



Sladden Engineering

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December 20, 2021

Project No. 644-21066
21-12-145

Greens Group, Inc.
8815 Research Drive
Irvine, California 92618

Project: Proposed Commercial Development
APN 118-270-024 & 054
West Second Street
Corona, California

Subject: Percolation/Infiltration Testing for On-Site Stormwater Management

Ref: Geotechnical Investigation, Proposed Commercial Development, APN 118-270-024 & 054, West Second Street, California; prepared by Sladden Engineering, Project No 644-21066, Report No. 21-12-143, dated December 20, 2021.

In accordance with your request, we have performed percolation testing on the subject site to evaluate the infiltration potential of the near surface soil to assist in stormwater management system design. It is our understanding that on-site stormwater retention including infiltration is proposed for the project.

Percolation testing was performed on November 30, 2021 within three (3) shallow tests bores excavated on the site. Testing was performed at depths of approximately 5.00 and 10.00 feet below existing grade. The approximate locations of the test holes are presented on the attached Exploration Location Plan (Figure 2). Testing was performed by placing water within the test bore and recording the drop in the water surface with time. Testing was performed in general accordance with the *United States Bureau of Reclamation (BOR) Procedure 7300-89 (1999)*. Test results are summarized in the following table.

PERCOLATION TEST RESULTS



Test No.	Depth (Ft)	USCS	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	5.00	SC/SM	76.50	9.79
P-2	10.00	SW	80.25	10.48
P-3	10.00	SW	71.25	8.87

The percolation rates determined represent the ultimate field rates that do not include a safety factor. The corresponding infiltration rates were calculated using the Porchet Method.


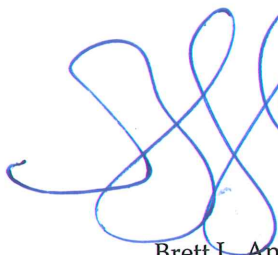
Based on our field investigation and our review of groundwater levels¹ within the vicinity, it is our professional opinion that groundwater should not be a controlling factor in on-site stormwater retention/infiltration system design.

If you have any questions regarding this memo or the testing summarized herein, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING



