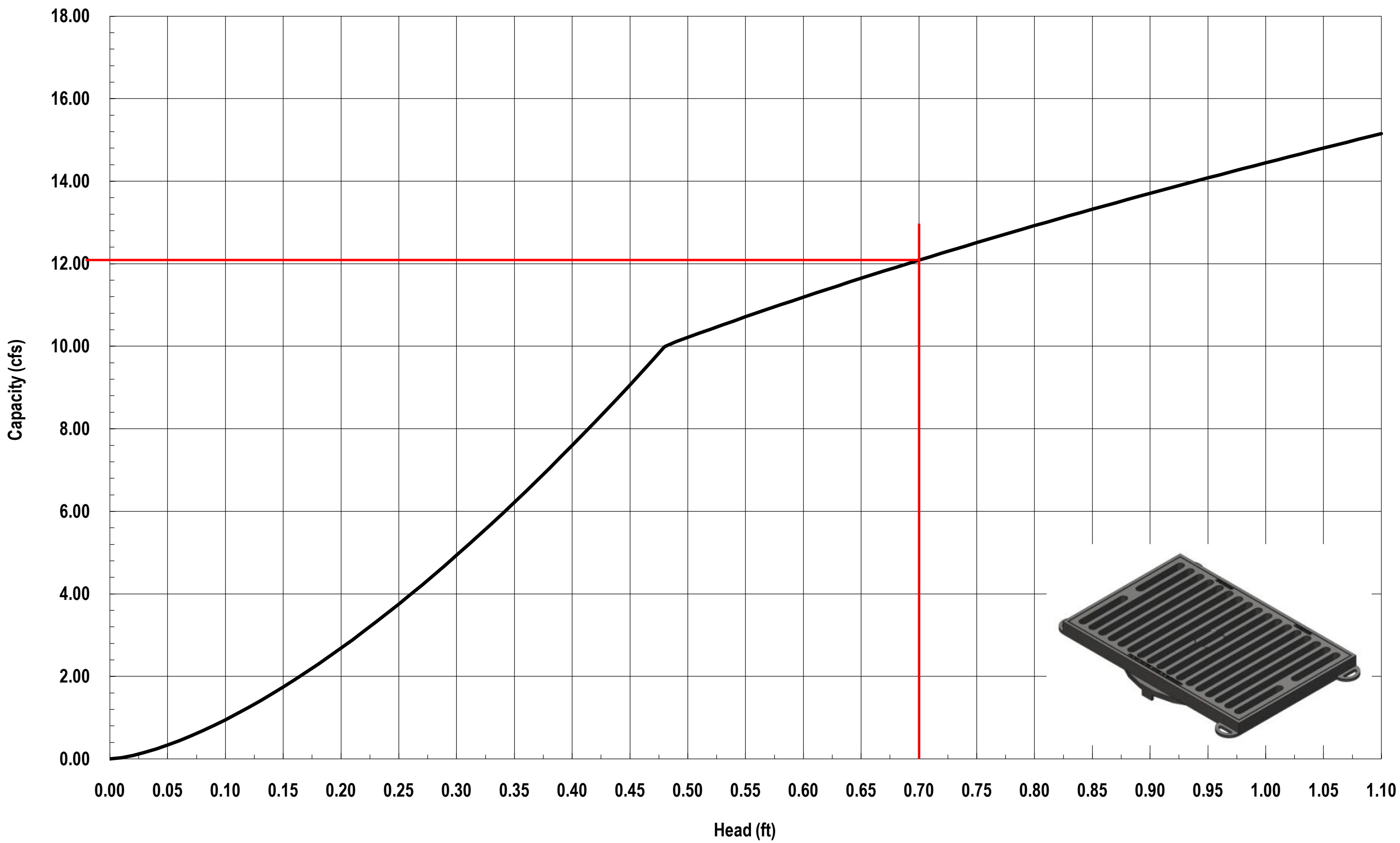
Calculated Max Shear Stress: 0.1084 lb/ft^2

Calculated Avg Shear Stress: 0.0540 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0150

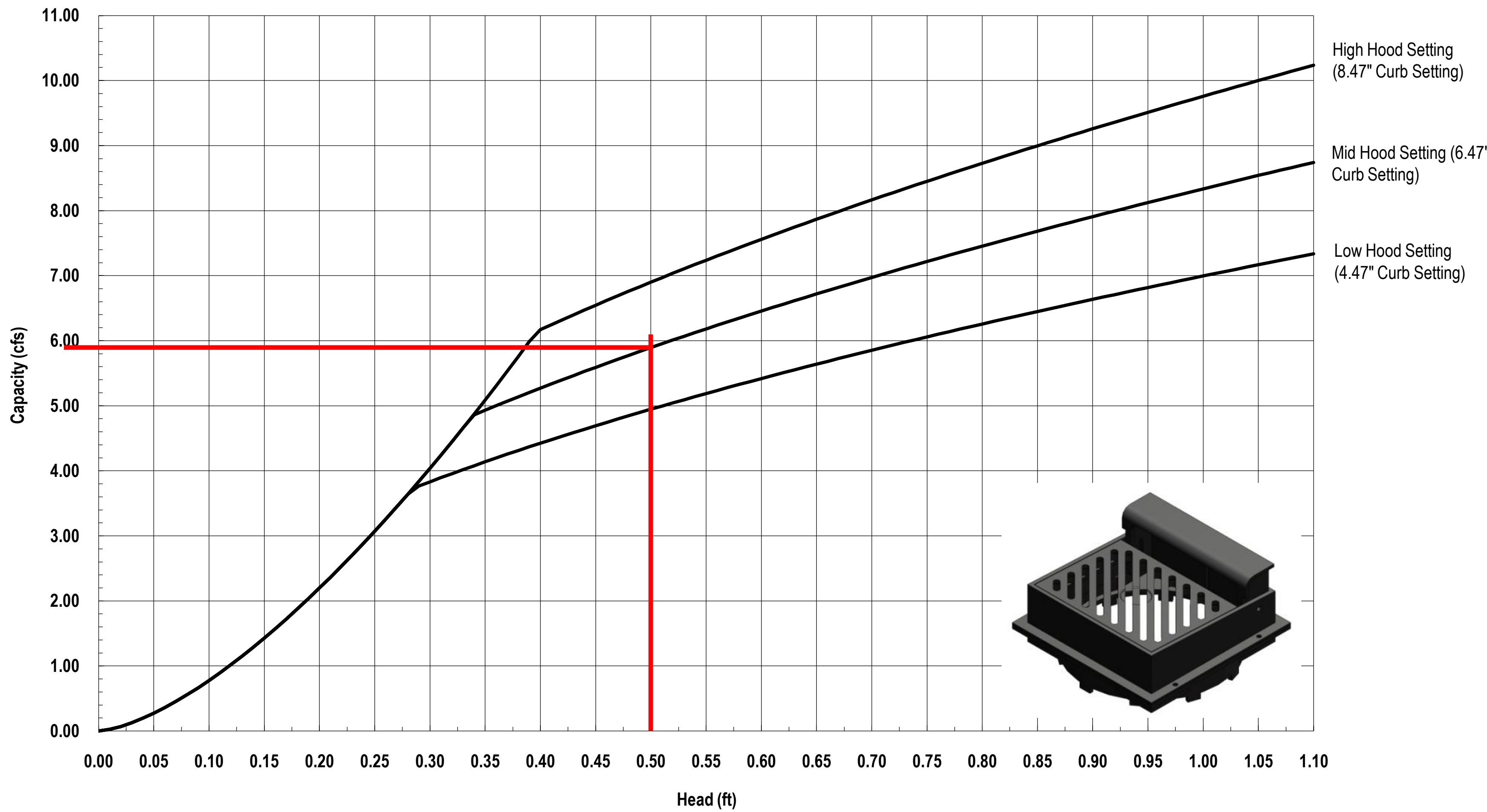
Nyloplast 2' x 3' Road & Highway Grate Inlet Capacity Chart



INLET #1 = 8.9 cfs

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

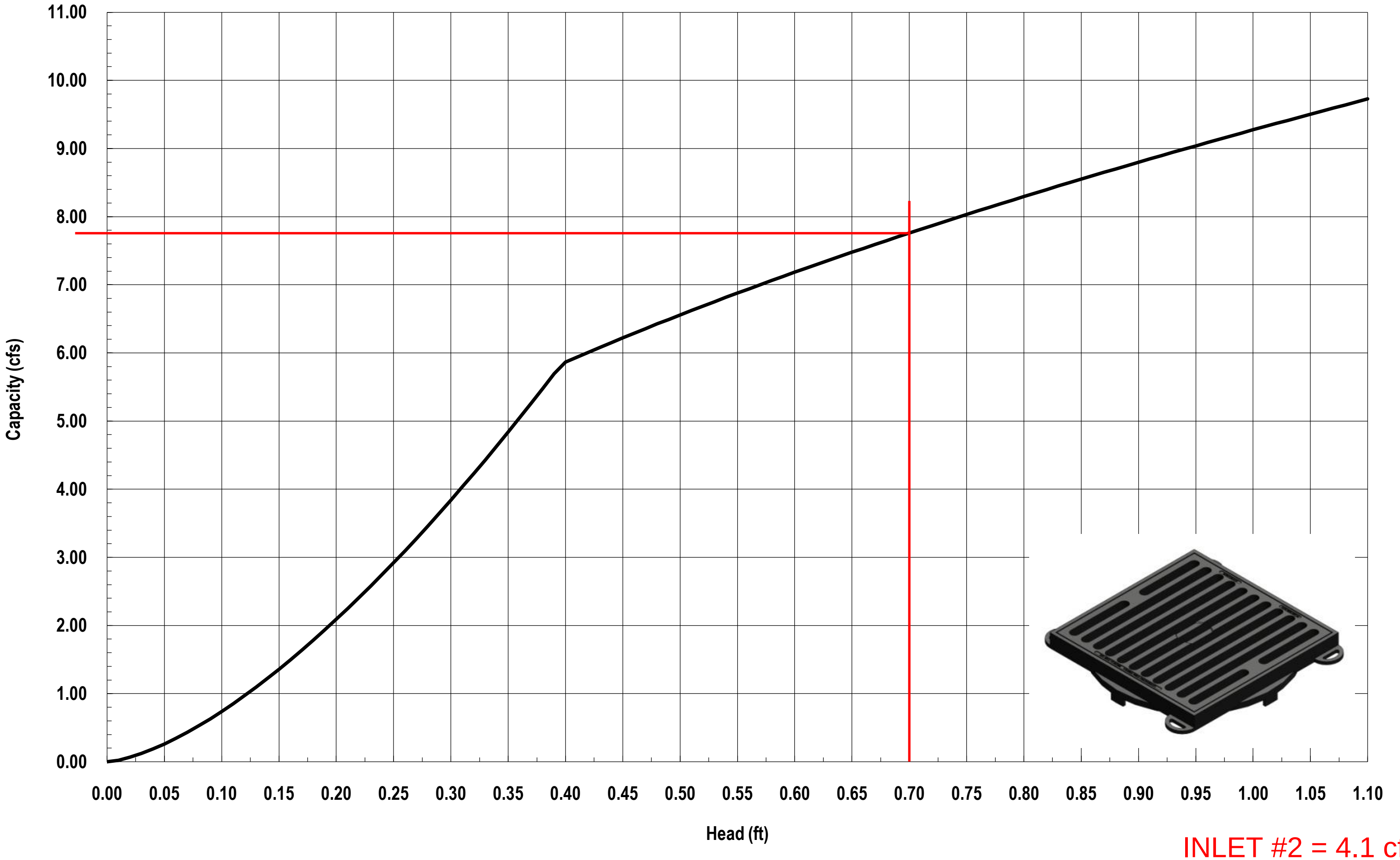
Nyloplast 2' x 2' Curb Inlet Diagonal Grate Inlet Capacity Chart



INLET #4 = 2.7 cfs
INLET #5 = 1.8 cfs
INLET #6 = 4.5 cfs
INLET #7 = 0.6 cfs
INLET #8 = 0.6 cfs

Nyloplast
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Nyloplast 2' x 2' Road & Highway Grate Inlet Capacity Chart



INLET #2 = 4.1 cfs
INLET #3 = 5.3 cfs

Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Monday, September 12, 2022

Project Units: U.S. Customary Units

Notes:

Weir Analysis: CB110 INLET #9

Notes: 9’ Opening

Input Parameters

Weir Type: Rectangular

Coefficient: 3.1000

Length: 6.0000 ft

Flow: 6.2000 cfs

Result Parameters

Head: 0.4807 ft

Weir Analysis: CB110 INLET #10

Notes: 24’ Opening

Input Parameters

Weir Type: Rectangular

Coefficient: 3.1000

Length: 16.0000 ft

Flow: 14.7000 cfs

Result Parameters

Head: 0.4445 ft

Hydraulic Analysis Report

Project Data

Project Title: 100 W Sinclair St

Designer: DJV

Project Date: Wednesday, September 14, 2022

Project Units: U.S. Customary Units

Notes:

Weir Analysis: Outlet Control Structure - Weir Analysis

Notes:

Input Parameters

Weir Type: Rectangular

Coefficient: 3.2000

Length: 7.0000 ft

Flow: 33.0000 cfs

Result Parameters

Head: 1.2947 ft

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

Western Riverside Area, California

September 6, 2022

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.

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Contents

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.

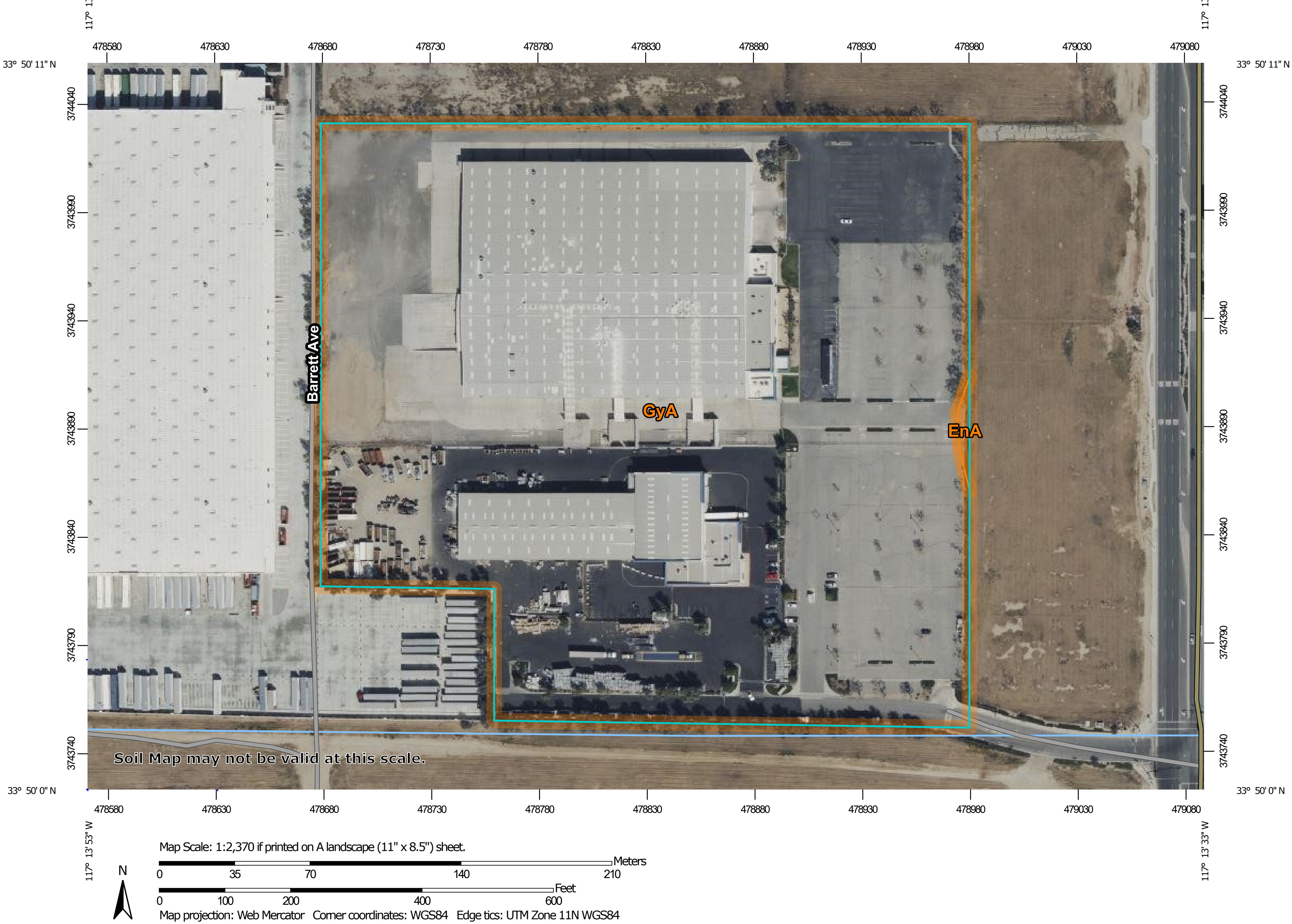
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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 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 1:15,800.

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: Western Riverside Area, California
Survey Area Data: Version 14, 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: Mar 14, 2022—Mar 17, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
EnA	Exeter sandy loam, 0 to 2 percent slopes	0.0	0.2%
GyA	Greenfield sandy loam, 0 to 2 percent slopes	19.4	99.8%
Totals for Area of Interest		**19.5**	**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.

