

May 23, 2023

City of San Diego

Development Services Department
1222 First Ave., 5th Floor
San Diego, CA 92101

**SUBJECT: MERGE 56 - UNIT 10: LOTS 1, 2, 3, 4, 5 & 6, UNIT 4: LOTS 3 & 4 – PDP #2
(PRJ-1059203)
ADDENDUM LETTER TO MERGE 56 ONSITE UNIT 1 AND 2 STORM WATER
QUALITY MANAGEMENT PLAN**

This letter is to address the proposed changes to the previously approved Merge 56 Unit 1 (PTS #697235) and Unit 2 (PTS #697236) Construction Change 'B' Storm Water Quality Management Plan.

Note: Please refer to the attached DMA exhibits for the Drainage Management Areas mentioned below.

PROPOSED PROJECT DESCRIPTION

This application proposes enacting changes to site grading, drainage, and water quality design across onsite Merge 56, more specifically, Unit 10, Lots 1, 2, 3, 4, 5, and 6, as appears on this PDP amendment plan. The bulk of this PDP concerns Unit 10, which will now cover a mixed use of three multi-story research and development buildings, retail space, and a hotel, along with a central parking structure which includes 4.5 subterranean levels and 6 above grade levels. Unit 4 will remain much the same as was previously approved but will incorporate internal adjustments within the previously proposed building footprint, thus no changes to impervious or pervious areas.

PROJECT WATER QUALITY AND HYDROMODIFICATION

Previously Approved CC'B': Drainage from the lots within the north half of the Merge 56 Onsite were separated into street DMA's and on-lot DMA's. The street DMA's were treated by MWS units and the on-lot DMA's by a combination of biofiltration basins (for DMA's 12, 13, and 14a) and an MWS unit (for DMA 14b).

Proposed PDP: The proposed PDP has been designed to maintain overall drainage patterns as the previously approved CC'B', but includes adjustments to DMA boundaries and routing. DMA 12 will now be split into 2 DMA's, 12a and 12b with a system of biofiltration basins treating each. DMA 13 is being separated into 3 DMA's, 13a, 13b, and 13c, each utilizing an MWS unit for treatment. DMA 14a is remaining the same but will now use an MWS unit for treatment. Since the PDP proposes to remove Private Drive R, DMA 4 will be split into 4a and 4b to treat Private Drive T and Private Drive M, respectively. Since a MWS unit has already been installed for the previous DMA 4, DMA

4a will utilize the same unit. DMA 4b will utilize a new MWS unit.

Hydromodification of the site will utilize the same storage vault approved in the onsite SWQMP. This PDP amendment does propose to shift and rotate the existing vault to better work with the proposed site plan. Since the previously approved vault was sized conservatively for the full build-out condition, no changes are required to vault sizing as the thresholds for this PDP fall within the thresholds used to size the vault originally.

The water quality design proposed as a part of this PDP is designed to adequately treat and store the drainage generated in the ultimate condition.

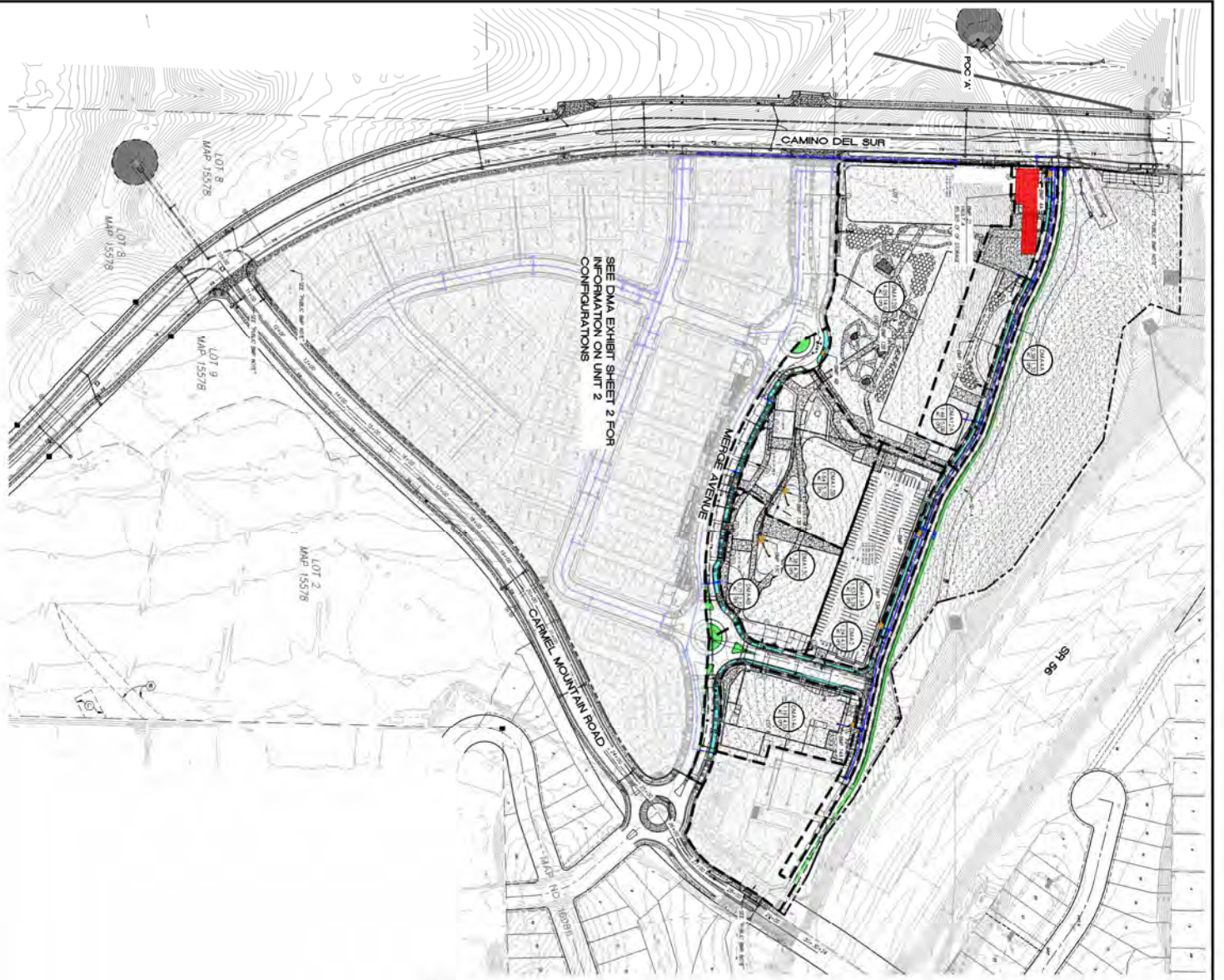
Note: Calculations for all the biofiltration basins and MWS units will be included in this SWQMP addendum. Additionally, a retabulated SDHM calculation has been included in this addendum.

In conclusion this PDP will not result in any unmitigated drainage or storm water quality impacts on the existing downstream conditions. If you have any questions or need any further information regarding the references listed above, please feel free to call me on my direct line (858-875-1718) or email me at Justin.Giles@latitude33.com.

Sincerely,



Justin R. Giles, Associate
Latitude 33 Planning and Engineering



SEE DMA EXHIBIT SHEET 2 FOR
INFORMATION ON UNIT 2
CONFIGURATIONS

- ### BIOPTRATION BASIN NOTES
1. BASED ON THE COURSE OF THE DEVELOPMENT BY PROVISION 4.1 OF THE CITY OF SAN DIEGO TREE AND PLANTING ORDINANCE, THE DESIGN OF THE BIOPTRATION BASIN SHALL BE AS FOLLOWS:
 - a. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 2' DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.
 - b. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 4" DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.
 - c. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 4" DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.
 2. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 4" DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.
 3. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 4" DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.
 4. THE BIOPTRATION BASIN SHALL BE A MINIMUM OF 4" DEEP AND SHALL BE CONSTRUCTED WITH A MINIMUM OF 2" OF CLEAN WASHED #10 SAND AT THE BOTTOM AND 2" OF CLEAN WASHED #20 SAND AT THE TOP.

NOTE FOR BMP 1-11 DETAILS, SEE SHEETS 3 AND 4 OF THIS EXHIBIT.
FOR HMP VAULT 'A' DETAILS, SEE HMP EXHIBIT, ATT. 2A.