Matthew J. Cohrt
Principal Geologist

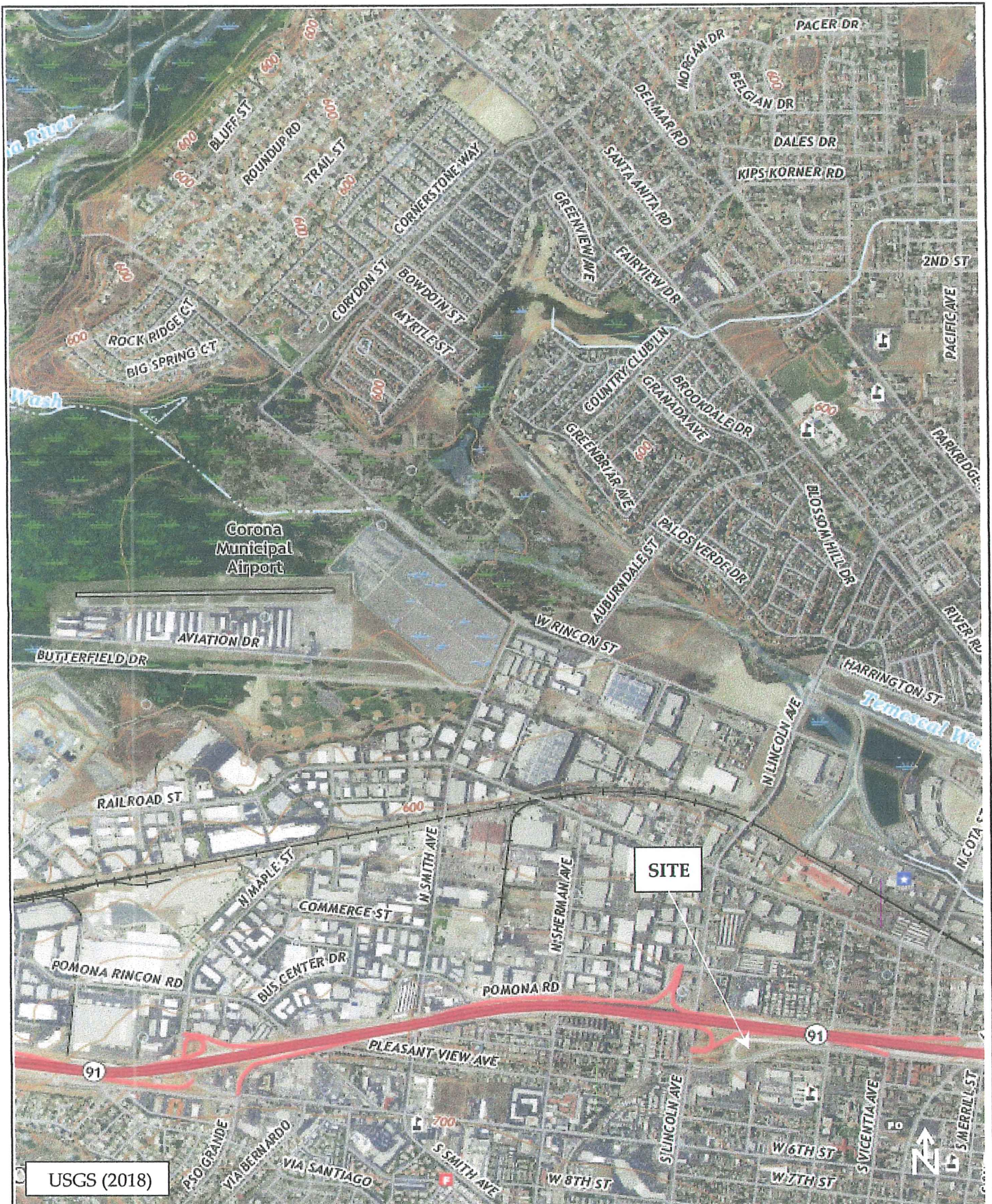


Brett L. Anderson
Principal Engineer

Copies: 4/Addressee

¹ California Department of Water Resources (CDWR), 2021, Historical Data by Well-Map Interface, available at: <http://wdl.water.ca.gov/waterdatalibrary/Home.aspx>

