Appendix C: Infiltration Report

NOT FOR BID

September 14, 2023
Project No. S168-185

STK ARCHITECTURE, INC.
Attention: Mr. Tony Finaldi
42095 Zevo Drive, Suite A15
Temecula, California 92590

Subject: Infiltration Testing Report
San Bernardino County Fire Station No. 305
8331 Caliente Road
Hesperia, California.

Reference: Geologic Hazards Evaluation/Geotechnical Investigation Report, San Bernardino County Fire Station No. 305, prepared by Inland Foundation Engineering, Inc., dated December 20, 2022, Project No. S168-185

Dear Mr. Finaldi:

This report presents the results of infiltration (percolation) testing performed for a stormwater infiltration system for the proposed County of San Bernardino (County) Fire Station 305 fire apparatus storage building.

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PROJECT DESCRIPTION

The proposed project will consist of the construction of a 70 ft. by 80 ft. metal building near the southeast corner of the site to be used for fire apparatus storage. An additional stormwater retention basin will be located northeast of the new building.

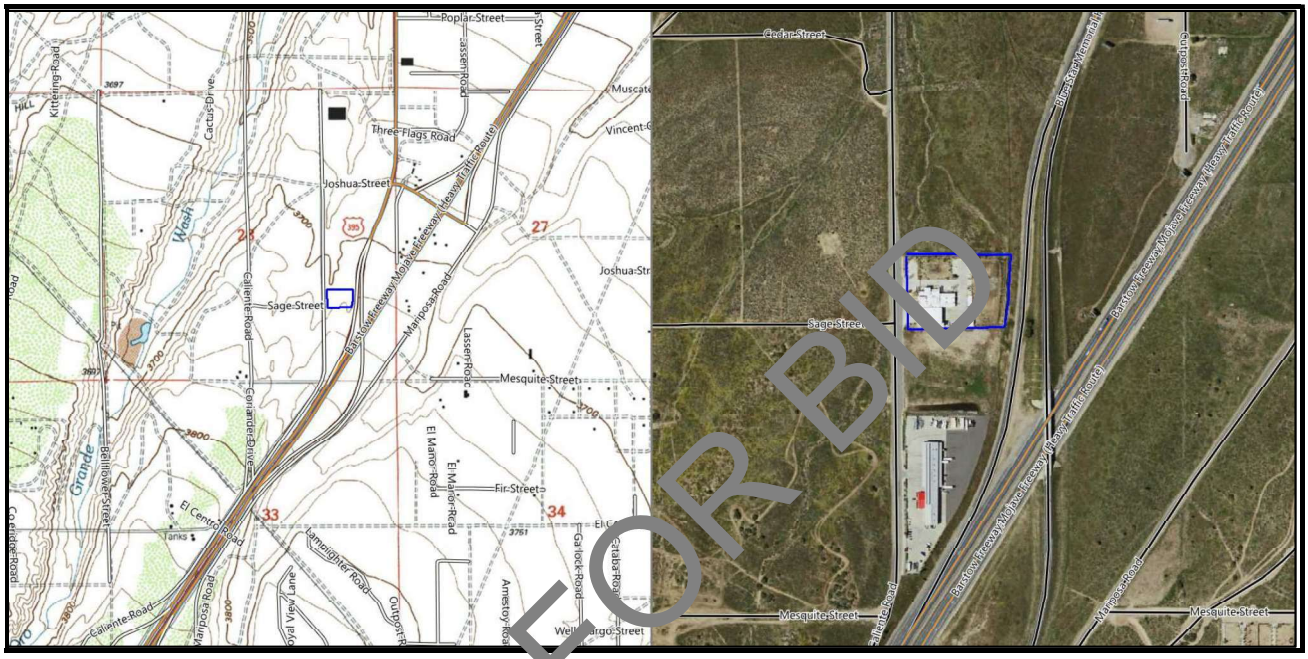
The proposed improvements are shown on the following site plan that was provided for our use during this study.

- Fire Station 305 Preliminary Site BMP Basin, prepared by STK Architects, Inc., undated

SITE DESCRIPTION

The ±3.5-acre fire station site is located within the southeastern portion of Section 28, Township 4 North, Range 5 West, S.B.B.&M. The rectangular-shaped parcel is located at 8331 Caliente Road in Hesperia, California. The Assessor Parcel Number for the property is 3039-351-09. The location of the fire station site is shown on Figure 1 below.

Figure 1: USGS Topographic Map, Baldy Mesa 7.5' Quadrangle and Aerial Photograph (2020)



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The existing Fire Station 305 is located on the westerly portion of the property, with concrete paving, landscaping and a stormwater retention basin. The easterly portion of the property is undeveloped. Topographically, the site is relatively flat and slopes slightly to the north. Vegetation on the east portion of the site consists of a sparse growth of weeds and grass.

SUBSURFACE CONDTIONS

One exploratory boring was drilled to a depth of 20 feet at the proposed basin location. A log of the boring is attached as Table 1, Exploratory Boring. The soil deposits encountered in the boring are generally comprised of clay (CL) and silty clay (CL-ML) to a depth of about 5 feet and clayey sand (SC) and silty sand (SM) below 5 feet. No groundwater was encountered.

Based on a review of pertinent groundwater data, groundwater is deeper than 800± feet in the general site vicinity. Based on the conditions encountered in the boring and historical groundwater data, there will be a minimum of 5 feet of permeable soil below

the infiltration facility and a minimum of 10 feet between the bottom of the infiltration facility and historical high groundwater levels.

INFILTRATION TESTING

Infiltration testing was conducted in general accordance with Appendix D of the Technical Guidance Document for Water Quality Management Plans, prepared by CDM Smith for the County of San Bernardino Areawide Stormwater Program (2013). The Riverside County Department of Environmental Health shallow percolation test procedure was used for this study. The percolation rates were converted to infiltration rates using the Porchet method.

Four percolation tests were performed at the locations shown on Figure 1. The test holes were drilled on August 28, 2023 to depths of approximately 48 to 84 inches below the existing ground surface. The test holes were approximately eight (8) inches in diameter. A two-inch thick layer of gravel was placed in the bottom of each test hole. The test holes were then pre-soaked by filling to ground surface (at least 5 times the hole radius).

The holes were presoaked on August 31, 2023. When testing commenced on September 1, 2023, all pre-soak water had percolated through the test holes. For tests P-03 and P-04, more than 6 inches of water seeped away twice consecutively in less than 25 minutes, which meets the sandy soil criteria. The tests were then run for an additional hour with measurements taken every 10 minutes. For tests P-01 and P-02, 6 inches of water did <u>not</u> seep away twice consecutively in less that 25 minutes; therefore, the tests were performed for a period of 6 hours, with the test holes refilled every 30 minutes. Copies of the field test sheets are attached.

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The measured percolation rates ranged from 1.5 to 120 minutes per inch (mpi) at depths ranging from 48 to 84 inches. Percolation test rates were converted to infiltration rates (I_c) using the Porchet method and the following equation:

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

Where:

r = Test Hole Radius (in.)
H_{avg} = Average Height of Water during Test Interval (in.)
ΔH = Change in Water Height during Test Interval (in.), and
Δt = Time Interval (in.)

The corresponding calculated infiltration rates (I_c) ranged from less than 0.1 to 3.4 inches per hour. These values <u>exclude</u> factors of safety.