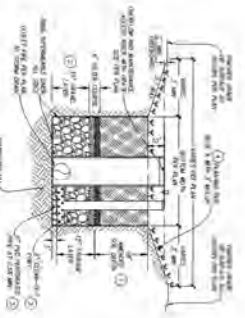
EXISTING SITE INFORMATION

BASED ON THE 2012 AIRCAD 3D SURVEY AND THE 2012 AIRCAD 3D SURVEY DATA, THE EXISTING SITE INFORMATION IS AS FOLLOWS:

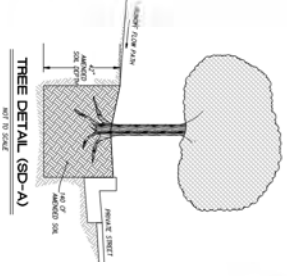
NO.	DESCRIPTION	AREA (SQ. FT.)	PERCENTAGE OF TOTAL AREA
1	ASPHALT	1,200	1.2%
2	CONCRETE	1,500	1.5%
3	PAVEMENT	1,800	1.8%
4	GRASS	2,000	2.0%
5	SOIL	2,500	2.5%
6	ROCK	3,000	3.0%
7	WOOD	3,500	3.5%
8	STEEL	4,000	4.0%
9	GLASS	4,500	4.5%
10	OTHER	5,000	5.0%

AREA TABLE TOTAL PROJECT

DESCRIPTION	EXISTING CONDITION	PROPOSED CONDITION	DIFFERENCE
TOTAL AREA	100,000 SQ. FT.	100,000 SQ. FT.	0 SQ. FT.
ASPHALT	1,200 SQ. FT.	1,200 SQ. FT.	0 SQ. FT.
CONCRETE	1,500 SQ. FT.	1,500 SQ. FT.	0 SQ. FT.
PAVEMENT	1,800 SQ. FT.	1,800 SQ. FT.	0 SQ. FT.
GRASS	2,000 SQ. FT.	2,000 SQ. FT.	0 SQ. FT.
SOIL	2,500 SQ. FT.	2,500 SQ. FT.	0 SQ. FT.
ROCK	3,000 SQ. FT.	3,000 SQ. FT.	0 SQ. FT.
WOOD	3,500 SQ. FT.	3,500 SQ. FT.	0 SQ. FT.
STEEL	4,000 SQ. FT.	4,000 SQ. FT.	0 SQ. FT.
GLASS	4,500 SQ. FT.	4,500 SQ. FT.	0 SQ. FT.
OTHER	5,000 SQ. FT.	5,000 SQ. FT.	0 SQ. FT.



BF-1 BIOPTRATION DETAIL
BMPs 12A, 12B



LEGEND

- ASPHALT
- CONCRETE
- PAVEMENT
- GRASS
- SOIL
- ROCK
- WOOD
- STEEL
- GLASS
- OTHER

SCALE: 1" = 10' 0"

DATE: 08/20/2012

PROJECT: BIOPTRATION BASIN

Area Weighted Runoff Factor (DMA 4a)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	13,978	12,580
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	2,707	271
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		16,685	12,851
Composite C	0.77		

Worksheet B.2-1 DCV (DMA 4a)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	16,685	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.77	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	600	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 4a)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	600	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	600	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.38	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.77	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.059	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.089	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

BMP 4a has a Modular Wetland System that is already installed. The model is MWS-L-8-12 which has a treatment flow rate of 0.346 cfs.

		Project Name Merge 56 Onsite Units 1 & 2		
		BMP ID 4a		
Sizing Method for Volume Retention Criteria			Worksheet B.5-2	
1	Area draining to the BMP	16685	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.77		
3	85 th percentile 24-hour rainfall depth	0.56	inches	
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	600	cu. ft.	
Volume Retention Requirement				
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.	
6	Factor of safety	2		
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.	
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%	
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023		
10	Target volume retention [Line 9 x Line 4]	14	cu. ft.	

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 4a	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	16685	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.77	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	12847	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	385	sq. ft.
5	Biofiltration BMP Footprint	96	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	2707	
7	Impervious area draining to the landscape area (sq. ft.)	3463	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	1.28	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	2309	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		2309
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		2405
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	6.24	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	14	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-72.25748479	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.) [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 4b)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	30,056	27,050
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	872	87
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		30,928	27,138
Composite C	0.88		

Worksheet B.2-1 DCV (DMA 4b)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	30,928	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.88	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	1266	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 4b)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1266	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	1266	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.71	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.88	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.125	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.187	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.


BMP 4b will utilize a Modular Wetlands System model MWS-L-4-17 which has a treatment flow rate of 0.206 cfs.


		Project Name		Merge 56 Onsite Units 1 & 2	
		BMP ID		4b	
Sizing Method for Volume Retention Criteria			Worksheet B.5-2		
1	Area draining to the BMP			30853	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)			0.88	
3	85 th percentile 24-hour rainfall depth			0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]			1267	cu. ft.
Volume Retention Requirement					
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C			0.006	in/hr.
6	Factor of safety			2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]			0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%			3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023			0.023	
10	Target volume retention [Line 9 x Line 4]			29	cu. ft.

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 4b	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	30928	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.88	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	27217	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	816	sq. ft.
5	Biofiltration BMP Footprint	68	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	5730	
7	Impervious area draining to the landscape area (sq. ft.)	3734	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.65	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	2489	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		2489
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		2557
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	3.13	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	29	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-62.22268237	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.) [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 12a)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	47,480	42,732
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	16,117	1,612
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		63,598	44,344
Composite C	0.70		

Worksheet B.2-1 DCV (DMA 12a)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	63,598	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.70	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2069	cubic-feet


		Project Name Merge 56 Onsite Units 1 & 2
		BMP ID 12a
Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1
1	Area draining to the BMP	63,598 sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.70
3	85 th percentile 24-hour rainfall depth	0.56 inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2069 cu. ft.
BMP Parameters		
5	Surface ponding [6 inch minimum, 12 inch maximum]	10 inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18 inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12 inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3 inches
9	Freely drained pore storage of the media	0.2 in/in
10	Porosity of aggregate storage	0.4 in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5 in/hr.
Baseline Calculations		
12	Allowable routing time for sizing	6 hours
13	Depth filtered during storm [Line 11 x Line 12]	30 inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	19.6 inches
15	Total Depth Treated [Line 13 + Line 14]	49.6 inches
Option 1 – Biofilter 1.5 times the DCV		
16	Required biofiltered volume [1.5 x Line 4]	3104 cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	751 sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding		
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	1552 cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	950 sq. ft.
Footprint of the BMP		
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	1330 sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	1330 sq. ft.
23	Provided BMP Footprint	1625 sq. ft.
24	Is Line 23 ≥ Line 22?	Yes, Performance Standard is Met


		Project Name Merge 56 Onsite Units 1 & 2		
		BMP ID 12a		
Sizing Method for Volume Retention Criteria			Worksheet B.5-2	
1	Area draining to the BMP	63,598	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.70		
3	85 th percentile 24-hour rainfall depth	0.56	inches	
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2069	cu. ft.	
Volume Retention Requirement				
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.	
6	Factor of safety	2		
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.	
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%	
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023		
10	Target volume retention [Line 9 x Line 4]	48	cu. ft.	

The City of SAN DIEGO		Project Name	Merge 56 Onsite Units 1 & 2				
		BMP ID	12a				
Volume Retention for No Infiltration Condition				Worksheet B.5-6			
1	Area draining to the biofiltration BMP		63,598			sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.70				
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		44344			sq. ft.	
4	Required area for Evapotranspiration [Line 3 x 0.03]		1330			sq. ft.	
5	Biofiltration BMP Footprint		1625			sq. ft.	
Landscape Area (must be identified on DS-3247)							
		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5)		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				1625		sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?		Volume Retention Performance Standard is Met				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]				1.22		
14	Target Volume Retention [Line 10 from Worksheet B.5.2]				48		cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]				-10.47111542		cu. ft.
Site Design BMP							
	Identification	Site Design Type	Credit				
16	1				cu. ft.		
	2				cu. ft.		
	3				cu. ft.		
	4				cu. ft.		
	5				cu. ft.		
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.				0		cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met				

Area Weighted Runoff Factor (DMA 12b)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	106,722	96,050
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	71,438	7,144
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		178,160	103,194
Composite C	0.58		

Worksheet B.2-1 DCV (DMA 12b)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	178,160	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.58	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	4816	cubic-feet

		Project Name Merge 56 Onsite Units 1 & 2
		BMP ID 12b
Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1
1	Area draining to the BMP	178,160 sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.58
3	85 th percentile 24-hour rainfall depth	0.56 inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	4816 cu. ft.
BMP Parameters		
5	Surface ponding [6 inch minimum, 12 inch maximum]	10 inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18 inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12 inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3 inches
9	Freely drained pore storage of the media	0.2 in/in
10	Porosity of aggregate storage	0.4 in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5 in/hr.
Baseline Calculations		
12	Allowable routing time for sizing	6 hours
13	Depth filtered during storm [Line 11 x Line 12]	30 inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	19.6 inches
15	Total Depth Treated [Line 13 + Line 14]	49.6 inches
Option 1 – Biofilter 1.5 times the DCV		
16	Required biofiltered volume [1.5 x Line 4]	7224 cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	1748 sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding		
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	3612 cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	2211 sq. ft.
Footprint of the BMP		
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	3096 sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	3096 sq. ft.
23	Provided BMP Footprint	8097 sq. ft.
24	Is Line 23 ≥ Line 22?	Yes, Performance Standard is Met

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 12b	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	178,160	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.58	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	4816	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	111	cu. ft.