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
EXPLORATION LOCATION PLAN



USGS (2018)



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SITE LOCATION MAP

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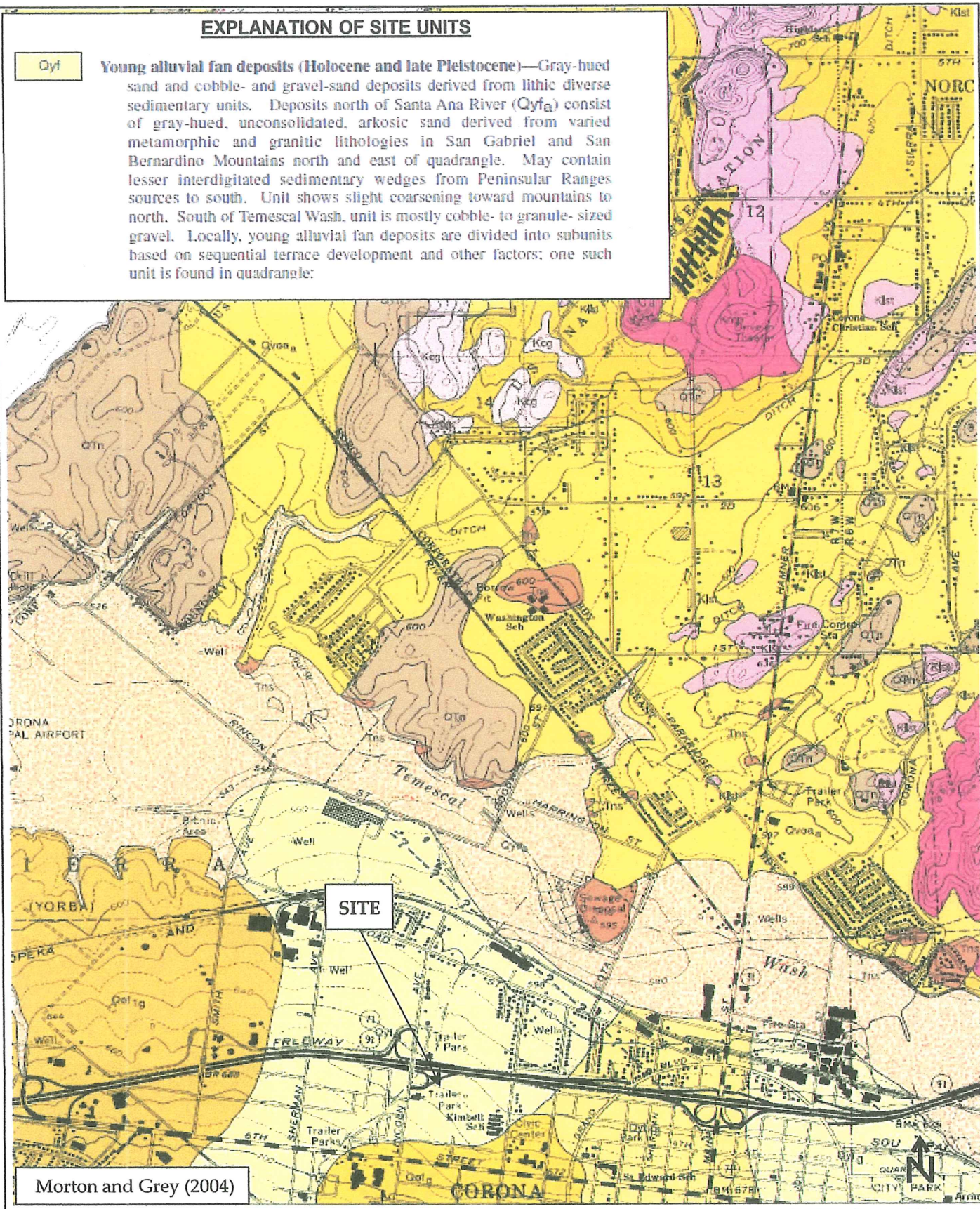
FIGURE

