

APPENDIX G
STORMWATER COMPLIANCE STUDY



Stantec Consulting Services Inc.
300 North Lake Avenue, Suite 400, Pasadena CA 91101-4169

March 16, 2023
File: 2042624900

City of Buenaventura
255-290 Maple Court
Ventura, CA 93003

Reference: Storm Water Compliance Study, Maple Court

The proposed project is a mixed-use development located north of Maple Street, between Mills Road and College Drive, in the City of San Buenaventura. This letter addresses the MS4 Stormwater compliance requirements for the proposed development.

The total proposed developed area is an approximately 5.75-acre. A portion of the proposed development (drainage area 1A) will drain south towards the Maple Court and consists of 3.06 acres. The second portion of the proposed development (drainage area 2A) drains southeast towards Maple Street and consists of 2.44 acres. A smaller area of landscape/turf/permeable pavers south of building no. 1 will drain towards the cul-de-sac (drainage 3A)

The Site is currently improved with three two-story office buildings constructed in or around the early 1970s along with surface parking areas and minimal landscape planters with trees. The proposed development will demolish the existing parking lot and the existing buildings. There's an existing 12 feet grade difference along the eastern property line and about 11 feet along the western property line. The existing site access points are located at the south-eastern and south-western corners on Maple Street.

The proposed development consists of two five story buildings with parking structures within, private driveways, landscaping areas. The project will provide multiple housing opportunities for different income levels in addition to commercial uses that would consist of small retail, cafe, office/co-working spaces, or other neighborhood-oriented uses that would revitalize the existing context with a place-making environment. The percent imperviousness of the proposed development is anticipated to be 76.84%. The proposed grading will maintain the drainage pattern consistent with the existing conditions. The northerly side of the proposed development will flow towards northwest corner the Maple Court cul-de-sac, where the water will be intercepted by the proposed storm drain system and directed to a drywell. The proposed drywell will have an overflow pipe which will be directed to the public street via curb drain.

Southeasterly portion of the project will drain towards the southeasterly driveway. The proposed the storm drain will pick up the from the roof of proposed south building, some of the landscape areas and the easterly driveway. The storm drain will be directed to an underground pipe infiltration/retention system, where an overflow pipe will be provided. The overflow pipe will drain the water via curb drain to Maple Street. A portion of driveway water will be treated either by



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Reference: Storm Water Compliance Study, Maple Court

media filter or biofiltration prior to leaving the site; these areas will be less the 5% allowed area of the entire project site.

Below are the calculations for the preliminary sizing of the selected Best Management Practices (BMPs) both watersheds:

Watershed 1A:

1.	Total Project Area ($A_{PROJECT}$):	3.06 acres
2.	Maximum Allowable % Effective Impervious Area:	0 %
3.	Allowable Effective Impervious Area (EIA_{allow})	0 acres
4.	Project Percent Impervious Area (IMP):	82.23%
5.	Project Total Impervious Area (TIA):	2.52 acres
6.	Total Area to be retained (A_{retain}):	2.52 acres
7.	Water Quality Design Volume (SQDV):	5,420 cu-ft
8.	Pretreatment BMP selected:	Catch Basin Filters & INF-5 Permeable Pavement
9.	BMP selected:	INF-1, Drywell
10.	Measured Percolation Rate:	TP3 (1.2 in/hr)
11.	Design Percolation Rate:	0.6 in/hr
12.	Required Infiltrating Surface:	703 sq-ft
13.	Available Infiltrating Surface:	703 sq-ft
14.	Available Volume for Treatment/Retention	5,500 cu-ft

Watershed 2A:

1.	Total Project Area ($A_{PROJECT}$):	2.44 acres
2.	Maximum Allowable % Effective Impervious Area:	5 %
3.	Allowable Effective Impervious Area (EIA_{allow})	0.288 acres
4.	Project Percent Impervious Area (IMP):	71.15%
5.	Project Total Impervious Area (TIA):	1.736 acres
6.	Total Area to be retained (A_{retain}):	1.448 acres
7.	Water Quality Design Volume (SQDV):	2,727 cu-ft
8.	Pretreatment BMP selected:	Catch Basin Filters & INF-5 Permeable Pavement
9.	BMP selected:	INF-1, Underground Infiltration Trench
10.	Measured Percolation Rate:	TP1 (0.8 in/hr)
11.	Design Percolation Rate:	0.4 in/hr
12.	Required Infiltrating Surface:	656 sq-ft
13.	Available Infiltrating Surface:	1,100 sq-ft
14.	Available Volume for Treatment/Retention	2,730 cu-ft



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Reference: Storm Water Compliance Study, Maple Court

Watershed 3A:

Self-treating (Pervious area: Landscape, turf & permeable pavers)

Total Area: 0.25 acres

The percolation rates used in the preliminary analysis were taken from a Soils Engineering Investigation prepared for the proposed project by A.G.I Geotechnical, Inc. dated January 6, 2022. Their percolation testing results are included as part of this letter for reference only.

Enclosed you will find an exhibit showing the preliminary proposed improvements and locations of the BMPs for pretreatment and infiltration systems covering both drainage watersheds. Enclosed you will also find preliminary Stormwater Quality Design Volume (SQDV) and infiltration facility calculations.

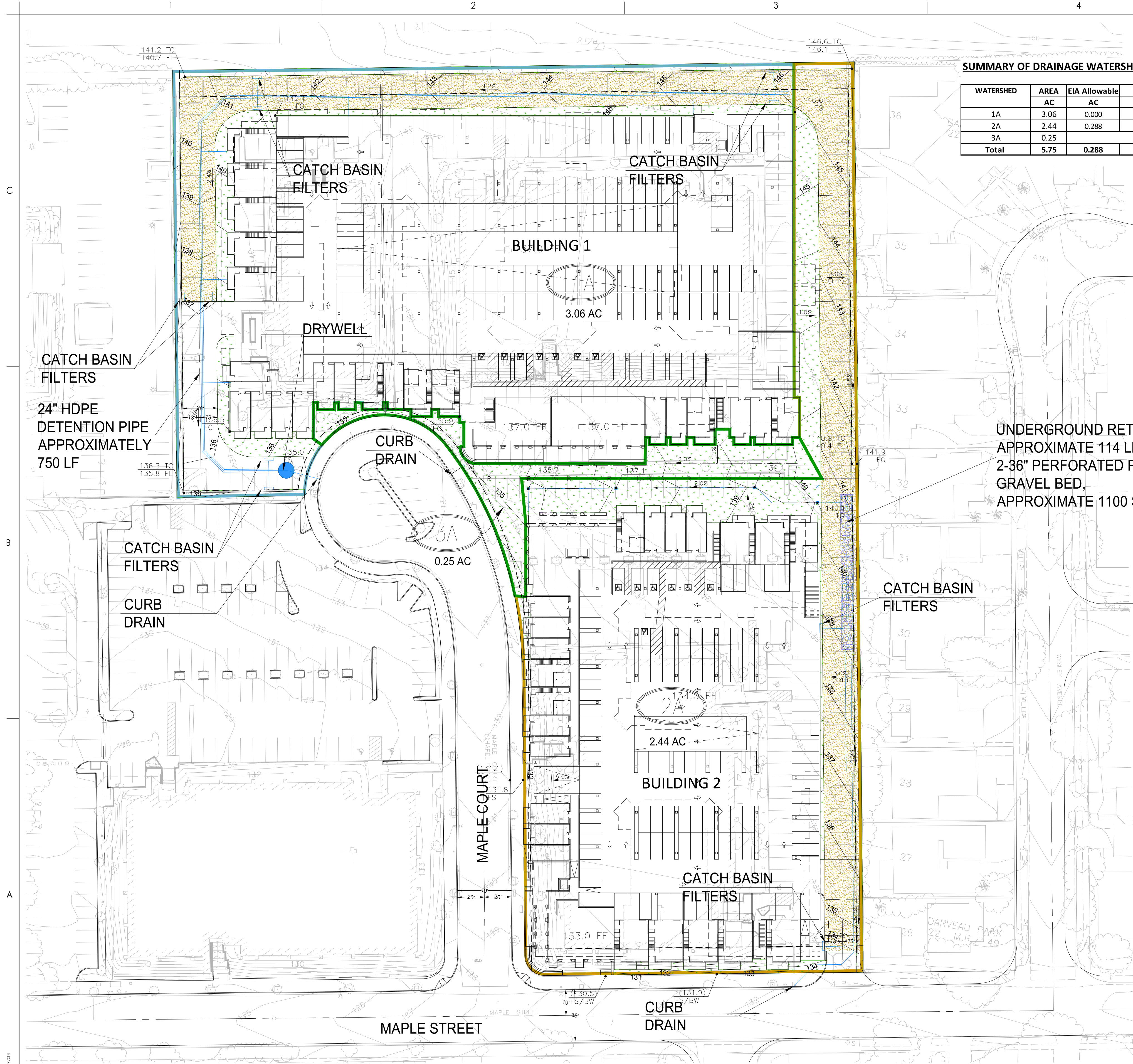
Please feel free to contact Colin Nemeroff at 213-269-4192 if you have any questions.

Regards,

STANTEC CONSULTING SERVICES INC.

Lusine Nidelian
Associate, Community Development, Civil Engineering
Phone: 213 269-4201
lusine.nidelian@stantec.com

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SUMMARY OF DRAINAGE WATERSHEDS

WATERSHED	AREA AC	EIA Allowable AC	A retain AC	REQUIRED SQDV AC-FT	CU-FT	PROVIDED VOLUME CU-FT	PROPOSED PRE-TREATMENT BMP	REQUIRED AREA FOR PERMEABLE	PROVIDED AREA FOR PERMEABLE	PROPOSED BIO-RETENTION BMP
1A	3.06	0.000	2.520	0.124	5420	5500	PERMEABLE PAVEMENT	4169	15795	DRYWELL
2A	2.44	0.288	1.448	0.062	2721	2730	PERMEABLE PAVEMENT	3265	17810	UNDERGROUND INFILTRATION TRENCH
3A	0.25						SELF-TREATING AREA			
Total	5.75	0.288	3.968	0.187	8142	8230				

HYDROLOGY LEGEND

SUBAREA

1A

3.00 Ac.

AREA (AC.)

SUBAREA BOUNDARY
(COLOR VARIES)

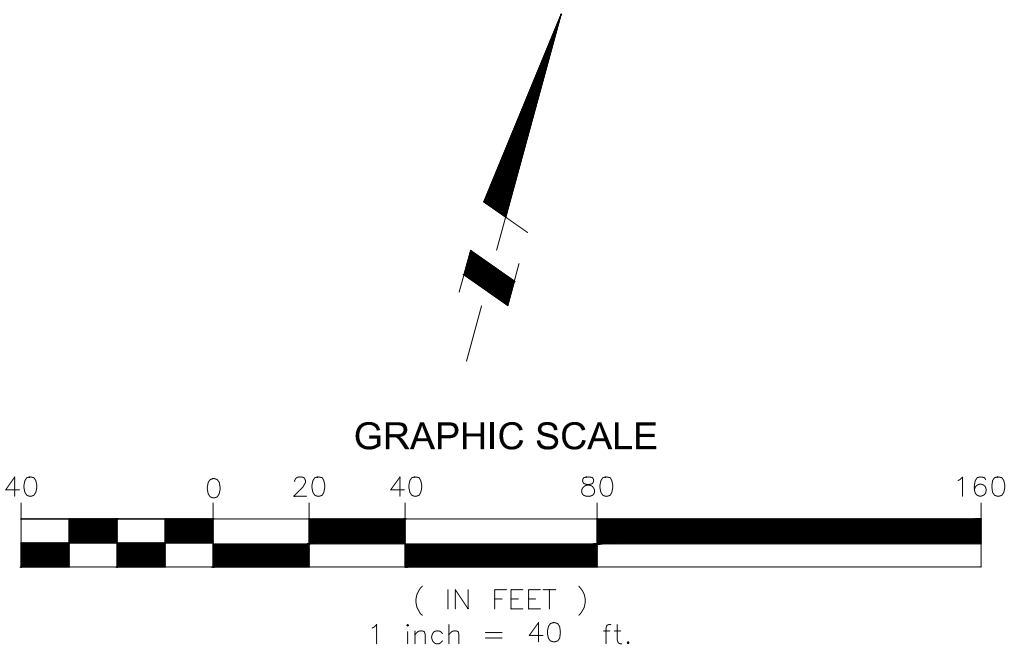
PROPOSED LANDSCAPE

PROPOSED UNDERGROUND
INFILTRATION BASIN

PROPOSED PERMEABLE
PAVERS

PROPOSED DRY WELL

PROPOSED STORM DRAIN



Revision

By

Appd

YYYY.MM.DD

Issued

By

Appd

YYYY.MM.DD

Permit/Seal

Consultant

Stantec

Stantec Consulting Services Inc.
300 North Lake Avenue Suite 400
Pasadena CA 91101-4169
Tel: (626) 796-9141
www.stantec.com

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Client/Project Logo

Client/Project
SKYA VENTURES

MAPLE COURT

File Name: 624900C-EX7001

Dwn.

Dsgn.

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3/2/2022

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CONCEPTUAL LID EXHBIT

Project No.

Scale

Revision

Sheet

Drawing No.