The City of SAN DIEGO		Project Name		Merge 56 Onsite Units 1 & 2					
		BMP ID		12b					
Volume Retention for No Infiltration Condition				Worksheet B.5-6					
1	Area draining to the biofiltration BMP			178,160	sq. ft.				
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)			0.58					
3	Effective impervious area draining to the BMP [Line 1 x Line 2]			103194	sq. ft.				
4	Required area for Evapotranspiration [Line 3 x 0.03]			3096	sq. ft.				
5	Biofiltration BMP Footprint			8097	sq. ft.				
Landscape Area (must be identified on DS-3247)									
		Identification			1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)								
7	Impervious area draining to the landscape area (sq. ft.)								
8	Impervious to Pervious Area ratio [Line 7/Line 6]			0.00	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5)			0	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0		sq. ft.	
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					8097		sq. ft.	
Volume Retention Performance Standard									
12	Is Line 11 ≥ Line 4?			Volume Retention Performance Standard is Met					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					2.62			
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					111		cu. ft.	
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-179.4331012		cu. ft.	
Site Design BMP									
	Identification	Site Design Type			Credit				
16	1						cu. ft.		
	2						cu. ft.		
	3						cu. ft.		
	4						cu. ft.		
	5						cu. ft.		
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.					0		cu. ft.	
17	Is Line 16 ≥ Line 15?			Volume Retention Performance Standard is Met					

Area Weighted Runoff Factor (DMA 13a)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	56,628	50,965
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	10,019	1,002
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		66,647	51,967
Composite C	0.78		

Worksheet B.2-1 DCV (DMA 13a)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	66,647	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.78	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2425	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 13a)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2425	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	2425	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.53	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.78	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.239	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.358	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

BMP 13A will utilize a Modular Wetlands System model MWS-L-8-16 which has a treatment flow rate of 0.462 cfs.

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 13a	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	66647	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.78	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2426	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	56	cu. ft.

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 13a	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	66647	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.78	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	51985	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1560	sq. ft.
5	Biofiltration BMP Footprint	128	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	10019	
7	Impervious area draining to the landscape area (sq. ft.)	56628	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	5.65	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	10019	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		10019
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		10147
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	6.51	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	56	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-307.4407449	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.) [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 13b)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	52,272	47,045
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	19,166	1,917
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		71,438	48,961
Composite C	0.69		

Worksheet B.2-1 DCV (DMA 13b)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	71,438	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.69	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2285	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 13b)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2285	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	2285	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.64	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.69	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.226	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.339	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

BMP 13B will utilize a Modular Wetlands System model MWS-L-8-16 which has a treatment flow rate of 0.462 cfs.

		Project Name Merge 56 Onsite Units 1 & 2		
		BMP ID 13B		
Sizing Method for Volume Retention Criteria			Worksheet B.5-2	
1	Area draining to the BMP	71438	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69		
3	85 th percentile 24-hour rainfall depth	0.56	inches	
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2300	cu. ft.	
Volume Retention Requirement				
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.	
6	Factor of safety	2		
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.	
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%	
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023		
10	Target volume retention [Line 9 x Line 4]	53	cu. ft.	

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 13B	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	71438	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	49292	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1479	sq. ft.
5	Biofiltration BMP Footprint	128	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	19166	
7	Impervious area draining to the landscape area (sq. ft.)	52272	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	2.73	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	19166	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		19166
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		19294
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	13.05	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	53	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-637.5291427	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.) [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 13c)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	51,401	46,261
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	8,712	871
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		60,113	47,132
Composite C	0.78		

Worksheet B.2-1 DCV (DMA 13c)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	60,113	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.78	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2199	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 13c)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2199	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	2199	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.38	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.78	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.215	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.323	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

BMP 13c will utilize a Modular Wetlands System model MWS-L-8-16 which has a treatment flow rate of 0.462 cfs.

		Project Name Merge 56 Onsite Units 1 & 2		
		BMP ID 13C		
Sizing Method for Volume Retention Criteria			Worksheet B.5-2	
1	Area draining to the BMP	60113	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.78		
3	85 th percentile 24-hour rainfall depth	0.56	inches	
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2188	cu. ft.	
Volume Retention Requirement				
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.	
6	Factor of safety	2		
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.	
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%	
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023		
10	Target volume retention [Line 9 x Line 4]	50	cu. ft.	

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 13C	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	60113	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.78	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	46888	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1407	sq. ft.
5	Biofiltration BMP Footprint	128	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	8712	
7	Impervious area draining to the landscape area (sq. ft.)	51401	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	5.90	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	8712	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		8712
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		8840
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	6.28	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	50	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-265.724467	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.) [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 14a)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	40,511	36,460
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	11,326	1,133
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		51,837	37,593
Composite C	0.73		

Worksheet B.2-1 DCV (DMA 14a)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	51,837	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.73	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	1754	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 14a)


Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1754	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	1754	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.19	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.73	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.174	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.261	cfs


1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

BMP 14a will utilize a Modular Wetlands System model MWS-L-8-12 which has a treatment flow rate of 0.346 cfs.

		Project Name Merge 56 Onsite Units 1 & 2		
		BMP ID 14A		
Sizing Method for Volume Retention Criteria		Worksheet B.5-2		
1	Area draining to the BMP	51837	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.73		
3	85 th percentile 24-hour rainfall depth	0.56	inches	
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1766	cu. ft.	
Volume Retention Requirement				
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or	0.006	in/hr.	
6	Factor of safety	2		
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.	
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 + 6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%	
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.023		
10	Target volume retention [Line 9 x Line 4]	41	cu. ft.	

		Project Name Merge 56 Onsite Units 1 & 2	
		BMP ID 14A	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	51837	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.73	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	37841	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1135	sq. ft.
5	Biofiltration BMP Footprint	96	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	11326	
7	Impervious area draining to the landscape area (sq. ft.)	40511	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	3.58	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	11326	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	11326	
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	11422	
Volume Retention Performance Standard			
12	Is Line 11 \geq Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	10.06	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	41	
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-367.9811176	
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	
17	Is Line 16 \geq Line 15?	Volume Retention Performance Standard is Met	

SDHM 3.1
PROJECT REPORT

General Model Information

Project Name: Detention sizing - one orifice no notch_REV
Site Name: Merge 56
Site Address: Camino del Sur
City: San Diego
Report Date: 3/20/2023
Gage: POWAY
Data Start: 10/01/1963
Data End: 09/30/2004
Timestep: Hourly
Precip Scale: 1.000
Version Date: 2021/06/28

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
D,NatVeg,Flat	9.31
D,NatVeg,Moderate	18.08
D,NatVeg,Steep	9.12
Pervious Total	36.51
Impervious Land Use	acre
Impervious Total	0
Basin Total	36.51

Element Flows To:		
Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass: No

GroundWater: No

Pervious Land Use acre

D,Urban,Flat 2.14

D,Urban,Moderate 3

D,Urban,Steep 5.15

Pervious Total 10.29

Impervious Land Use acre

IMPERVIOUS-FLAT 26.22

Impervious Total 26.22

Basin Total 36.51

Element Flows To:

Surface

Storm Capture 1

Interflow

Storm Capture 1

Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Storm Capture 1

Dimensions

Depth: 14 ft.
Length: 855 ft.
Width: 7 ft.
Discharge Structure
Riser Height: 13 ft.
Riser Diameter: 54 in.
Orifice 1 Diameter: 6.5 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

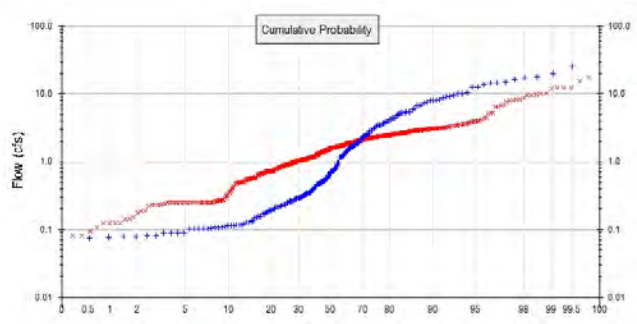
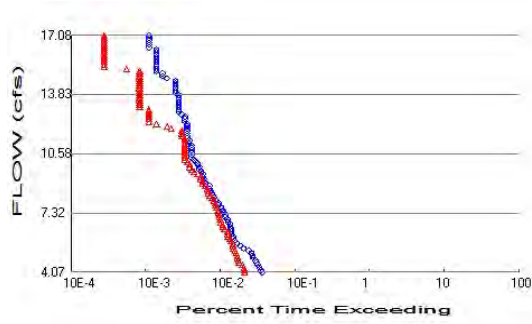
SCapture Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.137	0.000	0.000	0.000
0.1556	0.137	0.021	0.452	0.000
0.3111	0.137	0.042	0.639	0.000
0.4667	0.137	0.064	0.783	0.000
0.6222	0.137	0.085	0.904	0.000
0.7778	0.137	0.106	1.011	0.000
0.9333	0.137	0.128	1.107	0.000
1.0889	0.137	0.149	1.196	0.000
1.2444	0.137	0.171	1.279	0.000
1.4000	0.137	0.192	1.356	0.000
1.5556	0.137	0.213	1.430	0.000
1.7111	0.137	0.235	1.499	0.000
1.8667	0.137	0.256	1.566	0.000
2.0222	0.137	0.277	1.630	0.000
2.1778	0.137	0.299	1.692	0.000
2.3333	0.137	0.320	1.751	0.000
2.4889	0.137	0.342	1.808	0.000
2.6444	0.137	0.363	1.864	0.000
2.8000	0.137	0.384	1.918	0.000
2.9556	0.137	0.406	1.971	0.000
3.1111	0.137	0.427	2.022	0.000
3.2667	0.137	0.448	2.072	0.000
3.4222	0.137	0.470	2.121	0.000
3.5778	0.137	0.491	2.168	0.000
3.7333	0.137	0.512	2.215	0.000
3.8889	0.137	0.534	2.261	0.000
4.0444	0.137	0.555	2.305	0.000
4.2000	0.137	0.577	2.349	0.000
4.3556	0.137	0.598	2.392	0.000
4.5111	0.137	0.619	2.435	0.000
4.6667	0.137	0.641	2.476	0.000
4.8222	0.137	0.662	2.517	0.000
4.9778	0.137	0.683	2.558	0.000
5.1333	0.137	0.705	2.597	0.000
5.2889	0.137	0.726	2.636	0.000
5.4444	0.137	0.748	2.675	0.000
5.6000	0.137	0.769	2.713	0.000
5.7556	0.137	0.790	2.750	0.000
5.9111	0.137	0.812	2.787	0.000