1

EXPLANATION OF SITE UNITS

Qyf

Young alluvial fan deposits (Holocene and late Pleistocene)—Gray-hued sand and cobble- and gravel-sand deposits derived from lithic diverse sedimentary units. Deposits north of Santa Ana River (Qyf_A) consist of gray-hued, unconsolidated, arkosic sand derived from varied metamorphic and granitic lithologies in San Gabriel and San Bernardino Mountains north and east of quadrangle. May contain lesser interdigitated sedimentary wedges from Peninsular Ranges sources to south. Unit shows slight coarsening toward mountains to north. South of Temescal Wash, unit is mostly cobble- to granule- sized gravel. Locally, young alluvial fan deposits are divided into subunits based on sequential terrace development and other factors; one such unit is found in quadrangle:



Morton and Grey (2004)



REGIONAL GEOLOGIC MAP

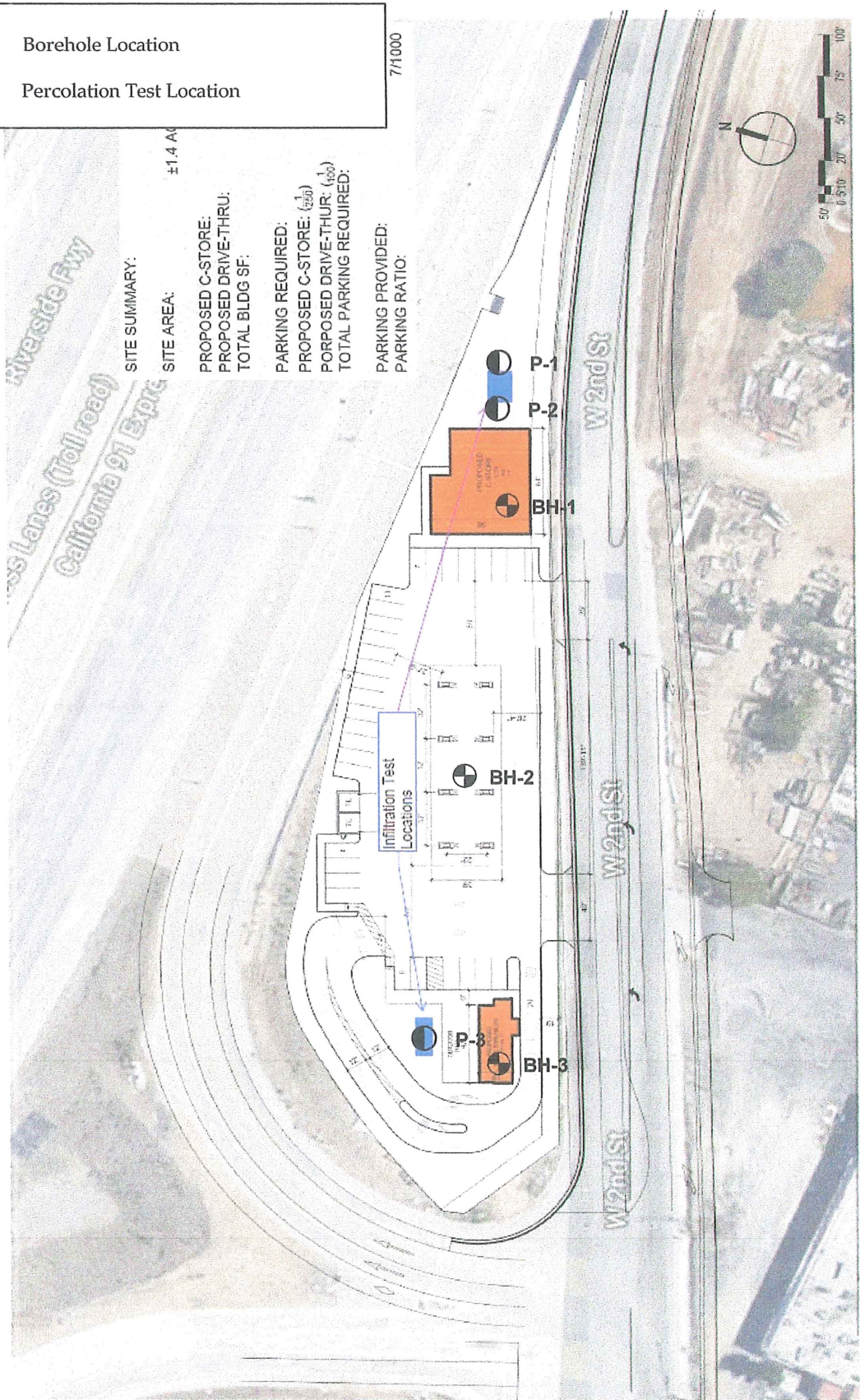
FIGURE

2



Project Number:	644-21066
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-  **BH-3** Borehole Location
-  **P-3** Percolation Test Location



SITE SUMMARY:
SITE AREA: ±1.4 AC
PROPOSED C-STORE:
PROPOSED DRIVE-THRU:
TOTAL BLDG SF:
PARKING REQUIRED:
PROPOSED C-STORE: (450)
PROPOSED DRIVE-THRU: (450)
TOTAL PARKING REQUIRED:
PARKING PROVIDED:
PARKING RATIO: 7/1000



CONCEPTUAL SITE PLAN

GREENS 4150 Sladden Drive, Suite 200, Corona, CA 92626
PROPOSED DRIVE-THRU PAD BUILDING
 W 2nd Street & 91 Freeway, Corona, CA



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EXPLORATION LOCATION PLAN

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FIGURE

3

BORELOGS



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BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	10/27/2021
Elevation:	655 Ft. (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); pale yellowish brown, dry, fine- to coarse-grained (Fill).
							4		
X	19 15 16						6		No Recovery.
							8		
				26.3	4.3		10		Clayey Sand (SC); pale yellowish brown, dry, medium dense, fine- to coarse-grained with gravel (Qyf).
							12		
				56.4	6.2	110.3	14		
	13 13 15						16		Sandy Clay (CL); reddish brown, dry, very stiff, low plasticity with gravel (Qyf).
							18		
				16.7	5.2		20		Clayey Sand (SC); grayish brown, dry, dense, fine- to coarse-grained with gravel (Qyf).
							22		
				5.4	3.8	114.8	24		
	36 50-6						26		Sand (SP); grayish brown, dry, very dense, fine- to coarse-grained with gravel (Qyf).
							28		
							30		Terminated at 26.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED COMMERCIAL DEVELOPMENT
W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

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BORE LOG

Equipment: MOBILE B-61

Date Drilled: 10/27/2021

Elevation: 655 Ft. (MSL)