Western Riverside Area, California

EnA—Exeter sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hctg
Elevation: 20 to 700 feet
Mean annual precipitation: 7 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Exeter

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

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 37 inches: sandy clay loam
H3 - 37 to 50 inches: indurated
H4 - 50 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Ramona
Percent of map unit: 4 percent
Hydric soil rating: No

Monserate
Percent of map unit: 4 percent
Hydric soil rating: No

Greenfield
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 3 percent
Hydric soil rating: No

GyA—Greenfield sandy loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: hcvv
Elevation: 100 to 3,500 feet
Mean annual precipitation: 9 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

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

Description of Greenfield

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

Typical profile
H1 - 0 to 26 inches: sandy loam
H2 - 26 to 43 inches: fine sandy loam
H3 - 43 to 60 inches: loam
H4 - 60 to 72 inches: stratified loamy sand to sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 10 percent
Hydric soil rating: No

Arlington

Percent of map unit: 2 percent
Hydric soil rating: No

Pachappa

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

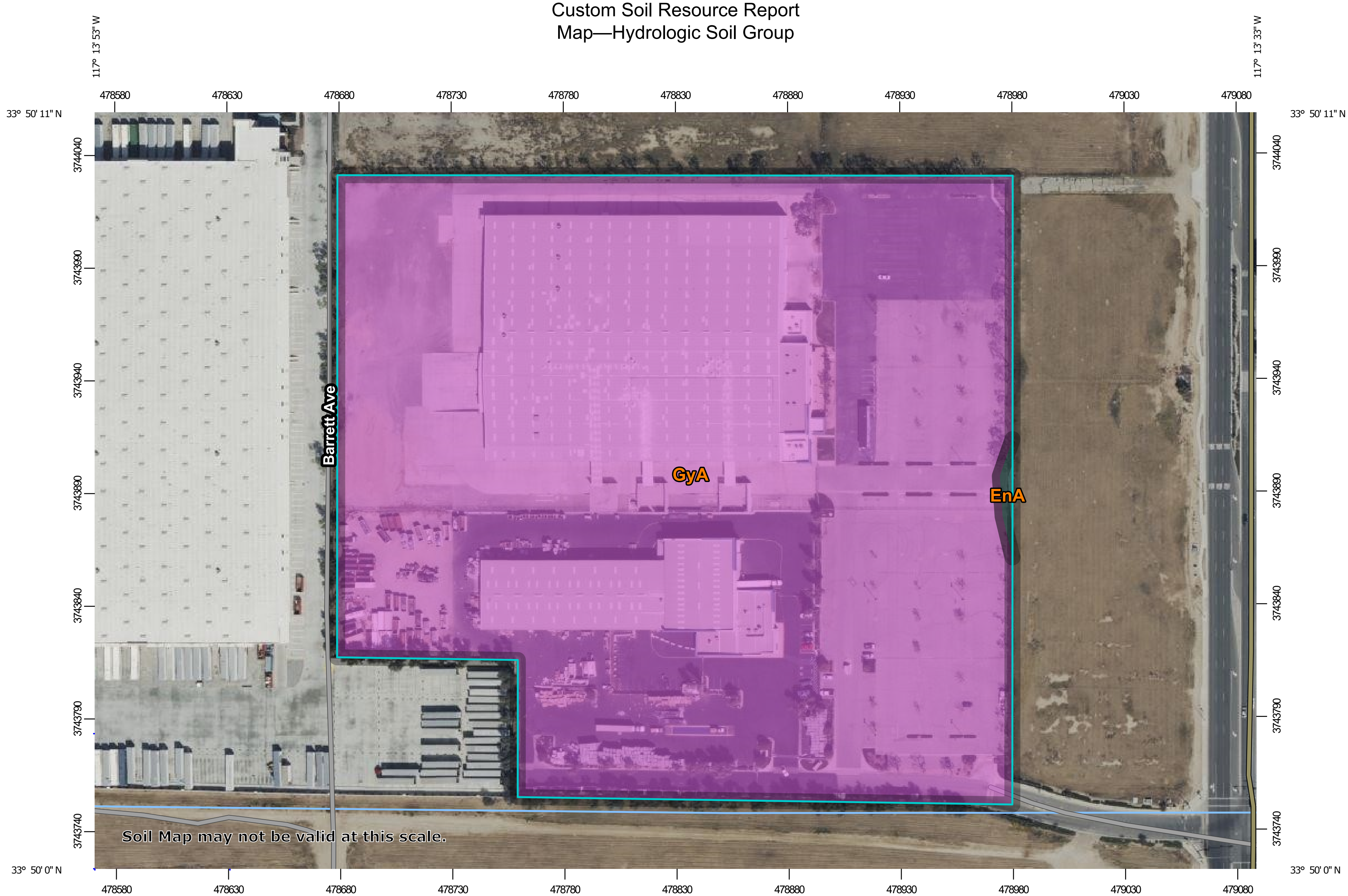
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:2,370 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 35, 70, 140, 210

Feet: 0, 100, 200, 400, 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Western Riverside Area, California
Survey Area Data: Version 14, 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: Mar 14, 2022—Mar 17, 2022

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EnA	Exeter sandy loam, 0 to 2 percent slopes	C	0.0	0.2%
GyA	Greenfield sandy loam, 0 to 2 percent slopes	A	19.4	99.8%
Totals for Area of Interest			**19.5**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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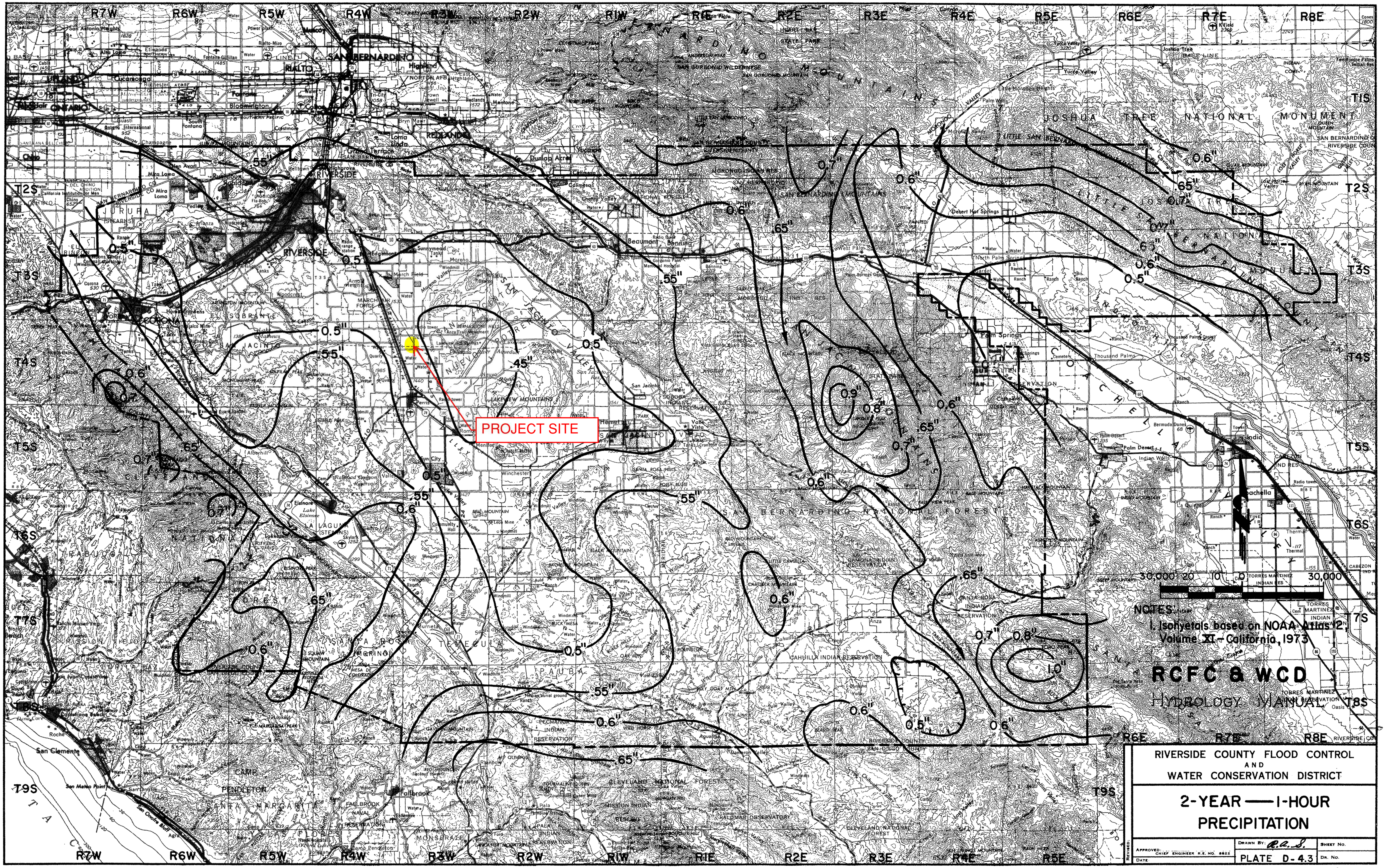
PROJECT SITE
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.3
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO
RIVERSIDE
CORONA
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
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T1S
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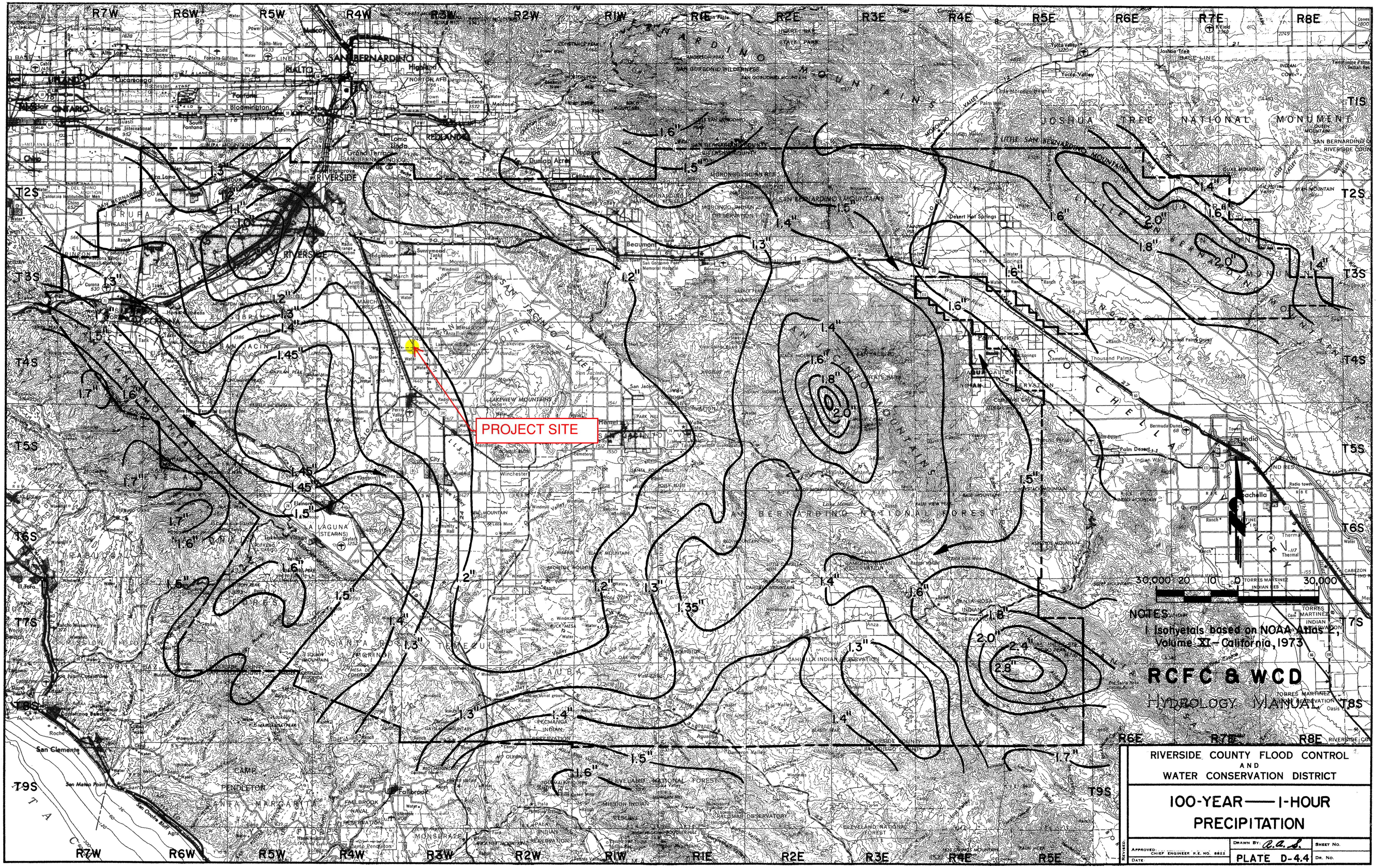
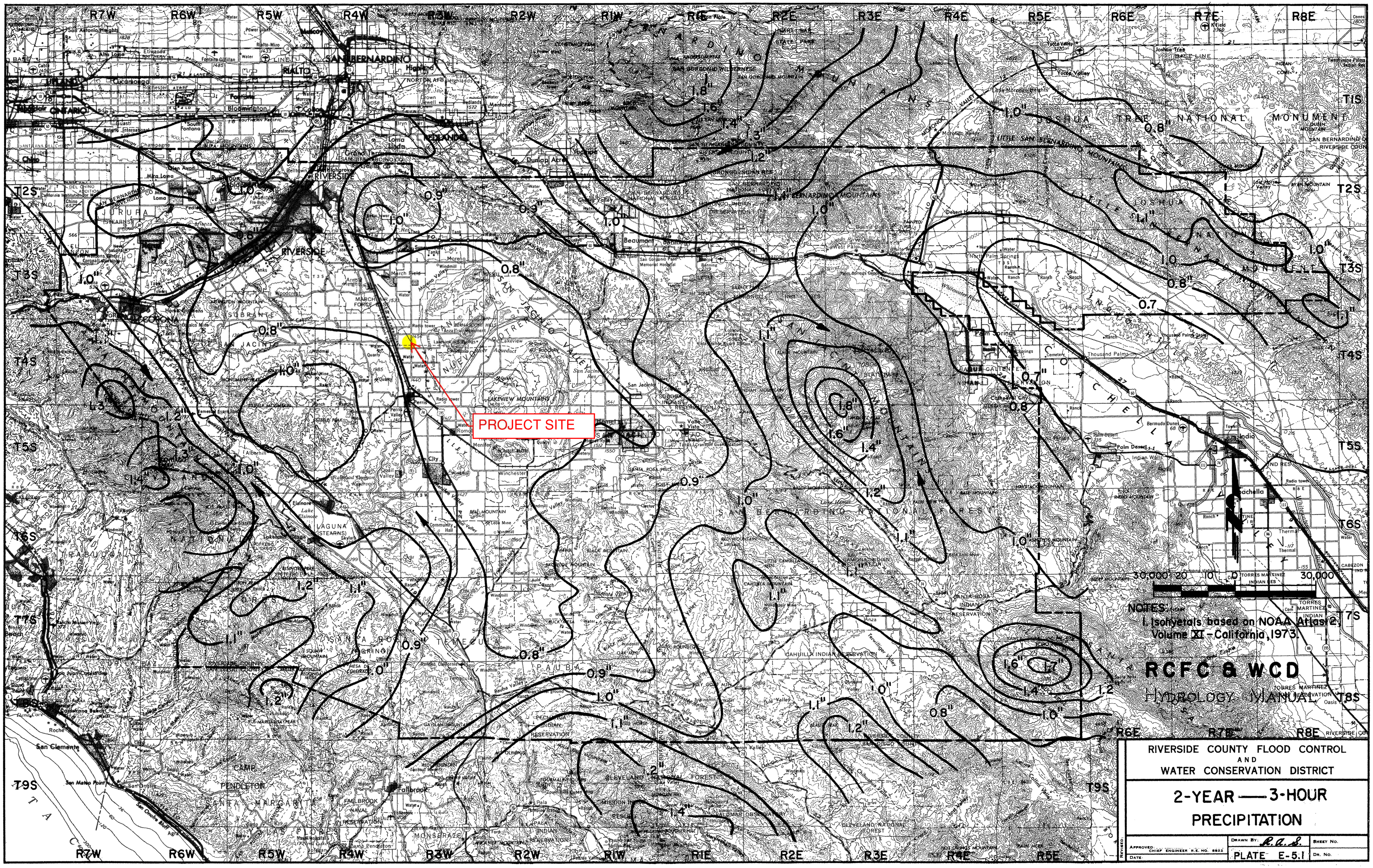
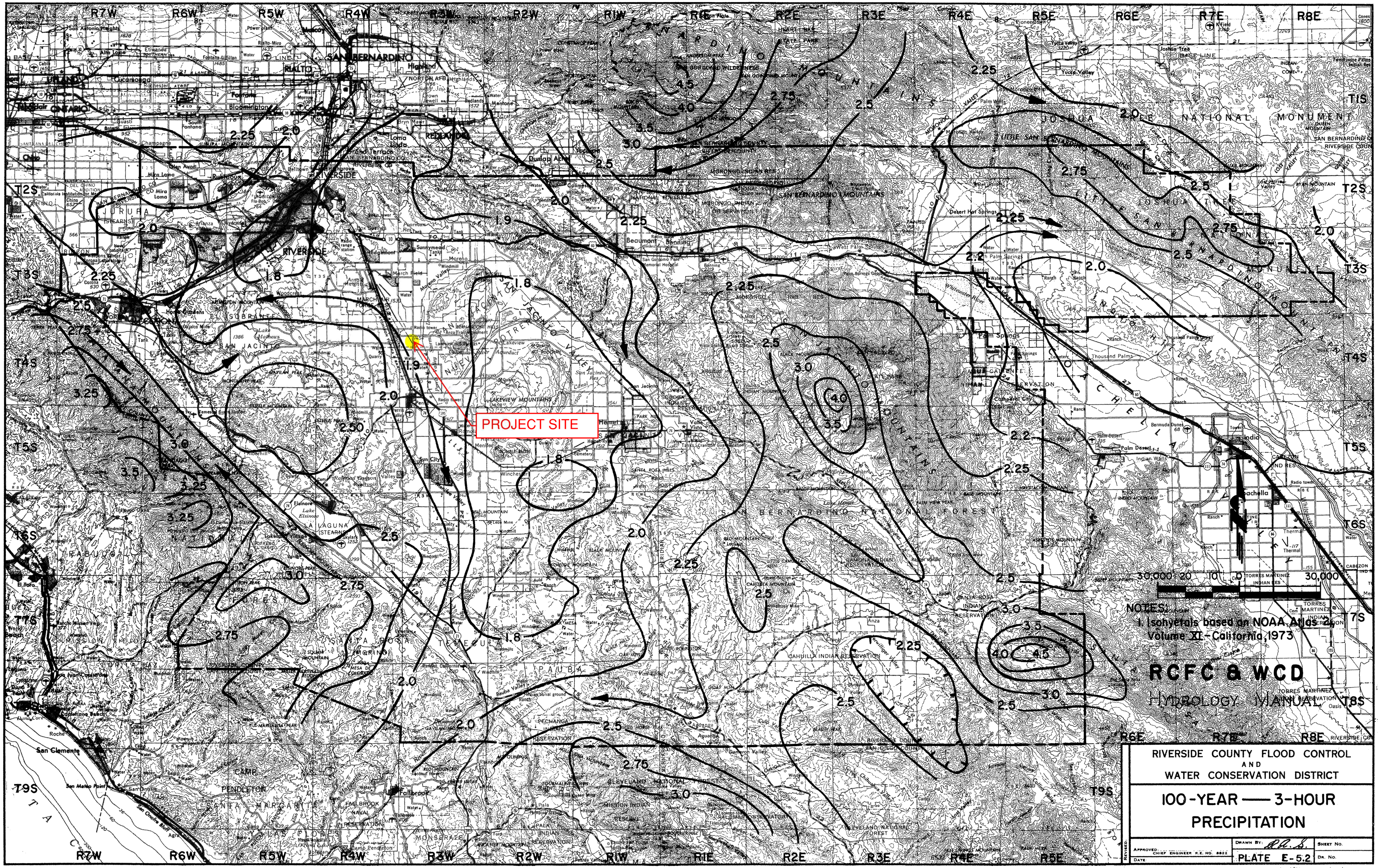
T3S
T4S
T5S
T6S
T7S
T8S
T9S