6.0667	0.137	0.833	2.824	0.000
6.2222	0.137	0.854	2.859	0.000
6.3778	0.137	0.876	2.895	0.000
6.5333	0.137	0.897	2.930	0.000
6.6889	0.137	0.919	2.965	0.000
6.8444	0.137	0.940	2.999	0.000
7.0000	0.137	0.961	3.033	0.000
7.1556	0.137	0.983	3.067	0.000
7.3111	0.137	1.004	3.100	0.000
7.4667	0.137	1.025	3.132	0.000
7.6222	0.137	1.047	3.165	0.000
7.7778	0.137	1.068	3.197	0.000
7.9333	0.137	1.090	3.229	0.000
8.0889	0.137	1.111	3.260	0.000
8.2444	0.137	1.132	3.292	0.000
8.4000	0.137	1.154	3.323	0.000
8.5556	0.137	1.175	3.353	0.000
8.7111	0.137	1.196	3.383	0.000
8.8667	0.137	1.218	3.414	0.000
9.0222	0.137	1.239	3.443	0.000
9.1778	0.137	1.261	3.473	0.000
9.3333	0.137	1.282	3.502	0.000
9.4889	0.137	1.303	3.531	0.000
9.6444	0.137	1.325	3.560	0.000
9.8000	0.137	1.346	3.589	0.000
9.9556	0.137	1.367	3.617	0.000
10.111	0.137	1.389	3.645	0.000
10.267	0.137	1.410	3.673	0.000
10.422	0.137	1.432	3.701	0.000
10.578	0.137	1.453	3.728	0.000
10.733	0.137	1.474	3.756	0.000
10.889	0.137	1.496	3.783	0.000
11.044	0.137	1.517	3.810	0.000
11.200	0.137	1.538	3.837	0.000
11.356	0.137	1.560	3.863	0.000
11.511	0.137	1.581	3.890	0.000
11.667	0.137	1.603	3.916	0.000
11.822	0.137	1.624	3.942	0.000
11.978	0.137	1.645	3.968	0.000
12.133	0.137	1.667	3.993	0.000
12.289	0.137	1.688	4.019	0.000
12.444	0.137	1.709	4.044	0.000
12.600	0.137	1.731	4.069	0.000
12.756	0.137	1.752	4.094	0.000
12.911	0.137	1.773	4.119	0.000
13.067	0.137	1.795	4.966	0.000
13.222	0.137	1.816	9.164	0.000
13.378	0.137	1.838	15.23	0.000
13.533	0.137	1.859	22.63	0.000
13.689	0.137	1.880	30.99	0.000
13.844	0.137	1.902	39.97	0.000
14.000	0.137	1.923	49.22	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 36.51
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 10.29
 Total Impervious Area: 26.22

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	8.137635
5 year	14.330715
10 year	17.08483
25 year	21.214658

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	6.436676
5 year	9.901473
10 year	12.204505
25 year	15.712773

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
4.0688	130	76	58	Pass
4.2003	126	76	60	Pass
4.3318	120	75	62	Pass
4.4632	114	71	62	Pass
4.5947	110	65	59	Pass
4.7262	106	63	59	Pass
4.8577	100	62	62	Pass
4.9891	98	61	62	Pass
5.1206	94	59	62	Pass
5.2521	87	57	65	Pass
5.3836	74	54	72	Pass
5.5150	67	54	80	Pass
5.6465	61	53	86	Pass
5.7780	55	51	92	Pass
5.9095	53	49	92	Pass
6.0409	53	46	86	Pass
6.1724	51	46	90	Pass
6.3039	51	45	88	Pass
6.4354	51	41	80	Pass
6.5668	49	39	79	Pass
6.6983	49	39	79	Pass
6.8298	46	37	80	Pass
6.9613	45	36	80	Pass
7.0927	42	35	83	Pass
7.2242	42	35	83	Pass
7.3557	41	34	82	Pass
7.4872	39	34	87	Pass
7.6186	37	32	86	Pass
7.7501	34	31	91	Pass
7.8816	34	31	91	Pass
8.0131	32	30	93	Pass
8.1445	30	28	93	Pass
8.2760	29	26	89	Pass
8.4075	28	25	89	Pass
8.5390	27	25	92	Pass
8.6704	26	24	92	Pass
8.8019	26	23	88	Pass
8.9334	23	21	91	Pass
9.0649	22	21	95	Pass
9.1963	22	20	90	Pass
9.3278	21	20	95	Pass
9.4593	21	18	85	Pass
9.5908	20	16	80	Pass
9.7222	19	15	78	Pass
9.8537	19	14	73	Pass
9.9852	18	14	77	Pass
10.1167	17	13	76	Pass
10.2481	16	12	75	Pass
10.3796	15	12	80	Pass
10.5111	15	12	80	Pass
10.6426	15	12	80	Pass
10.7740	15	12	80	Pass
10.9055	15	12	80	Pass

11.0370	15	12	80	Pass
11.1685	14	12	85	Pass
11.2999	14	12	85	Pass
11.4314	13	12	92	Pass
11.5629	13	11	84	Pass
11.6944	13	11	84	Pass
11.8258	13	11	84	Pass
11.9573	13	8	61	Pass
12.0888	13	7	53	Pass
12.2203	13	5	38	Pass
12.3517	12	4	33	Pass
12.4832	12	4	33	Pass
12.6147	12	4	33	Pass
12.7462	11	4	36	Pass
12.8776	10	4	40	Pass
13.0091	10	4	40	Pass
13.1406	10	3	30	Pass
13.2721	10	3	30	Pass
13.4035	10	3	30	Pass
13.5350	10	3	30	Pass
13.6665	10	3	30	Pass
13.7980	10	3	30	Pass
13.9294	9	3	33	Pass
14.0609	9	3	33	Pass
14.1924	9	3	33	Pass
14.3239	9	3	33	Pass
14.4553	9	3	33	Pass
14.5868	9	3	33	Pass
14.7183	7	3	42	Pass
14.8498	6	3	50	Pass
14.9812	6	3	50	Pass
15.1127	5	3	60	Pass
15.2442	5	2	40	Pass
15.3757	5	1	20	Pass
15.5071	5	1	20	Pass
15.6386	5	1	20	Pass
15.7701	5	1	20	Pass
15.9016	5	1	20	Pass
16.0330	5	1	20	Pass
16.1645	5	1	20	Pass
16.2960	5	1	20	Pass
16.4275	4	1	25	Pass
16.5589	4	1	25	Pass
16.6904	4	1	25	Pass
16.8219	4	1	25	Pass
16.9534	4	1	25	Pass
17.0848	4	1	25	Pass

Water Quality

Drawdown Time Results

Pond: Storm Capture 1

Days	Stage(feet)	Percent of Total Run Time
1	0.000	N/A
2	0.000	N/A
3	0.000	N/A
4	0.000	N/A
5	0.000	N/A

Maximum Stage: 13.00 Drawdown Time: 00 08:34:10

Model Default Modifications

Total of 0 changes have been made.