The table below provides a summary of the test data with values for I_c:

Percolation Test No.	Percolation Rate (min/in)	Depth Below Existing Ground Surface (in)	Infiltration Rate (I_c) (in/hr)
P-01	120	60	<0.1
P-02	60	48	0.1
P-03	5.0	84	1.0
P-04	1.5	84	3.4

Based on the soil conditions encountered in the exploratory boring and the calculated infiltration rates, the basin bottom should extend to a depth of at least 6 feet bgs. At this depth, the soil is expected to consist of clayey sand, which has a much better infiltration rate than the overlying clay and silty clay. The recommended design infiltration rate at this depth is 1.0 inches per hour.

LIMITATIONS

This report was prepared for STK Architecture, Inc. for their use in the design of the proposed stormwater infiltration system at the subject location. This report may only be used by STK Architecture, Inc. for this purpose. The use of this report by parties or for other purposes is not authorized without written permission by Inland Foundation Engineering, Inc. Inland Foundation Engineering, Inc. will not be liable for any projects connected with the unauthorized use of this report.

The information in this report represents professional opinions that have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, either expressed or implied, is made as to the professional advice included in this report.

We appreciate being of service to you on this project. If you have any questions, please contact our office.

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Respectfully,
INLAND FOUNDATION ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER
ALLEN D. EVANS
No. 2060
GEOTECHNICAL
STATE OF CALIFORNIA

Allen D. Evans, P.E., G.E.
Principal

ADE:es
Distribution: Addressee

TABLE 1
SUBSURFACE SOIL CONDITIONS

Depth	Description of Material
0-2 ft.	Clay (CL), dark brown, moist, dense.
2-5 ft.	Silty clay (CL-ML), olive brown, moist.
5-12 ft.	Clayey Sand (SC), olive brown, moist, fine to medium.
12-20 ft.	Silty sand (SM), trace clay, olive brown, slightly moist, medium fine to coarse. Bottom of boring at 20 feet. No groundwater encountered.

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PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

Project: Fire Station No. 305	Project No.: S168-185	Date: 9/1/2023
Test Hole No.: P-01	Tested By: Floyd Collins	
Depth of Test Hole (D_T): 60"	USCS Soil Classification: CL	

Test Hole Dimensions (inches)	Length	Width
Diameter (if round)= 8"	Sides (if rectangular) =	

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6" (Y/N)
1	7:41	8:11	30	48	48 ¾	¾	N
2							
3							

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	$\Delta D=\Delta H$ Change in Water Level (in.)	Perc. Rate min./in.	H_{Avg} $(D_T - D_o) + (D_T - D_f) \div 2$	I_T $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$
1	7:41	8:11	30	48	48 ¾	¾	40	11.63	0.2
2	8:11	8:41	30	48	48 ½	½	60	11.75	0.2
3	8:42	9:12	30	48	48 ¼	¼	120	11.88	<0.1
4	9:12	9:42	30	48	48 ¼	¼	120	11.88	<0.1
5	9:42	10:12	30	48	48 ¼	¼	120	11.88	<0.1
6	10:13	10:43	30	48	48 ¼	¼	120	11.88	<0.1
7	10:43	11:13	30	48	48 ¼	¼	120	11.88	<0.1
8	11:13	11:43	30	48	48 ¼	¼	120	11.88	<0.1
9	11:43	12:13	30	48	48 ¼	¼	120	11.88	<0.1
10	12:13	12:43	30	48	48 ¼	¼	120	11.88	<0.1
11	12:44	1:14	30	48	48 ¼	¼	120	11.88	<0.1
12	1:14	1:44	30	48	48 ¼	¼	120	11.88	<0.1
13									
14									
15									

COMMENTS: Pre-soaked on 8/31/23. 1 ½ inch of water still in hole at beginning of test. Temp 64 to 76°F, sunny to partly cloudy during testing. Hole failed sandy soil criteria.

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PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

Project: Fire Station No. 305	**Project No.: S168-185**	**Date: 9/1/2023**
Test Hole No.: P-02	**Tested By: Floyd Collins**	
Depth of Test Hole (D_T): 48”	**USCS Soil Classification: SC**	

Test Hole Dimensions (inches)	**Length**	**Width**
Diameter (if round)= 8”	**Sides (if rectangular) =**	

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6” (Y/N)
1	7:45	8:15	30	24	25 ½	1 ¼	N
2							
3							

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25”.

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	$\Delta D=\Delta H$ Change in Water Level (in.)	Perc. Rate min./in.	H_{Avg} $(D_T - D_o) + (D_T - D_f) \div 2$	I_T $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$
1	7:45	8:15	30	24	25 ¼	1 ¼	24	23.38	0.2
2	8:15	8:45	30	24	25	1	30	23.50	0.2
3	8:46	9:16	30	24	24 ½	½	60	23.75	0.1
4	9:16	9:46	30	24	24 ½	½	60	23.75	0.1
5	9:46	10:16	30	24	24 ½	½	60	23.75	0.1
6	10:17	10:47	30	24	24 ½	½	60	23.75	0.1
7	10:47	11:17	30	24	24 ½	½	60	23.75	0.1
8	11:17	11:47	30	24	24 ½	½	60	23.75	0.1
9	11:47	12:17	30	24	24 ½	½	60	23.75	0.1
10	12:18	12:48	30	24	24 ½	½	60	23.75	0.1
11	12:48	1:18	30	24	24 ½	½	60	23.75	0.1
12	1:18	1:48	30	24	24 ½	½	60	23.75	0.1
13									
14									
15									

COMMENTS: Pre-soaked on 8/31/23. Hole dry the next day. Hole failed sandy soil criteria. Sunny to partly cloudy.

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PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

Project: Fire Station No. 305	Project No.: S168-185	Date: 9/1/2023
Test Hole No.: P-03	Tested By: Floyd Collins	
Depth of Test Hole (D_T): 84"	USCS Soil Classification: SM	

Test Hole Dimensions (inches)		Length	Width
Diameter (if round)= 8"	Sides (if rectangular) =		

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6" (Y/N)
1	7:48	8:13	25	60	67 ½	7 ½	Y
2	8:14	8:39	25	60	66 ½	6 ½	Y
3							

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	$\Delta D=\Delta H$ Change in Water Level (in.)	Perc. Rate min./in.	H_{Avg} $(D_T - D_o) + (D_T - D_f) \div 2$	I_T $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$
1	8:40	8:50	10	60	62 ½	2 ½	4	22.75	1.2
2	8:51	9:01	10	60	62 ¼	2 ¼	4.4	22.88	1.1
3	9:02	9:12	10	60	62 ¼	2 ¼	4.4	22.88	1.1
4	9:13	9:23	10	60	62	2	5	23.00	1.0
5	9:24	9:34	10	60	62	2	5	23.00	1.0
6	9:35	9:45	10	60	62	2	5	23.00	1.0
7									
8									
9									
10									
11									
12									
13									
14									
15									

COMMENTS: Pre-soaked on 8/31/23. Hole dry the next day. Temp 64 to 70°F during test. Sunny to partly cloudy. Hole met sandy soil criteria.