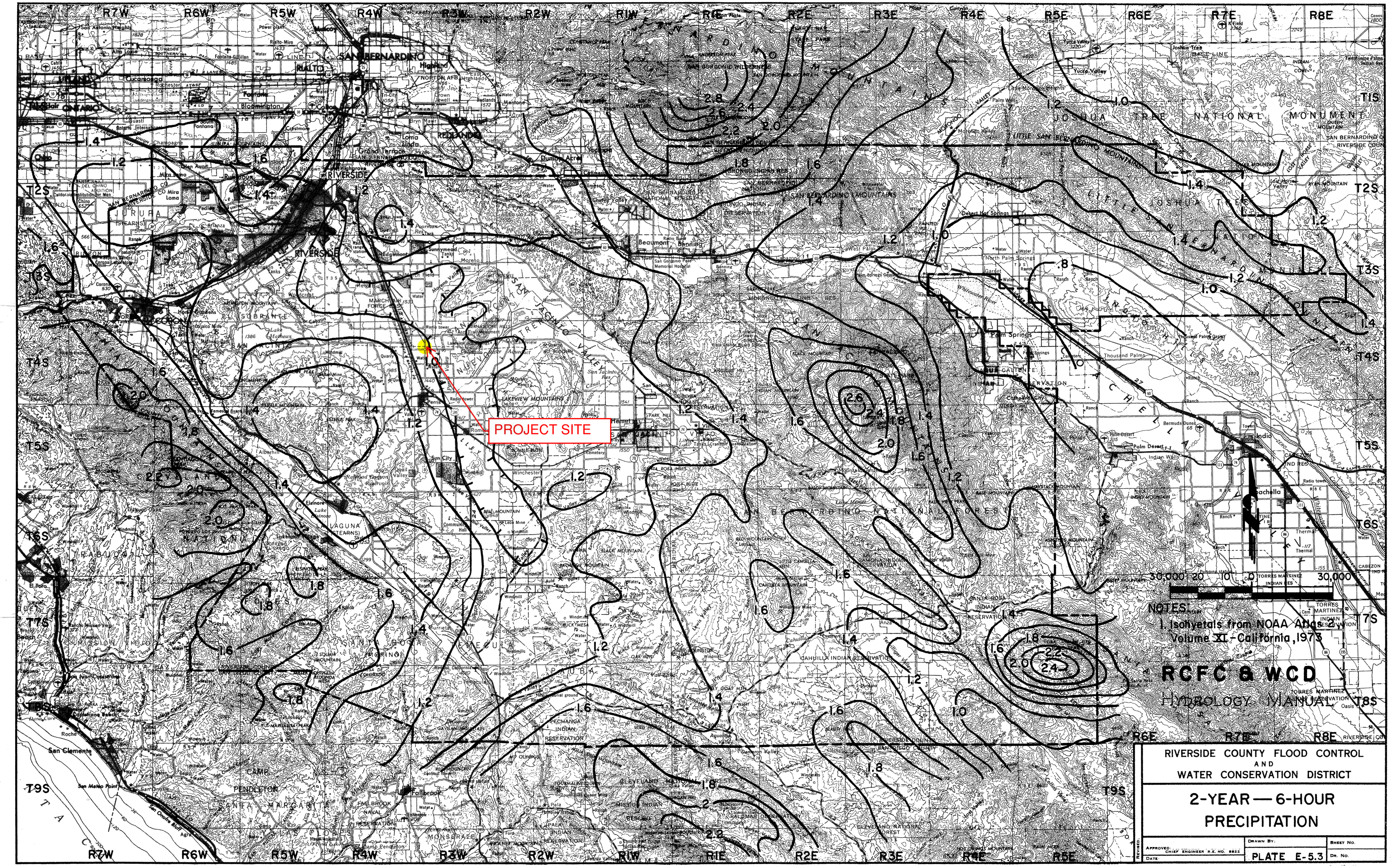

PROJECT SITE
NOTES
1 Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.4
30,000 20 10 0 30,000
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
REDLANDS
ONTARIO
UPLAND
RIALTO
Beaumont
Desert Hot Springs
Palm Desert
Indio
Coachella
Hemet
San Jacinto
Perris
Elsinore
Temecula
San Clemente
Fallbrook
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
LAKEVIEW MOUNTAINS
CAMP PENDLETON
1.6"
1.5"
1.4"
1.3"
1.2"
1.45"
1.7"
1.8"
2.0"
2.4"
2.8"
1.35"
2"

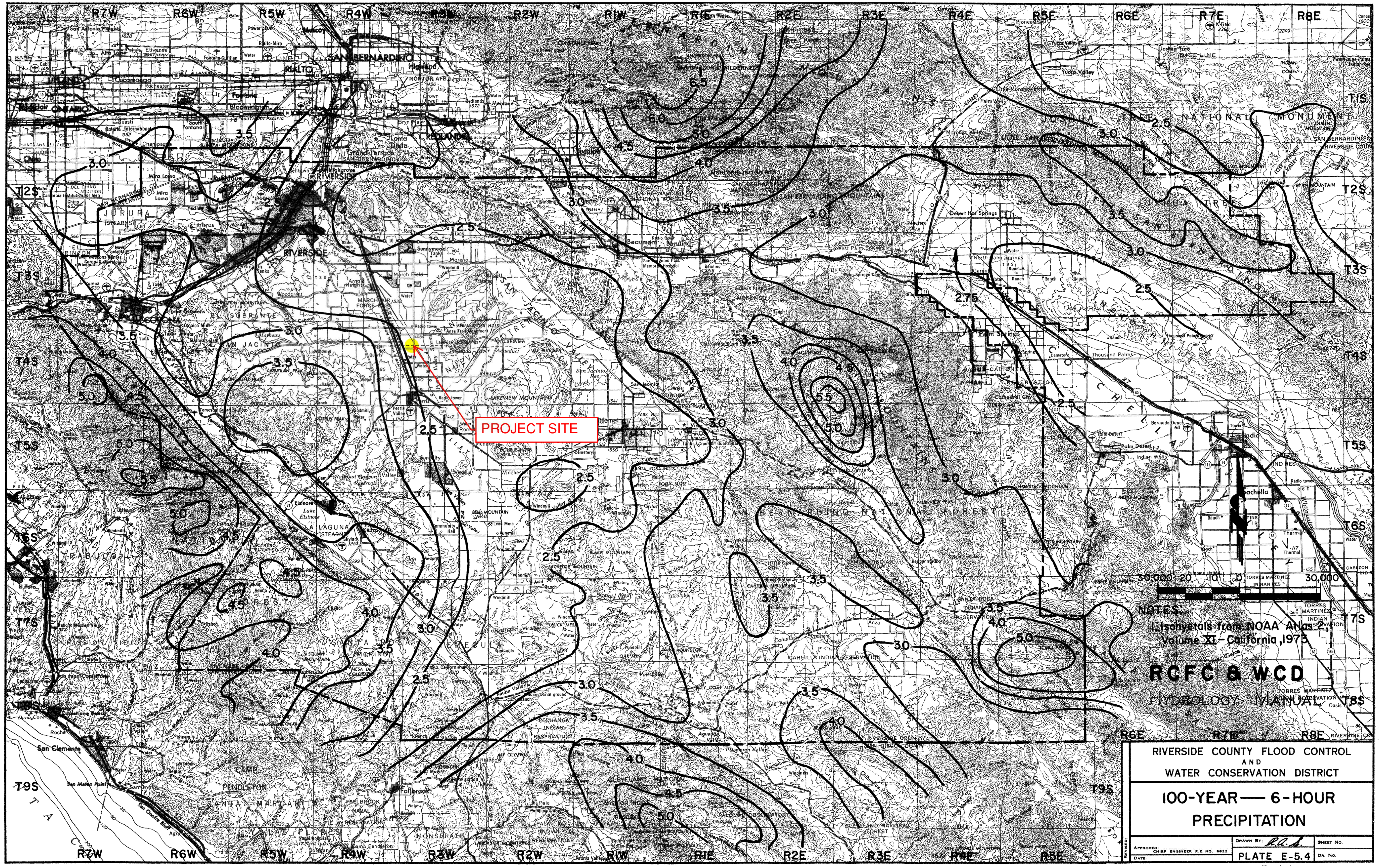


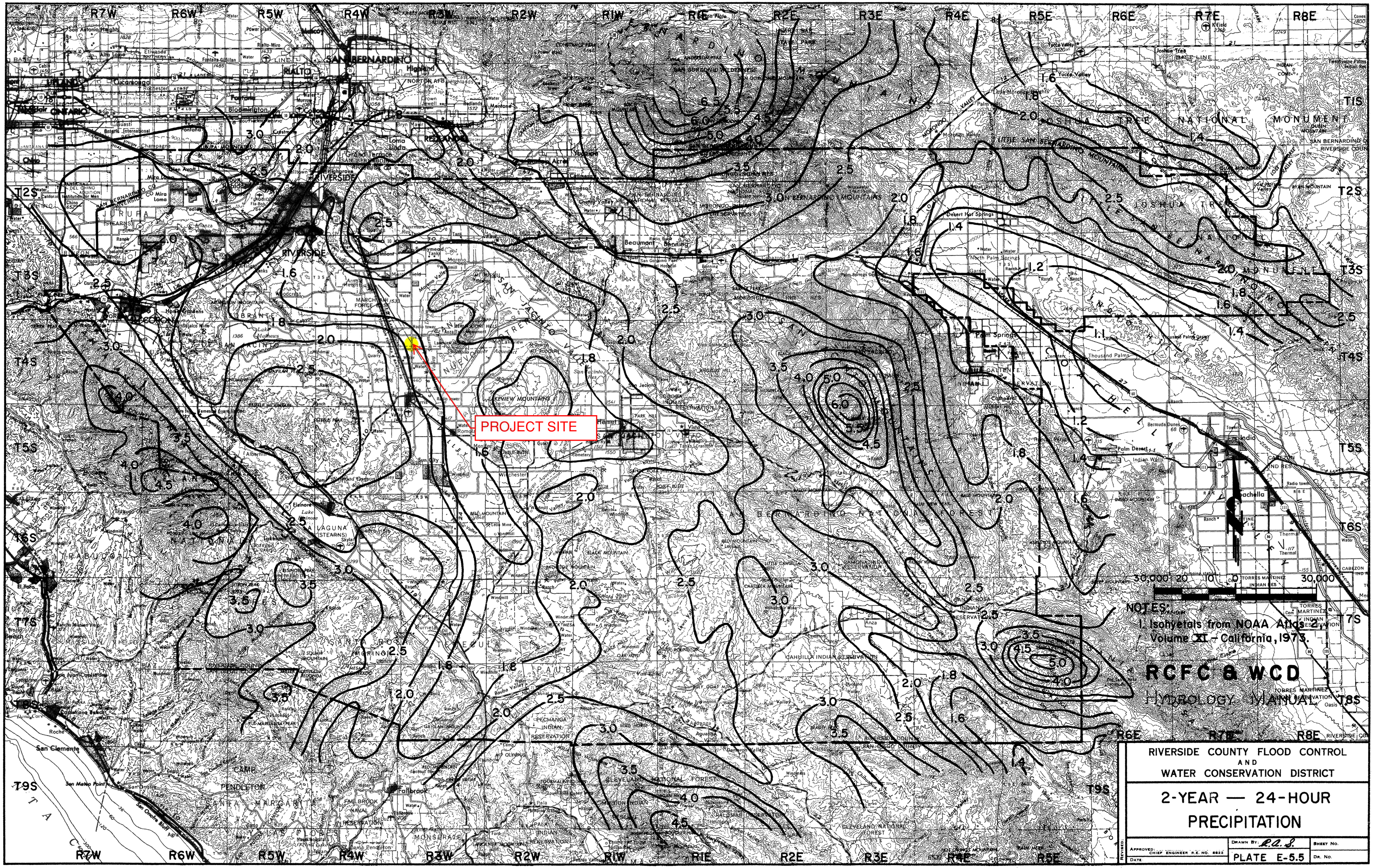
PROJECT SITE
NOTES:
I. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.1

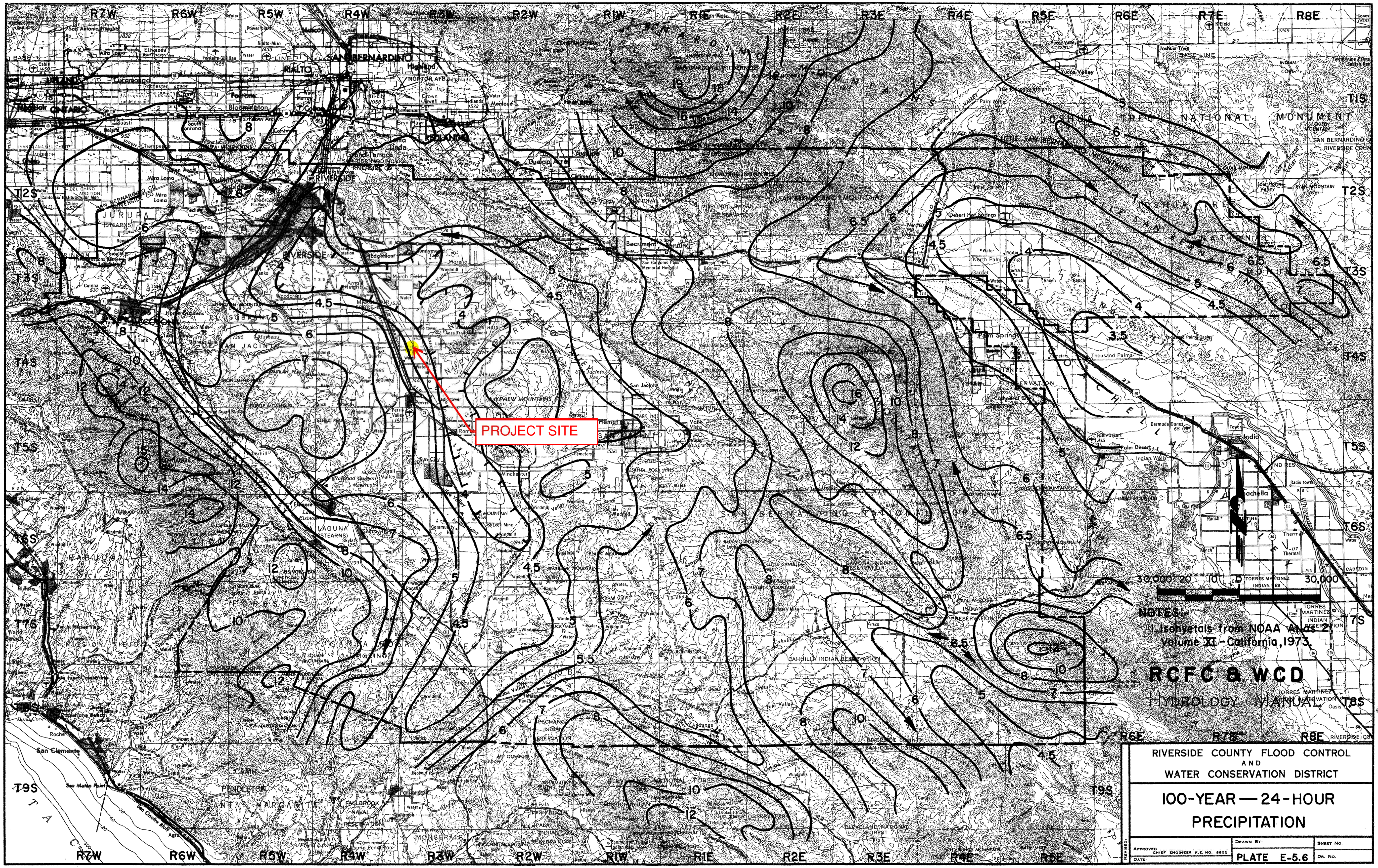


PROJECT SITE
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR —— 3-HOUR PRECIPITATION
PLATE E-5.2
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
Beaumont
Banning
Palm Springs
Hemet
San Clemente
Fallbrook
JOSHUA TREE NATIONAL MONUMENT