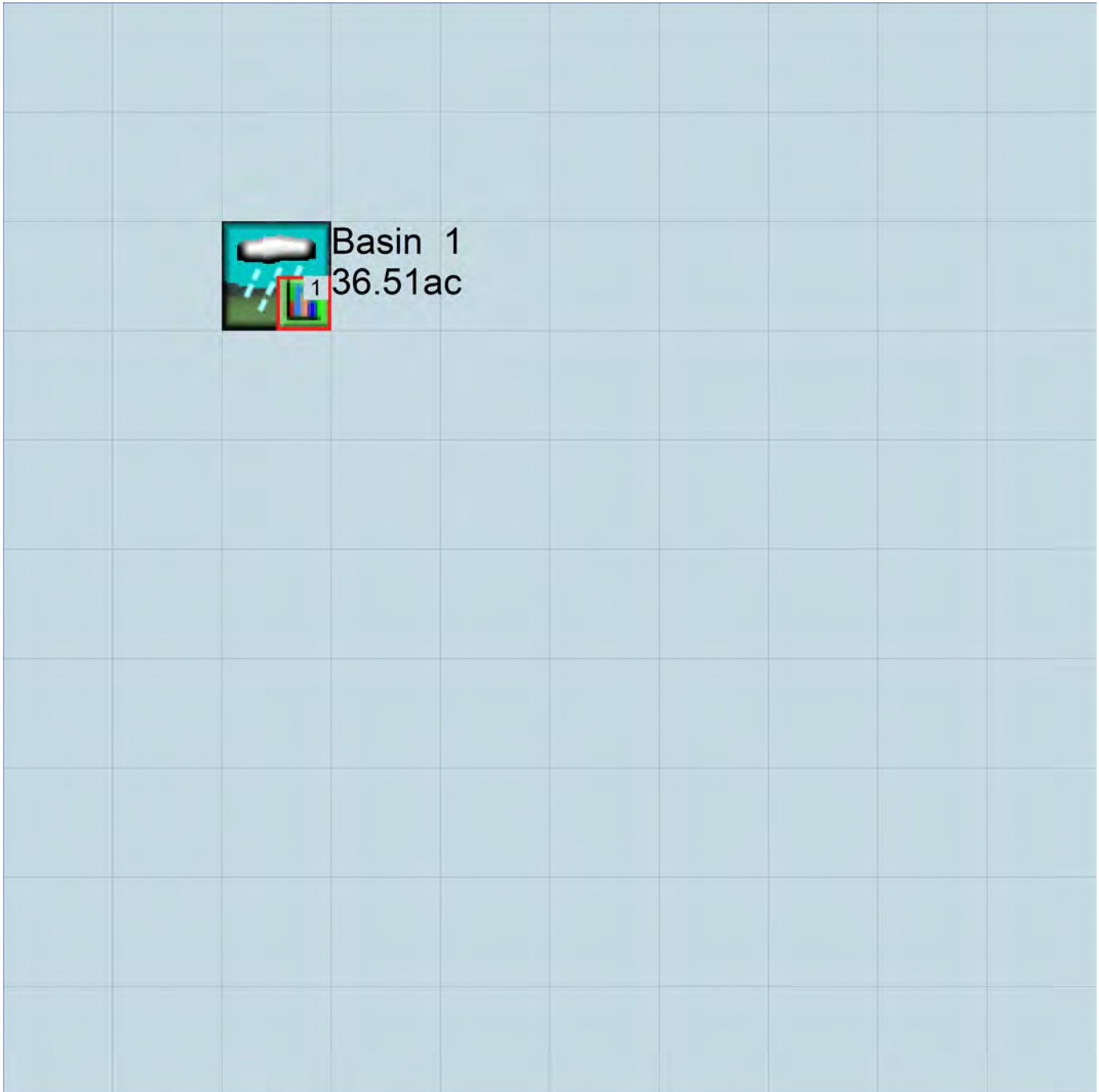
PERLND Changes

No PERLND changes have been made.

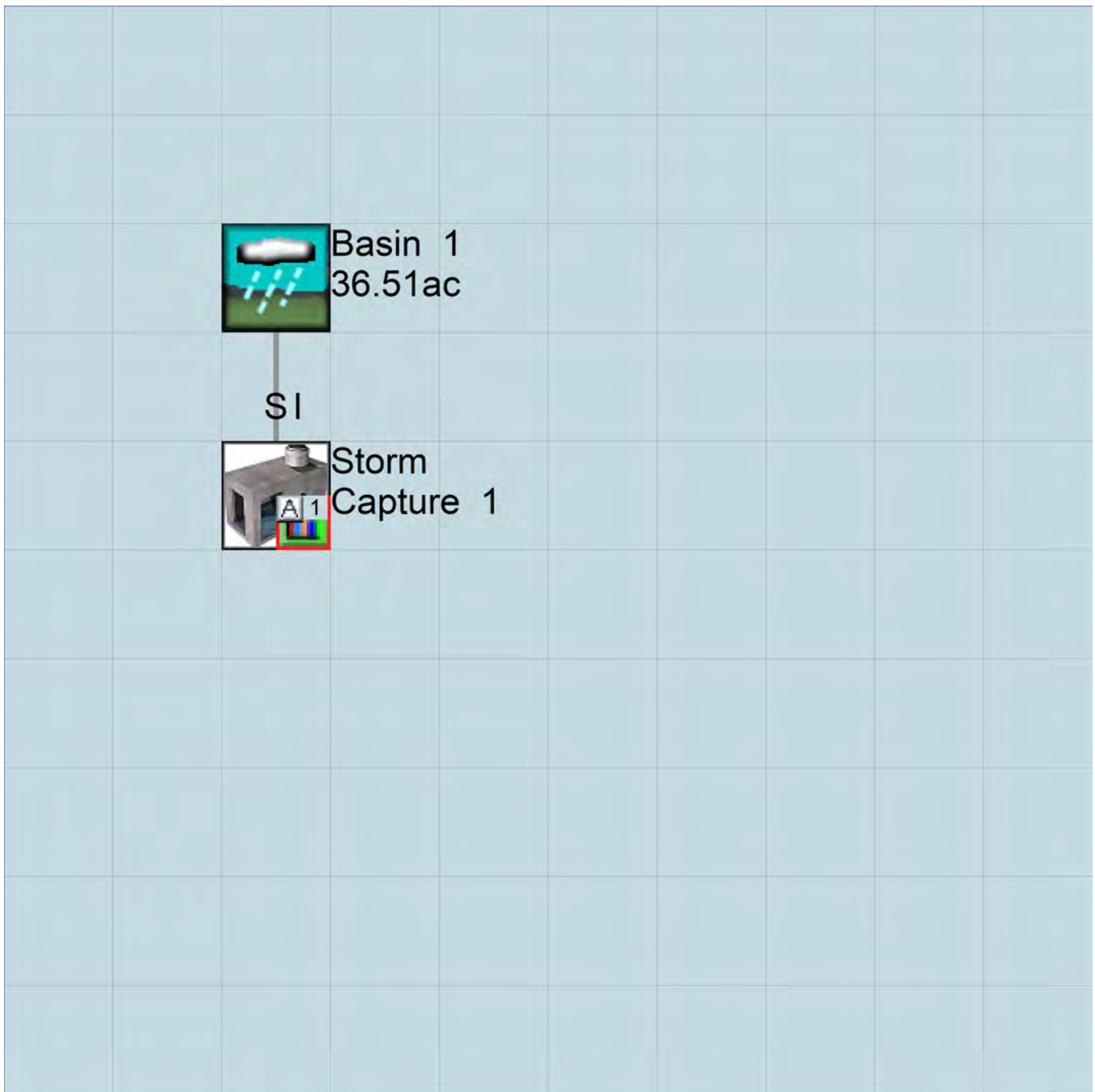
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```

WVHM4 model simulation
START      1963 10 01      END      2004 09 30
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN          1              UNIT SYSTEM      1
END GLOBAL
  
```

FILES

```

<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26 Detention sizing - one orifice no notch_REV.wdm
MESSU    25 PreDetention sizing - one orifice no notch_REV.MES
          27 PreDetention sizing - one orifice no notch_REV.L61
          28 PreDetention sizing - one orifice no notch_REV.L62
          30 POCDetention sizing - one orifice no notch_REV1.dat
  
```

END FILES

OPN SEQUENCE

```

INGRP              INDELT 00:60
  PERLND           28
  PERLND           29
  PERLND           30
  COPY             501
  DISPLY           1
  
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INF01

```

# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   Basin 1                               MAX           1   2   30   9
  
```

END DISPLY-INF01

END DISPLY

COPY

TIMESERIES

```

# - # NPT NMN ***
1   1   1   1
501 1   1   1
  
```

END TIMESERIES

END COPY

GENER

OPCODE

```

# # OPCODE ***
  
```

END OPCODE

PARM

```

# # K ***
  
```

END PARM

END GENER

PERLND

GEN-INFO

```

<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #                               User  t-series  Engr Metr ***
                               in  out      ***
28   D,NatVeg,Flat             1   1   1   1   27   0
29   D,NatVeg,Moderate         1   1   1   1   27   0
30   D,NatVeg,Steep            1   1   1   1   27   0
  
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL  PEST  NITR  PHOS  TRAC  ***
28   0   0   1   0   0   0   0   0   0   0   0   0
29   0   0   1   0   0   0   0   0   0   0   0   0
30   0   0   1   0   0   0   0   0   0   0   0   0
  
```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC  *****
28   0   0   4   0   0   0   0   0   0   0   0   0   0   1   9
29   0   0   4   0   0   0   0   0   0   0   0   0   0   1   9
30   0   0   4   0   0   0   0   0   0   0   0   0   0   1   9
END PRINT-INFO

```

PWAT-PARM1

```

<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
28   0   1   1   1   0   0   0   0   1   1   0
29   0   1   1   1   0   0   0   0   1   1   0
30   0   1   1   1   0   0   0   0   1   1   0
END PWAT-PARM1

```

PWAT-PARM2

```

<PLS > PWATER input info: Part 2 *****
# - # ***FOREST  LZSN  INFILT  LRSUR  SLSUR  KVARY  AGWRC
28   0   3.3  0.03  100  0.05  2.5  0.915
29   0   3  0.025  80  0.1  2.5  0.915
30   0   2.7  0.02  75  0.15  2.5  0.915
END PWAT-PARM2

```

PWAT-PARM3

```

<PLS > PWATER input info: Part 3 *****
# - # ***PETMAX  PETMIN  INFEXP  INFILD  DEEPFR  BASETP  AGWETP
28   0   0   2   2   0   0.05  0.05
29   0   0   2   2   0   0.05  0.05
30   0   0   2   2   0   0.05  0.05
END PWAT-PARM3

```

PWAT-PARM4

```

<PLS > PWATER input info: Part 4 *****
# - # CEPSC  UZSN  NSUR  INTFW  IRC  LZETP ***
28   0   0.6  0.04  1  0.3  0
29   0   0.6  0.04  1  0.3  0
30   0   0.6  0.04  1  0.3  0
END PWAT-PARM4

```

MON-LZETPARM