1 of 1

SUMMARY OF DRAINAGE WATERSHEDS										
WATERSHED	AREA	EIA Allowable	A retain	REQUIRED SQDV		PROVIDED VOLUME	PROPOSED PRE-TREATMENT BMP	REQUIRED AREA FOR PERMEABLE PAVEMENT	PROVIDED AREA FOR PERMEABLE PAVEMENT	PROPOSED BIO-RETENTION BMP
	AC	AC	AC	AC-FT	CU-FT	CU-FT				
1A	3.06	0.000	2.520	0.124	5420	5500	PERMEABLE PAVEMENT	4169	15795	DRYWELL
2A	2.44	0.288	1.448	0.062	2721	2730	PERMEABLE PAVEMENT	3265	17810	UNDERGROUND INFILTRATION TRENCH
3A	0.25						SELF-TREATING AREA			
Total	5.75	0.288	3.968	0.187	8142	8230				
			Runoff Coefficient for 1A, C=		0.79007					
			Design Storm, D=		0.75					
			Runoff Coefficient for 2A, C=		0.69035					

Sizing Worksheet

Designer: Stantec Consulting Services, Inc. Project Proponent: Date: December 6, 2022 Project: Maple Court - Drainage Area 1A - Drywell Location: City of Buenaventura		Drywell Calculations for Drainage Watershed 1A
Type of Vegetation: (Check type used or describe "Other")	☐ Native Grasses ☐ Irrigated Turf Grass ☐ Other	
Outflow Collection:		
Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project} = 3.06$ acres	
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%allowable$	$\%allowable = 0\%$	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project}) * (\%allowable)$	$EIA_{allowable} = 0.0$ acres	
1-4. Enter Project impervious fraction, Imp (e.g. 60% = 0.60)	$Imp = 0.8223$	
1-5. Determine the Project Total Impervious area (acres), $TIA = A_{project} * Imp$	$TIA = 2.52$ acres	
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain} = TIA - EIA_{allowable}$	$A_{retain} = 2.52$ acres	
1-7. Determine pervious runoff coefficient using <u>Table E-1</u> , C_p	$C_p = .05$	
1-8. Calculate runoff coefficient, $C = 0.95 * imp + C_p (1 - imp)$	$C = 0.79007$	
1-9. Enter design rainfall depth of the storm (in), P_i	$P_i = 0.75$ inches	

1-10. Calculate rainfall depth (ft), $P = P_i/12$	$P = 0.0625$ in
1-11. Calculate water quality design volume (ft ³), $SQDV = 43560 \times C \times P \times A_{retain}$	$SQDV = 5,420$ cu-ft.
Step 2: Determine the design percolation rate	
2-1. Enter measured soil percolation rate (in/hr, 0.5 in/hr min.), $P_{measured}$	$P_{measured} = 1.20$ in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-1)	$S_A = 1.0$
2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-1)	$S_b = 2.0$
2-4. Calculate combined safety factor, $S = S_A \times S_b$	$S = 2.0$
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	$P_{design} = 0.6$ in/hr
Step 3: Calculate the surface area	
3-1. Enter required drain time(hours, 72 hrs max.), t	$t = 72$ hours
3-2. Calculate max. depth of runoff that can be infiltrated within the t (ft), $d_{max} = P_{design} t/12$	$d_{max} = 3.6$ ft
3-3. For basins, select ponding depth (ft), d_p , such that $d_p \leq d_{max}$	$d_p = 3.6$ ft
3-4. For trenches, enter trench fill aggregate porosity, n_t	$n_t = 0.42$
3-5. For trenches, enter depth of trench fill (ft), d_t	$d_t = 5$ ft
3-5. For trenches, select ponding depth d_p such that $d_p \leq d_{max} - n_t d_t$	$d_p = 1.5$ ft
3-6. Enter the time to fill infiltration basin or trench with water (Use 2 hours for most designs), T	$T = 2$ hrs

TP 3

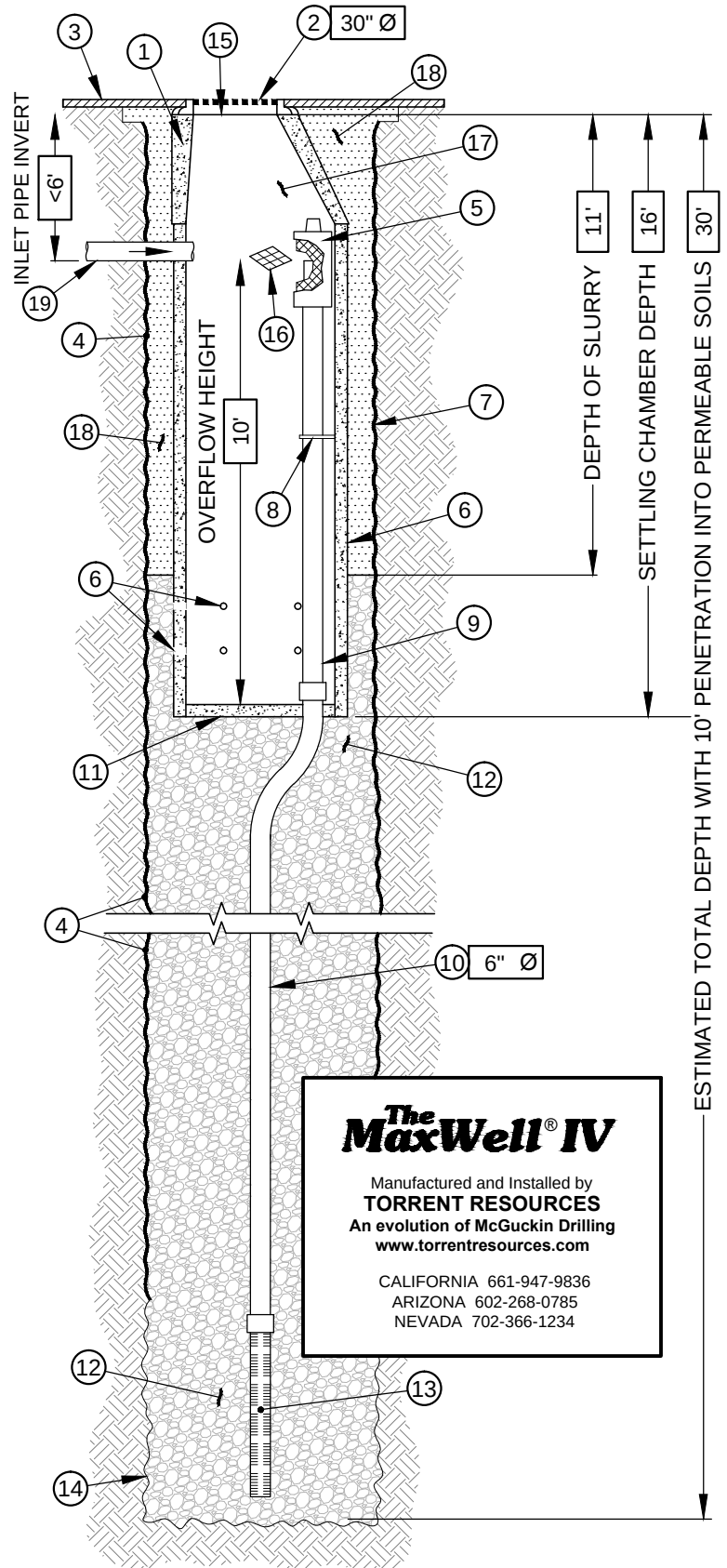
3-7. Calculate infiltrating surface area for infiltration basin (ft²): $A_b = SQDV / ((T P_{design} / 12) + d_p)$ OR Calculate infiltrating surface area for infiltration trenches or aggregate- filled drywells (ft²): $A_t = SQDV / ((T P_{design} / 12) + n_t d_t + d_p)$	$A_b =$ ft² $A_t =$ 703 sq-ft
Step 4: Size the forebay (infiltration basins or trenches)	
If a separate pre-treatment unit is designed for the infiltration facility, skip to Step 5. If not, continue through 4-1 through 4-4.	
4-1. Calculate the volume of the forebay (ft ³), $V_{forebay} = 0.25 * SQDV$	$V_{forebay} =$ ft ³
4-2. Determine forebay depth (ft), $d_{forebay}$	$d_{forebay} =$ ft
4-3. Calculate forebay bottom surface area (ft ²), $A_{forebay} = V_{forebay} / d_{forebay}$	$A_{forebay} =$ ft ²
4-4. Provide outlet pipe such that the forebay drains to the infiltration facility within 10 minutes.	
Step 5: Provide conveyance capacity for filter clogging	
5-1. The infiltration facility should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged. Design emergency overflow in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.	

Maple Court - Ventura, CA

The MaxWell® IV Drainage System Detail And Specifications

ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE** - DIAMETER AS SHOWN. CLEAN CAST IRON WITH WORDING "**STORM WATER ONLY**" IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION $\pm 0.02'$ OF PLANS.
3. **GRADED BASIN OR PAVING** (BY OTHERS).
4. NON-WOVEN GEOTEXTILE SLEEVE, MIRAFITM/ 140 NL. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
5. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL .265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED.**
6. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE AND ALIGN SECTIONS TO MAXIMIZE BEARING SURFACE. EIGHT (8) PERFORATIONS PER FOOT, 2 ROWS MINIMUM.**
7. **MIN. 6' Ø DRILLED SHAFT.**
8. **SUPPORT BRACKET** - FORMED 12 GA. STEEL. **FUSION BONDED EPOXY COATED.**
9. **OVERFLOW PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
10. **DRAINAGE PIPE** - ADS HIGHWAY GRADE WITH TRI-A COUPLER. **SUSPEND PIPE** DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
11. **BASE SEAL** - GEOTEXTILE OR CONCRETE SLURRY.
12. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO BEST COMPLEMENT SOIL CONDITIONS.
13. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 120" OVERALL LENGTH WITH TRI-B COUPLER.
14. **MIN. 6' Ø SHAFT** - DRILLED TO MAINTAIN PERMEABILITY OF DRAINAGE SOILS.
15. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER AT PROJECT COMPLETION.**
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, TWO PER CHAMBER.
17. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE OVERFLOW PIPE INLET.
18. STABILIZED BACKFILL - TWO-SACK SLURRY MIX.
19. **INLET PIPE** (BY OTHERS).



The MaxWell® IV

Manufactured and Installed by
TORRENT RESOURCES
 An evolution of McGuckin Drilling
www.torrentresources.com

CALIFORNIA 661-947-9836
 ARIZONA 602-268-0785
 NEVADA 702-366-1234

AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
 CA Lic. 528080, C-42, HAZ
 NV Lic. 0035350 A - NM Lic. 90504 GF04

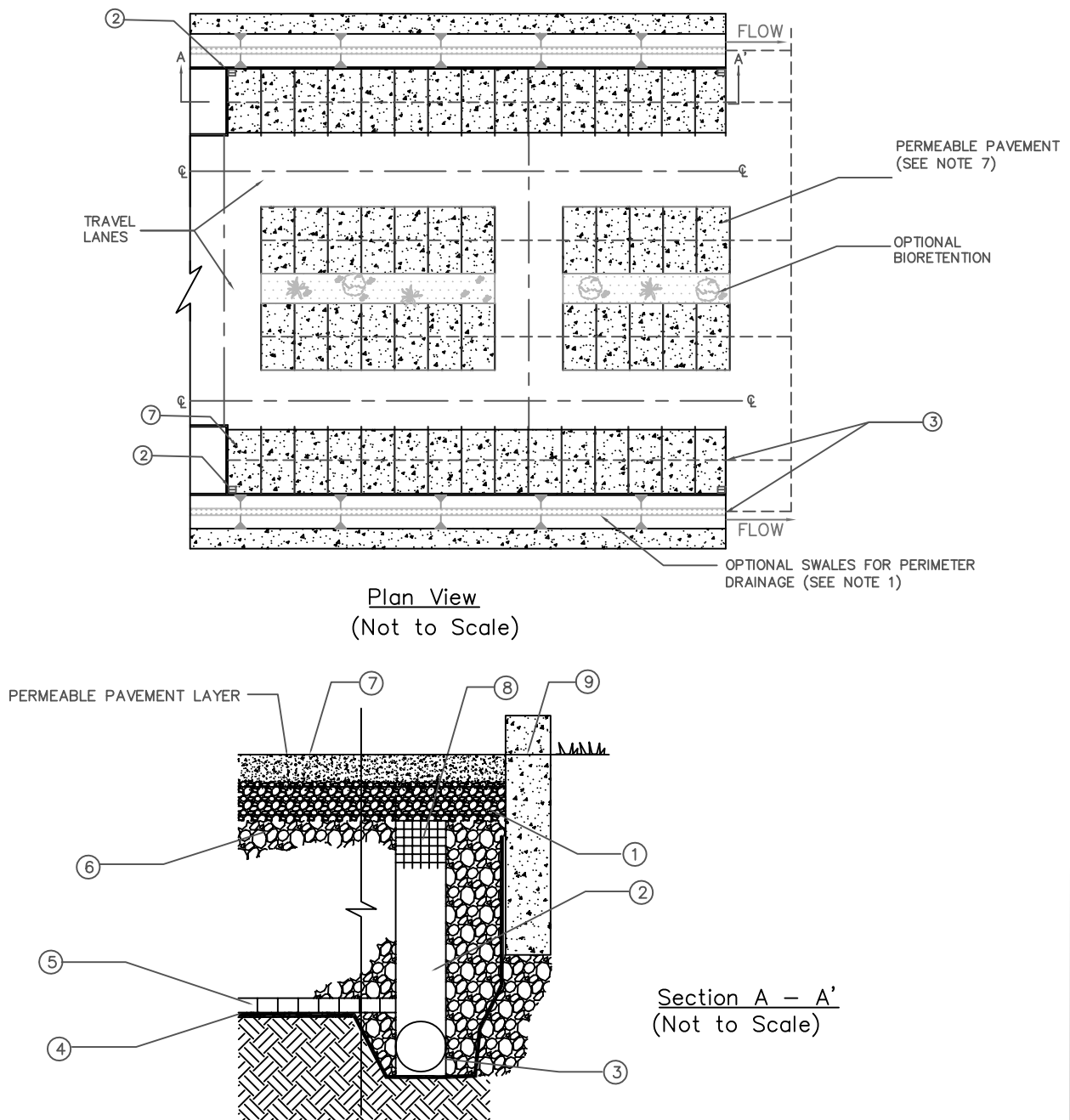
U.S. Patent No. 4,923,330 - TM Trademark 1974, 1990, 2004