PROJECT SITE
NOTES
1. Isohyetals from NOAA Atlas 2 Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR
PRECIPITATION
PLATE E-5.3
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO
RIVERSIDE
Palm Springs
Beaumont
Banning
Hemet
Perris
San Clemente
Fallbrook
Indio
Coachella


PROJECT SITE
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR PRECIPITATION
PLATE E-5.4


PROJECT SITE
NOTES:
1. Isohyetals from NOAA Atlas 2 Volume XI - California, 1973.
RCFC & WCD
Hydrology Manual
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.5



PROJECT SITE
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

March 8, 2022

First Industrial Realty Trust, Inc.
898 North Pacific Coast Highway, Suite 175
El Segundo, California 90245

Attention: Mr. Michael Goodwin
Director of Development

Project No.: **21G122-2**

Subject: **Results of Infiltration Testing**
First Sinclair Logistics Center
100 West Sinclair Street
Perris, California

Reference: Geotechnical Investigation, First Sinclair Logistics Center, 100 West Sinclair Street, Perris, California, prepared for First Industrial Realty Trust, Inc., by Southern California Geotechnical, Inc. (SCG), SCG Project No. 22G122-1, dated March 4, 2022.

Mr. Goodwin:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 22P120, dated January 20, 2022. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with the guidelines published in Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A, prepared for the Riverside County Department of Environmental Health (RCDEH), dated December, 2013.

Site and Project Description

The site is located at 100 West Sinclair Street in Perris, California. The site is bounded to the north and east by vacant parcels and to the west by Barrett Avenue. An existing building is located on the southerly adjacent property. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of an L-shaped parcel, 13.85± acres in size. The site is presently developed with one (1) warehouse building, 161,000± ft^2 in size, located in the north-central area of the site. The building is surrounded by Portland cement concrete pavements in the loading dock areas and asphaltic concrete (AC) pavements in the eastern parking area. The asphaltic concrete pavements were in fair to poor condition with moderate cracking throughout. Ground surface cover in the remaining areas of the site consists of open-graded gravel in the northwestern area and exposed soil in the southwestern area of the site. Concrete flatwork and landscape planters are present throughout the western parking area and along the west, north and east property lines. The planters include medium to large trees and exposed soil.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth and visual observations made at the time of the subsurface investigation, the eastern parking area slopes downward to the north at a gradient of less than 1± percent. The western portion of the site has a central low point with gentle ascending slopes to the south, west and north with estimated gradients between 2 and 3± percent.

Proposed Development

SCG was provided with conceptual site plan prepared by HPA Architecture (Scheme 5). Based on Scheme 5, the site will be developed with one (1) new warehouse building, 271,359± ft^2 in size, located in the north-central area of the site. Dock-high doors will be constructed along most of the southern building wall. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes, Portland cement concrete pavements in the loading dock areas, and limited areas of concrete flatwork and landscape planters throughout the site.

We understand that the proposed development will include on-site storm water infiltration. The infiltration system will consist of a below-grade chamber system located in the southeastern area of the site. The bottom of the infiltration system is expected to be 8 to 9± feet below the existing site grades.

Concurrent Study

The subsurface exploration for this phase of the project consisted of six (6) borings advanced to depths of 15 to 25± feet below the existing site grades. Artificial fill soils were encountered beneath the pavements/slab at several of the boring locations, extending to depths of 4½ to 6± feet. The fill soils generally consisted of loose to medium dense silty fine to medium sands and fine to medium sandy silts. Native alluvium was encountered beneath the fill soils at all of the boring locations. The alluvial soils generally consisted of loose to medium dense fine sandy silts, clayey fine sands, fine to coarse sands, silty fine to medium sands, and stiff to hard silty clays extending to at least the maximum depth explored of 25± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

Recent water level data was obtained from the California State Water Resources Control Board, GeoTracker, website, https://geotracker.waterboards.ca.gov/. One monitoring well on record is located 210± feet south of the site. Water level readings within this monitoring well indicate a high groundwater level of 79± feet below the ground surface in February 2015.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of two (2) infiltration test borings, advanced to a depth of 9± feet below the existing site grades. The infiltration borings (identified as Infiltration No. I-1 and I-2) were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers and were logged during drilling by a member of our staff. The borings were logged during drilling by a member of our staff. The approximate locations of the infiltration borings are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Fill soils were encountered beneath the pavements at both of the infiltration boring locations. The fill soils consist of medium dense clayey fine to medium sands with varying amounts of silt extended to a depth of 3± feet. Native alluvial soils were encountered beneath the fill soils at both of the infiltration boring locations. The alluvial soils consist of medium dense to dense, silty fine to coarse sands and fine to medium sandy silts extending to the maximum depth explored of 9± feet. The Boring Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Infiltration Testing

The infiltration testing was performed in general accordance with the Riverside County guidelines: Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A.

Pre-soaking

In accordance with the county infiltration standards for sandy soils, all infiltration test borings were pre-soaked 2 hours prior to the infiltration testing or until all of the water had percolated through the test holes. The pre-soaking process consisted of filling test borings by inverting a full 5-gallon bottle of clear water supported over each hole so that the water flow into the hole holds constant at a level at least 5 times the hole's radius above the gravel at the bottom of each hole. Pre-soaking was completed after all of the water had percolated through the test holes.

Infiltration Testing

Following the pre-soaking process, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of the test holes. In accordance with the Riverside County guidelines, since "sandy soils" (where 6 inches of water infiltrated into the surrounding soils in less than 25 minutes for two consecutive readings) were encountered at the bottom of Infiltration Test No. I-1, readings were taken at 10-minute intervals for a total of at least 1 hour. Since "non-sandy soils" (where 6 inches of water did not infiltrate into the surrounding soils in less than 25 minutes for two consecutive readings) were encountered at the bottom of Infiltration Test No. I-2, readings were taken at 30-minute intervals for a total of at least 6 hours.

After each reading, water was added to the borings so that the depth of the water was at least 5 times the radius of the hole. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

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

Infiltration Test No.	Depth (feet)	Soil Description	Infiltration Rate (inches/hour)
I-1	9	Fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay	2.4
I-2	9	Fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay	0.3

Laboratory Testing

Moisture Content

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

Grain Size Analysis

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

Design Recommendations

Two (2) infiltration tests were performed at the subject site. As noted above, the infiltration rates at these locations vary from 0.3 to 2.4 inches per hour. **Based on the infiltration test results, we recommend an average rate of 1.4 inches per hour be used for the infiltration chamber system.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each chamber system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

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

Infiltration Rate Considerations

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

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

Construction Considerations

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

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Chamber Maintenance

The proposed project may include infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the chamber subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Jose A. Zuniga
Staff Engineer

Daryl Kas, CEG 2467
Senior Geologist

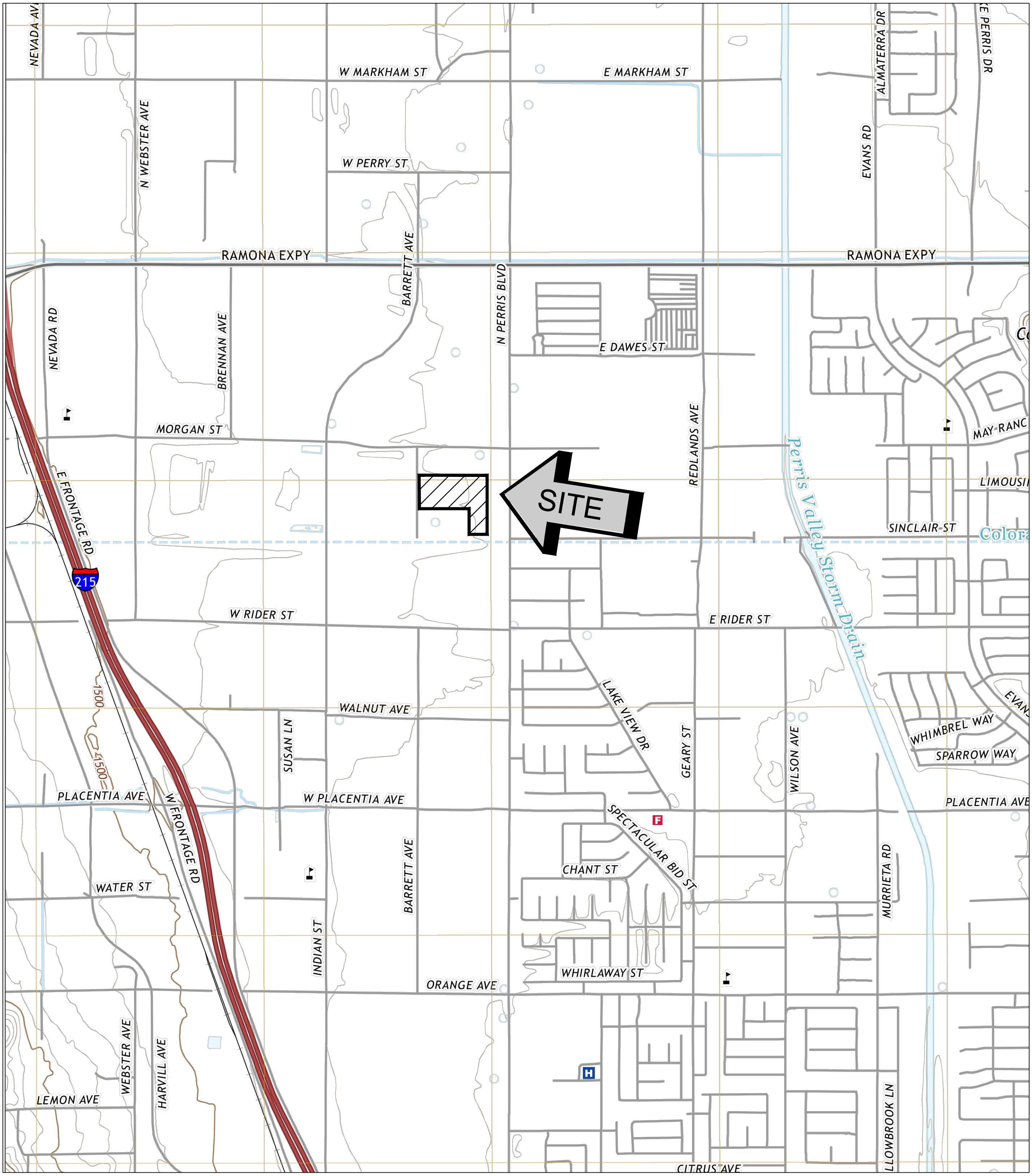
Gregory K. Mitchell, GE 2364
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER GREGORY K. MITCHELL No. 2364 Exp. 09/30/22 GEOTECHNICAL STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST DARYL R. KAS No. 2467 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Distribution: (1) Addressee

Enclosures:
- Plate 1 - Site Location Map
- Plate 2 - Infiltration Test Location Plan
- Boring Log Legend and Logs (4 pages)
- Infiltration Test Results Spreadsheets (2 pages)
- Grain Size Distribution Graphs (3 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

FIRST SINCLAIR LOGISTICS CENTER

PERRIS, CALIFORNIA

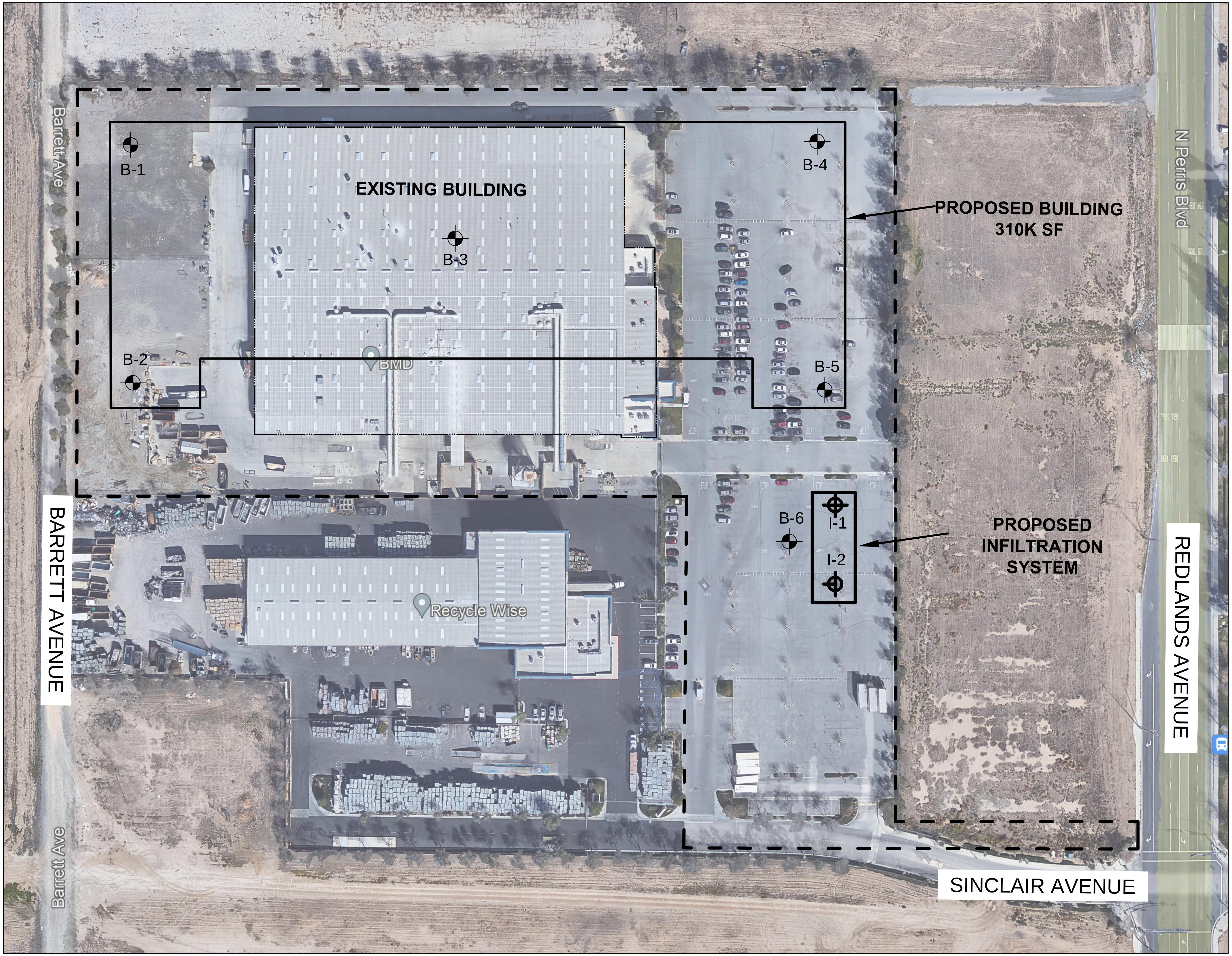
SCALE: 1" = 2000'

DRAWN: MD
CHKD: RGT

SCG PROJECT
22G122-2

PLATE 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION (SCG PROJECT NO. 22G122-1)
- PROPOSED INDUSTRIAL BUILDING OUTLINE
- PROPERTY LINE
- EXISTING BUILDING

NOTE: CONCEPTUAL SITE PLAN PREPARED BY HPA ARCHITECTURE. AERIAL PHOTGRAPH OBTAINED FROM GOOGLE EARTH.