```

<PLS > PWATER input info: Part 3 *****
# - # JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
28   0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
29   0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
30   0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
END MON-LZETPARM

```

MON-INTERCEP

```

<PLS > PWATER input info: Part 3 *****
# - # JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
28   0.1  0.1  0.1  0.1  0.06  0.06  0.06  0.06  0.06  0.1  0.1  0.1
29   0.1  0.1  0.1  0.1  0.06  0.06  0.06  0.06  0.06  0.1  0.1  0.1
30   0.1  0.1  0.1  0.1  0.06  0.06  0.06  0.06  0.06  0.1  0.1  0.1
END MON-INTERCEP

```

PWAT-STATE1

```

<PLS > *** Initial conditions at start of simulation
      ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS  SURS  UZS  IFWS  LZS  AGWS  GWVS
28   0   0   0.01  0   0.4  0.01  0
29   0   0   0.01  0   0.4  0.01  0
30   0   0   0.01  0   0.4  0.01  0
END PWAT-STATE1

```

END PERLND

IMPLND

GEN-INFO

```

<PLS ><-----Name----->  Unit-systems  Printer ***
# - #  User t-series  Engr Metr ***
      in out  ***

```

END GEN-INFO

*** Section IWATER***

ACTIVITY

<PLS > ***** Active Sections *****
- # ATMP SNOW IWAT SLD IWG IQAL ***

END ACTIVITY

PRINT-INFO

<ILS > ***** Print-flags ***** PIVL PYR
- # ATMP SNOW IWAT SLD IWG IQAL *****

END PRINT-INFO

IWAT-PARM1

<PLS > IWATER variable monthly parameter value flags ***
- # CSNO RTOP VRS VNN RTLI ***

END IWAT-PARM1

IWAT-PARM2

<PLS > IWATER input info: Part 2 ***
- # *** LSUR SLSUR NSUR RETSC

END IWAT-PARM2

IWAT-PARM3

<PLS > IWATER input info: Part 3 ***
- # ***PETMAX PETMIN

END IWAT-PARM3

IWAT-STATE1

<PLS > *** Initial conditions at start of simulation
- # *** RETS SURS

END IWAT-STATE1

END IMPLND

SCHEMATIC

<-Source->	<--Area-->	<-Target->	MBLK	***
<Name> #	<-factor->	<Name> #	Tbl#	***
Basin 1***				
PERLND 28	9.31	COPY 501	12	
PERLND 28	9.31	COPY 501	13	
PERLND 29	18.08	COPY 501	12	
PERLND 29	18.08	COPY 501	13	
PERLND 30	9.12	COPY 501	12	
PERLND 30	9.12	COPY 501	13	

*****Routing*****

END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name> #		<Name> #	#	<-factor->strg	<Name> #	#	<Name> #	***
COPY	501	OUTPUT	MEAN	1 1	12.1	DISPLY	1	INPUT TIMSER 1

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
<Name> #		<Name> #	#	<-factor->strg	<Name> #	#	<Name> #	***

END NETWORK

RCHRES

GEN-INFO

RCHRES	Name	Nexits	Unit	Systems	Printer	***
# - #	<----->	<---->	User	T-series	Engl Metr	LKFG
				in	out	***

END GEN-INFO

*** Section RCHRES***

ACTIVITY

<PLS > ***** Active Sections *****
- # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUGF PKFG PHFG ***

```
END ACTIVITY

PRINT-INFO
  <PLS > ***** Print-flags ***** PIVL  PYR
  # - # HYDR ADCA CONS HEAT  SED  GQL  OXRX  NUTR  PLNK  PHCB  PIVL  PYR  *****
END PRINT-INFO

HYDR-PARM1
  RCHRES  Flags for each HYDR Section *****
  # - # VC A1 A2 A3  ODFVFG for each *** ODGTFG for each  FUNCT for each
         FG FG FG FG  possible exit *** possible exit  possible exit
         * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
END HYDR-PARM1

HYDR-PARM2
  # - # FTABNO          LEN          DELTH          STCOR          KS          DB50          ***
<-----><-----><-----><-----><-----><-----><----->          ***
END HYDR-PARM2
HYDR-INIT
  RCHRES  Initial conditions for each HYDR section *****
  # - # *** VOL          Initial value of COLIND          Initial value of OUTDGT
         *** ac-ft          for each possible exit          for each possible exit
  <-----><----->          <-----><-----><-----><----->          *** <-----><-----><-----><----->
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # tem strg<-factor->strg <Name> # # <Name> # # ***
WDM      2 PREC      ENGL      1          PERLND  1 999 EXTNL  PREC
WDM      2 PREC      ENGL      1          IMPLND  1 999 EXTNL  PREC
WDM      1 EVAP      ENGL      1          PERLND  1 999 EXTNL  PETINP
WDM      1 EVAP      ENGL      1          IMPLND  1 999 EXTNL  PETINP
END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name> # <Name> # #<-factor->strg <Name> # <Name> tem strg strg***
COPY  501 OUTPUT MEAN  1 1 12.1 WDM  501 FLOW ENGL REPL
END EXT TARGETS

MASS-LINK
<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
<Name> <Name> # #<-factor-> <Name> <Name> # #***
MASS-LINK 12
PERLND PWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 12

MASS-LINK 13
PERLND PWATER IFWO 0.083333 COPY INPUT MEAN
END MASS-LINK 13

END MASS-LINK

END RUN
```

Mitigated UCI File

RUN

```
GLOBAL
  WWHM4 model simulation
  START      1963 10 01      END      2004 09 30
  RUN INTERP OUTPUT LEVEL    3      0
  RESUME     0 RUN          1
  UNIT SYSTEM          1
END GLOBAL
```

```
FILES
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26 Detention sizing - one orifice no notch_REV.wdm
MESSU    25 MitDetention sizing - one orifice no notch_REV.MES
          27 MitDetention sizing - one orifice no notch_REV.L61
          28 MitDetention sizing - one orifice no notch_REV.L62
          30 POCDetention sizing - one orifice no notch_REV1.dat
END FILES
```

```
OPN SEQUENCE
  INGRP          INDELT 00:60
  PERLND        46
  PERLND        47
  PERLND        48
  IMPLND        1
  RCHRES        1
  COPY          1
  COPY          501
  DISPLY        1
  END INGRP
END OPN SEQUENCE
```

```
DISPLY
  DISPLY-INF01
  # - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
  1      Storm Capture 1          MAX          1 2 30 9
  END DISPLY-INF01
END DISPLY
```

```
COPY
  TIMESERIES
  # - # NPT NMN ***
  1      1 1
  501    1 1
  END TIMESERIES
END COPY
```

```
GENER
  OPCODE
  #      # OPCD ***
  END OPCODE
  PARM
  #      #          K ***
  END PARM
END GENER
```

```
PERLND
  GEN-INFO
  <PLS ><-----Name----->NBLKS Unit-systems Printer ***
  # - # User t-series Engl Metr ***
  # - # in out ***
  46      D,Urban,Flat 1 1 1 1 27 0
  47      D,Urban,Moderate 1 1 1 1 27 0
  48      D,Urban,Steep 1 1 1 1 27 0
  END GEN-INFO
  *** Section PWATER***
```

```
ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
  46      0 0 1 0 0 0 0 0 0 0 0 0 0
  47      0 0 1 0 0 0 0 0 0 0 0 0 0
```

48 0 0 1 0 0 0 0 0 0 0 0 0 0
END ACTIVITY

PRINT-INFO

<PLS > ***** Print-flags ***** PIVL PYR
- # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
46 0 0 4 0 0 0 0 0 0 0 0 0 1 9
47 0 0 4 0 0 0 0 0 0 0 0 0 0 1 9
48 0 0 4 0 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

PWAT-PARM1

<PLS > PWATER variable monthly parameter value flags ***
- # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
46 0 1 1 1 0 0 0 0 1 1 0
47 0 1 1 1 0 0 0 0 1 1 0
48 0 1 1 1 0 0 0 0 1 1 0
END PWAT-PARM1

PWAT-PARM2

<PLS > PWATER input info: Part 2 ***
- # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
46 0 3.8 0.03 50 0.05 2.5 0.915
47 0 3.5 0.025 50 0.1 2.5 0.915
48 0 3.2 0.02 50 0.15 2.5 0.915
END PWAT-PARM2

PWAT-PARM3

<PLS > PWATER input info: Part 3 ***
- # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
46 0 0 2 2 0 0.05 0.05
47 0 0 2 2 0 0.05 0.05
48 0 0 2 2 0 0.05 0.05
END PWAT-PARM3

PWAT-PARM4

<PLS > PWATER input info: Part 4 ***
- # CEPSC UZSN NSUR INTFW IRC LZETP ***
46 0 0.6 0.03 1 0.3 0
47 0 0.6 0.03 1 0.3 0
48 0 0.6 0.03 1 0.3 0
END PWAT-PARM4

MON-LZETPARM

<PLS > PWATER input info: Part 3 ***
- # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
46 0.6 0.6 0.6 0.6 0.7 0.7 0.7 0.7 0.7 0.6 0.6 0.6
47 0.6 0.6 0.6 0.6 0.7 0.7 0.7 0.7 0.7 0.6 0.6 0.6
48 0.6 0.6 0.6 0.6 0.7 0.7 0.7 0.7 0.7 0.6 0.6 0.6
END MON-LZETPARM

MON-INTERCEP

<PLS > PWATER input info: Part 3 ***
- # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
46 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
47 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
48 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
END MON-INTERCEP

PWAT-STATE1

<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
- # *** CEPS SURS UZS IFWS LZS AGWS GWVS
46 0 0 0.15 0 1 0.05 0
47 0 0 0.15 0 1 0.05 0
48 0 0 0.15 0 1 0.05 0
END PWAT-STATE1

END PERLND

IMPLND

GEN-INFO

<PLS ><-----Name-----> Unit-systems Printer ***