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PERCOLATION TEST DATA SHEET – INFILTRATION TESTING

Project: Fire Station No. 305	Project No.: S168-185	Date: 9/1/2023
Test Hole No.: P-04	Tested By: Floyd Collins	
Depth of Test Hole (D_T): 84"	USCS Soil Classification: SM	

Test Hole Dimensions (inches)		Length	Width
Diameter (if round)= 8"	Sides (if rectangular) =		

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6" (Y/N)
1	7:51	8:16	25	60	80 ½	20 ½	Y
2	8:18	8:43	25	60	80	20	Y
3							

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	$\Delta D=\Delta H$ Change in Water Level (in.)	Perc. Rate min./in.	H_{Avg} $(D_T - D_o) + (D_T - D_f) \div 2$	I_T $\frac{\Delta H\ 60r}{\Delta t(r+2H)_{Avg}}$
1	8:44	8:54	10	60	67 ½	7 ½	1.3	20.25	4.0
2	8:55	9:05	10	60	67 ½	7 ½	1.3	20.25	4.0
3	9:06	9:16	10	60	67	7	1.4	20.50	3.7
4	9:17	9:27	10	60	66 ½	6 ½	1.5	20.75	3.4
5	9:28	9:38	10	60	66 ½	6 ½	1.5	20.75	3.4
6	9:39	9:49	10	60	66 ½	6 ½	1.5	20.75	3.4
7									
8									
9									
10									
11									
12									
13									
14									
15									

COMMENTS: Pre-soaked on 8/31/23. Hole dry the next day. Temp 64 to 70°F during test. Sunny to partly cloudy. Hole met sandy soil criteria.

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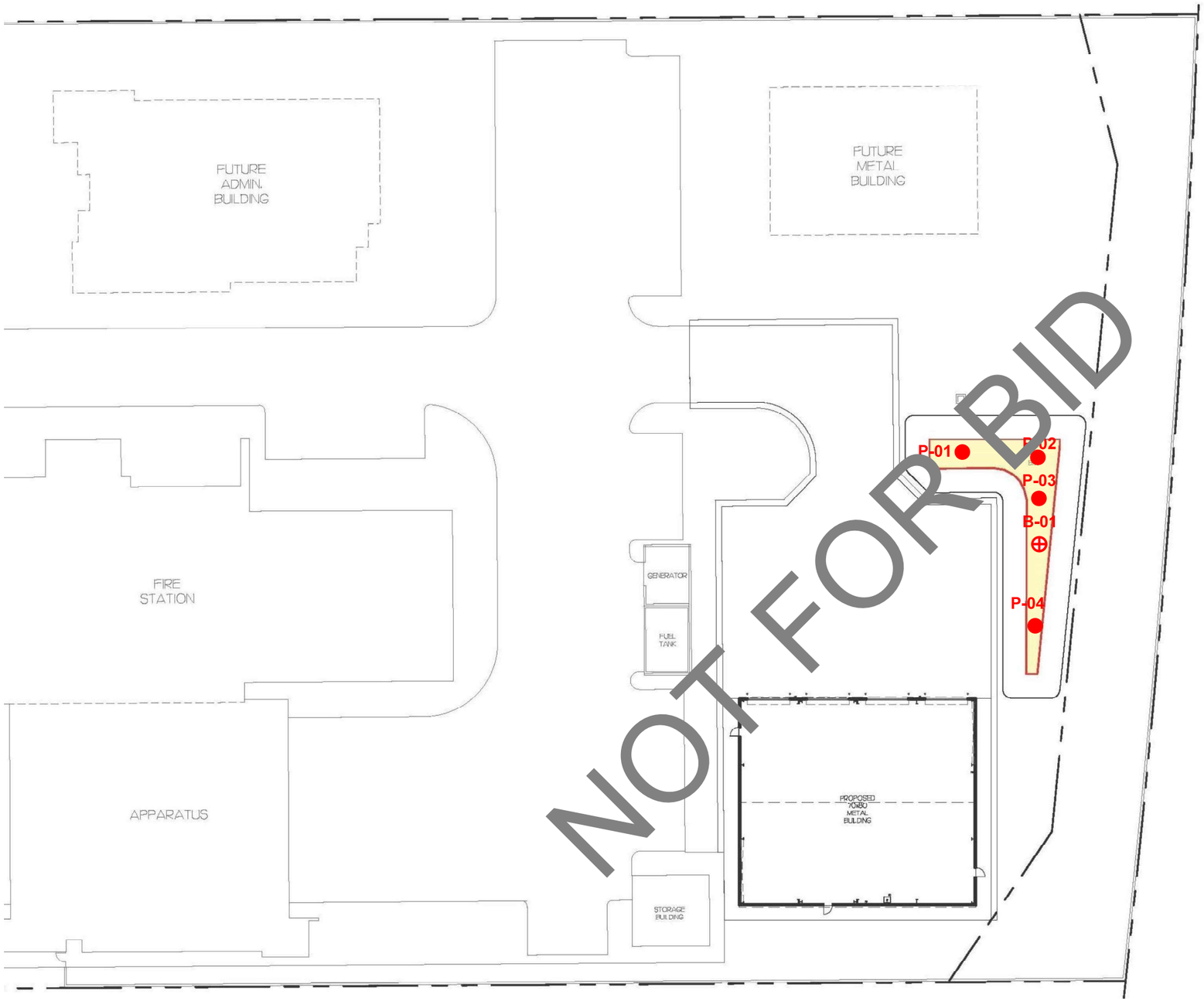
SITE PLAN

San Bernardino County Fire Station 305

8331 Caliente Road

Hesperia, California



Legend

- ● Approximate Location of Infiltration Test
- ⊕ Approximate Location of Exploratory Boring

N

Base Map: Prepared by STK Architecture, Inc, Fire Station 305 Preliminary Site BPM Basin

IFE Inland Foundation Engineering, Inc.

1310 S. Santa Fe Avenue, San Jacinto, CA 92583 | (951) 654-1555

Figure No. 2	STK Architecture, Inc. San Bernardino County Fire Station 305 8331 Caliente Road, Hesperia, CA	
	Drawn By: ES	Project No. S168-185
	1”=40’	Date: September 2023