Sizing Worksheet

Designer: Stantec Consulting Services, Inc.		Permeable Pavement as Pre-treatment Calcs for Drainage Area 1A
Project Proponent:		
Date: March 14, 2023		
Project: Maple Court - Drainage Area 1A - Permeable Pavement as pre-treatment		
Location: City of Buenaventura		
Type of Vegetation:		
Outflow Collection:		
Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project} = 3.06$ acres	
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable} = 0\%$	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project}) * (\%_{allowable})$	$EIA_{allowable} = 0.0$ acres	
1-4. Enter Project impervious fraction, Imp (e.g. 60% = 0.60)	$Imp = 0.8223$	
1-5. Determine the Project Total Impervious area (acres), $TIA = A_{project} * Imp$	$TIA = 2.52$ acres	
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain} = TIA - EIA_{allowable}$	$A_{retain} = 2.52$ acres	
1-7. Determine pervious runoff coefficient using <u>Table E-1</u> , C_p	$C_p = 0.05$	
1-8. Calculate runoff coefficient, $C = 0.95 * imp + C_p (1 - imp)$	$C = 0.79007$	
1-9. Enter design rainfall depth of the storm (in), P_i	$P_i = 0.75$ in	
1-10. Calculate rainfall depth (ft), $P = P_i / 12$	$P = 0.0625$ ft	
1-11. Calculate water quality design volume (ft ³),	$SQDV = 5,420$ ft ³	

$SQDV = 43560 \times C^*P^*A_{retain}$	5,420 cu-ft
Step 2: Determine the design percolation rate	
2-1. Enter measured soil percolation rate (0.5 in/hr minimum), $P_{measured}$	$P_{measured} = 1.20$ in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-5)	$S_A = 2.0$
Step 2: Determine the design percolation rate	
2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-5)	$S_B = 2.0$
2-4. Calculate combined safety factor, $S = S_A \times S_B$	$S = 4.0$
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	$P_{design} = 0.3$ in/hr
Step 3: Determine the Gravel Drainage Layer Depth	
3-1. Enter drawdown time (hours, 72 hrs max.), t	$t = 48$ hours
3-2. Calculate max. depth of runoff (ft) that can be infiltrated within the t , $d_{max} = P_{design}t/12$	$d_{max} = 1.2$ ft
3-3. Enter the gravel drainage layer porosity, n (typically 32% or 0.32 for gravel)	$n = 0.32$
3-4. Select the gravel drainage layer depth (ft) such that $d_{max} \geq n \times l$	$l = 3.75$ ft
Step 4: Determine infiltrating surface area	
4-1. Enter gravel drainage layer porosity, n	$n = 0.32$
4-2. Enter depth of gravel drainage layer (ft), l	$l = 3.75$ ft
4-3. Enter the time to fill the gravel drainage layer with water (Use 2 hours for most designs), T	$T = 2$ hrs

4-4. Calculate infiltrating surface area (ft ³):	
$A = SQDV / ((TP_{design} / 12) + nl)$	A = 4,169 ft ²
Step 5: Provide conveyance capacity for clogging	
5-1. The permeable pavement must have an emergency overflow for storm events greater than the design and in the event the permeable pavement becomes clogged.	



NOTES:

- ① BEDDING COURSE SHALL BE 1½" TO 3" MIN THICKNESS (TYP NO. 8 AGGREGATE).
- ② OPTIONAL OVERFLOW PIPE(S) SHALL BE PROVIDED IF OVERFLOWS ARE NOT MANAGED VIA PERIMETER DRAINAGE TO SWALES, BIORETENTION OR STORM WATER CONVEYANCE SYSTEM INLETS.
- ③ CONNECT OUTFALL PIPES TO DOWNSTREAM STORMWATER CONVEYANCE SYSTEM. OUTFALL PIPES SHALL BE SLOPED TOWARDS COLLECTION SYSTEM.
- ④ SOIL SUBGRADE SHALL HAVE ZERO SLOPE.
- ⑤ INSTALL GEOTEXTILE OR CHOKING LAYER ON BOTTOM & SIDES OF OPEN-GRADED BASE FOR FULL AND PARTIAL INFILTRATION, OR AN IMPERMEABLE LINER FOR NO INFILTRATION.
- ⑥ OPEN-GRADED BASE. THICKNESS AND GRADATION VARIES WITH DESIGN. TYP. NO. 57 AGGREGATE OR 4" THICK NO. 57 OVER NO. 2 STONE SUBBASE. THICKNESS OF SUB-BASE VARIES WITH DESIGN.
- ⑦ PERMEABLE PAVEMENT INFILTRATIVE LAYER
- ⑧ OPTIONAL RIGID PLASTIC SCREEN FASTENED OVER OVERFLOW INLETS.
- ⑨ CURB/EDGE RESTRAINT WITH CUT-OUTS FOR OVERFLOW DRAINAGE TO PERIMETER BMPS, STORMWATER CONVEYANCE SYSTEM INLETS OR OPTIONAL OVERFLOW PIPES.
- ⑩ PARTIAL EXFILTRATION THROUGH THE SOIL. PERFORATED PIPES DRAIN EXCESS RUNOFF THAT CAN NOT BE ABSORBED BY SLOW-DRAINING SOIL.

Geosyntec
consultants

Figure 6-6: Permeable Pavement

Sizing Worksheet

Designer: Stantec Consulting Services, Inc.		Underground Infiltration Trench Calculations for Watershed 2A
Project Proponent:		
Date: December 6, 2022		
Project: Maple Court, Watershed 2A - Underground Infiltration Trench		
Location: City of Buenaventura		
Type of Vegetation: (Check type used or describe "Other")	☐ Native Grasses ☐ Irrigated Turf Grass ☐ Other	
Outflow Collection:		
Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project} = 2.44$ acres	
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%allowable$	$\%allowable = 5$ %	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project}) * (\%allowable)$	$EIA_{allowable} = 0.288^*$ acres * 5% of entire project site (5.69 acres)	
1-4. Enter Project impervious fraction, Imp (e.g. 60% = 0.60)	$Imp = 0.7115$	
1-5. Determine the Project Total Impervious area (acres), $TIA = A_{project} * Imp$	$TIA = 1.736$ acres	
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain} = TIA - EIA_{allowable}$	$A_{retain} = 1.448$ acres	
1-7. Determine pervious runoff coefficient using Table E-1, C_p	$C_p = .05$	
1-8. Calculate runoff coefficient, $C = 0.95 * imp + C_p (1 - imp)$	$C = 0.6904$	
1-9. Enter design rainfall depth of the storm (in), P_i	$P_i = 0.75$ in	

1-10. Calculate rainfall depth (ft), $P = P_i/12$	$P = 0.0625$ ft
1-11. Calculate water quality design volume (ft ³), $SQDV = 43560 \times C \times P \times A_{\text{retain}}$	$SQDV = 2,721$ ft ³
Step 2: Determine the design percolation rate	
2-1. Enter measured soil percolation rate (in/hr, 0.5 in/hr min.), P_{measured}	$P_{\text{measured}} = 0.8$ in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-1)	$S_A = 1.0$
2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-1)	$S_b = 2.0$
2-4. Calculate combined safety factor, $S = S_A \times S_b$	$S = 2.0$
2-5. Calculate the design percolation rate (in/hr), $P_{\text{design}} = P_{\text{measured}}/S$	$P_{\text{design}} = 0.4$ in/hr
Step 3: Calculate the surface area	
3-1. Enter required drain time(hours, 72 hrs max.), t	$t = 72$ hrs
3-2. Calculate max. depth of runoff that can be infiltrated within the t (ft), $d_{\text{max}} = P_{\text{design}} t/12$	$d_{\text{max}} = 2.4$ ft
3-3. For basins, select ponding depth (ft), d_p , such that $d_p \leq d_{\text{max}}$	$d_p = 2.4$ ft
3-4. For trenches, enter trench fill aggregate porosity, n_t	$n_t = 0.40$
3-5. For trenches, enter depth of trench fill (ft), d_t	$d_t = 3$ ft
3-5. For trenches, select ponding depth d_p such that $d_p \leq d_{\text{max}} - n_t d_t$	$d_p = 1.4$ ft
3-6. Enter the time to fill infiltration basin or trench with water (Use 2 hours for most designs), T	$T = 2$ hours

TP 1

3-7. Calculate infiltrating surface area for infiltration basin (ft²): $A_b = SQDV / ((T P_{design} / 12) + d_p)$ OR Calculate infiltrating surface area for infiltration trenches or aggregate- filled drywells (ft²): $A_t = SQDV / ((T P_{design} / 12) + n_t d_t + d_p)$	$A_b =$ ft² $A_t =$ 656 sq. ft.
Step 4: Size the forebay (infiltration basins or trenches)	
If a separate pre-treatment unit is designed for the infiltration facility, skip to Step 5. If not, continue through 4-1 through 4-4.	
4-1. Calculate the volume of the forebay (ft ³), $V_{forebay} = 0.25 * SQDV$	$V_{forebay} =$ ft ³
4-2. Determine forebay depth (ft), $d_{forebay}$	$d_{forebay} =$ ft
4-3. Calculate forebay bottom surface area (ft ²), $A_{forebay} = V_{forebay} / d_{forebay}$	$A_{forebay} =$ ft ²
4-4. Provide outlet pipe such that the forebay drains to the infiltration facility within 10 minutes.	
Step 5: Provide conveyance capacity for filter clogging	
5-1. The infiltration facility should be placed off-line, but an emergency overflow must still be provided in the event the filter becomes clogged. Design emergency overflow in accordance with applicable standards of the Ventura County Flood Control District or local jurisdiction.	

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 228 LF

STORAGE SUMMARY

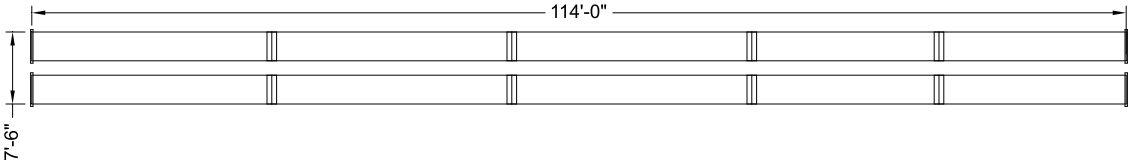
- STORAGE VOLUME REQUIRED = 2,727 CF
- PIPE STORAGE VOLUME = 1,612 CF
- BACKFILL STORAGE VOLUME = 1,119 CF
- TOTAL STORAGE PROVIDED = 2,730 CF

PIPE DETAILS

- DIAMETER = 36"
- CORRUGATION = 2 2/3x1/2
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 18"

BACKFILL DETAILS

- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



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 2²/₃" x 1¹/₂" 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.

ASSEMBLY
SCALE: 1" = 20'

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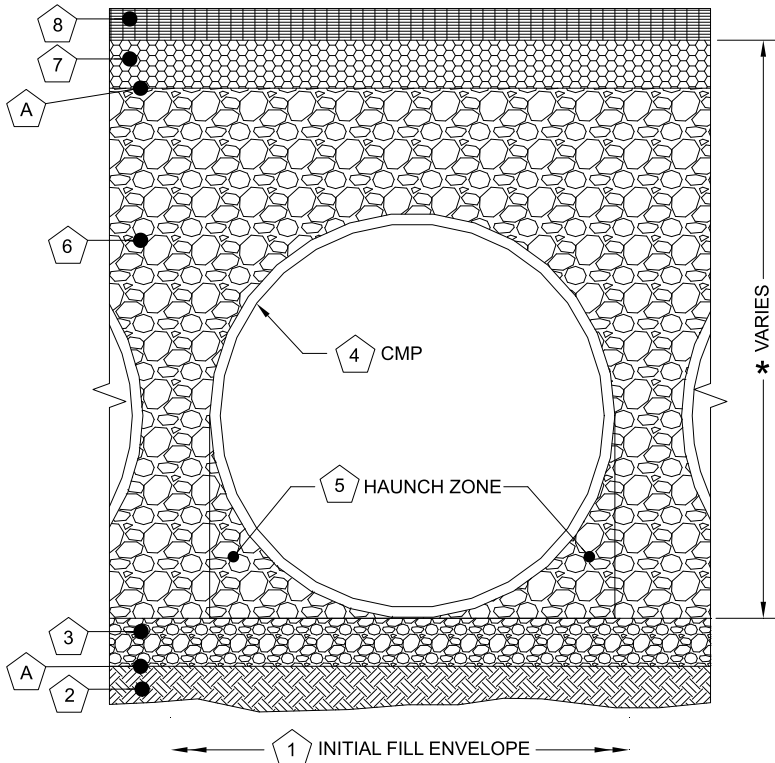


CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO28690 Maple Court
Drainage 2A
Ventura, CA
DETENTION SYSTEM

PROJECT No.: 19222	SEQ. No.: 28690	DATE: 3/17/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1



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.