```

# - # User t-series Engl Metr ***
in out ***
1 IMPERVIOUS-FLAT 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
1 0 0 1 0 0 0
END ACTIVITY

```

```

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
1 0 0 4 0 0 0 1 9
END PRINT-INFO

```

```

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
1 0 0 0 0 1
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
1 100 0.05 0.011 0.1
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
1 0 0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
1 0 0
END IWAT-STATE1

```

END IMPLND

```

SCHEMATIC
<-Source-> <--Area--> <-Target-> MBLK ***
<Name> # <-factor-> <Name> # Tbl# ***
Basin 1***
PERLND 46 2.14 RCHRES 1 2
PERLND 46 2.14 RCHRES 1 3
PERLND 47 3 RCHRES 1 2
PERLND 47 3 RCHRES 1 3
PERLND 48 5.15 RCHRES 1 2
PERLND 48 5.15 RCHRES 1 3
IMPLND 1 26.22 RCHRES 1 5

```

```

*****Routing*****
PERLND 46 2.14 COPY 1 12
PERLND 47 3 COPY 1 12
PERLND 48 5.15 COPY 1 12
IMPLND 1 26.22 COPY 1 15
PERLND 46 2.14 COPY 1 13
PERLND 47 3 COPY 1 13
PERLND 48 5.15 COPY 1 13
RCHRES 1 1 COPY 501 16
END SCHEMATIC

```

```

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

RCHRES
GEN-INFO
RCHRES Name Nexits Unit Systems Printer ***
- #<-----><----> User T-series Engl Metr LKFG ***
in out ***
1 Storm Capture 1-003 1 1 1 1 28 0 1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
<PLS > ***** Active Sections *****
- # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFQ PKFG PHFG ***
1 1 0 0 0 0 0 0 0 0 0 0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
- # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1 4 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

HYDR-PARM1
RCHRES Flags for each HYDR Section ***
- # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each FUNCT for each
FG FG FG FG possible exit *** possible exit possible exit
* *
1 0 1 0 0 4 0 0 0 0 0 0 0 0 0 2 2 2 2 2
END HYDR-PARM1

HYDR-PARM2
- # FTABNO LEN DELTH STCOR KS DB50 ***
<-----><-----><-----><-----><-----><-----><-----> ***
1 1 0.16 0.0 0.0 0.5 0.0 ***
END HYDR-PARM2

HYDR-INIT
RCHRES Initial conditions for each HYDR section ***
- # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1 0 4.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES

FTABLE 1
92 4
Depth Area Volume Outflowl Velocity Travel Time***
(ft) (acres) (acre-ft) (cfs) (ft/sec) (Minutes)***
0.000000 0.137397 0.000000 0.000000
0.155556 0.137397 0.022392 0.452198
0.311111 0.137397 0.043969 0.639504
0.466667 0.137397 0.065342 0.783229
0.622222 0.137397 0.086715 0.904395
0.777778 0.137397 0.108088 1.011144
0.933333 0.137397 0.129461 1.107653
1.088889 0.137397 0.150833 1.196402
1.244444 0.137397 0.172206 1.279008
1.400000 0.137397 0.193579 1.356593
1.555556 0.137397 0.214952 1.429974
1.711111 0.137397 0.236325 1.499770

1.866667	0.137397	0.257697	1.566458
2.022222	0.137397	0.279070	1.630421
2.177778	0.137397	0.300443	1.691968
2.333333	0.137397	0.321816	1.751354
2.488889	0.137397	0.343189	1.808790
2.644444	0.137397	0.364562	1.864458
2.800000	0.137397	0.385934	1.918512
2.955556	0.137397	0.407307	1.971083
3.111111	0.137397	0.428680	2.022289
3.266667	0.137397	0.450053	2.072229
3.422222	0.137397	0.471426	2.120994
3.577778	0.137397	0.492798	2.168663
3.733333	0.137397	0.514171	2.215306
3.888889	0.137397	0.535544	2.260988
4.044444	0.137397	0.556917	2.305764
4.200000	0.137397	0.578290	2.349687
4.355556	0.137397	0.599663	2.392804
4.511111	0.137397	0.621035	2.435158
4.666667	0.137397	0.642408	2.476788
4.822222	0.137397	0.663781	2.517729
4.977778	0.137397	0.685154	2.558016
5.133333	0.137397	0.706527	2.597677
5.288889	0.137397	0.727899	2.636742
5.444444	0.137397	0.749272	2.675237
5.600000	0.137397	0.770645	2.713185
5.755556	0.137397	0.792018	2.750610
5.911111	0.137397	0.813391	2.787533
6.066667	0.137397	0.834764	2.823973
6.222222	0.137397	0.856136	2.859948
6.377778	0.137397	0.877509	2.895477
6.533333	0.137397	0.898882	2.930575
6.688889	0.137397	0.920255	2.965258
6.844444	0.137397	0.941628	2.999539
7.000000	0.137397	0.963000	3.033433
7.155556	0.137397	0.984373	3.066953
7.311111	0.137397	1.005746	3.100110
7.466667	0.137397	1.027119	3.132916
7.622222	0.137397	1.048492	3.165383
7.777778	0.137397	1.069865	3.197519
7.933333	0.137397	1.091237	3.229336
8.088889	0.137397	1.112610	3.260843
8.244444	0.137397	1.133983	3.292048
8.400000	0.137397	1.155356	3.322960
8.555556	0.137397	1.176729	3.353587
8.711111	0.137397	1.198101	3.383937
8.866667	0.137397	1.219474	3.414017
9.022222	0.137397	1.240847	3.443834
9.177778	0.137397	1.262220	3.473395
9.333333	0.137397	1.283593	3.502707
9.488889	0.137397	1.304966	3.531776
9.644444	0.137397	1.326338	3.560607
9.800000	0.137397	1.347711	3.589207
9.955556	0.137397	1.369084	3.617580
10.111111	0.137397	1.390457	3.645733
10.266667	0.137397	1.411830	3.673670
10.422222	0.137397	1.433202	3.701396
10.577778	0.137397	1.454575	3.728916
10.733333	0.137397	1.475948	3.756235
10.888889	0.137397	1.497321	3.783356
11.044444	0.137397	1.518694	3.810284
11.200000	0.137397	1.540067	3.837023
11.355556	0.137397	1.561439	3.863578
11.511111	0.137397	1.582812	3.889950
11.666667	0.137397	1.604185	3.916146
11.822222	0.137397	1.625558	3.942167
11.977778	0.137397	1.646931	3.968017
12.133333	0.137397	1.668303	3.993701
12.288889	0.137397	1.689676	4.019220
12.444444	0.137397	1.711049	4.044578
12.600000	0.137397	1.732422	4.069778


```

12.75556 0.137397 1.753795 4.094823
12.91111 0.137397 1.775168 4.119716
13.06667 0.137397 1.796540 4.966547
13.22222 0.137397 1.817913 9.164891
13.37778 0.137397 1.839286 15.23789
13.53333 0.137397 1.860659 22.63682
13.68889 0.137397 1.882032 30.99608
13.84444 0.137397 1.903404 39.97470
14.00000 0.137397 1.924777 49.22395
14.15556 0.137397 1.946150 58.38768

```

END FTABLE 1

END FTABLES

EXT SOURCES

```

<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # tem strg<-factor->strg <Name> # # <Name> # # ***
WDM 2 PREC ENGL 1 PERLND 1 999 EXTNL PREC
WDM 2 PREC ENGL 1 IMPLND 1 999 EXTNL PREC
WDM 1 EVAP ENGL 1 PERLND 1 999 EXTNL PETINP
WDM 1 EVAP ENGL 1 IMPLND 1 999 EXTNL PETINP
WDM 22 IRRG ENGL 0.7 SAME PERLND 46 EXTNL SURLI
WDM 22 IRRG ENGL 0.7 SAME PERLND 47 EXTNL SURLI
WDM 22 IRRG ENGL 0.7 SAME PERLND 48 EXTNL SURLI

```

END EXT SOURCES

EXT TARGETS

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name> # <Name> # #<-factor->strg <Name> # <Name> tem strg strg***
RCHRES 1 HYDR RO 1 1 1 WDM 1000 FLOW ENGL REPL
RCHRES 1 HYDR STAGE 1 1 1 WDM 1001 STAG ENGL REPL
COPY 1 OUTPUT MEAN 1 1 12.1 WDM 701 FLOW ENGL REPL
COPY 501 OUTPUT MEAN 1 1 12.1 WDM 801 FLOW ENGL REPL

```

END EXT TARGETS

MASS-LINK

```

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
<Name> # <Name> # #<-factor-> <Name> # <Name> # #***
MASS-LINK 2
PERLND PWATER SURO 0.083333 RCHRES INFLOW IVOL
END MASS-LINK 2