Appendix D: NOAA14

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NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.4016°, Longitude: -117.403°
Elevation: 3720 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.092 (0.076-0.112)	0.129 (0.107-0.158)	0.179 (0.147-0.219)	0.220 (0.180-0.271)	0.276 (0.218-0.352)	0.320 (0.248-0.418)	0.366 (0.276-0.489)	0.413 (0.304-0.568)	0.479 (0.338-0.687)	0.531 (0.361-0.788)
10-min	0.132 (0.109-0.161)	0.185 (0.153-0.226)	0.256 (0.211-0.314)	0.315 (0.257-0.389)	0.396 (0.313-0.505)	0.459 (0.355-0.599)	0.524 (0.396-0.[illegible]01)	0.592 (0.[illegible]5-0.815)	0.687 (0.484-0.985)	0.761 (0.518-1.13)
15-min	0.159 (0.132-0.195)	0.224 (0.185-0.274)	0.310 (0.256-0.379)	0.381 (0.311-0.470)	0.478 (0.378-0.611)	0.555 (0.430-0.724)	0.634 (0.47[illegible].847)	0.[illegible]16 (0.[illegible]6-0.985)	0.830 (0.585-1.19)	0.921 (0.627-1.37)
30-min	0.240 (0.199-0.293)	0.337 (0.279-0.412)	0.466 (0.385-0.571)	0.573 (0.469-0.708)	0.720 (0.570-0.920)	0.835 (0.647-1.[illegible])	0.954 (0.[illegible]1.28)	1.08 (0.792-1.48)	1.25 (0.881-1.79)	1.39 (0.943-2.06)
60-min	0.345 (0.285-0.420)	0.484 (0.400-0.591)	0.670 (0.552-0.820)	0.823 (0.673-1.02)	1.03 (0.818-1.32)	1.20 (0.929-1.56)	1.3[illegible]-1.83)	1.55 (1.14-2.13)	1.80 (1.26-2.57)	1.99 (1.35-2.95)
2-hr	0.512 (0.424-0.625)	0.693 (0.573-0.847)	0.936 (0.772-1.15)	1.14 (0.932-1.41)	1.42 (1.12-1.82)	1.[illegible]5 (1.[illegible]-2.15)	1.88 (1.42-2.51)	2.13 (1.56-2.92)	2.47 (1.74-3.54)	2.75 (1.87-4.08)
3-hr	0.646 (0.535-0.789)	0.863 (0.714-1.05)	1.16 (0.953-1.42)	1.40 (1.15-1.73)	1.74 (1.[illegible]-2.23)	2.02 (1.[illegible]-2.63)	2.31 (1.74-3.08)	2.61 (1.92-3.59)	3.04 (2.14-4.36)	3.39 (2.30-5.03)
6-hr	0.932 (0.772-1.14)	1.23 (1.02-1.51)	1.64 (1.36-2.01)	1.99 (1.62-2.45)	2.47 (1.[illegible]-3.16)	2.86 (2.22-3.74)	3.28 (2.48-4.38)	3.72 (2.73-5.11)	4.34 (3.06-6.22)	4.85 (3.30-7.20)
12-hr	1.24 (1.02-1.51)	1.67 (1.38-2.04)	2.25 (1.86-2.76)	2.74 (2.25-3.[illegible])	3.44 (2.72-4.39)	4.00 (3.09-5.21)	4.58 (3.46-6.12)	5.21 (3.82-7.16)	6.09 (4.29-8.74)	6.82 (4.64-10.1)
24-hr	1.67 (1.48-1.92)	2.32 (2.05-2.67)	3.19 (2.82-3.69)	3.93 (3.44-4.58)	4.96 (4.21-5.98)	5.79 (4.81-7.12)	6.66 (5.40-8.40)	7.59 (5.98-9.83)	8.91 (6.73-12.0)	9.98 (7.29-13.9)
2-day	1.96 (1.74-2.26)	2.74 (2.43-3.16)	3.81 (3.36-4.40)	4.71 (4.1[illegible]-5.49)	6.01 (5.09-7.24)	7.06 (5.86-8.68)	8.17 (6.62-10.3)	9.37 (7.38-12.1)	11.1 (8.39-15.0)	12.5 (9.14-17.5)
3-day	2.10 (1.87-2.42)	2.95 (2.61-3.40)	[illegible].11 (3.[illegible]3-4.75)	5.11 (4.48-5.96)	6.55 (5.55-7.89)	7.73 (6.41-9.50)	8.99 (7.28-11.3)	10.4 (8.16-13.4)	12.3 (9.32-16.6)	14.0 (10.2-19.5)
4-day	2.27 (2.01-2.61)	3.18 (2.82-3.67)	4.[illegible]5 (3.[illegible]3-5.[illegible])	5.54 (4.85-6.45)	7.12 (6.03-8.57)	8.41 (6.98-10.3)	9.80 (7.94-12.3)	11.3 (8.91-14.6)	13.5 (10.2-18.2)	15.3 (11.2-21.4)
7-day	2.55 (2.26-2.93)	3.5[illegible] (3.16-4.1[illegible])	[illegible]8 (4.40-5.76)	6.20 (5.43-7.23)	7.97 (6.75-9.60)	9.41 (7.81-11.6)	11.0 (8.88-13.8)	12.7 (9.97-16.4)	15.1 (11.4-20.4)	17.1 (12.5-23.9)
10-day	2.72 (2.41-3.13)	3.81 (3.37-4.39)	5.31 (4.69-6.14)	6.61 (5.79-7.70)	8.48 (7.19-10.2)	10.0 (8.32-12.3)	11.7 (9.45-14.7)	13.5 (10.6-17.4)	16.1 (12.2-21.7)	18.2 (13.3-25.5)
20-day	3.24 (2.87-3.73)	4.54 (4.02-5.24)	6.34 (5.60-7.33)	7.90 (6.92-9.20)	10.1 (8.59-12.2)	12.0 (9.95-14.7)	14.0 (11.3-17.6)	16.1 (12.7-20.9)	19.3 (14.6-26.1)	21.9 (16.0-30.6)
30-day	3.82 (3.39-4.40)	5.33 (4.72-6.15)	7.43 (6.56-8.58)	9.24 (8.09-10.8)	11.9 (10.0-14.3)	14.0 (11.6-17.2)	16.3 (13.2-20.6)	18.9 (14.9-24.5)	22.6 (17.1-30.5)	25.8 (18.8-36.0)
45-day	4.56 (4.04-5.25)	6.30 (5.57-7.26)	8.70 (7.68-10.1)	10.8 (9.44-12.6)	13.8 (11.7-16.6)	16.3 (13.5-20.0)	19.0 (15.4-23.9)	22.0 (17.3-28.5)	26.4 (19.9-35.6)	30.1 (22.0-42.0)
60-day	5.23 (4.64-6.02)	7.10 (6.28-8.18)	9.70 (8.56-11.2)	11.9 (10.5-13.9)	15.2 (12.9-18.3)	17.9 (14.9-22.1)	20.9 (16.9-26.3)	24.2 (19.0-31.3)	29.0 (21.9-39.2)	33.1 (24.2-46.3)

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

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

Please refer to NOAA Atlas 14 document for more information.

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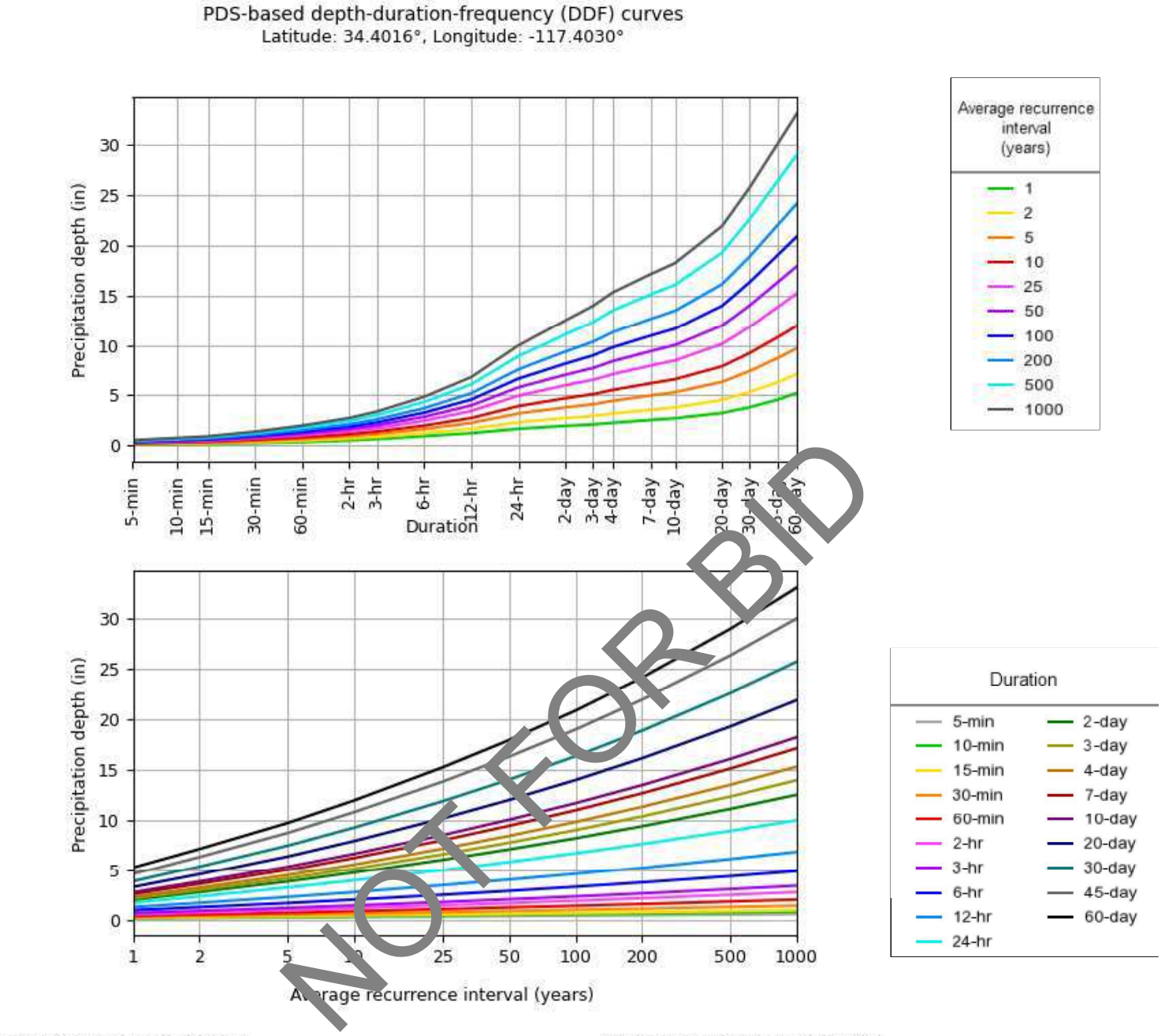
PF graphical