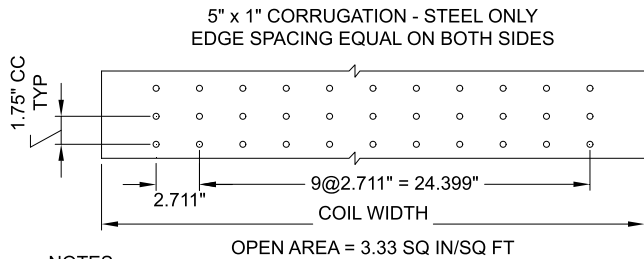
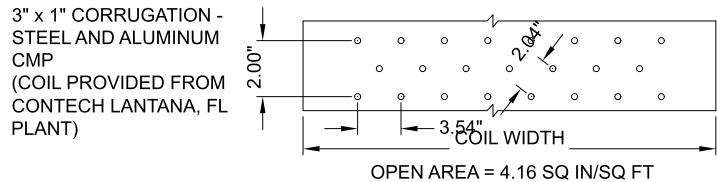
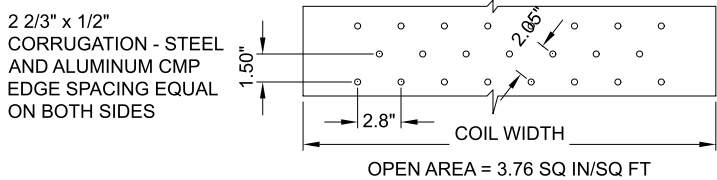
BACKFILL

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.

Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
Rigid or Flexible Pavement (if applicable)			
Road Base (if applicable)			
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.
Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of 1/2" - 2 1/2" 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"
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.
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.			

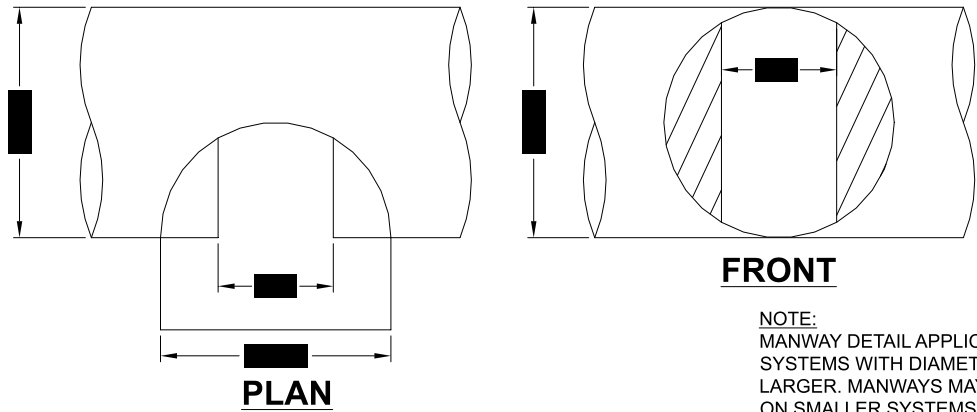


NOTES:

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

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.

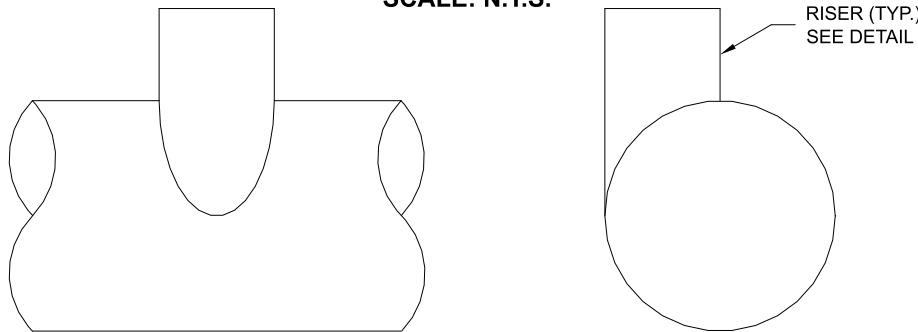


FRONT

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.



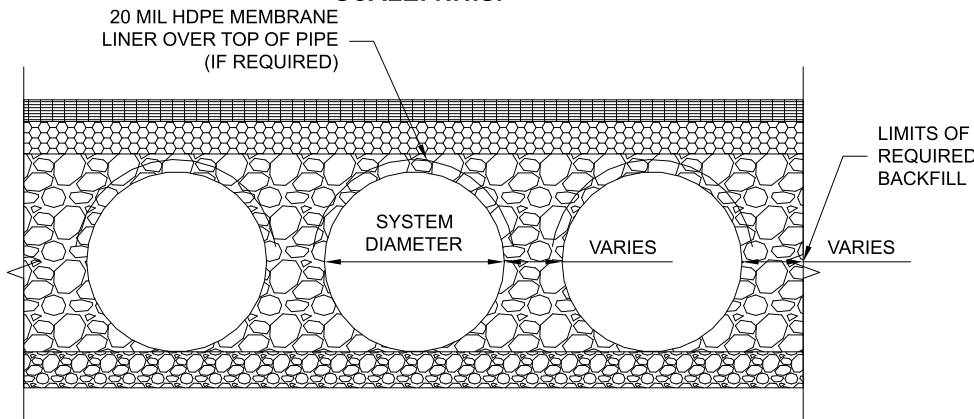
ELEVATION

END

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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CMP DETENTION SYSTEMS
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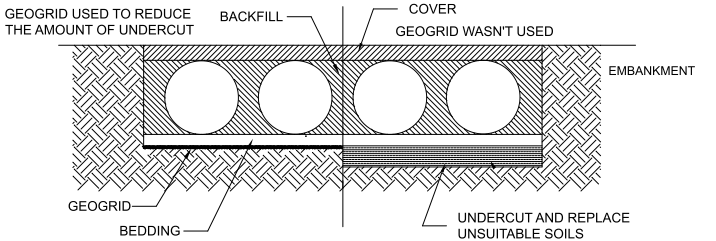
CMP DETENTION INSTALLATION GUIDE

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.

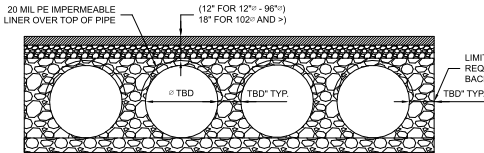


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

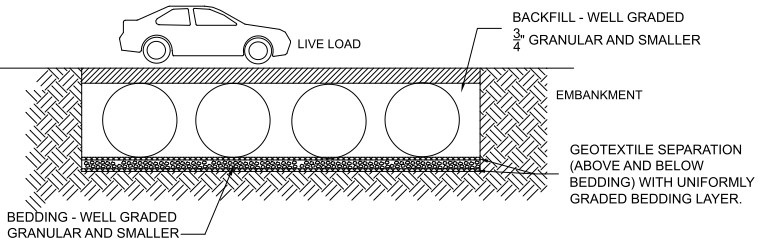
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

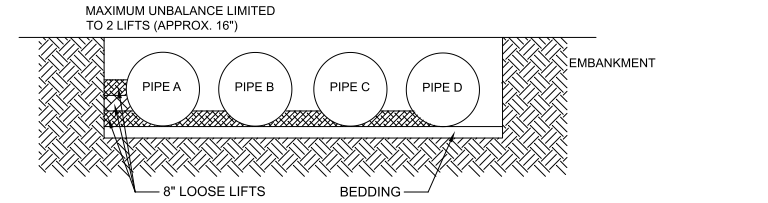
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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



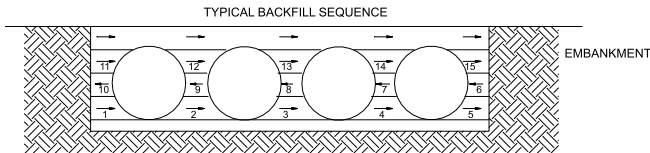
BACKFILL PLACEMENT

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

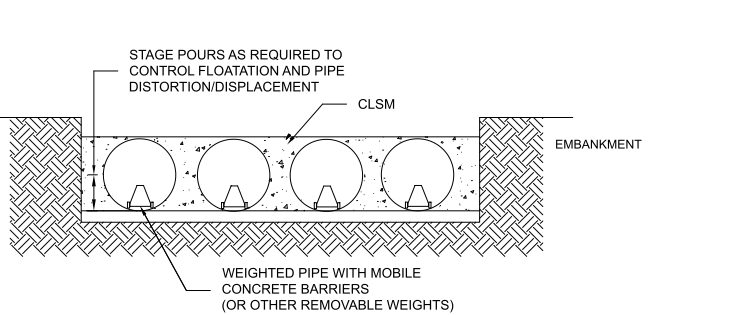


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

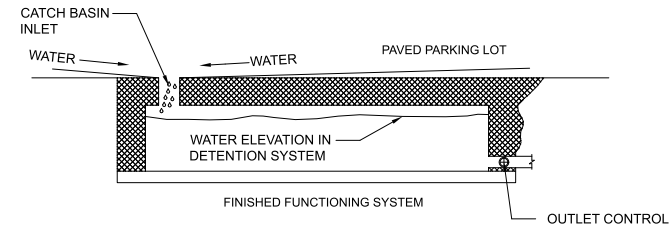


CONSTRUCTION LOADING

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.

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CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DY028690 Maple Court
Drainage 2A
Ventura, CA
DETENTION SYSTEM

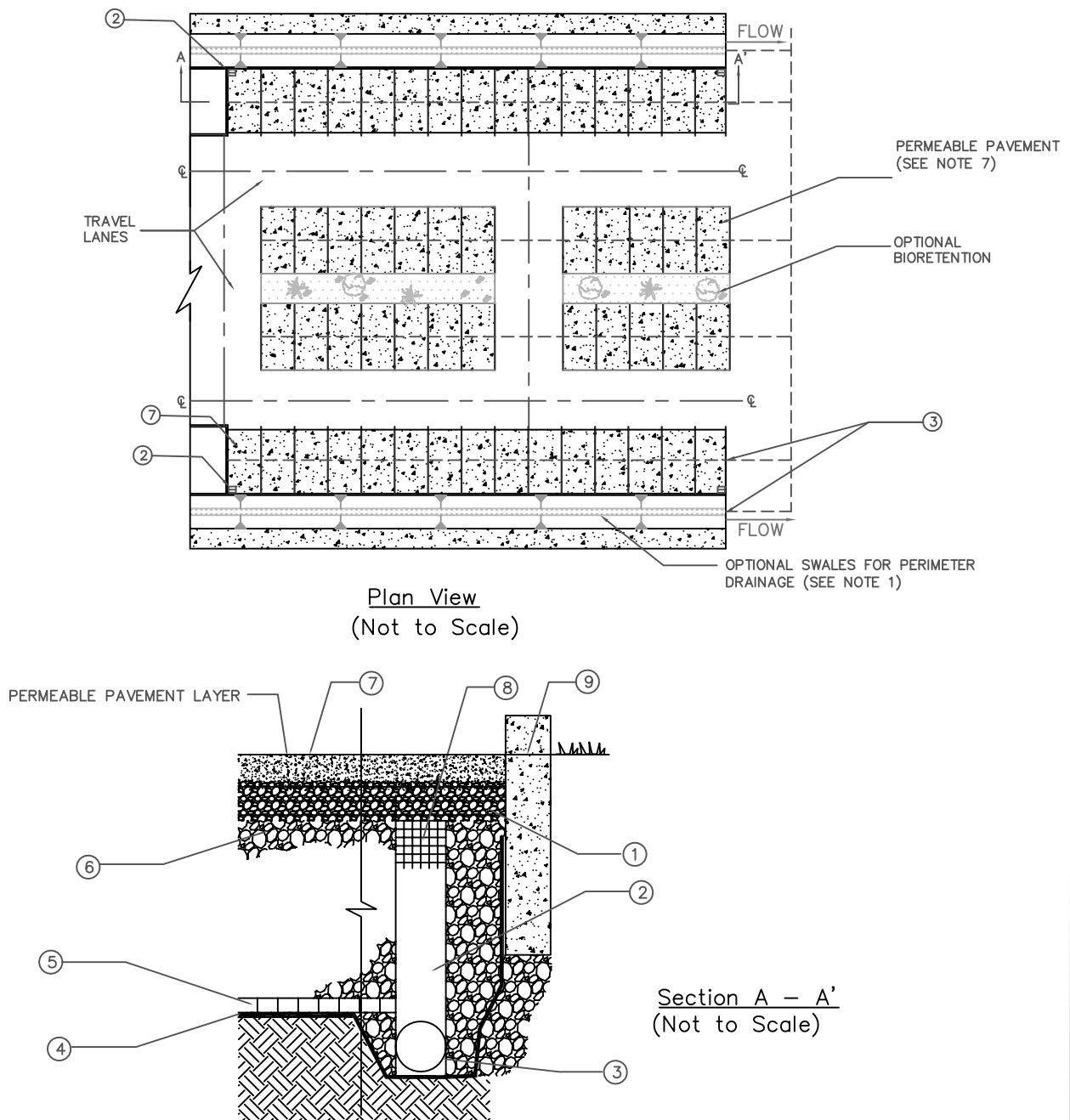
PROJECT No.: 19222	SEQ. No.: 28690	DATE: 3/17/2023
DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.: 1		