INFILTRATION TEST LOCATION PLAN

FIRST SINCLAIR LOGISTICS CENTER

PERRIS, CALIFORNIA

SCALE: 1" = 120'

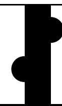
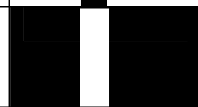
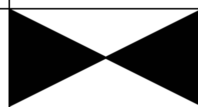
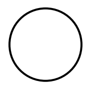
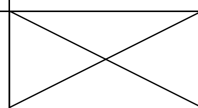
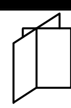
DRAWN: MD
CHKD: GKM

SCG PROJECT 22G122-2

PLATE 2

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

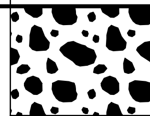
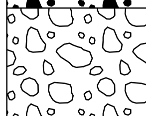
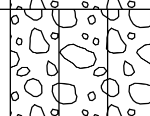
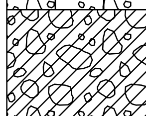
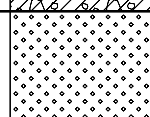
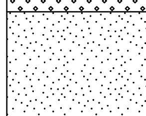
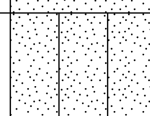
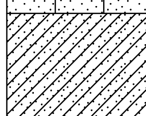
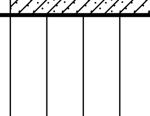
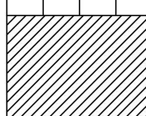
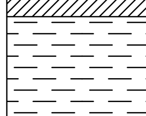
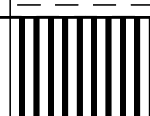
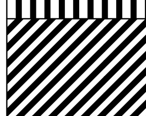
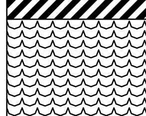
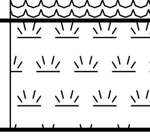
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 22G122-2
PROJECT: First Sinclair Logistics Center
LOCATION: Perris, California

DRILLING DATE: 2/4/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± inches Asphaltic Concrete; 4± inches Aggregate Base							
	X	12			FILL: Brown Clayey fine to coarse Sand, trace Silt, medium dense-moist		10					
5	X	5			ALLUVIUM: Brown Silty fine to coarse Sand, loose to medium dense-moist		9					
	X	22					6			18		
					Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay, medium dense-moist		13			46		

Trench Terminated at 9'

TBL 22G122-2.GPJ SOCALGEO.GDT 3/8/22

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 22G122-2
PROJECT: First Sinclair Logistics Center
LOCATION: Perris, California

DRILLING DATE: 2/4/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± inches Asphaltic Concrete; 4± inches Aggregate Base							
	X	10			FILL: Brown Clayey fine to medium Sand, little Silt, medium dense-moist		12					
5	X	15			ALLUVIUM: Brown Silty fine Sand, little medium Sand, medium dense-moist		14					
	X	31			Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay, dense-moist		10			44		

Boring Terminated at 9'

TBL 22G122-2.GPJ SOCALGEO.GDT 3/8/22

TEST BORING LOG

INFILTRATION CALCULATIONS

Project Name	First Sinclair Logistics Center
Project Location	Perris, California
Project Number	22G122-2
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	9.00	(ft)

Infiltration Test Hole	I-1

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	7:00 AM	25.00	7.20	10.92	YES	SANDY SOILS
	Final	7:25 AM		8.11			
2	Initial	7:27 AM	25.00	7.20	9.84	YES	SANDY SOILS
	Final	7:52 AM		8.02			

Test Data

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	7:55 AM	10.00	7.20	0.42	1.59	2.87
	Final	8:05 AM		7.62			
2	Initial	8:07 AM	10.00	7.20	0.41	1.60	2.79
	Final	8:17 AM		7.61			
3	Initial	8:27 AM	10.00	7.20	0.39	1.61	2.64
	Final	8:37 AM		7.59			
4	Initial	8:39 AM	10.00	7.20	0.38	1.61	2.57
	Final	8:49 AM		7.58			
5	Initial	8:51 AM	10.00	7.20	0.36	1.62	2.42
	Final	9:01 AM		7.56			
6	Initial	9:03 AM	10.00	7.20	0.36	1.62	2.42
	Final	9:13 AM		7.56			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	First Sinclair Logistics Center
Project Location	Perris, California
Project Number	22G122-2
Engineer	CB

Test Hole Radius	4	(in)
Test Depth	9.00	(ft)

Infiltration Test Hole	I-2

Soil Criteria Test

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	9:30 AM	25.00	7.30	0.96	NO	NON-SANDY SOILS
	Final	9:55 AM		7.38			
2	Initial	9:57 AM	25.00	7.30	0.72	NO	NON-SANDY SOILS
	Final	10:22 AM		7.36			

Test Data

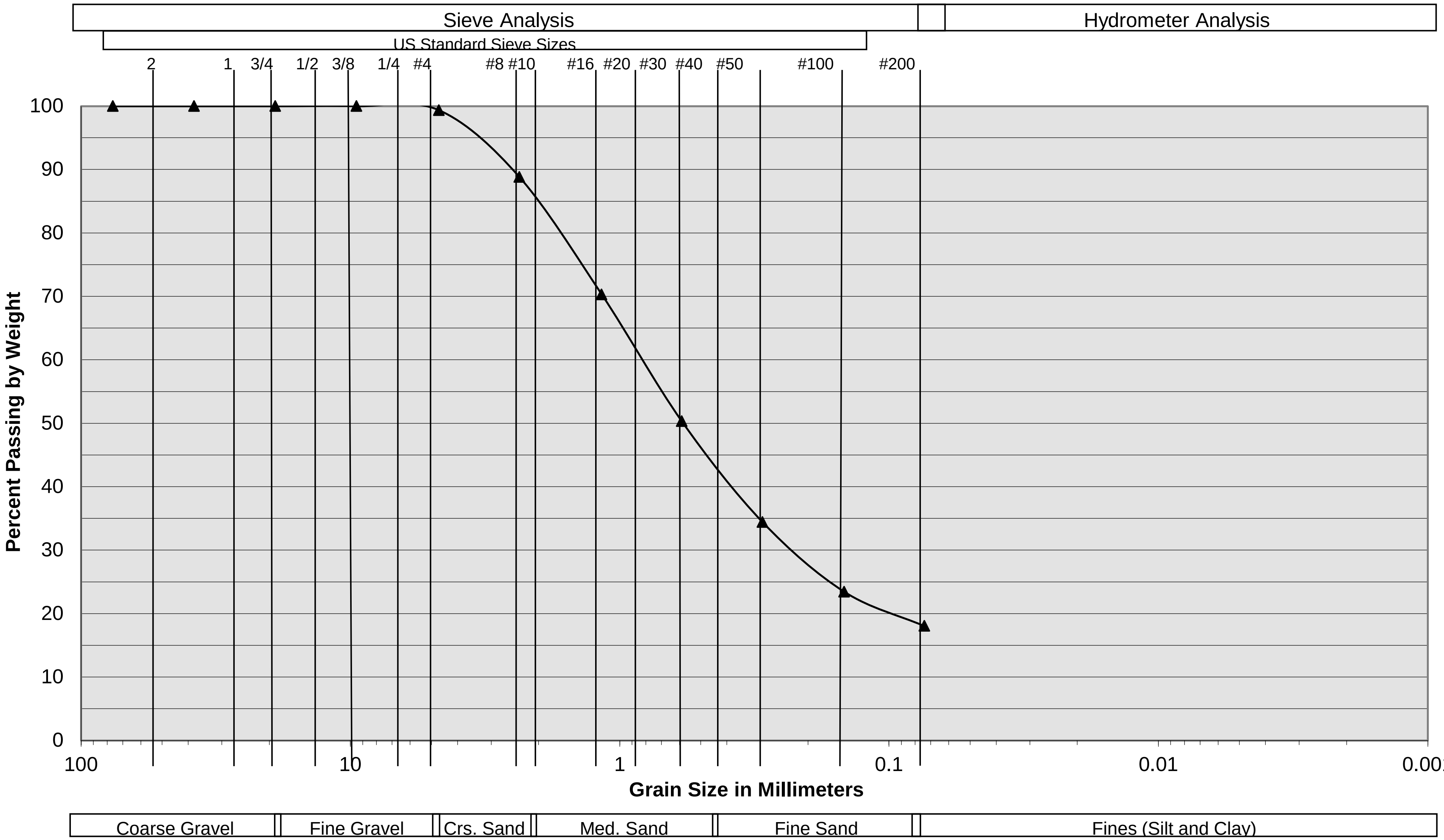
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	10:25 AM	30.00	7.30	0.29	1.56	0.67
	Final	10:55 AM		7.59			
2	Initial	10:55 AM	30.00	7.30	0.26	1.57	0.60
	Final	11:25 AM		7.56			
3	Initial	11:25 AM	30.00	7.30	0.25	1.58	0.57
	Final	11:55 AM		7.55			
4	Initial	11:55 AM	30.00	7.30	0.23	1.59	0.53
	Final	12:25 PM		7.53			
5	Initial	12:25 PM	30.00	7.30	0.20	1.60	0.45
	Final	12:55 PM		7.50			
6	Initial	12:55 PM	30.00	7.30	0.19	1.61	0.43
	Final	1:25 PM		7.49			
7	Initial	1:25 PM	30.00	7.30	0.18	1.61	0.41
	Final	1:55 PM		7.48			
8	Initial	1:55 PM	30.00	7.30	0.15	1.63	0.33
	Final	2:25 PM		7.45			
9	Initial	2:25 PM	30.00	7.30	0.14	1.63	0.31
	Final	2:55 PM		7.44			
10	Initial	2:55 PM	30.00	7.30	0.13	1.64	0.29
	Final	3:25 PM		7.43			
11	Initial	3:25 PM	30.00	7.30	0.13	1.64	0.29
	Final	3:55 PM		7.43			
12	Initial	3:55 PM	30.00	7.30	0.13	1.64	0.29
	Final	4:25 PM		7.43			

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:
- Q = Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

Grain Size Distribution

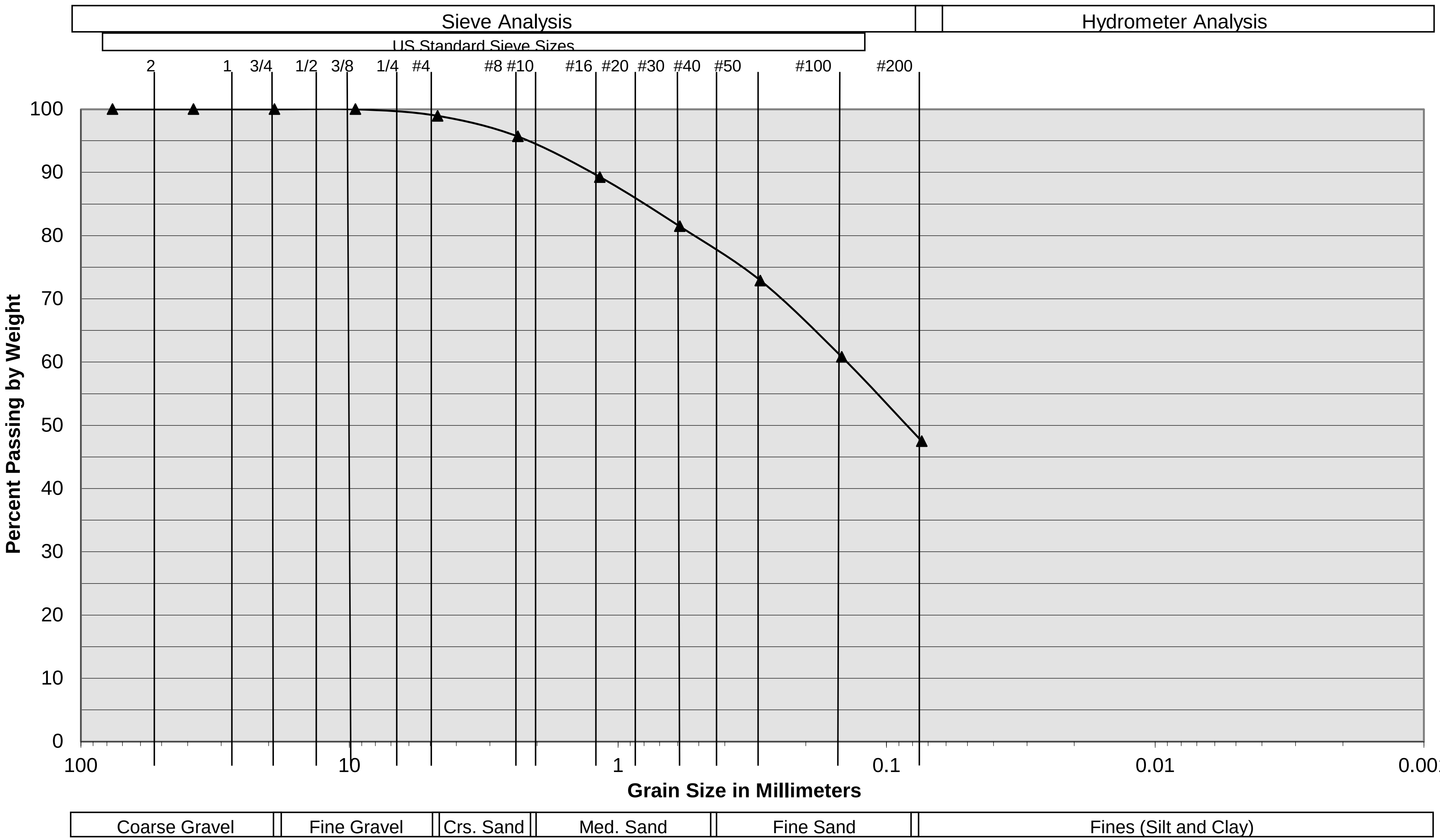


Sample Description	I-1 @ 7.5 to 8'
Soil Classification	Brown Silty fine to coarse Sand

First Lsinclair Logistics Center
Perris, California
Project No. 22G122-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

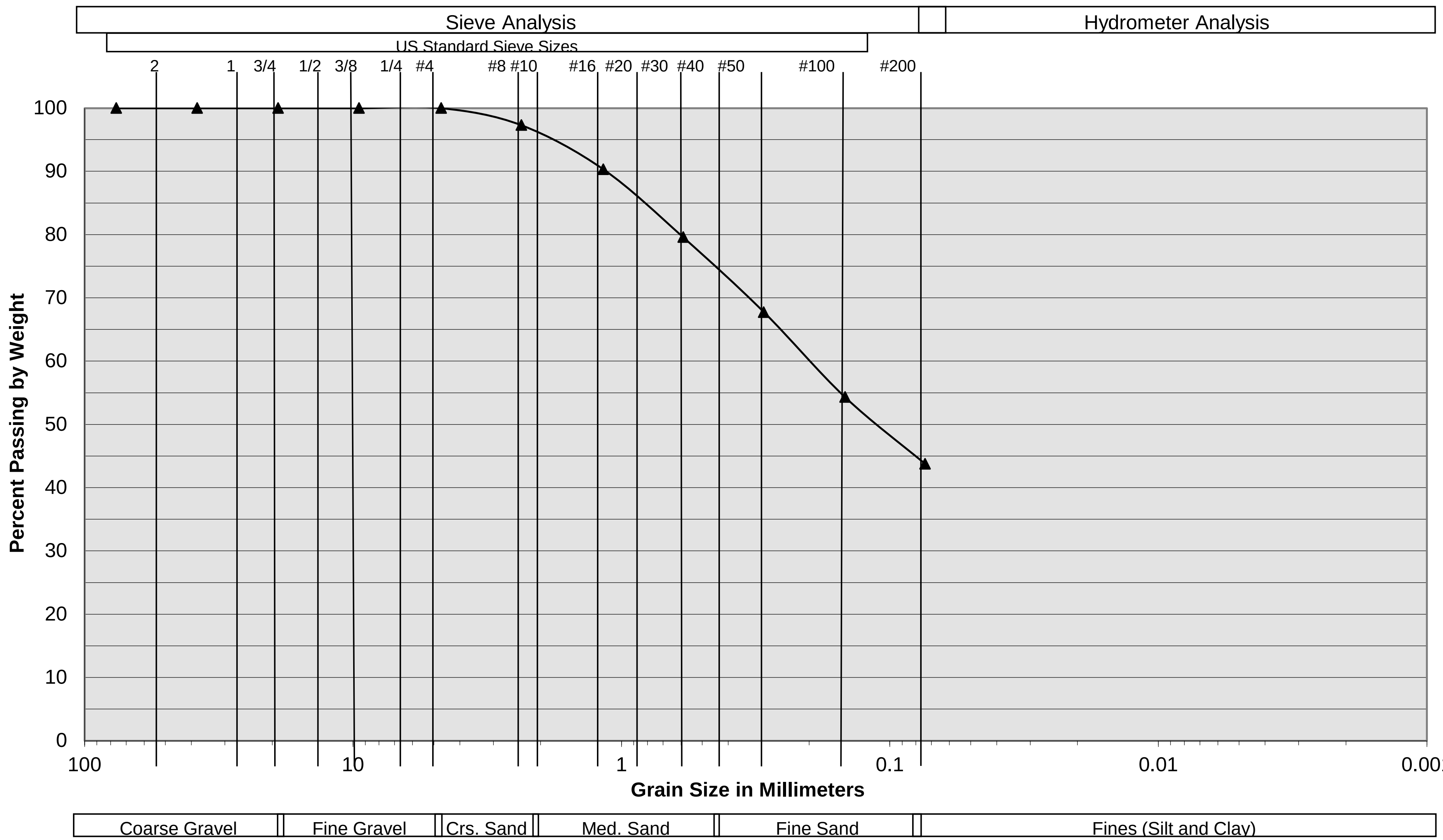


Sample Description	I-1 @ 8 to 9'
Soil Classification	Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay

First Sinclair Logistics Center
Perris, California
Project No. 22G122-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-2 @ 7.5'
Soil Classification	Brown fine to medium Sandy Silt to Silty fine to medium Sand, trace coarse Sand, trace Clay

First Sinclair Logistics Center
Perris, California
Project No. 22G122-2
PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