Boring No: BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); pale yellowish brown, dry, fine- to coarse-grained (Fill).
	2 3 4			49.5	5.0		4		
							6		Clayey Sand (SC); pale yellowish brown, dry, loose, fine-grained (Fill).
							8		
	8 9 8			47.6	4.8	100.8	10		Clayey Sand (SC); pale yellowish brown, dry, medium dense, fine-grained with gravel (Qyf).
							12		
							14		
	6 8 8			38.9	6.2		16		Clayey Sand (SC); pale yellowish brown, dry, medium dense, fine-grained with gravel (Qyf).
							18		
	50-6						20		No Recovery.
							22		
							24		
	18 24 35			20.2	5.8		26		Clayey Sand (SC); grayish brown, dry, very dense, fine-grained with gravel (Qyf).
							28		Terminated at 26.5 Feet bgs.
							30		No Bedrock Encountered.
							32		No Groundwater or Seepage Encountered.
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED COMMERCIAL DEVELOPMENT
W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

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Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	10/27/2021
Elevation:	655 Ft. (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
	18 15 13	1	36	46.0	8.1		2		Clayey Sand (SC); dark yellowish brown, slightly moist, medium dense, fine-grained (Fill).
	16 50-6			7.1	2.2		4		
	5 5 7			39.1	9.6		6		Sandy Gravel (GW); yellowish brown, dry to slightly moist, very dense, fine- to coarse-grained (Qyf).
							8		
	5 6 7			57.2	13.5	117.8	10		Clayey Sand (SC); yellowish brown, slightly moist, medium dense, fine-grained (Qyf).
							12		
	5 6 7			57.2	13.5	117.8	14		Sandy Clay (CL); reddish brown, slightly moist, medium stiff, low plasticity with gravel (Qyf).
							16		
	25 27 23			14.8	5.9		18		Clayey Sand (SC); grayish brown, dry, dense, fine- to coarse-grained (Qyf).
							20		
	24 23 30			9.5	5.8	121.9	22		Sand (SP); yellowish brown, dry, dense, fine- to coarse-grained (Qyf).
							24		
	18 21 35			14.9	5.4		26		Gravel at 24 Feet.
							28		
	18 50-6			13.1	5.2		30		Clayey Sand (SC); yellowish brown, dry, very dense, fine- to coarse-grained (Qyf).
							32		
	6 8 15			26.3	8.6		34		Gravel at 33 Feet.
							36		
	5 8 12			70.0	16.1	113.9	38		Clayey Gravel (GC); dark yellowish brown, dry to slightly moist, very dense, fine- to coarse-grained (Qyf).
							40		
	13 19 13			26.1	7.7		42		Clayey Sand (SC); yellowish brown, slightly moist, medium dense, fine- to coarse-grained (Qyf).
							44		
							46		Sandy Clay (CL); reddish brown, moist, stiff, low plasticity (Qyf).
							48		
							50		Clayey Sand (SC); yellowish brown, moist, dense, fine- to coarse-grained (Qyf).

Completion Notes:
 Terminated at 51.5 Feet bgs.
 No Bedrock Encountered.
 No Groundwater or Seepage Encountered.

PROPOSED COMMERCIAL DEVELOPMENT
 W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

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BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	10/27/2021
Elevation:	655 Ft. (MSL)	Boring No:	P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); dark yellowish brown, slightly moist, fine-to coarse-grained with gravel and debris (Fill).
							4		Silty Sand (SM); dark yellowish brown, slightly moist, fine- to coarse-grained (Qyf).
							6		Terminated at 5.0 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Cased to Facilitate Percolation Testing
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED COMMERCIAL DEVELOPMENT
W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

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BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	10/27/2021
Elevation:	655 Ft. (MSL)	Boring No:	P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); dark yellowish brown, slightly moist, fine-to coarse-grained with gravel (Fill).
							4		
							6		Gravelly Sand (SW); yellowish brown, dry, fine- to coarse-grained (Qyf).
							8		
							10		
							12		Terminated at 10.0 Feet bgs.
							14		No Bedrock Encountered.
							16		No Groundwater or Seepage Encountered.
							18		Cased to Facilitate Percolation Testing
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED COMMERCIAL DEVELOPMENT
W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