Sizing Worksheet

Designer: Stantec Consulting Services, Inc.		Permeable Pavement as Pre-treatment Calcs for Drainage Area 2A
Project Proponent:		
Date: March 14, 2023		
Project: Maple Court, Watershed 2A - Permeable Pavement as Pre-Treatment		
Location: City of Buenaventura		
Type of Vegetation:		
Outflow Collection:		
Step 1: Determine water quality design volume		
1-1. Enter Project area (acres), $A_{project}$	$A_{project} = 2.44$ acres	
1-2. Enter the maximum allowable percent of the Project area that may be effective impervious area (%) (refer to permit), ranges from 5-30%, $\%_{allowable}$	$\%_{allowable} = 5\%$	
1-3. Determine the maximum allowable effective impervious area (acres), $EIA_{allowable} = (A_{project}) * (\%_{allowable})$	$EIA_{allowable} = 0.288$ acres *5% of entire project site (5.69 acres)	
1-4. Enter Project impervious fraction, Imp (e.g. 60% = 0.60)	$Imp = 0.7115$	
1-5. Determine the Project Total Impervious area (acres), $TIA = A_{project} * Imp$	$TIA = 1.736$ acres	
1-6. Determine the total area from which runoff must be retained (acres), $A_{retain} = TIA - EIA_{allowable}$	$A_{retain} = 1.448$ acres	
1-7. Determine pervious runoff coefficient using <u>Table E-1</u> , C_p	$C_p = 0.05$	
1-8. Calculate runoff coefficient, $C = 0.95 * imp + C_p (1 - imp)$	$C = 0.6904$	
1-9. Enter design rainfall depth of the storm (in), P_i	$P_i = 0.75$ in	
1-10. Calculate rainfall depth (ft), $P = P_i / 12$	$P = 0.0625$ ft	
1-11. Calculate water quality design volume (ft ³),	$SQDV = 2,721$ ft ³	

$SQDV = 43560 \times C^* P^* A_{retain}$	2,721 cu-ft
Step 2: Determine the design percolation rate	
2-1. Enter measured soil percolation rate (0.5 in/hr minimum), $P_{measured}$	$P_{measured} = 0.8$ in/hr
2-2. Determine percolation rate correction factor, S_A based on suitability assessment (see Section 6 INF-5)	$S_A = 2.0$
Step 2: Determine the design percolation rate	
2-3. Determine percolation rate correction factor, S_B based on design (see Section 6 INF-5)	$S_B = 2.0$
2-4. Calculate combined safety factor, $S = S_A \times S_B$	$S = 4.0$
2-5. Calculate the design percolation rate (in/hr), $P_{design} = P_{measured}/S$	$P_{design} = 0.2$ in/hr
Step 3: Determine the Gravel Drainage Layer Depth	
3-1. Enter drawdown time (hours, 72 hrs max.), t	$t = 48$ hours
3-2. Calculate max. depth of runoff (ft) that can be infiltrated within the t , $d_{max} = P_{design} t / 12$	$d_{max} = 0.8$ ft
3-3. Enter the gravel drainage layer porosity, n (typically 32% or 0.32 for gravel)	$n = 0.32$
3-4. Select the gravel drainage layer depth (ft) such that $d_{max} \geq n \times l$	$l = 2.5$ ft
Step 4: Determine infiltrating surface area	
4-1. Enter gravel drainage layer porosity, n	$n = 0.32$
4-2. Enter depth of gravel drainage layer (ft), l	$l = 2.5$ ft
4-3. Enter the time to fill the gravel drainage layer with water (Use 2 hours for most designs), T	$T = 2$ hrs

4-4. Calculate infiltrating surface area (ft ³): $A = SQDV / ((TP_{design} / 12) + nl)$	 $A = 3,265 \text{ ft}^2$
Step 5: Provide conveyance capacity for clogging	
5-1. The permeable pavement must have an emergency overflow for storm events greater than the design and in the event the permeable pavement becomes clogged.	



NOTES:

- ① BEDDING COURSE SHALL BE 1½" TO 3" MIN THICKNESS (TYP NO. 8 AGGREGATE).
- ② OPTIONAL OVERFLOW PIPE(S) SHALL BE PROVIDED IF OVERFLOWS ARE NOT MANAGED VIA PERIMETER DRAINAGE TO SWALES, BIORETENTION OR STORM WATER CONVEYANCE SYSTEM INLETS.
- ③ CONNECT OUTFALL PIPES TO DOWNSTREAM STORMWATER CONVEYANCE SYSTEM. OUTFALL PIPES SHALL BE SLOPED TOWARDS COLLECTION SYSTEM.
- ④ SOIL SUBGRADE SHALL HAVE ZERO SLOPE.
- ⑤ INSTALL GEOTEXTILE OR CHOKING LAYER ON BOTTOM & SIDES OF OPEN-GRADED BASE FOR FULL AND PARTIAL INFILTRATION, OR AN IMPERMEABLE LINER FOR NO INFILTRATION.
- ⑥ OPEN-GRADED BASE. THICKNESS AND GRADATION VARIES WITH DESIGN. TYP. NO. 57 AGGREGATE OR 4" THICK NO. 57 OVER NO. 2 STONE SUBBASE. THICKNESS OF SUB-BASE VARIES WITH DESIGN.
- ⑦ PERMEABLE PAVEMENT INFILTRATIVE LAYER
- ⑧ OPTIONAL RIGID PLASTIC SCREEN FASTENED OVER OVERFLOW INLETS.
- ⑨ CURB/EDGE RESTRAINT WITH CUT-OUTS FOR OVERFLOW DRAINAGE TO PERIMETER BMPS, STORMWATER CONVEYANCE SYSTEM INLETS OR OPTIONAL OVERFLOW PIPES.
- ⑩ PARTIAL EXFILTRATION THROUGH THE SOIL. PERFORATED PIPES DRAIN EXCESS RUNOFF THAT CAN NOT BE ABSORBED BY SLOW-DRAINING SOIL.

Geosyntec
consultants

Figure 6-6: Permeable Pavement



A. G. I. G E O T E C H N I C A L, I N C.

16555 Sherman Way, Suite A - Van Nuys, CA 91406 - Office: (818) 785-5244 - Facsimile: (818) 785-6251

January 6, 2022

Project No. 31-5904-02

Skya Ventures, Inc.
18751 Ventura Blvd., 2nd Floor
Tarzana, CA 91356

Attention: Ms. Gelena Skya-Wasserman

Subject: **PERCOLATION TESTING RESULTS**
Proposed On-Site Storm Water Infiltration System for a
Proposed 325-Unit 4-Story Multi-Family Complex On-Grade
APNs: 079-0-101-395, 079-0-101-425, 079-0-101-445 and 079-0-101-455
3585 Maple Street and 255 & 260 Maple Court
Ventura, California

Reference: **SOILS ENGINEERING INVESTIGATION**
Proposed Two 4-Story Apartment Buildings On-Grade
APNs: 079-0-101-395, 079-0-101-425 and 079-0-101-445
3585 Maple Street and 255 & 260 Maple Court
Ventura, California
Prepared by A.G.I. Geotechnical, Inc., Project No.31-5904-00
dated November 24, 2021

Dear Ms. Skya-Wasserman:

This report has been prepared in order to present the results of the percolation tests for the proposed on-site storm water infiltration system at the subject site. The subject site is located on the north side of Maple Street, between Mills Road and College Drive in the city of Ventura, California. The percolation testing was performed at the four locations shown on the Plot Plan, Figure 2. The subject property is practically level and presently occupied by four 2-story office buildings surrounded by asphalt parking lots and trees. The site is bound on the north, west, and east by developed properties. The location of the site is shown on the Location Map, Figure 1.

Four test pits were hand dug to a depth of four feet. A one cubic foot hole (1' x 1' x 1') was excavated at the bottom of each of the test pits. The percolation testing was performed at a depth of four to five feet. The 1ft³ excavations were pre-soaked, refilled and percolation tests were performed in all the 1 ft³ excavations except in TP-4, in which, after 24 hours of pre-soak, there was standing water at the bottom of the excavation when we returned to perform the tests. Recorded water drop rates for TP-1, TP-2, and TP-3 are shown on the enclosed Percolation Test Results.

The percolation test results in TP-1 show that the stabilized infiltration rate is 0.4 in/hr; in TP-2 is 0.3 in/hr and in TP-3 is 0.6 in/hr. To arrive at the stabilized infiltration rates, we used the lowest six inches of the water column that percolated in the bottom of the pits and then a 2.0 factor of safety was applied.

According to the Ventura County Technical Guidance Manual for Stormwater Quality Control Measures, infiltration is feasible when infiltration rate is greater than 0.5 in/hr.; therefore, infiltration for this site is only feasible at or around the location of TP-3.

The on-site soils below five feet consist of clayey sands and lean clays in a slightly moist and medium dense or stiff condition which are not susceptible to hydroconsolidation. No groundwater was encountered in the test pits to the depth explored of five feet below existing ground surface, however, groundwater was encountered in the previous exploratory borings which were drilled on August 5, 2021 and August 25 and 26, 2021 at depths ranging from 47 to 56 feet below the existing ground surface. According to the "Seismic Hazard Evaluation of the Saticoy 7.5-Minute Quadrangle, Ventura County, California" dated 2003 by the Department of Conservation - Division of Mines and Geology, historically highest groundwater level has been about ten feet from the ground surface.

The upper on-site soils in the area of TP-3 are sufficiently permeable to allow for the construction of a properly functioning infiltration facility. Based on the soils present at the site to the depths explored, it is our opinion that the infiltrated stormwater will move in a vertical direction with no potential for creating perched water conditions. The infiltration facilities shall be a minimum of ten feet from any foundations and ten feet from private property lines. **Infiltration in compacted fill is not allowed.** Provided that the infiltration facilities are located a minimum of ten feet from any foundations, the infiltration would not result in distress to the existing or adjacent structures due to expansive soils. **When prepared, this office shall review the infiltration plans and specifications.**

If you have any questions regarding the information presented in this report, please contact this office.

Respectfully submitted,
A.G.I. GEOTECHNICAL, INC.

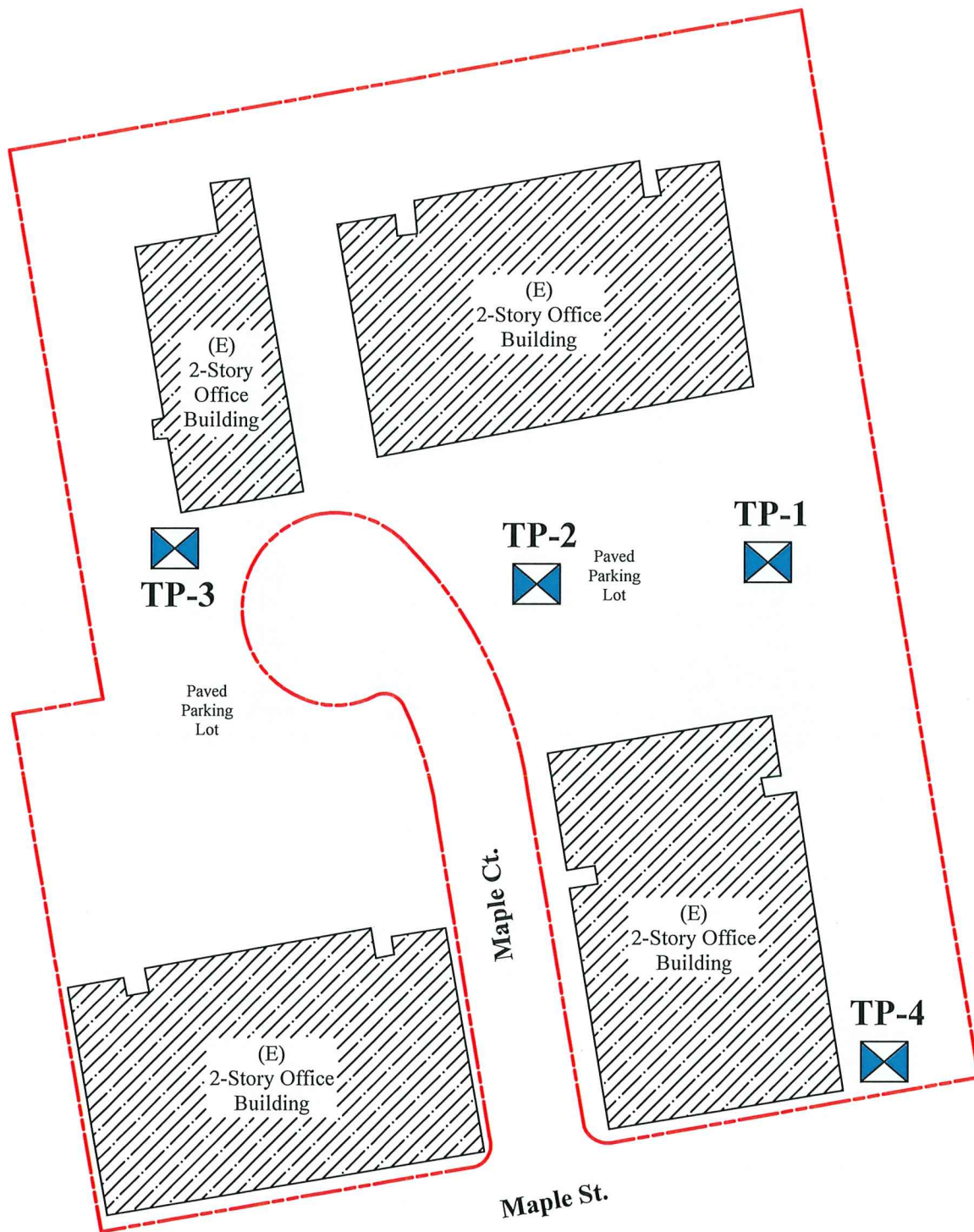

Bruce Smith, R.G.E. 2673
Senior Engineer



MBS:wb

Distribution: (3) Skya Ventures, Inc.