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NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Sep 20 18:14:17 2023

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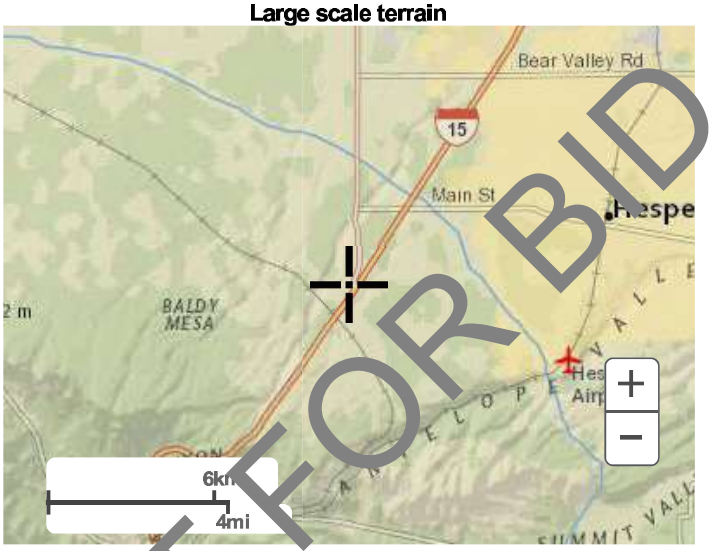
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map

Large scale aerial

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Appendix E: Figure C-3, C-6 and D-1

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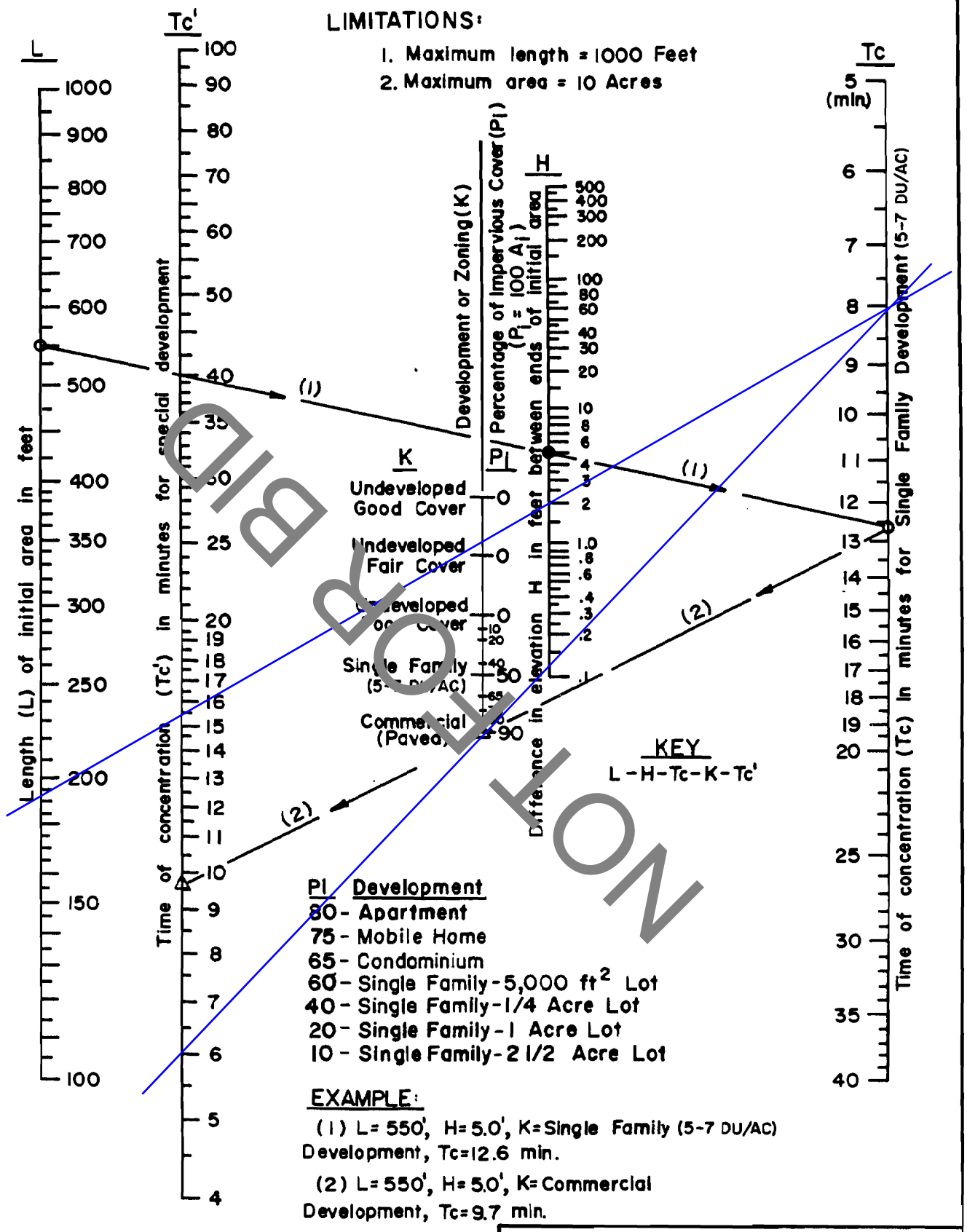
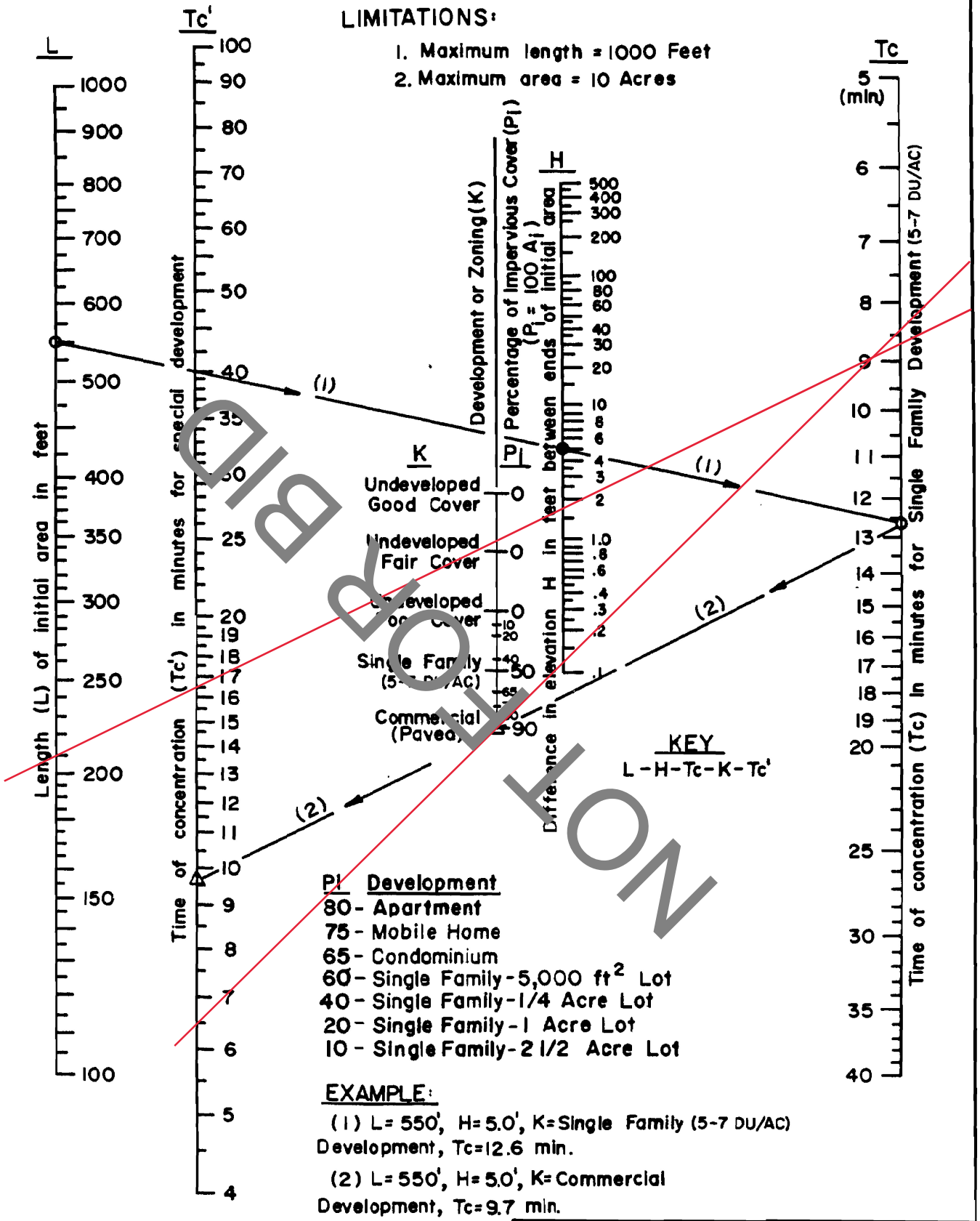