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BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	10/27/2021
Elevation:	655 Ft. (MSL)	Boring No:	P-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); dark yellowish brown, slightly moist, fine-to coarse-grained with gravel (Fill).
							4		
							6		Gravelly Sand (SW/SP); yellowish brown, dry, fine- to coarse-grained (Qyf).
							8		
							10		
							12		Terminated at 10.0 Feet bgs.
							14		No Bedrock Encountered.
							16		No Groundwater or Seepage Encountered.
							18		Cased to Facilitate Percolation Testing
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

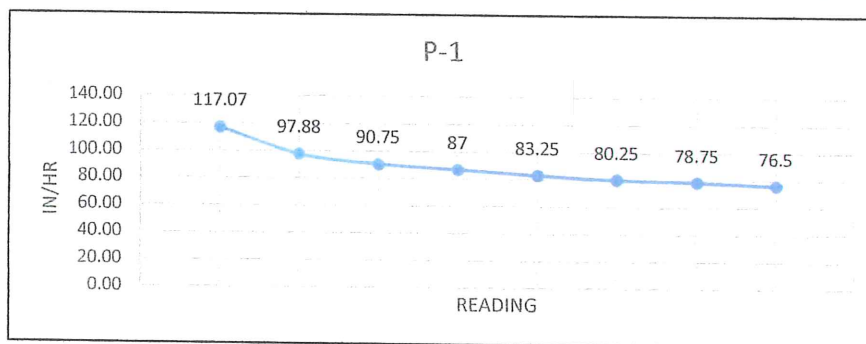
PROPOSED COMMERCIAL DEVELOPMENT
W. 2ND STREET & 91 FREEWAY, CORONA, CALIFORNIA

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project: W. 2nd Street, Corona	Depth (ft): 5.00
Job No. : 644-21066	USCS Soil Class: SC
Date: 11/30/2021	Sandy Soil: M.C.
Test Hole #: P-1	Tested By: R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	10.25	5.00	20	0	20	117.07
B	12.26	5.00	20	0	20	97.88

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	5.00	20	4 7/8	15 1/8	90.75
2	10.00	5.00	20	5 4/8	14 4/8	87
3	10.00	5.00	20	6 1/8	13 7/8	83.25
4	10.00	5.00	20	6 5/8	13 3/8	80.25
5	10.00	5.00	20	6 7/8	13 1/8	78.75
6	10.00	5.00	20	7 2/8	12 6/8	76.5



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$I_t = \frac{\Delta H \cdot 60 \cdot R}{\Delta t(r+2H_{avg})}$	Δt (minutes) D_f (Final Depth to water) r (hole radius in inches) D_0 (Initial Depth to water) D_t (Total Depth of test hole) H_0 (initial height of water at selected time interval) H_f (final height of water at the selected time interval) ΔH (change in head over the time interval) H_{avg} (average head height over the time interval)
$\Delta t = 10.00$	$H_0 = D_t - D_0$
$D_f = 52.75$	$H_f = D_t - D_f$
$r = 4.00$	
$D_0 = 40$	$\Delta H = H_0 - H_f$
$D_t = 60.00$	$H_{avg} = (H_0 + H_f) / 2$
$H_0 = 20$	
$H_f = 7.25$	
$\Delta H = 12.75$	
$H_{avg} = 13.63$	

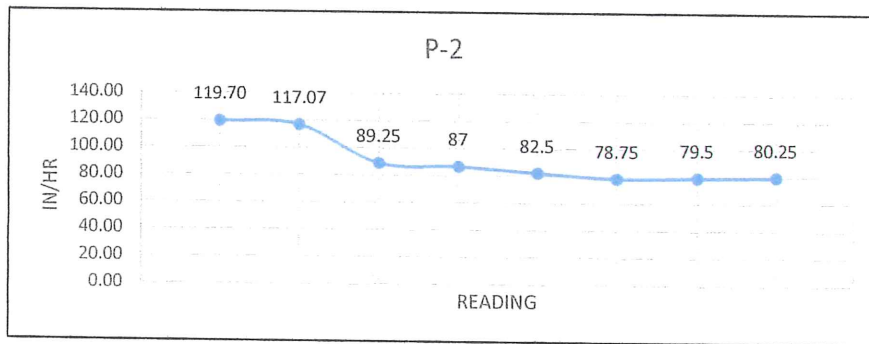
Field Rate: 76.5 in/hr
 Infiltration Rate: 9.79 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project: W. 2nd Street, Corona	Depth (ft): 10.00
Job No. : 644-21066	USCS Soil Class: SC
Date: 11/30/2021	Sandy Soil: M.C.
Test Hole #: P-2	Tested By: R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	10.03	10.00	20	0	20	119.70
B	10.25	10.00	20	0	20	117.07