Enclosures: Location Map, Figure 1
Plot Plan, Figure 2
Percolation Test Reports
Quadrangle Location Map
Groundwater Map



EXPLANATION

TP-1 Approximate Location of

☒ Square Seepage Pit

Scale 1" = 100'

FIGURE 2



A.G.I. GEOTECHNICAL, INC.

Engineering Geology • Geotechnical Engineering

16555 Sherman Way, Ste. A • Van Nuys, CA 91406
(818) 785-5244 • Fax (818) 785-6251

PLOT PLAN

Maple St. & Maple Ct., Ventura

PROJECT NO. 31-5904-02

DATE 01-2022

PREPARED BY WFB

APPROVED BY MBS

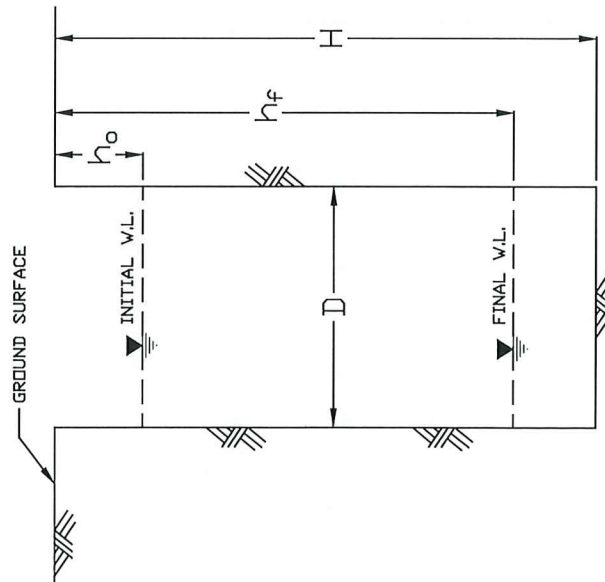
Percolation Test Report (Square Seepage Pit)

Skya Ventures, Inc.
Ventura, California

Pit No. TP-1
Pit Sides, D (ft) 1.0
Pit Depth, H (ft) 1.0

Design Infiltration Rate 0.4 (in/hr) F.O.S.= 2.0

Date	Time	Depth to Water, h (ft)	Elapsed Time, t (min)	Infiltration Volume, V (ft ³)	Infiltration Volume, V (gal)	Infiltration Area, A (ft ²)	Infiltration Rate, k			
							(ft/min)	(ft/day)	(in/hr)	(cm/sec)
12/16/21	8:44:21	0.000	0.00	0.000	0.000	5.000	#N/A	#N/A	#N/A	#N/A
12/16/21	8:51:03	0.083	6.70	0.083	0.623	4.833	0.00257	3.7	1.9	1.3E-03
12/16/21	8:58:20	0.167	13.98	0.083	0.623	4.500	0.00254	3.7	1.8	1.3E-03
12/16/21	9:11:51	0.250	27.50	0.083	0.623	4.167	0.00148	2.1	1.1	7.5E-04
12/16/21	9:35:15	0.333	50.90	0.083	0.623	3.833	0.00093	1.3	0.7	4.7E-04
12/16/21	9:59:22	0.417	75.02	0.083	0.623	3.500	0.00099	1.4	0.7	5.0E-04
12/16/21	10:22:23	0.500	98.03	0.083	0.623	3.167	0.00114	1.6	0.8	5.8E-04
12/16/21	10:43:23	0.583	119.03	0.083	0.623	2.833	0.00140	2.0	1.0	7.1E-04
12/16/21	11:10:51	0.667	146.50	0.083	0.623	2.500	0.00121	1.7	0.9	6.2E-04
12/16/21	12:11:20	0.750	206.98	0.083	0.623	2.167	0.00064	0.9	0.5	3.2E-04
12/16/21	13:05:16	0.833	260.92	0.083	0.623	1.833	0.00084	1.2	0.6	4.3E-04
12/16/21	14:20:25	0.917	336.07	0.083	0.623	1.500	0.00074	1.1	0.5	3.8E-04
12/16/21	15:28:47	1.000	404.43	0.083	0.623	1.167	0.00104	1.5	0.8	5.3E-04



Square Pit
 $k = 10771 \cdot V / At$

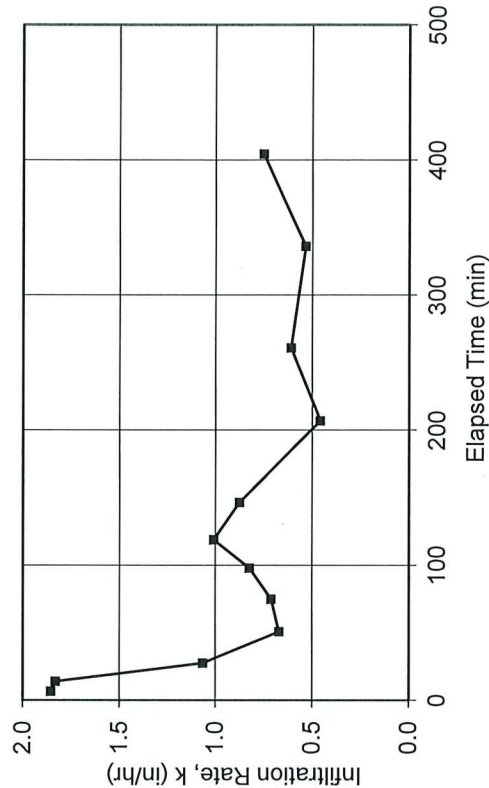
Where:

k = Infiltration Rate, k (gpd/ft²)

V = Infiltration Volume, V (ft³) = $D^2 \cdot (h_f - h_o)$

A = Infiltration Area, A (ft²) = $D^2 + 2 \cdot D \cdot (2 \cdot h_f - h_o)$

t = Elapsed Time, t (minutes) = $t_f - t_o$



Proj No.: 31-5904-02 Date: Jan. 2022

Calc By: WFB

Appr By: MBS



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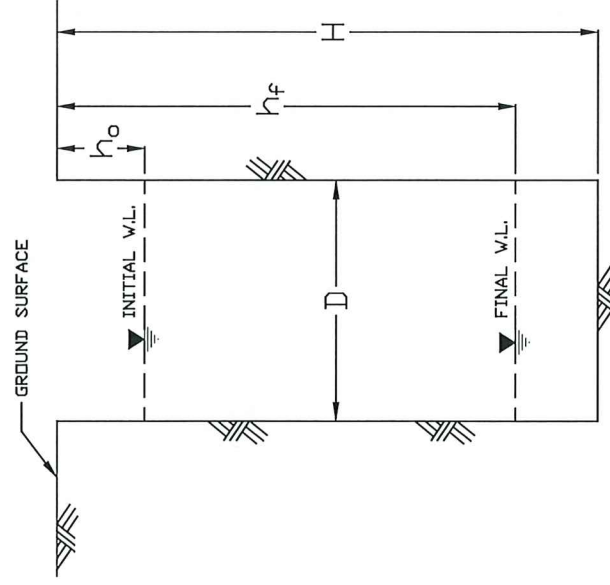
Percolation Test Report (Square Seepage Pit)

Skya Ventures, Inc.
Ventura, California

Pit No. TP-2
Pit Sides, D (ft) 1.0
Pit Depth, H (ft) 1.0

Design Infiltration Rate 0.3 (in/hr) F.O.S.= 2.0

Date	Time	Depth to Water, h (ft)	Elapsed Time, t (min)	Infiltration Volume, V (ft ³)	Infiltration Volume, V (gal)	Infiltration Area, A (ft ²)	Infiltration Rate, k				
							(ft/min)	(ft/day)	(in/hr)	(cm/sec)	(gpd/ft ²)
12/16/21	7:00:00	0.000	0.00	0.000	0.000	5.000	#N/A	#N/A	#N/A	#N/A	#N/A
12/16/21	7:06:04	0.083	6.07	0.083	0.623	4.833	0.00284	4.1	2.0	1.4E-03	30.6
12/16/21	7:13:35	0.167	13.58	0.083	0.623	4.500	0.00246	3.5	1.8	1.3E-03	26.5
12/16/21	7:23:32	0.250	23.53	0.083	0.623	4.167	0.00201	2.9	1.4	1.0E-03	21.7
12/16/21	7:34:24	0.333	34.40	0.083	0.623	3.833	0.00200	2.9	1.4	1.0E-03	21.5
12/16/21	7:47:30	0.417	47.50	0.083	0.623	3.500	0.00182	2.6	1.3	9.2E-04	19.6
12/16/21	8:15:55	0.500	75.92	0.083	0.623	3.167	0.00093	1.3	0.7	4.7E-04	10.0
12/16/21	8:44:14	0.583	104.23	0.083	0.623	2.833	0.00104	1.5	0.7	5.3E-04	11.2
12/16/21	9:18:57	0.667	138.95	0.083	0.623	2.500	0.00096	1.4	0.7	4.9E-04	10.3
12/16/21	10:03:32	0.750	183.53	0.083	0.623	2.167	0.00086	1.2	0.6	4.4E-04	9.3
12/16/21	10:49:46	0.833	229.77	0.083	0.623	1.833	0.00098	1.4	0.7	5.0E-04	10.6
12/16/21	12:00:54	0.917	300.90	0.083	0.623	1.500	0.00078	1.1	0.6	4.0E-04	8.4
12/16/21	13:14:25	1.000	374.42	0.083	0.623	1.167	0.00097	1.4	0.7	4.9E-04	10.5



Square Pit
 $k = 10771 * V / At$

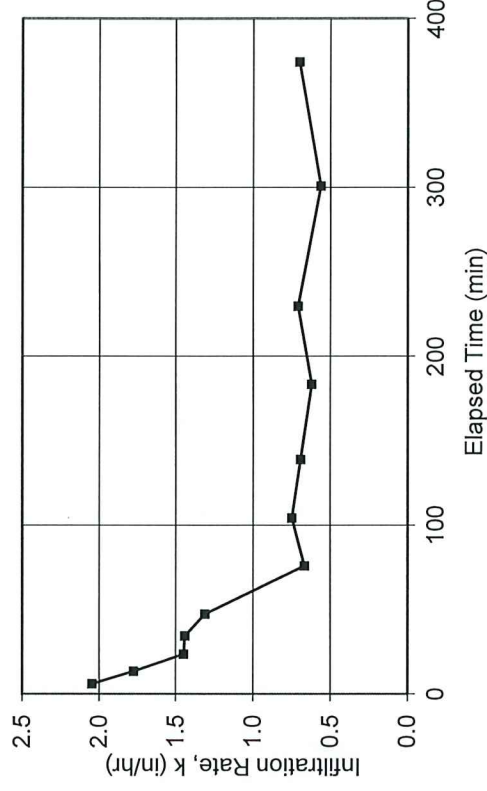
Where:

k = Infiltration Rate, k (gpd/ft²)