FOR BID

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

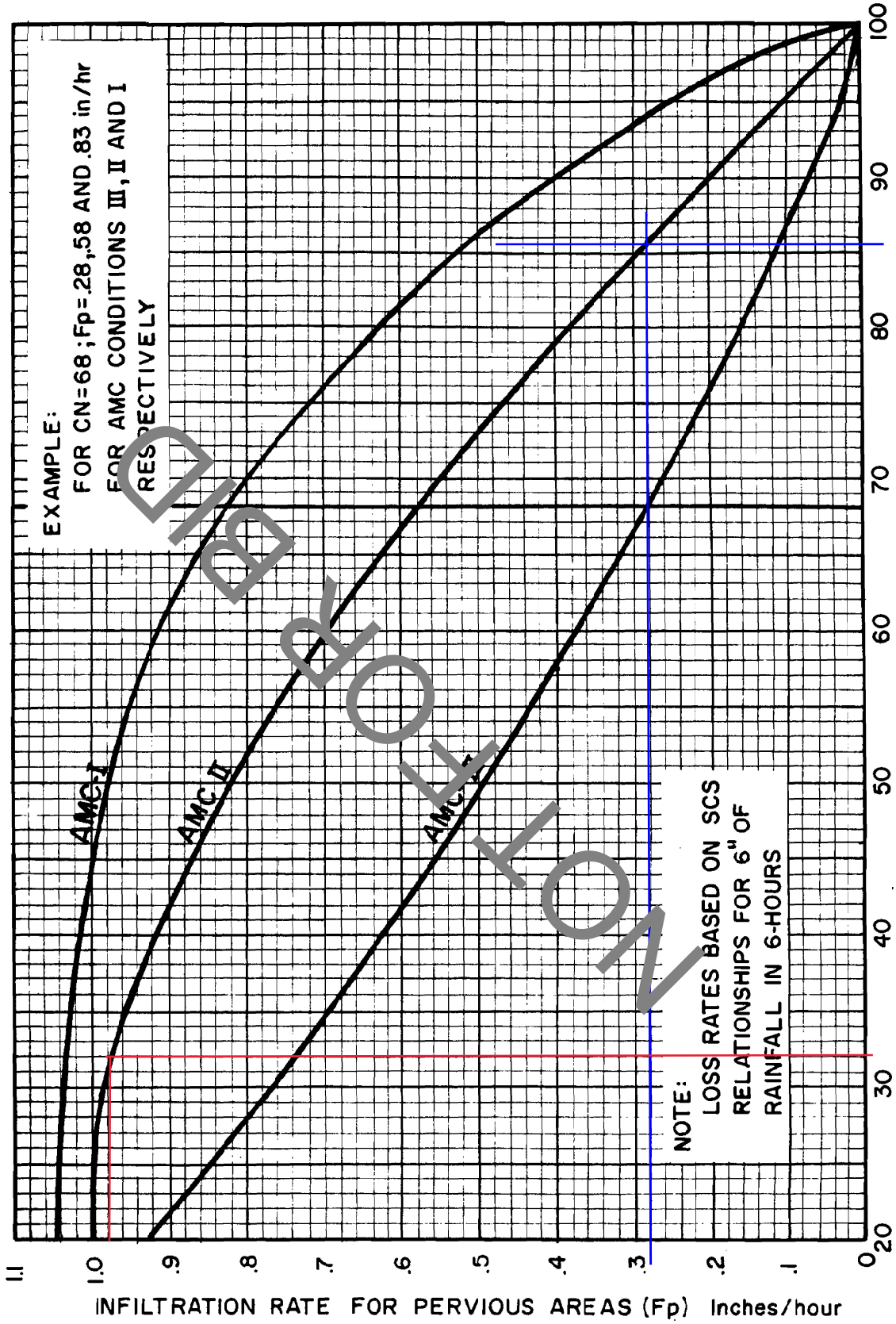


PROPOSITION

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1



DRAFT

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS SCS CURVE NUMBERS

POST-DEVELOPMENT CONDITION
PRE-DEVELOOPMENT CONDITION

Appendix F: FEMA Panel

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National Flood Hazard Layer FIRMette

FEMA

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/15/2023 at 10:59 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix F: Effluent pump

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STA-RITE® ST.E.P Plus Series

4" high-head multi-stage submersible effluent pumps

The STEP Plus 4" submersible filtered effluent pumps in 10, 20, 30 and 50 GPM models offer dependable performance and value for high pressure filtered effluent applications.

These STEP Plus pumps will handle "dry run" conditions.

The 10, 20, 30 and 50 GPM are industry standard 3-3/4" in diameter.

APPLICATIONS

Filtered Effluent... for residential, commercial, and agricultural use.