GEOTECHNICAL LEGEND

- PROPOSED BORING LOCATION
- PROPOSED INFILTRATION TEST LOCATION
- PREVIOUS BORING LOCATION (SCG PROJECT NO. 22G122-1)
- PREVIOUS INFILTRATION TEST LOCATION (SCG PROJECT NO. 22G122-2)
- PREVIOUS INFILTRATION TEST LOCATION (SCG PROJECT NO. 22G122-3)

PROPOSED BORING LOCATION PLAN

FIRST SINCLAIR LOGISTICS CENTER

PERRIS, CALIFORNIA

SCALE: 1" = 120'

DRAWN: XXX
CHKD: XXX

SCG PROJECT 22G122-4

PLATE 2

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

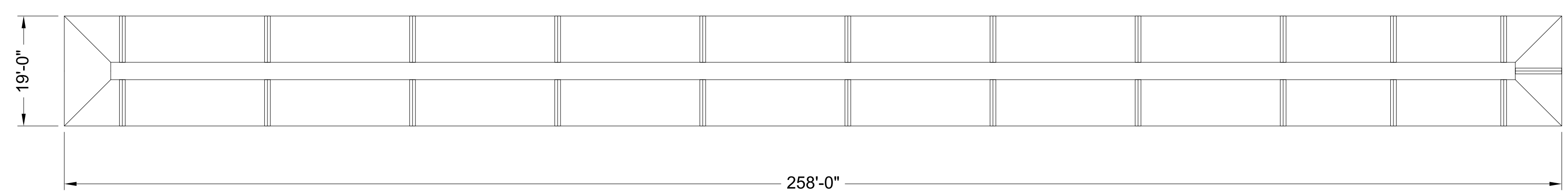
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 522 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 26,239 CF
- BACKFILL STORAGE VOLUME = 6,977 CF
- TOTAL STORAGE PROVIDED = 33,215 CF

PIPE DETAILS
- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

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



ASSEMBLY
SCALE: 1" = 30'

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

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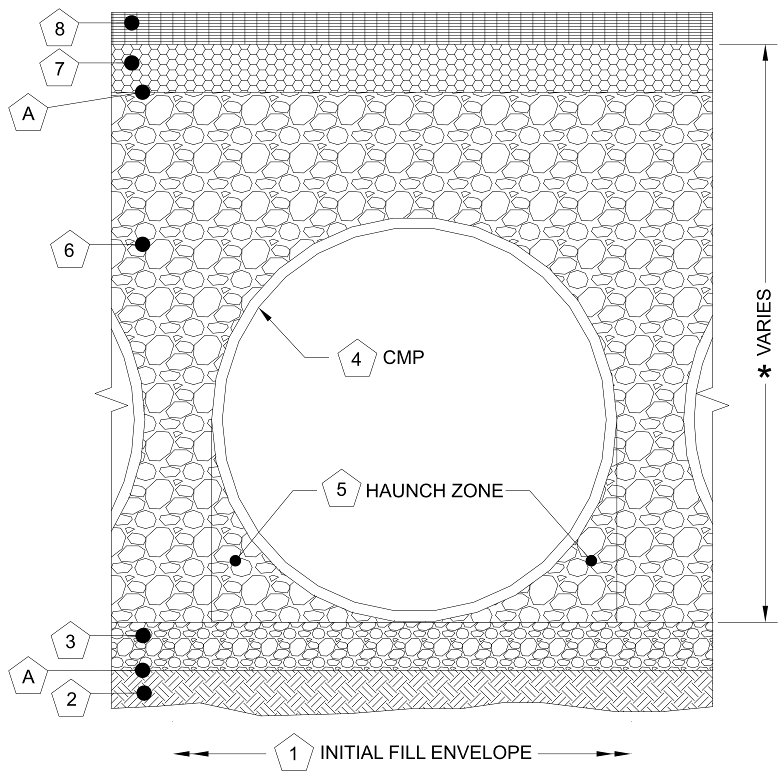
CONTECH® CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO21274 Sinclair St
Under Ground Chamber System - Water Quality
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13869	SEQ. No.: 21274	DATE: 9/14/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



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

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

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

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

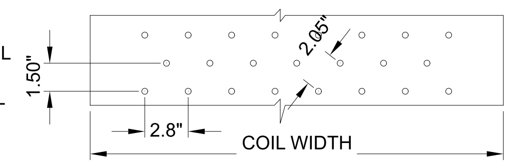
BACKFILL

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

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

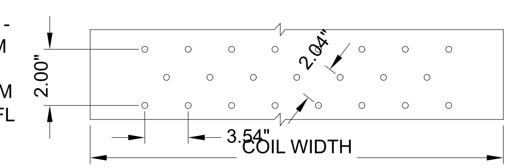
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



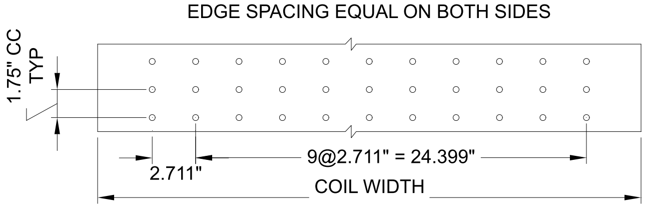
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY EDGE SPACING EQUAL ON BOTH SIDES



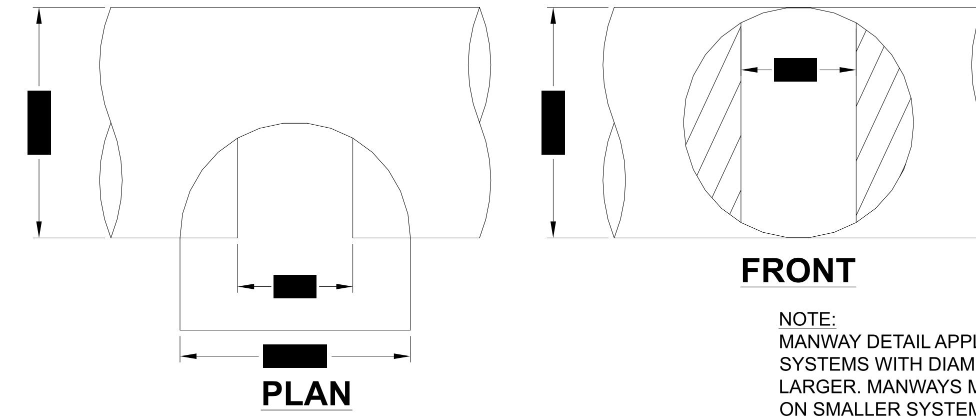
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

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

TYPICAL PERFORATION DETAIL

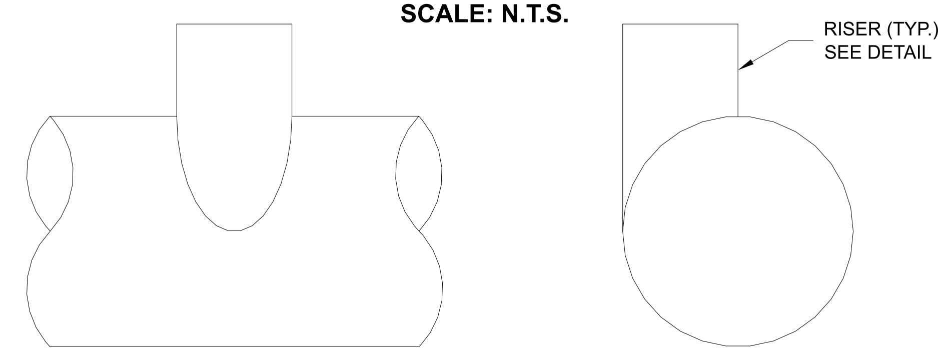
SCALE: N.T.S.



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

TYPICAL MANWAY DETAIL

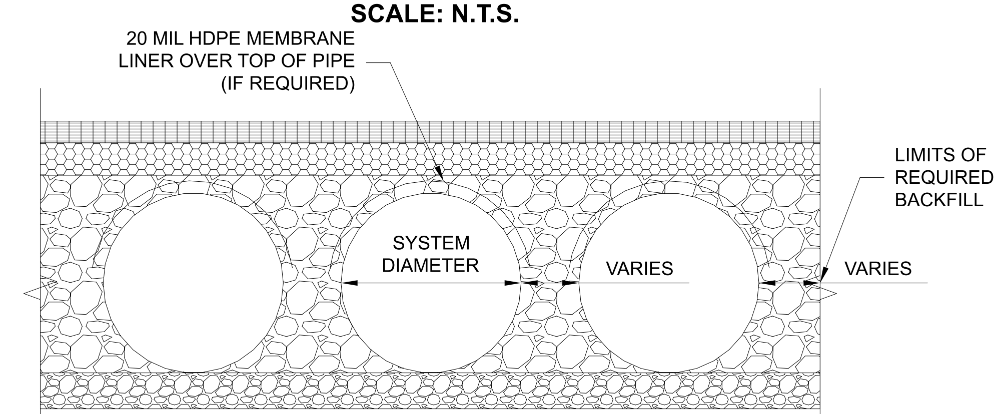
SCALE: N.T.S.



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

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

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

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CONTECH® CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO21274 Sinclair St
Under Ground Chamber System - Water Quality
Perris, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13869	21274	9/14/2022
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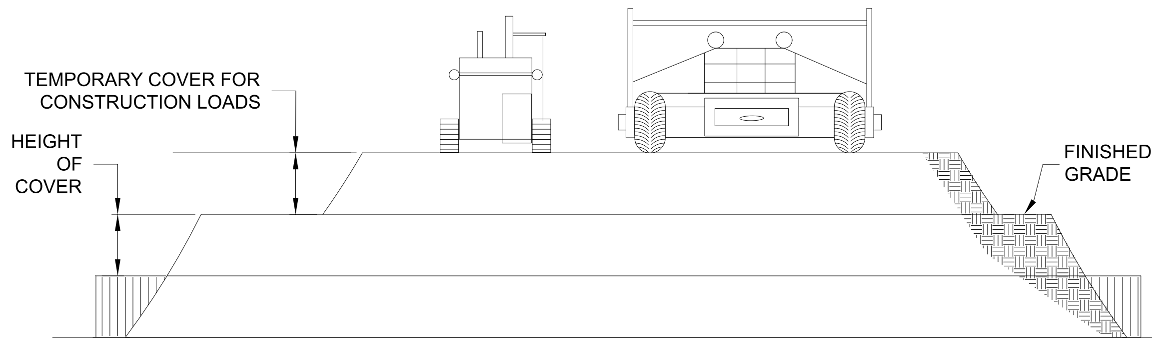
SHEET NO.:		1



CONSTRUCTION LOADS

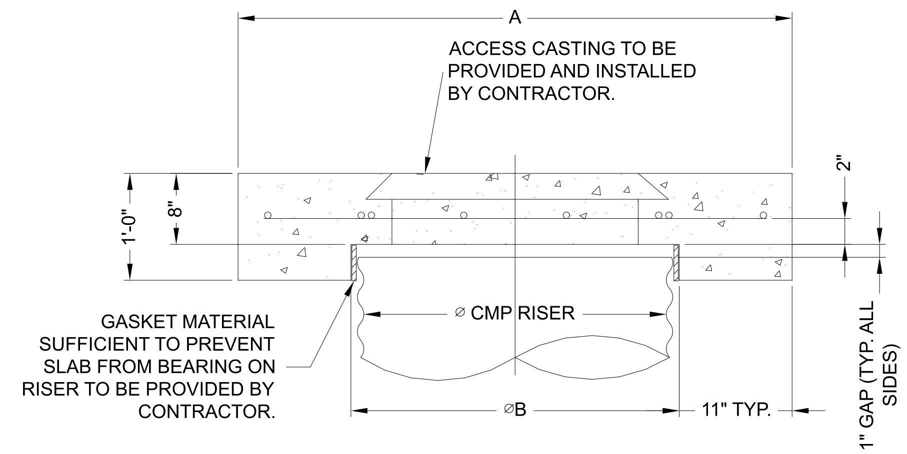
FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE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

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

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

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

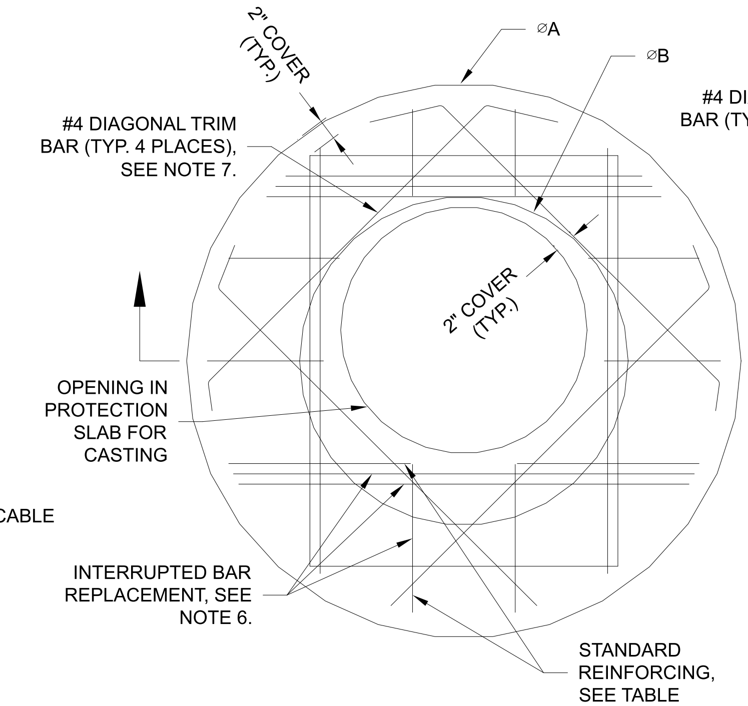


SECTION VIEW

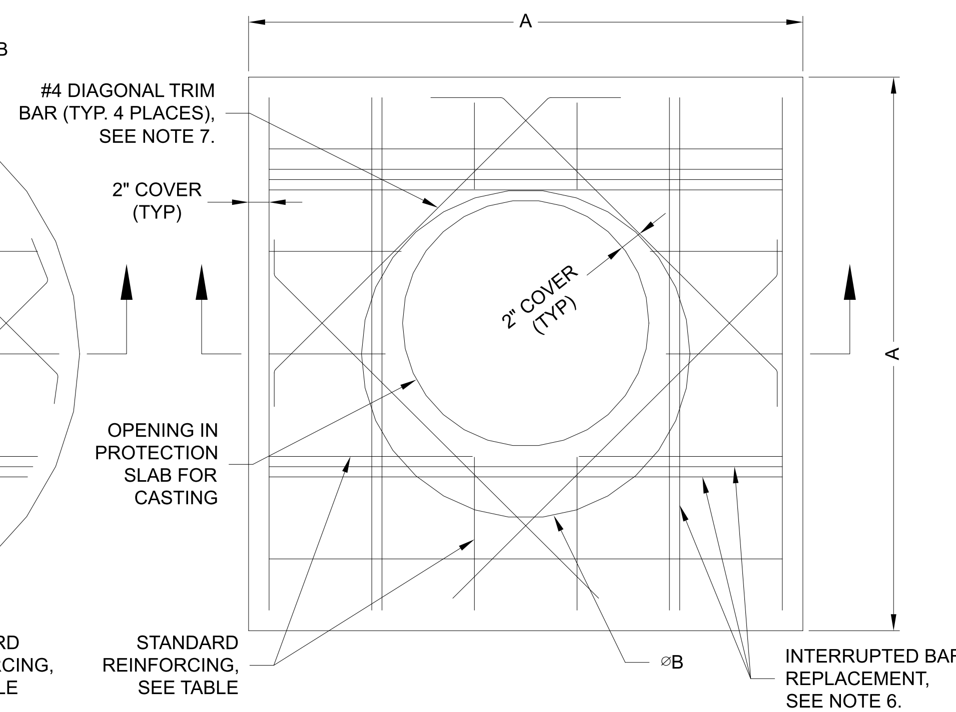
REINFORCING TABLE

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

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

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

ALUMINUM: AASHTO M-196 OR ASTM B-745

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

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

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

NOTES:

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

MANHOLE CAP DETAIL

SCALE: N.T.S.