V = Infiltration Volume, V (ft³) = $D^2 * (h_f - h_o)$

A = Infiltration Area, A (ft²) = $D^2 + 2 * D * (2 * H - h_f - h_o)$

t = Elapsed Time, t (minutes) = $t_f - t_o$



Proj No.: 31-5904-02 Date: Jan. 2022
Calc By: WFB
Appr By: MBS



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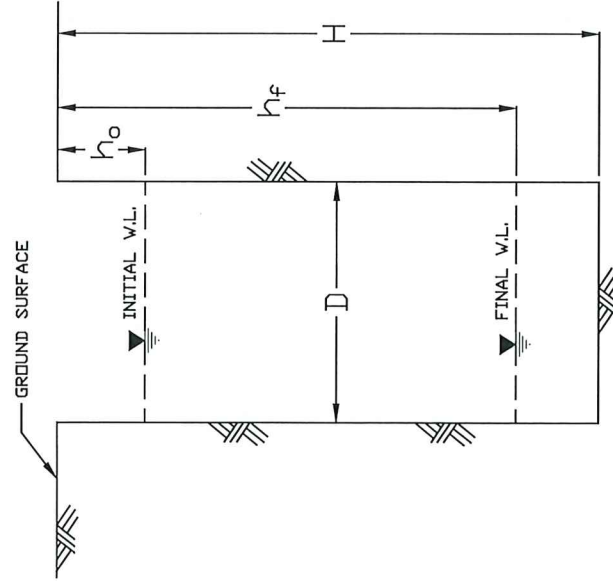
Percolation Test Report (Square Seepage Pit)

Skya Ventures, Inc.
Ventura, California

Pit No.	TP-3
Pit Sides, D (ft)	1.0
Pit Depth, H (ft)	1.0

Design Infiltration Rate	0.6 (in/hr)	F.O.S.=	2.0
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Date	Time	Depth to Water, h (ft)	Elapsed Time, t (min)	Infiltration Volume, V (ft ³)	Infiltration Volume, V (gal)	Infiltration Area, A (ft ²)	Infiltration Rate, k			
							(ft/min)	(ft/day)	(in/hr)	(cm/sec)
12/16/21	11:28:23	0.000	0.00	0.000	0.000	5.000	#N/A	#N/A	#N/A	#N/A
12/16/21	11:34:51	0.083	6.47	0.083	0.623	4.833	0.00267	3.8	1.9	1.4E-03
12/16/21	11:41:26	0.167	13.05	0.083	0.623	4.500	0.00281	4.1	2.0	1.4E-03
12/16/21	11:54:42	0.250	26.32	0.083	0.623	4.167	0.00151	2.2	1.1	7.7E-04
12/16/21	12:04:05	0.333	35.70	0.083	0.623	3.833	0.00232	3.3	1.7	1.2E-03
12/16/21	12:15:16	0.417	46.88	0.083	0.623	3.500	0.00213	3.1	1.5	1.1E-03
12/16/21	12:34:26	0.500	66.05	0.083	0.623	3.167	0.00137	2.0	1.0	7.0E-04
12/16/21	12:51:46	0.583	83.38	0.083	0.623	2.833	0.00170	2.4	1.2	8.6E-04
12/16/21	13:07:56	0.667	99.55	0.083	0.623	2.500	0.00206	3.0	1.5	1.0E-03
12/16/21	13:21:09	0.750	112.77	0.083	0.623	2.167	0.00291	4.2	2.1	1.5E-03
12/16/21	14:21:00	0.833	172.62	0.083	0.623	1.833	0.00076	1.1	0.5	3.9E-04
12/16/21	15:26:26	0.917	238.05	0.083	0.623	1.500	0.00085	1.2	0.6	4.3E-04
12/16/21	16:30:36	1.000	302.22	0.083	0.623	1.167	0.00111	1.6	0.8	5.7E-04



Square Pit
 $k = 10771 * V / At$

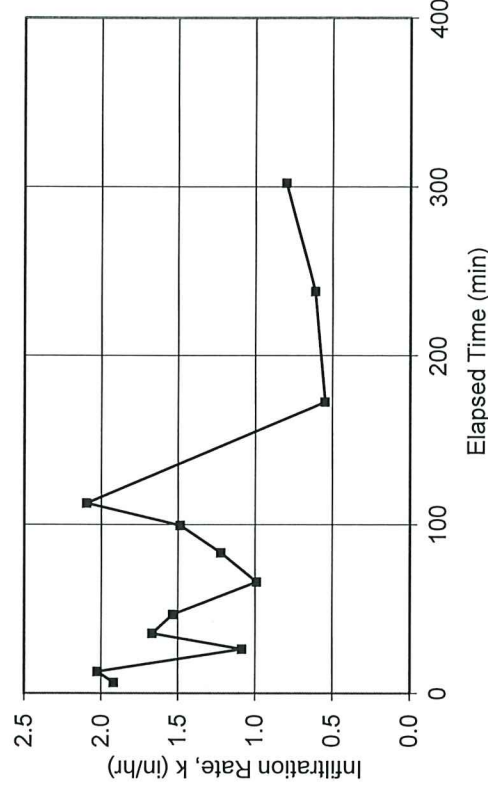
Where:

k = Infiltration Rate, k (gpd/ft²)

V = Infiltration Volume, V (ft³) = $D^2 * (h_i - h_o)$

A = Infiltration Area, A (ft²) = $D^2 * (2 * H - h_i - h_o)$

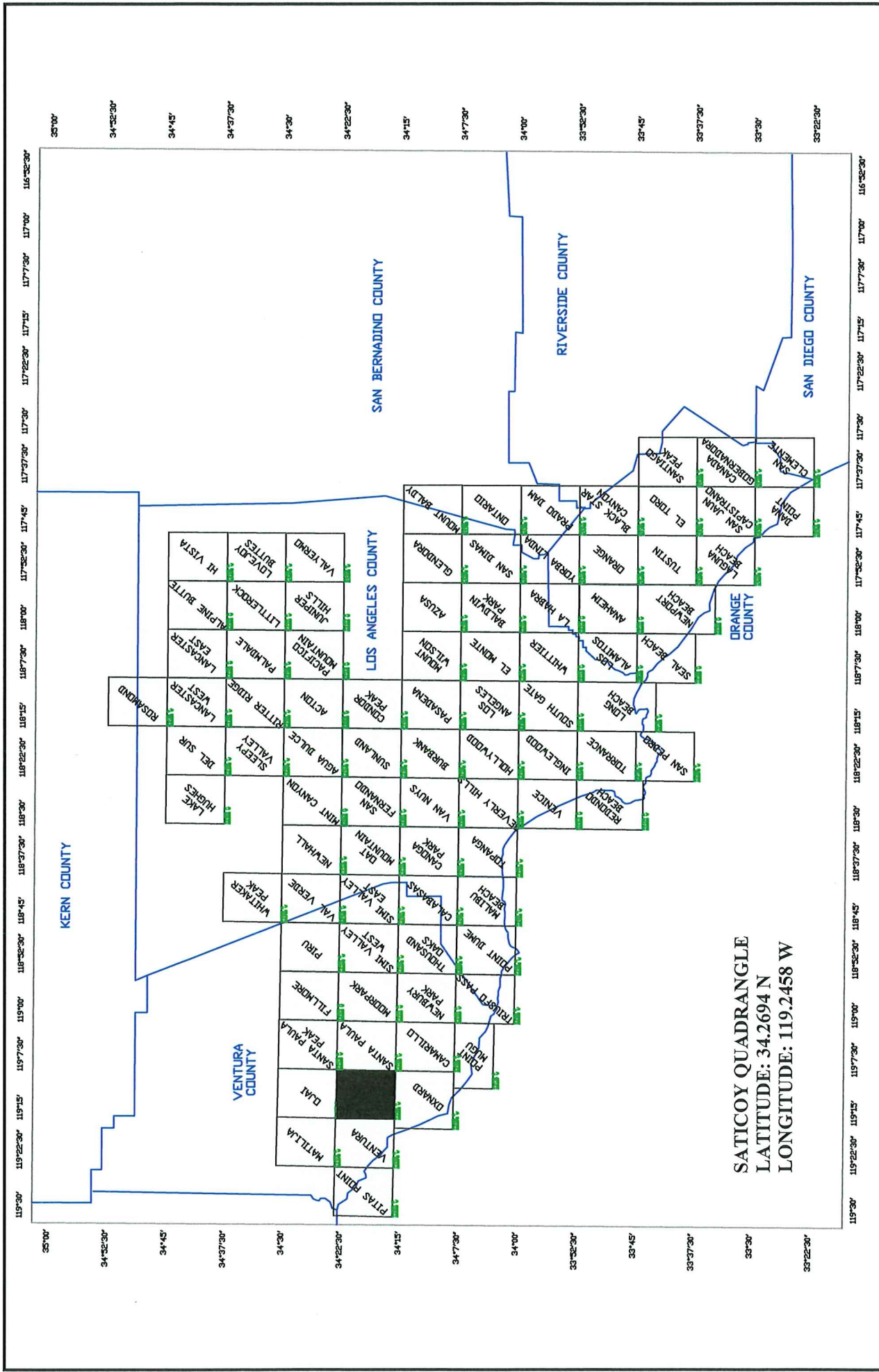
t = Elapsed Time, t (minutes) = $t_i - t_o$



Proj No. :	31-5904-02	Date :	Jan. 2022
Calc By :	WFB		
Appr By :	MBS		



A.G.I. GEOTECHNICAL, INC.



 A.G.I. GEOTECHNICAL, INC. Engineering Geology • Geotechnical Engineering 16555 Sherman Way, Unit A • Van Nuys, CA 91406 (818) 785-5244 • Fax (818) 785-6251		QUADRANGLE LOCATION MAP Maple St. & Maple Ct., Ventura		PROJECT NO.	31-5904-02
				DATE	01-2022
				PREPARED BY	WFB
				APPROVED BY	MBS

VENTURA COUNTYWIDE STORMWATER QUALITY PROGRAM POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN (PCSMP)

INSTRUCTIONS

- ▶ The following set of spreadsheets are intended to assist project applicants in meeting the Planning and Land Development requirements contained in Part 4, Section E of the Los Angeles Regional Water Quality Control Board's municipal separate storm sewer system (MS4) permit (Order R4-2010-0108) for new development and redevelopment projects.
- ▶ The spreadsheets are not intended to replace the Technical Guidance Manual (TGM). The TGM is referenced in multiple locations and should be consulted for additional guidance on complying with the Planning and Land Development requirements. Specifically, definitions and details on site assessment and BMP selection can be found in the TGM.
- ▶ The 0.75-inch storm event (TGM Methodology #3) is used as the stormwater quality design volume (SQDV) throughout the workbook; applicants should not use this workbook if using a methodology other than Methodology #3.
- ▶ Project applicants should fill out each applicable spreadsheet; when complete, make sure to print "entire workbook."
- ▶ A few additional tips:
 - All green boxes denote a numeric input.
 - Blue cells indicate that text should be included.
 - Follow prompts where applicable.
 - When finished filling out the applicable steps, go to "Submittal List" for additional required project submittals.
 - The spreadsheet is locked, restricting input only to certain cells. Unlocking the spreadsheet is not recommended and may lead to errors, but if necessary, the password to unlock all sheets is "PCSMP" (case sensitive).

**VENTURA COUNTYWIDE STORMWATER QUALITY PROGRAM
POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN (PCSMP)**

FOR

255-290 Maple Court

PARCEL #: 079-0-101-395, 079-0-101-425, 079-0-101-445, 079-0-101-455

Project Name: 255-290 Maple Court

Preparation/Revision Date: 12/6/2022

Prepared for:

Name of Owner/Developer: SKYA Ventures
Stress Address: 18781 Ventura Blvd.
City, State, Zip Code: Tarzana, CA 91356
Telephone: 818 388-6807

Prepared by:

Name and Title of Preparer: Lusine Nidelian, Associate, Community Development
Company Name: Stantec Consulting Services Inc.
Stress Address: 300 North Lake Avenue, Suite 400
City, State, Zip Code: Pasadena CA 91101-4169
Telephone: 213 269-4201

I hereby certify that the information provided in this Application is correct.

Application Prepared by: Shawn Blanton, Stantec Consulting Services Inc.
Print Name and Firm

Signed _____
Signature of Project Engineer in the Firm Named Above

Title Project Manager
Affix Professional registration stamp of the person named above with signature and expiration date

Project Name: 255-290 Maple Court

STEP 1: DETERMINE PROJECT APPLICABILITY

Instructions:

For new development projects, answer yes, no, or NA to questions (1) - (10) below.

For redevelopment projects, answer yes, no, or NA to questions (11) - (13) below.

NEW DEVELOPMENT PROJECTS	
Does the new development project fall within categories (1) - (10) below?	
Project Type and/or Characteristics	Y/N/NA
1) Development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area →go to Step 2	Y
2) Industrial parks with 10,000 square feet or more of total altered surface area →go to Step 2	N
3) Commercial strip malls with 10,000 square feet or more of impervious surface area →go to Step 2	N
4) Retail gasoline outlets with 5,000 square feet or more of total altered surface area →go to Step 2	N
5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of total altered surface area →go to Step 2	N
6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces →go to Step 2	N
7) Streets, roads, highways, and freeway construction of 10,000 square feet or more of impervious surface area → go to Roadway Projects	N
8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) of 5,000 square feet or more of total altered surface area →go to Step 2	N
9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious surface area →go to Step 2	N
10) Single-family hillside homes (see Section 2 of the TGM for specific requirements) →go to SF Hillside	N

Project Name: 255-290 Maple Court

PROJECT APPLICABILITY, CONT.