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	10.00	20	5 1/8	14 7/8	89.25
2	10.00	10.00	20	5 4/8	14 4/8	87
3	10.00	10.00	20	6 2/8	13 6/8	82.5
4	10.00	10.00	20	6 7/8	13 1/8	78.75
5	10.00	10.00	20	6 6/8	13 2/8	79.5
6	10.00	10.00	20	6 5/8	13 3/8	80.25



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$I_{t=}$	$\frac{\Delta H \ 60 \ R}{\Delta t(r+2H_{avg})}$	Δt (minutes) D_f (Final Depth to water) r (hole radius in inches) D_0 (Initial Depth to water) D_t (Total Depth of test hole)
$\Delta t =$	10.00	H_0 (initial height of water at selected time interval) $H_0 = D_t - D_0$
$D_f =$	113.38	H_f (final height of water at the selected time interval) $H_f = D_t - D_f$
$r =$	4.00	ΔH (change in head over the time interval) $\Delta H = H_0 - H_f$
$D_0 =$	100	H_{avg} (average head height over the time interval) $H_{avg} = (H_0 + H_f) / 2$
$D_t =$	120.00	
$H_0 =$	20	
$H_f =$	6.625	
$\Delta H =$	13.38	
$H_{avg} =$	13.31	

Field Rate: 80.25 in/hr
 Infiltration Rate: 10.48 in/hr

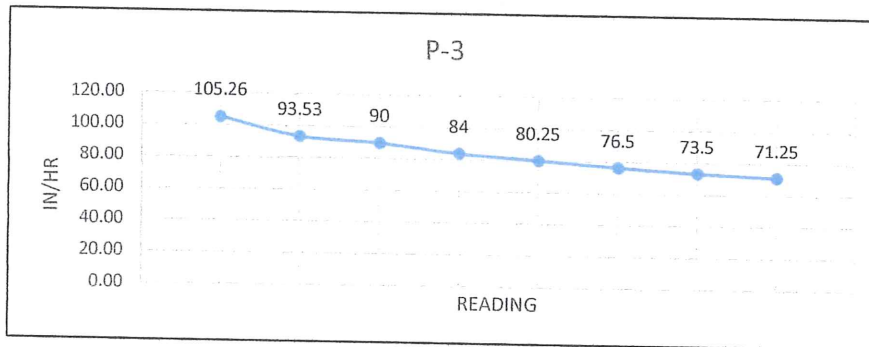
STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project: W. 2nd Street, Corona
 Job No. : 644-21066
 Date: 11/30/2021
 Test Hole #: P-3

Depth (ft): 10.00
 USCS Soil Class: SC
 Sandy Soil: M.C.
 Tested By: R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	11.40	10.00	20	0	20	105.26
B	12.83	10.00	20	0	20	93.53

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	10.00	20	5	15	90
2	10.00	10.00	20	6	14	84
3	10.00	10.00	20	6 5/8	13 3/8	80.25
4	10.00	10.00	20	7 2/8	12 6/8	76.5
5	10.00	10.00	20	7 6/8	12 2/8	73.5
6	10.00	10.00	20	8 1/8	11 7/8	71.25



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$I_t =$	$\frac{\Delta H \cdot 60 \cdot R}{\Delta t(r+2H_{avg})}$	Δt (minutes) D_f (Final Depth to water) r (hole radius in inches) D_0 (Initial Depth to water) D_t (Total Depth of test hole)
$\Delta t =$	10.00	H_0 (initial height of water at selected time interval)
$D_f =$	111.88	$H_0 = D_t - D_0$
$r =$	4.00	H_f (final height of water at the selected time interval)
$D_0 =$	100	$H_f = D_t - D_f$
$D_t =$	120.00	ΔH (change in head over the time interval)
$H_0 =$	20	$\Delta H = H_0 - H_f$
$H_f =$	8.125	H_{avg} (average head height over the time interval)
$\Delta H =$	11.88	$H_{avg} = (H_0 + H_f) / 2$
$H_{avg} =$	14.06	

Field Rate: 71.25 in/hr
 Infiltration Rate: 8.87 in/hr