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

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CONTECH CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO21274 Sinclair St
Under Ground Chamber System - Water Quality
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13869	SEQ. No.: 21274	DATE: 9/14/2022
DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.: 1		

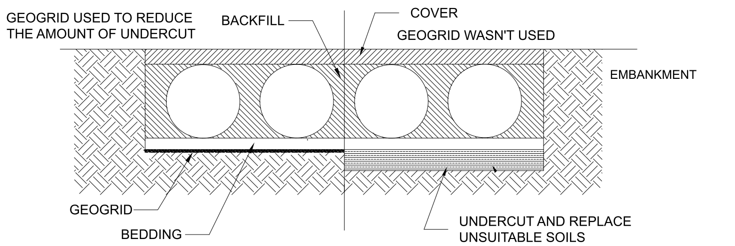
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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

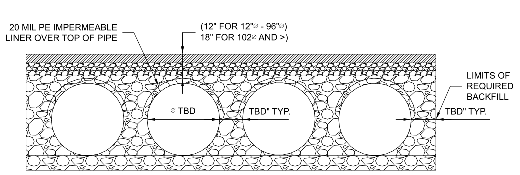


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

GEOMEMBRANE BARRIER

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

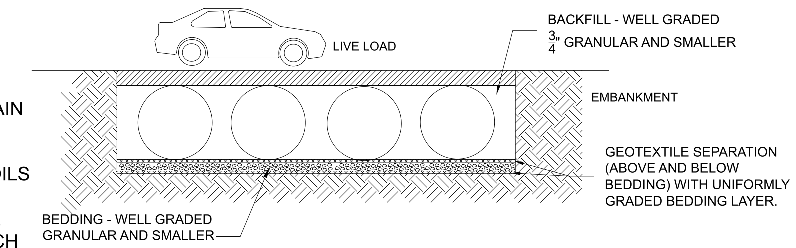
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

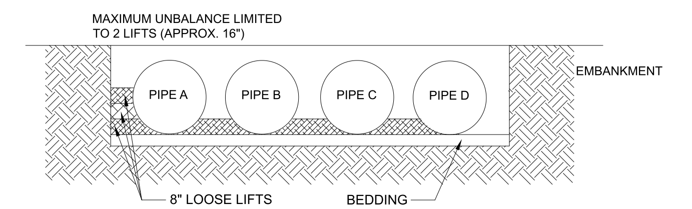
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



BACKFILL PLACEMENT

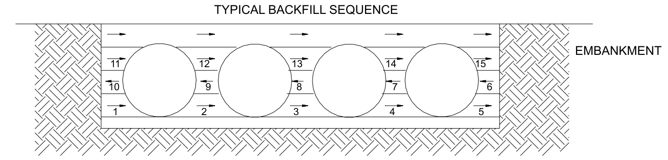
MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.



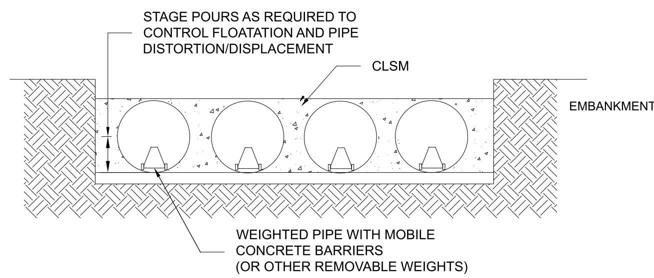
IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

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

TYPICAL BACKFILL SEQUENCE



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

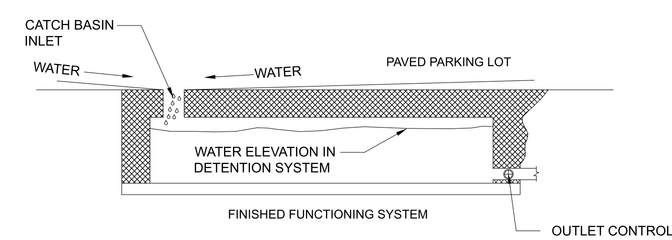


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

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

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

MAINTENANCE

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

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

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

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

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

DATE	REVISION DESCRIPTION	BY

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

CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO21274 Sinclair St
Under Ground Chamber System - Water Quality
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13869	SEQ. No.: 21274	DATE: 9/14/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 2,998 LF

STORAGE SUMMARY

- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 150,671 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 150,671 CF

PIPE DETAILS

- DIAMETER = 96"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS

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

ASSEMBLY

SCALE: 1" = 30'

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

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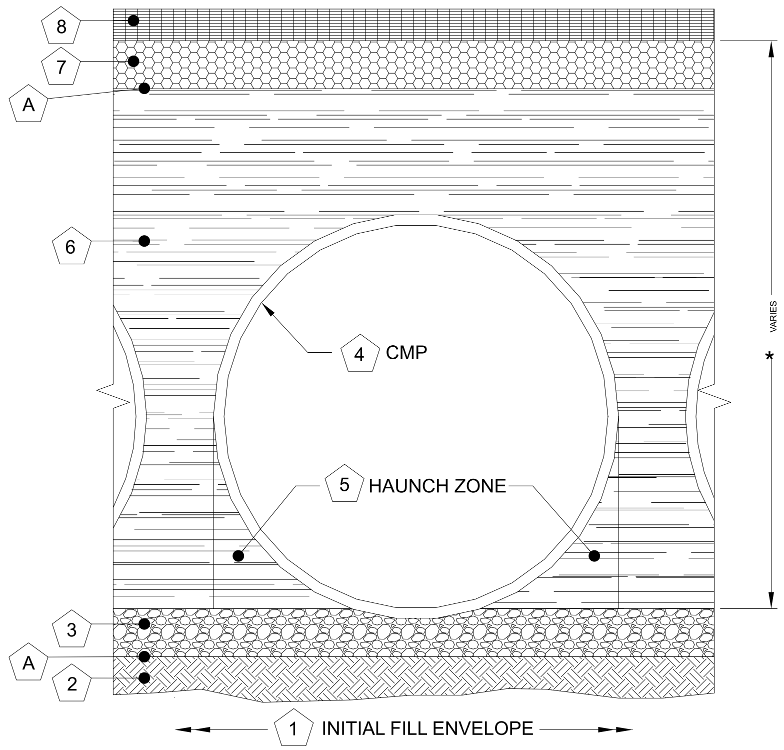
CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO21273 Sinclair St
Underground Chamber System
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13868	SEQ. No.: 21273	DATE: 9/14/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE

	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

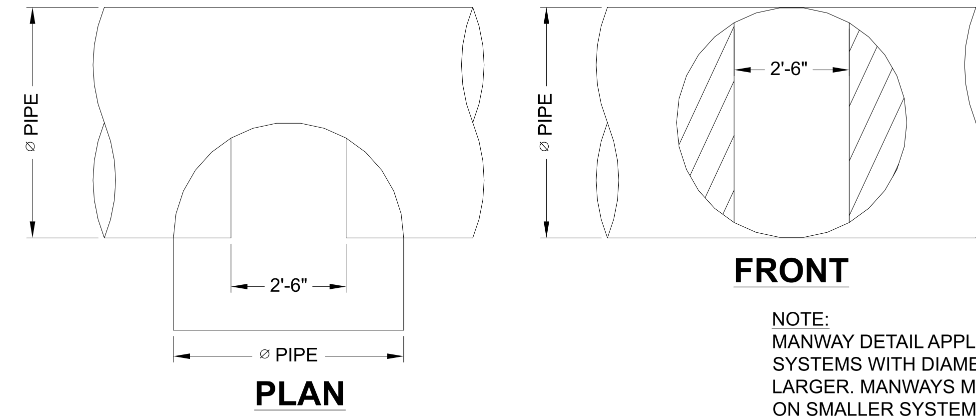
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

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

BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

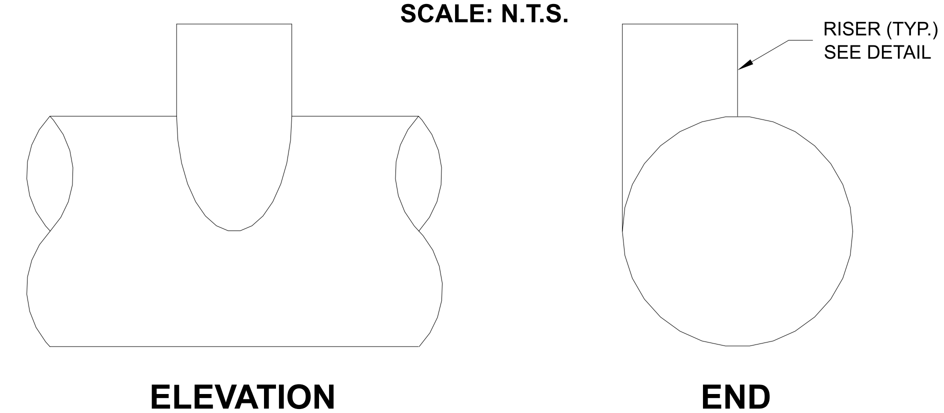
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



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

TYPICAL MANWAY DETAIL

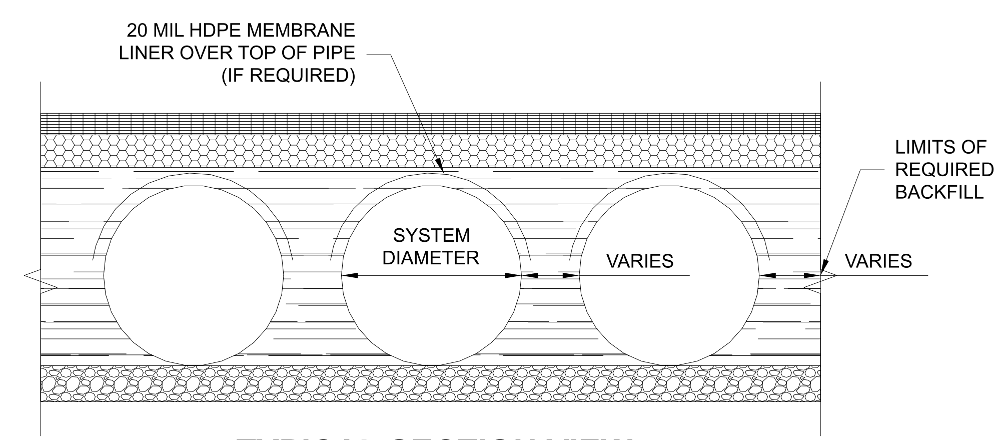
SCALE: N.T.S.



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

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

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

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CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO21273 Sinclair St
Underground Chamber System
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13868	SEQ. No.: 21273	DATE: 9/14/2022
DESIGNED: DYO	DRAWN: DYO	
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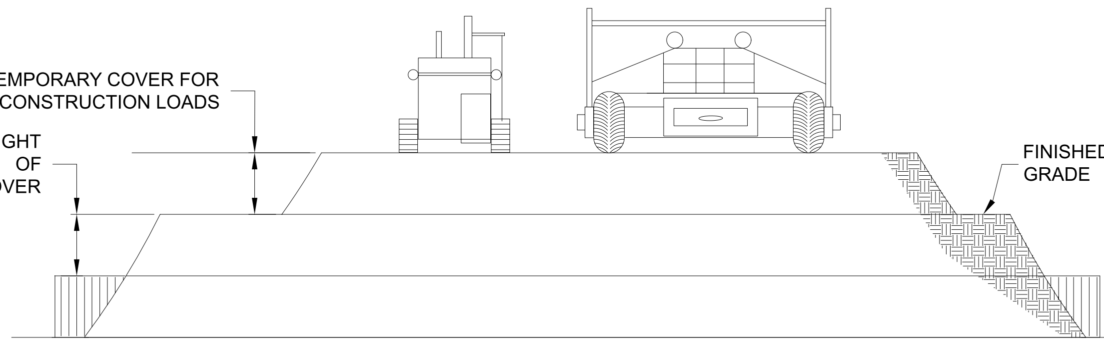
SHEET NO.: 1		



CONSTRUCTION LOADS

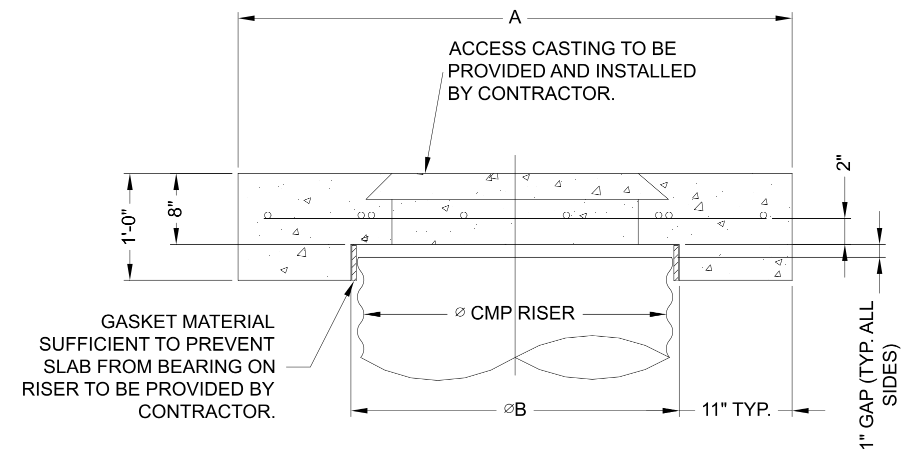
FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE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

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

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

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

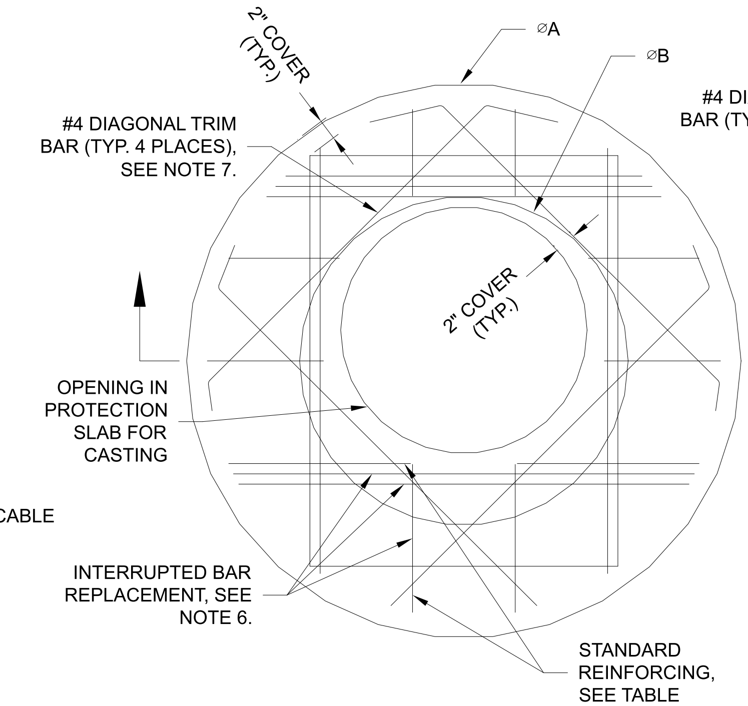


SECTION VIEW

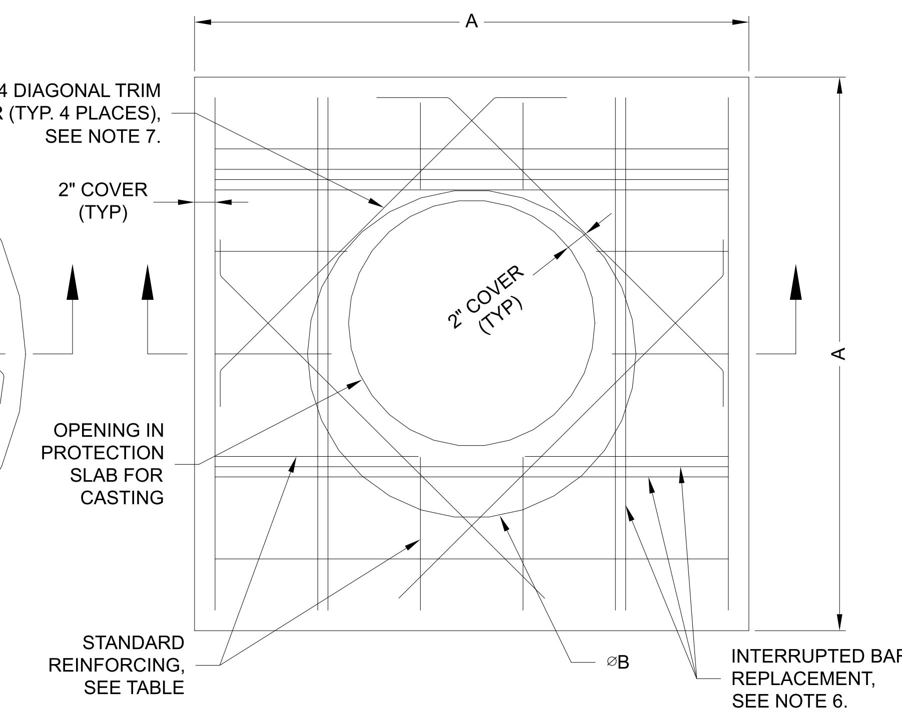
REINFORCING TABLE

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

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

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

ALUMINUM: AASHTO M-196 OR ASTM B-745

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

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

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

NOTES:

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

MANHOLE CAP DETAIL

SCALE: N.T.S.