SPECIFICATIONS

Shell – Stainless steel

Discharge –
10, 20 and 30 GPM models: fiberglass-reinforced thermoplastic; 50 GPM models: stainless steel

Discharge Bearing – Nylatron®

Impellers – Engineered composite

Diffusers – Engineered composite

Suction Caps – Engineered composite with stainless steel wear ring

Thrust Pads – Proprietary spec.

Shaft and coupling – Stainless steel 300 grade

Intake – Engineered composite

Intake Screen – Polypropylene

Jacketed Cord – 600 Volt "SOOW" or 300 Volt "SJOW" jacketed 10' leads (2-wire with ground); optional 20', 30', 50' and 100' lengths available

FEATURES

Proven "Floating Impeller" Staging System – Incorporates 1st-in-class performance, sand handling and thrust management staging system with the industry exclusive "dry-run" design element. Reinforced engineered composites and stainless steel, offering high resistance to corrosion and abrasion.

Discharge – Tested-tough, fiberglass-reinforced thermoplastic, with proven internal check valve. Large wrench flats and rope hole.

Shell – Stainless steel pump shell offers high corrosion resistance.

Shaft – Hexagonal 3/8", 300-grade stainless steel pump shaft; offers generous impeller drive surfaces.

Shaft Bearing – Exclusive self-lubricating Nylatron bearing resists wear surface from sand.

Motor Bracket – Tested-tough, fiberglass-reinforced thermoplastic; incorporates an integral suction screen.

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In order to provide the best products possible, specifications are subject to change.

STA-RITE® ST.E.P Plus Series

4" high-head multi-stage submersible effluent pumps

ORDERING INFORMATION

CATALOG NUMBER	HP	STAGES	MAX. LOAD AMPS	VOLTS	PHASE/ CYCLES	CORD LENGTH	PUMP END LENGTH	PUMP + MOTOR LENGTH
STEP10	1/2	7	12.0	115	1/60	10'	13"	21-1/2"
STEP10X100FT-05121	1/2	7	12.0	115	1/60	100'	13"	21-1/2"
STEP10X30FT	1/2	7	12.0	115	1/60	30'	13"	21-1/2"
STEP10X50FT	1/2	7	12.0	115	1/60	50'	13"	21-1/2"
STEP20	1/2	5	12.0	115	1/60	10'	13-1/4"	22-1/4"
STEP20X30FT	1/2	5	12.0	115	1/60	30'	13-1/4"	22-1/4"
STEP20X50FT	1/2	5	12.0	115	1/60	50'	13-1/4"	22-1/4"
STEP30-05121	1/2	3	9.5	115	1/60	10'	11-1/2"	22-1/2"
STEP30X30-05121	1/2	3	12.0	115	1/60	30'	11-1/2"	22-1/2"
STEP30X50-05121	1/2	3	12.0	115	1/60	50'	11-1/2"	22-1/2"
STEP30-05221	1/2	3	4.7	230	1/60	10'	11-1/2"	22-1/2"
STEP30X100-05221	1/2	3	4.7	230	1/60	100'	11-1/2"	22-1/2"
STEP30X30-05221	1/2	3	4.7	230	1/60	30'	11-1/2"	22-1/2"
STEP30X50-05221	1/2	3	4.7	230	1/60	50'	11-1/2"	22-1/2"
STEP30-10221	1	5	9.1	230	1/60	10'	14"	27-1/2"
STEP30X100-10221	1	5	9.1	230	1/60	100'	14"	27-1/2"
STEP30X30-10221	1	5	9.1	230	1/60	30'	14"	27-1/2"
STEP30X50-10221	1	5	9.1	230	1/60	50'	14"	27-1/2"
STEP30-15221	1-1/2	6	11.0	230	1/60	10'	15-1/4"	30-1/4"
STEP30X100-15221	1-1/2	6	11.0	230	1/60	100'	15-1/4"	30-1/4"
STEP30X30-15221	1-1/2	6	11.0	230	1/60	30'	15-1/4"	30-1/4"
STEP30X50-15221	1-1/2	6	11.0	230	1/60	50'	15-1/4"	30-1/4"
STEP50-05121	1/2	2	9.1	115	1/60	10'	11-1/ 4"	21-1/ 2"
STEP50-05221	1/2	2	9.1	230	1/60	10'	11-1/ 4"	21-1/ 2"
STEP50-10221	1	3	9.1	230	1/60	10'	13-1/4"	26-3/4"
STEP50X100FT-10221	1	3	9.1	230	1/60	100'	13-1/4"	26-3/4"
STEP50X30FT-10221	1	3	9.1	230	1/60	30'	13-1/4"	26-3/4"
STEP50X50FT-10221	1	3	9.1	230	1/60	50'	13-1/4"	26-3/4"
STEP50-15221	1-1/2	4	11.0	230	1/60	10'	15-1/4"	30-1/4"
STEP50X100FT-15221	1-1/2	4	11.0	230	1/60	100'	15-1/4"	30-1/4"
STEP50X30FT-15221	1-1/2	4	11.0	230	1/60	30'	15-1/4"	30-1/4"
STEP50X50FT-15221	1-1/2	4	11.0	230	1/60	50'	15-1/4"	30-1/4"

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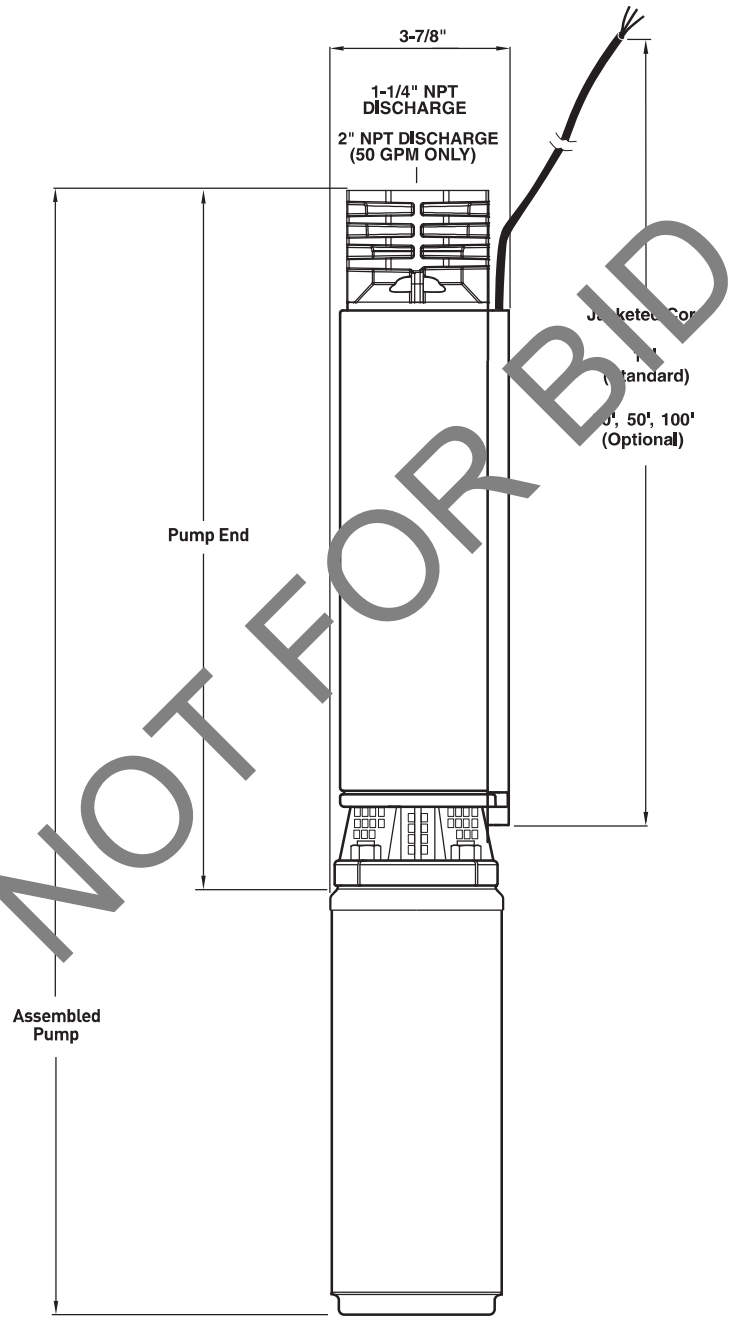
STA-RITE® ST.E.P Plus Series