REDEVELOPMENT PROJECTS	
<i>For redevelopment projects that fall within categories (1) through (9) above, and that conduct land-disturbing activities that result in the creation, or addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site, answer questions 11-13 below. Existing single-family dwelling and accessory structures are exempt from redevelopment projects unless such projects create, add, or replace 10,000 square feet of impervious surface area.</i>	
Project Type and/or Characteristics	Y/N/NA
11) Projects where redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development <u>was not</u> subject to the post development stormwater quality control requirements of Board Order 00-108, these projects must mitigate the entire redevelopment project area →go to Step 2	Y
12) Projects where redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development <u>was</u> subject to the post development stormwater quality control requirements of Board Order 00-108, the project must mitigate only the altered portion of the redevelopment project area and not the entire project area →go to Step 2	N/A
13) Projects where redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development these projects must mitigate only the altered portion of the redevelopment project area and not the entire project area →go to Step 2	N/A

Project Name:

255-290 Maple Court

STEP 2: ASSESS SITE CONDITIONS

Provide an assessment of the project site using the following tables

New Development Project General Characteristics

General Project Characteristics	Area (acres)
Total Project Site Area	
Total Disturbed Area	
Total Existing (Pre-Project) Impervious Area	
Post-Project Impervious Area [1]	
Area of Green Roof (ET-1) [1]	
Area Draining to Hydrologic Source Controls (ET-2) [1]	
Revised Post-Project Impervious Area	0.00
Project Imperviousness (%)	

Redevelopment Project General Characteristics

General Project Characteristics	Area (acres)
Total Project Site Area	5.75
Total Altered Area [6]	5.75
Total Existing (Pre-Project) Impervious Area	5.18
Was existing (pre-project) impervious area subject to post-development stormwater quality control requirements? [2]	N
Amount of Existing Impervious Area Altered [3]	5.18
Amount of Impervious Area Added	-0.76
% Alteration of Existing Impervious Area [4]	85.31%
Post-Project Impervious Area (Impervious Area to be Mitigated) [1], [4]	4.42
Area of Green Roof (ET-1) [1]	
Area Draining to Hydrologic Source Controls (ET-2) [1]	
Revised Post-Project Impervious Area	4.42
Project Imperviousness (%) [5]	76.78%

Project Name:

255-290 Maple Court

Project Description

Briefly describe project:

Mixed-use project consisting of 350 residential units and 4,850 sf of commercial space on a 5.75 AC site.

Describe current and proposed zoning and land use designation:

C1-A

Describe topography of project area. Identify low and high points and the location of steep slopes (provide a range of grades):

There's an existing 12 feet grade difference along the eastern property line and about 11 feet along the western property line.

Describe the site's soil types (A, B, C, D) and geological conditions

Refer to Soils report and percolation test addendum letter for additional information.

Attach soil type information

Project Name:255-290 Maple Court**Project Description, cont'd**

Describe the site's groundwater conditions (e.g. depth to seasonal high groundwater):

The groundwater depth ranging from 47 to 56 feet below existing grade.

Is there offsite drainage on the site? If so, identify the location(s) and source(s) of offsite drainage and the volume of water running onto the site:

No, there is no offsite drainage.

Describe any existing utilities within the project area that would limit the possible locations of certain BMPs:

There aren't any existing site utilities to limit the possibilities to propose BMPs

Describe any environmentally sensitive areas (e.g. riparian areas, wetlands) within the project area:

There aren't any environmentally sensitive areas within the project area.

Geotechnical considerations:*Does the site contain any of the following characteristics:***Y/N/NA**

Collapsible Soil

N

Expansion Soil

N

Potential for seismically-induced soil liquefaction

N

Additional considerations:

Attach relevant geotechnical information

Project Name:

255-290 Maple Court

STEP 2: POLLUTANTS OF CONCERN

Pollutants of Concern (See Section 3.3 of TGM)

Activity / Potential Land Uses	Potential Pollutant*								
	Sediment	Nutrients	Metals	Pesticides	Oxygen Demanding Substances	Toxic Organics	Oil & Grease	Bacteria	Trash and Debris
Mixed Use	x	x	x	x	x		x	x	x
Other [fill in if necessary]									

*Denote potential pollutant with "x"

Receiving Waterbody Listings (see Section 3.3. of TGM)

Receiving Waterbody (watershed indicated in parentheses)	Constituent Group [7]	Distance to Project (ft)
Ventura Harbor; Ventura Keys, Ventura Marina Jetties (Ventura Coastal)	Bacteria, Pesticides	8700.00
Other [fill in if necessary]		

[1] Applicant should enter post-project impervious cover prior to accounting for green roof and hydrologic source control (HSC) credits. Volume reduction provided by green roofs and HSCs are accounted for implicitly in the sizing calculations for BMPs by assuming the roof area covered by a green roof or the area draining to a HSC is pervious rather than impervious when calculating the runoff coefficient for the site. Green roofs and HSCs are not required to be considered for all project locations and types. In order to obtain credit, Green Roofs and HSCs must be designed as specified in the TGM. Additional detail on Green Roofs (ET-1) and HSCs (ET-2) can be found in Section 6 of the TGM.

[2] Land-disturbing activity that results in the creation or addition or replacement of less than 5,000 square feet of impervious surface area on an already developed site, or that results in a decrease in impervious area which was subject to the post development stormwater quality control requirements of Board Order 00-108, is not subject to mitigation unless so directed by the local permitting agency

[3] Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of the facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways, that does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Agencies' flood control, drainage, and wet utilities projects that maintain original line and grade or hydraulic capacity are considered routine maintenance. Redevelopment also does not include the repaving of existing roads to maintain original line and grade.

[4] "% Alteration of Existing Impervious Area" determines the 50% threshold which is key in determining portion of site that must comply with post-construction requirements - see Step 1 redevelopment categories for more detail. The amount of "Post Project Impervious Area" that must adhere to post-construction requirements is dependant on 50% threshold

[5] "Project Imperviousness" is calculated using the "Total Project Area" except when redevelopment projects that must mitigate only the altered portion of the redevelopment project area. In this case, the "Total Disturbed Area" is used to calculate "Project Imperviousness"

[6] For the purposes of this calculation, Total Altered Area shall mean any area that is altered as a result of land disturbance, such as clearing, grading, grubbing, and excavation. This excludes areas used exclusively for temporary stockpiling.

[7] If a waterbody is listed for "toxicity" and the cause and/or contribution to toxicity is known, then the constituent group known to contribute to toxicity are listed here (in lieu of listing "toxicity")

Project Name: 255-290 Maple Court

STEP 3: APPLY SITE DESIGN PRINCIPLES AND TECHNIQUES

Provide a brief description of site design principles and techniques included within the proposed project site.

Site Design Measures [1]	Included? Y/N/NA	Brief Description of the Site Design Measure
Site Planning	Y	Site was designed to provide more landscape areas and permeable pavement to improve the site conditions.
Protect and Restore Natural Areas	N/A	Existing site was completely developed.
Minimize Land Disturbance	N/A	Existing site was completely developed.
Minimize Impervious Cover	Y	The proposed site has added more landscaping and permeable driveways.
Apply LID at Various Scales	Y	Post construction BMPs have been proposed, such as drywell, permeable pavements, underground infiltration trench, which will address the water quality and quantity of the site.
Implement Integrated Water Resource Management Practices	Y	The proposed site has taken in consideration of the water resource management practices, by increasing the site's impermeable cover, added water quality and quantity BMPs.

[1] Refer to Section 4.2 - 4.7 of the TGM for applicable Design Criteria.

Project Name: 255-290 Maple Court

STEP 4: APPLY SOURCE CONTROL MEASURES

Provide a brief description of the source control measures included in the proposed project site.

Site-Specific Source Control Measures[1]	Included? Y/N/NA	Brief Description of the Source Control Measure
S-1: Storm Drain Message and Signage	Y	All the storm drain catch basins will have proper signage to inform the public that dumping of waste into storm drain inlets is prohibited.
S-2: Outdoor Material Storage Area Design	Y	No Outdoor material Storage area is proposed.
S-3: Outdoor Trash Storage and Waste Handling Area Design	Y	Each building will contain its individual enclosed recycling facilities with adequate space for waste management
S-4: Outdoor Loading/Unloading Dock Area Design	N/A	There is no loading dock at the proposed site.
S-5: Outdoor Repair/Maintenance Bay Design	N/A	Outdoor repair/ maintenance Bay will not be allowed.
S-6: Outdoor Vehicle /Equipment/ Accessory Washing Area Design	N/A	Washing vehicle at the site will not be allowed
S-7: Fueling Area Design	N/A	Fueling will not be allowed
S-8: Proof of Control Measure Maintenance	Y	There will be O&M prepared for the site. Onsite Treatment Control Measures will be maintained by the owner/operator.

[1] Refer to Fact Sheets in Section 5 of the TGM for detailed information and design criteria

Project Name: 255-290 Maple Court

STEP 5: APPLY BMPS TO REDUCE EIA TO $\leq 5\%$

New development and redevelopment projects (Categories 1-6, 8, and 9) must reduce EIA to $\leq 5\%$

Step 5a: Calculate Allowable EIA

EIA is defined as impervious area that is hydrologically connected via sheet flow over a hardened conveyance or impervious surface without any intervening medium to mitigate flow volume.

The allowable "EIA" for a project is calculated as:

$$EIA_{\text{allowable}} = (A_{\text{project}}) * (\%_{\text{allowable}}) \quad \text{Equation 2-1}$$

Where:

$EIA_{\text{allowable}}$ = The maximum impervious area from which runoff can be treated and discharged offsite (and not retained onsite) [acres]

A_{project} = The total project area [acres] [1]

$\%_{\text{allowable}}$ = 5 percent

Input:		Units
A_{project} [1]	5.75	Acres
$\%_{\text{allowable}}$	5.00%	Percent
$EIA_{\text{allowable}}$	0.29	Acres

Step 5b: Calculate Impervious Area to be Retained

The impervious area from which runoff must be retained onsite is the total impervious area minus the EIA allowable, which should be calculated as follows:

$$A_{\text{retain}} = TIA - EIA_{\text{allowable}} = (IMP * A_{\text{project}}) - EIA_{\text{allowable}} \quad \text{Equation 2-2}$$

Where:

A_{retain} = the drainage area from which runoff must be retained [acres]

TIA = total impervious area [acres]

IMP = imperviousness of project area (%)

Input:		Units
Imperviousness	76.78%	
A_{project} [1]	5.75	Acres
$EIA_{\text{allowable}}$	0.29	Acres
A_{retain}	4.13	Acres

Project Name: 255-290 Maple Court

BMPS TO REDUCE EIA TO <=5%, CONT.

Step 5c: Calculate the Volume to be Retained (SQDV)

The runoff volume that is to be retained onsite should be calculated using Equation 2-3 below:

$$V_{\text{retain}} = C * (0.75/12) * A_{\text{retain}} \quad \text{Equation 2-3}$$

Where:

V_{retain} = The stormwater quality design volume (SQDV) that must be retained onsite [ac-ft]

C = runoff coefficient (equals 0.95 for impervious surfaces)

Input:		Units
C	0.95	
A_{retain}	4.13	Acres
V_{retain}	0.245	ac-ft
	79,857.0	gallons
	10,675.3	cu.ft.

Continue to Step 5d

Project Name: 255-290 Maple Court

STEP 5d: SELECT RETENTION BMPs

Select and size Retention BMPs to meet the 5% EIA Requirement. Retention BMPs include INF1-6, RWH-1, and ET 1 and 2. See TGM, Section 6 for more information.

Retention BMPs	Included? Y/N	Drainage Area Retained (acres) [2]	Drainage Area Runoff Coefficient	Volume Retained (SQDV) (ac-ft) [1],[2]	If not applicable, state brief reason
<i>Infiltration BMPs</i>					
INF-1: Infiltration Basin	Y	2.00	0.95	0.119	
INF-2: Infiltration Trench			0.95		
INF-3: Bioretention			0.95		
INF-4: Drywell	Y	2.13	0.95	0.126	
INF-5: Permeable Pavement			0.95		
INF-6: Proprietary Infiltration			0.95		
INF-7: Bioinfiltration			0.95		
<i>Rainwater Harvesting BMPs</i>					
RWH-1: Rainwater Harvesting			2		
TOTAL Volume Retained				0.245	ac-ft
				79,905.4	gallons
				10,681.7	cu.ft.
REMAINING Volume to meet 5% EIA requirement				0.000	ac-ft
				-48	gallons
				-6	cu.ft.

[1] SQDV Methodology #3 used here.

[2] If a Retention BMP is used more than once on a site (i.e., 2 Infiltration Trenches implemented on one site) then drainage area and volume retained shown here should be additive. A separate BMP sizing worksheet (see Appendix E of the TGM) should be submitted for each BMP.

If onsite Retention BMPs cannot feasibly be used to meet the 5% EIA Requirement, move onto Step 5e; if 5%EIA Requirement is met go to Step 7

	Y/N/NA
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A completed copy of the applicable "BMP Sizing Worksheet(s)" for the project's Retention BMPs from Appendix E of the TGM is included as an attachment. BMPs must be sized to meet the SQDV or SQDF (See Section 2 Step 7 of the TGM).