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

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CONTECH CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO21273 Sinclair St
Underground Chamber System
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DETENTION SYSTEM

PROJECT No.: 13868	SEQ. No.: 21273	DATE: 9/14/2022
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SHEET NO.: 1		

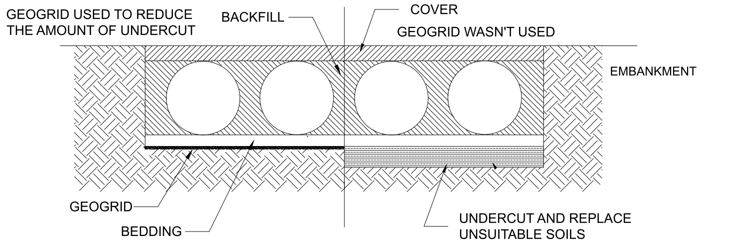
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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

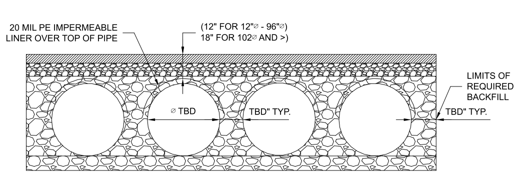


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

GEOMEMBRANE BARRIER

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

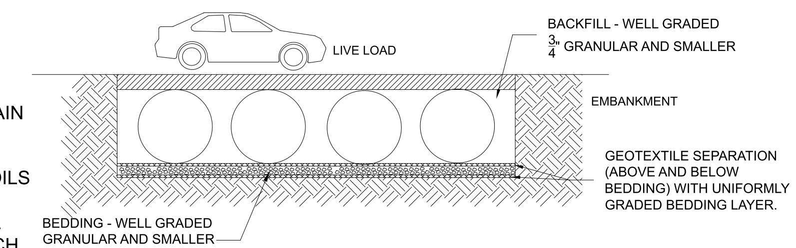
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

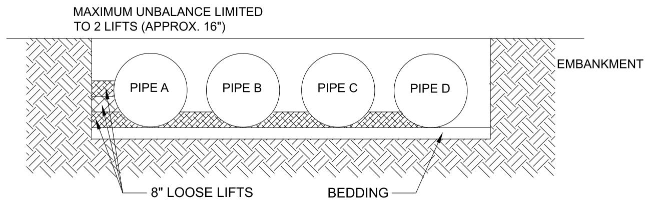
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



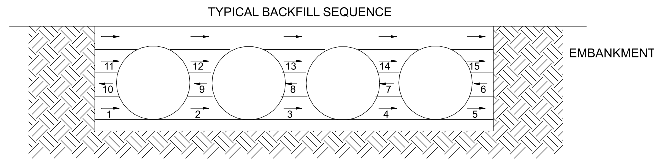
BACKFILL PLACEMENT

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

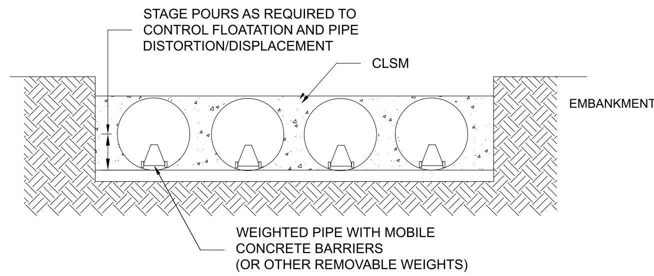


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

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



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

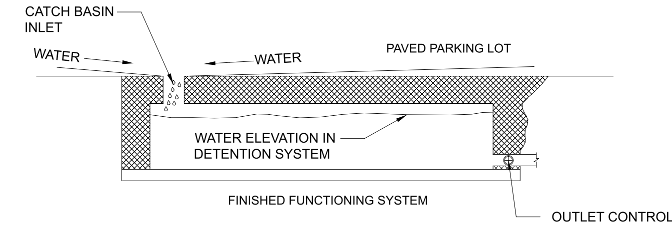


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

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

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

MAINTENANCE

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

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

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

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

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

DATE	REVISION DESCRIPTION	BY

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

CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO21273 Sinclair St
Underground Chamber System
Perris, CA
DETENTION SYSTEM

PROJECT No.: 13868	SEQ. No.: 21273	DATE: 9/14/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name FMCivil Date 9/15/2022
Designed by Hector Paez Case No
Company Project Number/Name 22-004 - 100 W Sinclair Street

BMP Identification

BMP NAME / ID Bioretention Basin & Underground Chambers

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.65 inches

Drainage Management Area Tabulation

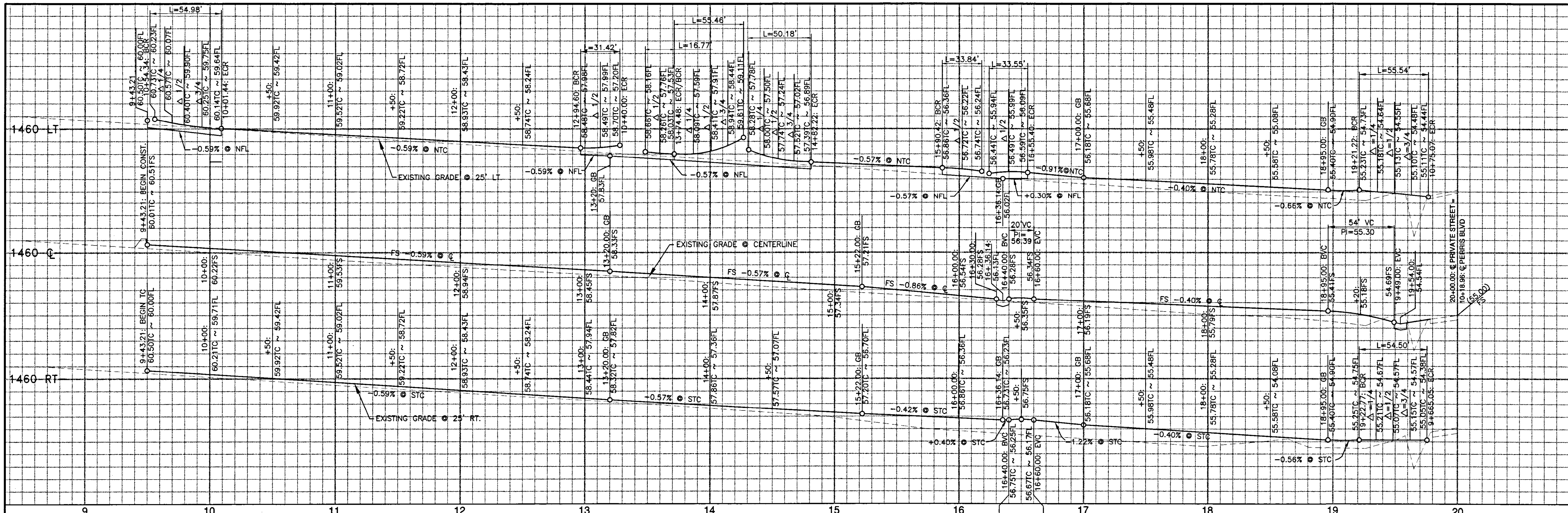
Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1	848338.1	Mixed Surface Types	0.941	0.79	672373			
	848338.1	Total			672373	0.65	36420.2	44587

Notes:

Calculation for Mixed Surface Type 100 W Sinclair Street

	Type	Fraction	Area		Runoff Coefficient
DMA 1	Landscaping	0.1	55789.9	5578.99	
	Roof	1	423223.99	423224	
	Concrete/Asphalt	1	369324.21	369324.2	0.940813
	Total		848338.10		



CURB AND CURVE DATA

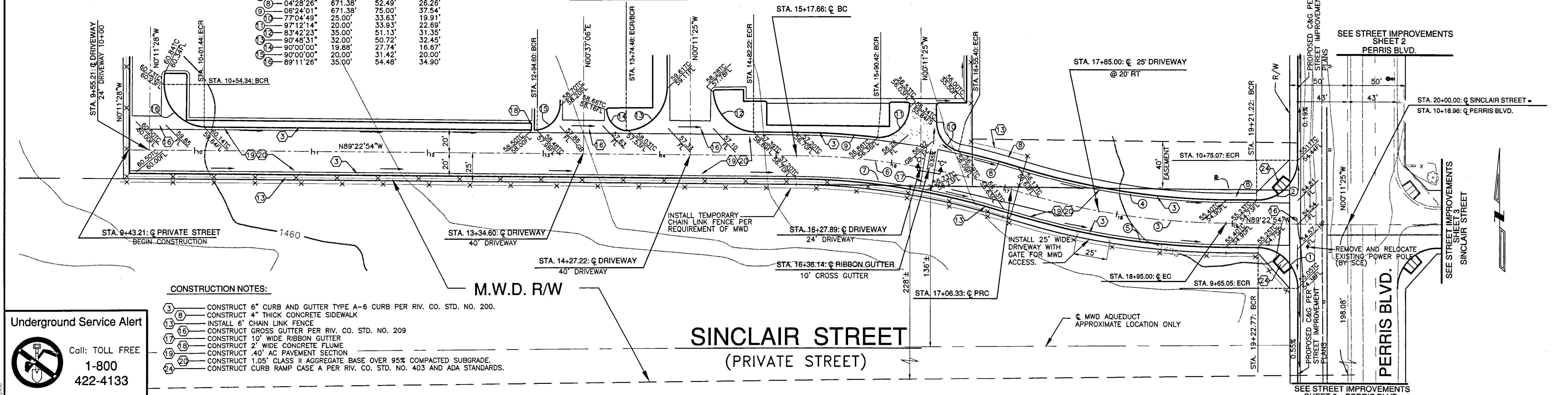
	Δ	R	L	T
1	89°11'29"	35.00'	54.48'	34.51'
2	90°48'31"	35.00'	55.47'	35.50'
3	16°35'44"	651.38'	188.67'	95.00'
4	16°35'44"	631.38'	182.88'	92.08'
5	16°35'44"	671.38'	194.46'	97.92'
6	16°35'44"	651.38'	188.67'	95.00'
7	16°35'44"	631.38'	182.88'	92.08'
8	04°28'26"	671.38'	52.49'	26.26'
9	06°24'01"	671.38'	75.00'	37.54'
10	77°04'49"	25.00'	33.63'	19.91'
11	97°12'14"	20.00'	33.93'	22.69'
12	83°42'23"	35.00'	51.13'	31.35'
13	90°48'31"	32.00'	50.72'	32.45'
14	90°00'00"	19.88'	27.74'	16.67'
15	90°00'00"	20.00'	31.42'	20.00'
16	89°11'26"	35.00'	54.48'	34.90'

SPECIAL NOTE TO CONTRACTOR:

THE CONTRACTOR SHALL NOTIFY MR. CHARLES POLING OF MWD OPERATIONS MAINTENANCE BRANCH, (909) 780-1511, EXT. 2826, AT LEAST TWO WORKING DAYS (MONDAY THROUGH THURSDAY) PRIOR TO ANY WORK IN MWD RIGHT-OF-WAY

NOTES:

1. FOR GENERAL NOTES SEE SHEET 1
2. FOR DETAILS AND SECTIONS SEE SHEET 8



CONSTRUCTION NOTES:

- (3) CONSTRUCT 6" CURB AND GUTTER TYPE A-6 CURB PER RIV. CO. STD. NO. 200.
- (8) CONSTRUCT 4" THICK CONCRETE SIDEWALK
- (13) INSTALL 6' CHAIN LINK FENCE
- (16) CONSTRUCT GROSS GUTTER PER RIV. CO. STD. NO. 209
- (17) CONSTRUCT 10' WIDE RIBBON GUTTER
- (18) CONSTRUCT 2' WIDE CONCRETE FLUME
- (19) CONSTRUCT .40' AC PAVEMENT SECTION
- (20) CONSTRUCT 1.05' CLASS II AGGREGATE BASE OVER 95% COMPACTED SUBGRADE.
- (24) CONSTRUCT CURB RAMP CASE A PER RIV. CO. STD. NO. 403 AND ADA STANDARDS.

Underground Service Alert

Call: TOLL FREE 1-800 422-4133

TWO WORKING DAYS BEFORE YOU DIG

DATE	BY	MARK		APPR.	DATE
ENGINEER			REVISIONS		COUNTY
DESIGNED BY		DRAWN BY		CHECKED BY	

RECOMMENDED FOR APPROVAL

DATE

CHECKED BY

DATE

SEAL CITY

SEAL: REGISTERED PROFESSIONAL ENGINEER ALLEN W. MARTIN No. C 38463 EXP. 3-31-01 CIVIL STATE OF CALIFORNIA

APPROVED BY DATE 5-23-00

CITY OF PERRIS

PREPARED UNDER THE SUPERVISION OF DATE 5-23-00

ALLEN W. MARTIN R.C.E. NO. 38463 EXP. DATE 3-31-01

SCALE 1" = 40'

DATE JANUARY 2000

Southland Engineering

2200 BUSINESS WAY, Ste. 100
RIVERSIDE, CA. 92501
(909) 788-8488

BENCHMARK SEE ABOVE

CITY OF PERRIS

DPR 99-0174

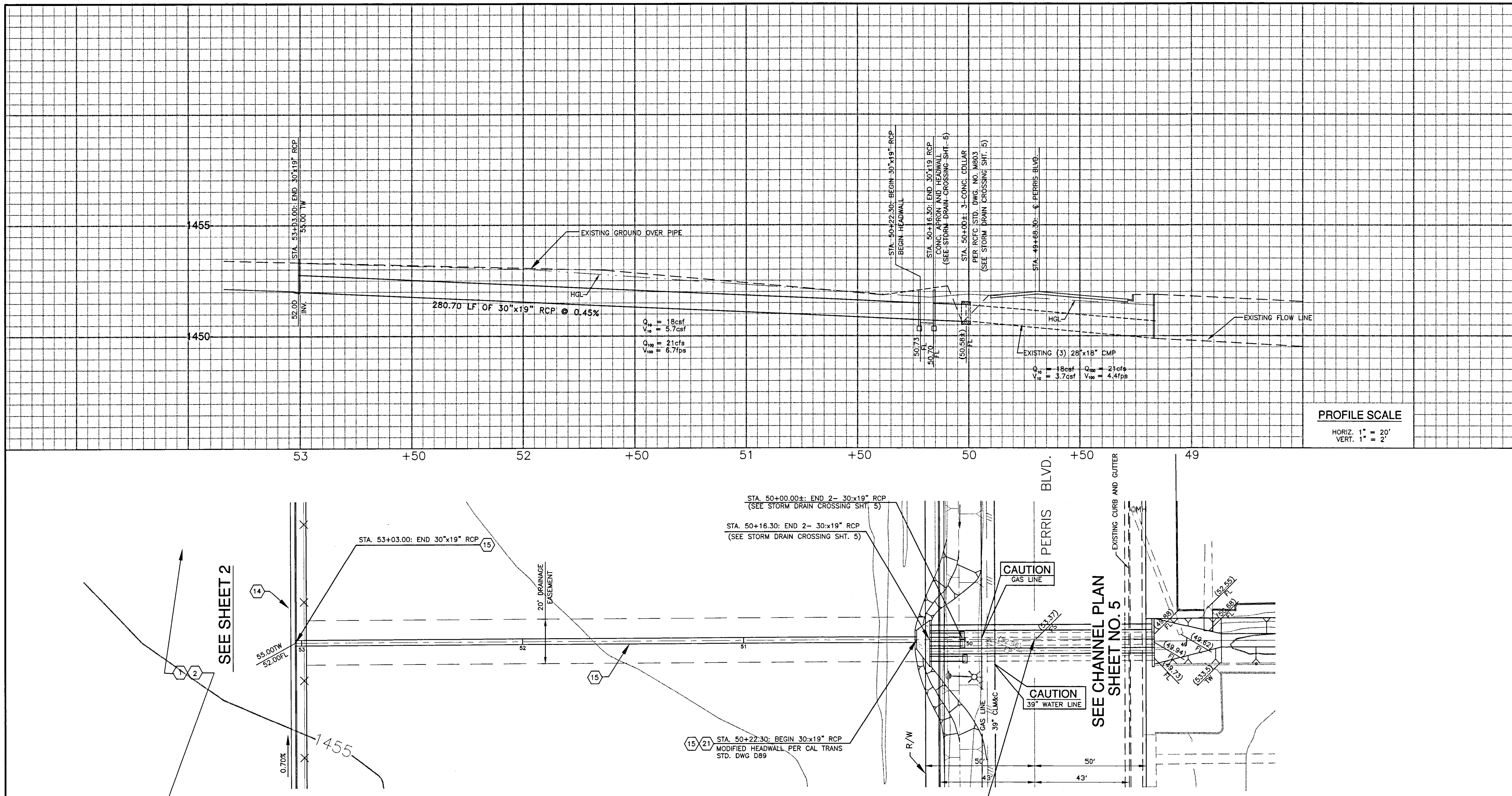
PRIVATE SINCLAIR STREET

FOR NATIONAL RV

W.O. 98110

SHEET NO. 4 OF 9 SHTS.

FILE NO.



CONSTRUCTION NOTES:

1. CONSTRUCT .25' AC PAVEMENT SECTION.
2. CONSTRUCT .5' CLASS II AGGREGATE BASE OVER 95% COMPACTED SUBGRADE.
14. CONSTRUCT CONCRETE RETAINING WALL PER STRUCTURAL ENGINEER AND SECTION "F-F"
15. INSTALL 30"x19" CMP STORM DRAIN PIPE CLASS IV, D=1500
21. CONSTRUCT MODIFIED HEADWALL PER CAL TRANS STD. DWG D89

Underground Service Alert

Call: TOLL FREE
1-800
422-4133

TWO WORKING DAYS BEFORE YOU DIG

DATE	BY	MARK		APPR.	DATE
ENGINEER			REVISIONS	COUNTY	
DESIGNED BY		DRAWN BY		CHECKED BY	

RECOMMENDED FOR APPROVAL
DATE
CHECKED BY
DATE

SEAL CITY

SEAL: REGISTERED PROFESSIONAL ENGINEER, ALLEN W. MARTIN, No. C 38463, EXP. 3-31-01, CIVIL, STATE OF CALIFORNIA

APPROVED BY DATE 5-2?-00
CITY OF PERRIS
PREPARED UNDER THE SUPERVISION OF DATE 5-23-00
ALLEN W. MARTIN
R.C.E. NO. 38463 EXP. DATE 3-31-01

Southland Engineering
2200 BUSINESS WAY, Ste. 100
RIVERSIDE, CA. 92501
(909) 788-8488

SCALE HORIZ. 1"=20' VERT. 1"=2'
DATE JANUARY 2000
BENCHMARK SEE SHEET 1

CITY OF PERRIS
DPR 99-0174
STORM DRAIN PLAN & PROFILE
FOR NATIONAL RV
W.O. 98110

SHEET NO. 5 OF 9 SHTS.
FILE NO.

P-190