4" high-head multi-stage submersible effluent pumps

OUTLINE DIMENSIONS



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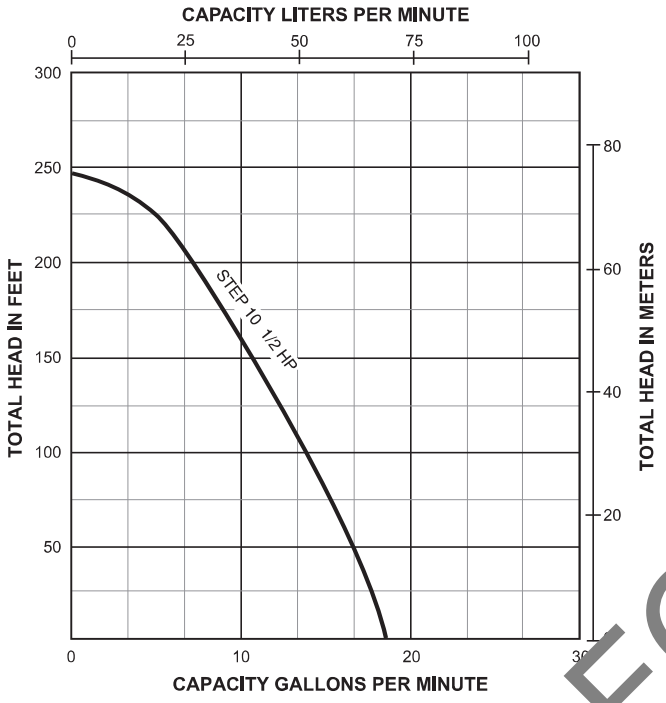
Dimensions (in inches) are for estimating purposes only.

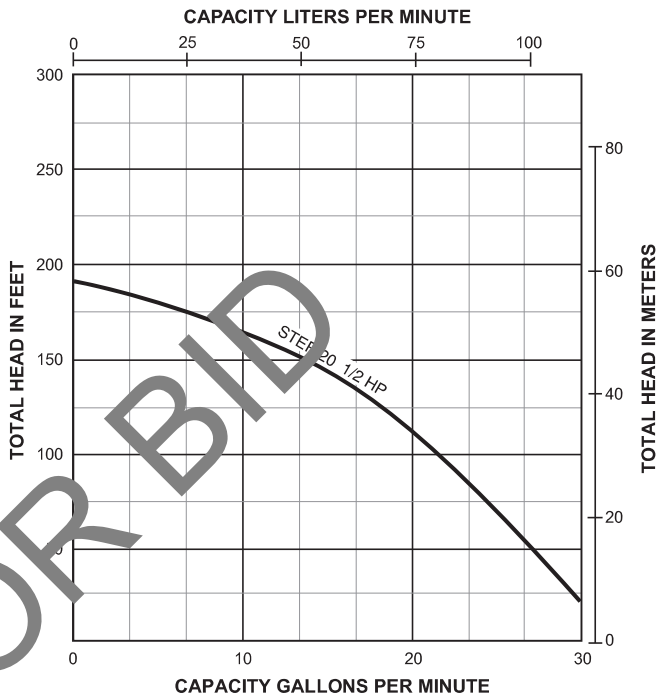
STA-RITE® ST.E.P Plus Series

4" high-head multi-stage submersible effluent pumps

PUMP PERFORMANCE – 10 GPM



PUMP PERFORMANCE – 20 GPM



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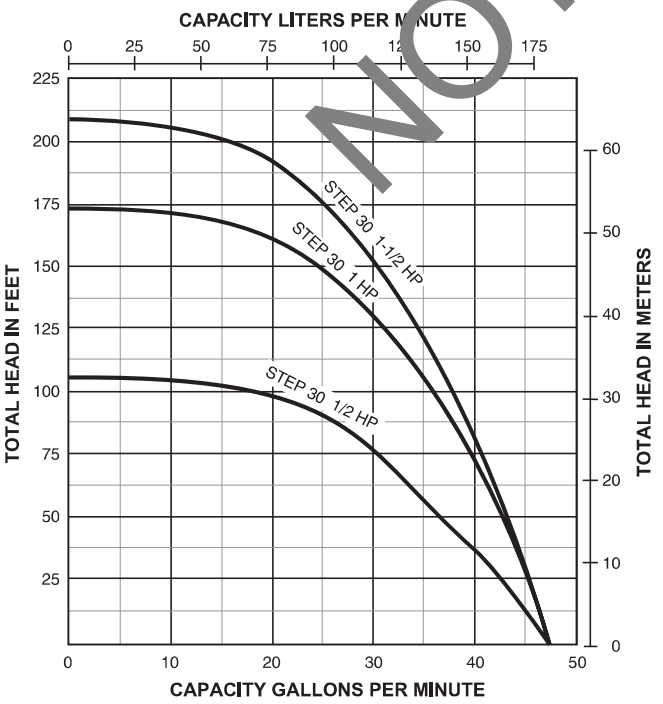
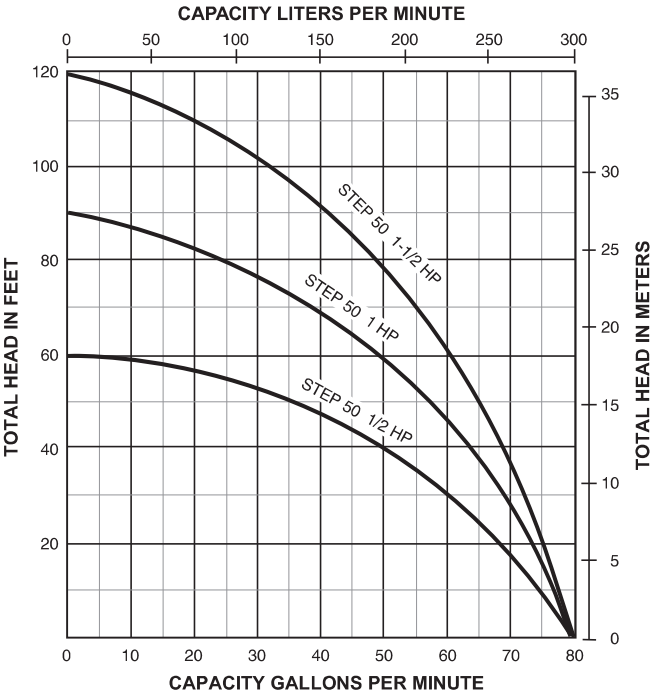
PUMP PERFORMANCE – 30 GPM



PUMP PERFORMANCE – 50 GPM



PENTAIR

293 WRIGHT STREET, DELAVAN, WI 53115 WWW.STA-RITE.COM PH: 888-782-7483 ORDERS FAX: 800-426-9446

Because we are continuously improving our products and services, Pentair reserves the right to change specifications without prior notice.