MASS-LINK 3
PERLND PWATER IFWO 0.083333 RCHRES INFLOW IVOL
END MASS-LINK 3

MASS-LINK 5
IMPLND IWATER SURO 0.083333 RCHRES INFLOW IVOL
END MASS-LINK 5

MASS-LINK 12
PERLND PWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 12

MASS-LINK 13
PERLND PWATER IFWO 0.083333 COPY INPUT MEAN
END MASS-LINK 13

MASS-LINK 15
IMPLND IWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 15

MASS-LINK 16
RCHRES ROFLOW COPY INPUT MEAN
END MASS-LINK 16

```

END MASS-LINK

END RUN

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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www.clearcreeksolutions.com

September 30, 2021

**San Diego Developmental
Services Department**
101 Ash St, San Diego, CA 92101
ATTN: STORMWATER

**SUBJECT: MERGE 56 UNIT 1 & 2 CONSTRUCTION CHANGE "B", PTS 697235 & PTS 697236
ADDENDUM LETTER TO STORM WATER QUALITY MANAGEMENT PLAN**

The letter is to address the proposed changes in the Merge 56 Unit 1 Construction Change "B", PTS 697235 (Construction Change to PTS 596359 / 679136) Water Quality assessment, and in the Merge 56 Unit 2 Construction Change "B", PTS 697236 (Construction Change to PTS 599995 / 679132) Water Quality assessment.

Note: Please refer to the attached DMA exhibits for the Drainage Management Areas mentioned below.

PROPOSED PROJECT DESCRIPTION

This application proposes enacting changes to site grading and design across both Merge 56 Unit 1 and Merge 56 Unit 2 (for greater detail on these changes, please see respective PTS submittal.) These changes include but are not limited to: revising grading and storm drain design in the shared north-east corner of the Merge 56 site to account for housing design on site, taking the previously approved combined DMA 14 and splitting it into DMA 14a and DMA 14b (one for Unit 1 and one for Unit 2), and implementing a new Modular Wetlands System BMP (14b) to service the new Unit 2 specific DMA.

Previously Approved Conditions: Drainage from Lot 6 of Unit 1 and Lot 88 and 89 of Unit 2 was previously considered as one DMA (DMA 14) and was jointly managed by a BMP Biofiltration basin (BMP 14).

Proposed Conditions: The proposed construction change has been designed to maintain overall drainage patterns of the previously approved Exhibit A, but with consideration given to each Unit of Merge independently. The area in question is now subdivided into 2 DMAs (14a and 14b). DMA 14b will be treated by a newly proposed 8' x 16' Modular Wetlands Systems, while DMA 14a will be treated by the previously approved biofiltration basin BMP 14 (now BMP 14a). The configuration of BMP 14a will not be resized for this Construction Change, providing oversized service to the new area of DMA 14a.

PROJECT WATER QUALITY AND HYDROMODIFICATION

Proposed Construction Change: Site drainage has been modified to incorporate a

MEGE 505 HMP
CC'B' ADDENDUM
PTO 697236-8 697236

proposed design on the Unit 2 portion of the site, now under DMA 14b, which will instead treat runoff through a BioClean Modular Wetland System (MWS) unit rather than the prior BMP 14. The previously approved BMP 14 has been rebranded as 14a with no direct changes to sizing, so this will more than cover the remaining area of DMA 14 on the Unit 1 side, now DMA 14a. With these proposed measures in place, runoff generated from the site will not result in any unmitigated drainage or storm water quality impacts on the existing downstream conditions as both treatment measures are oversized for the portioned DMA areas they are servicing.

Note: Updated pollutant control sizing calculations and updated DMA and HMP exhibits have been provided in this addendum study.

If you have any questions or need any further information please feel free to call me on my direct line (858-875-1718) or email me at Justin.Giles@latitude33.com.

Sincerely,



Justin R. Giles, PE C83540
Project Manager
Latitude 33 Planning and Engineering

**Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)**

**ONSITE MERGE 56 UNITS 1 & 2 ADDENDUM CC 'B'
PTS 697235 & 697236**

DWG. 40552-D and 40553-D

Check if electing for offsite alternative compliance

Engineer of Work:

Provide Wet Signature and Stamp Above Line

Prepared For:

SEA BREEZE PROPERTIES, LLC
5550 CARMEL MOUNTAIN ROAD, SUITE 204
SAN DIEGO, CA 92130
(858) 509-0484

Prepared By:

latitude 
PLANNING & ENGINEERING

LATITUDE 33 PLANNING & ENGINEERING
9968 HIBERT STREET 2ND FLOOR
SAN DIEGO, CA 92131
(858) 751-0633

Date:

NOVEMBER 2021

Approved by: City of San Diego

Date

The City of
**SAN
DIEGO** 

Project Name: ONSITE MERGE 56 UNITS 1 & 2

Certification Page

Project Name: MERGE 56 - ONSITE UNITS 1 & 2
Permit Application PTS 697235 & 697236

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Record's Signature

71075

06-30-2023

PE#

Expiration Date

MATTHEW J. SEMIC

Print Name

LATITUDE 33 PLANNING & ENGINEERING

Company

Date

Structural BMP Summary Information

Structural BMP ID No. 14a

Construction Plan Sheet No. 40553-4

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification form DS-563

Matthew J. Semic | RCE 71075 | 858.751.1704
Latitude 33 Planning & Engineering -
9968 Hibert Street, 2nd Floor
San Diego, CA 92143

Who will be the final owner of this BMP?

SeaBreeze Communities, or designated
Property/Homeowner's Association

Who will maintain this BMP into perpetuity?

SeaBreeze Communities, or designated
Property/Homeowner's Association

What is the funding mechanism for maintenance?

SeaBreeze Communities, or designated
Property/Homeowner's Association Dues

Project Name: Merge 56 Units 1 & 2

Form I-6 Page 28 of 54 (Copy as many as needed)

Structural BMP ID No. 14a

Construction Plan Sheet No. 40553-4

Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP14a is a biofiltration basin that was sized utilizing worksheet B.5-1 (see calculation worksheets in Attachment 1e). The required minimum treatment area for BMP 14 from worksheet B.5-1 is 466 sqft. The proposed BMP14a has a treatment area of 1150 sqft.

Structural BMP Summary Information

Structural BMP ID No. 14b

Construction Plan Sheet No. 40553-4

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification form DS-563

Matthew J. Semic | RCE 71075 | 858.751.1704
Latitude 33 Planning & Engineering -
9968 Hibert Street, 2nd Floor
San Diego, CA 92143

Who will be the final owner of this BMP?

SeaBreeze Communities, or designated
Property/Homeowner's Association

Who will maintain this BMP into perpetuity?

SeaBreeze Communities, or designated
Property/Homeowner's Association

What is the funding mechanism for maintenance?

SeaBreeze Communities, or designated
Property/Homeowner's Association Dues

Project Name: Merge 56 Units 1 & 2

Form I-6 Page 30 of 54 (Copy as many as needed)

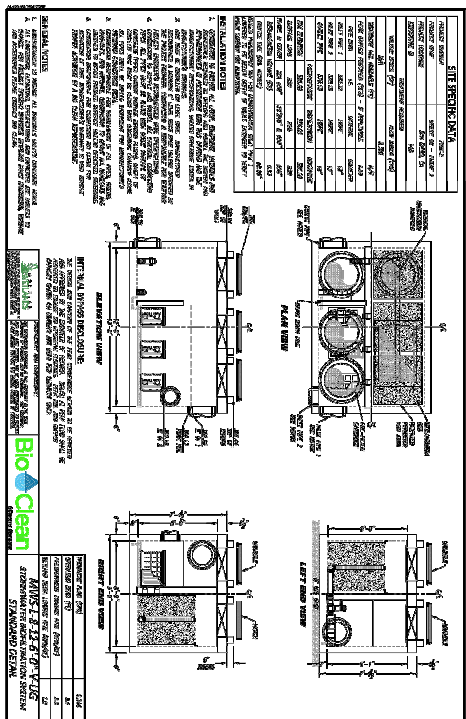
Structural BMP ID No. 14b

Construction Plan Sheet No. 40553-4

Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 14b (8'x12' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1E). The required minimum treatment flow rate for BMP 14b from worksheet B.6-1 is 0.306 cfs. The proposed BMP 14b has a treatment flowrate of 0.346 cfs.

MEGE 56 SWQMP
 CC'B' ADDENDUM
 PTS 697235 & 697236



Tabular Summary of DMAs

Worksheet B-1

DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated by (BMP ID)	Pollutant Control Type	Drains to (POC ID)
1	0.449	0.282	62.8	Type D	0.60	412	1	MWS	POC 'A'
2	1.340	1.030	76.8	Type D	0.71	1947	2	MWS	POC 'A'
3	0.366	0.251	68.5	Type D	0.65	485	3	MWS	POC 'A'
4	1.550	1.214	78.3	Type D	0.73	2290	4	MWS	POC 'A'
5	0.295	0.211	71.4	Type D	0.67	302	5	MWS	POC 'A'
6	0.804	0.622	77.3	Type D	0.72	1175	6	MWS	POC 'A'
7	0.130	0.106	81.8	Type D	0.75	199	7	MWS	POC 'A'
8	0.422	0.309	73.2	Type D	0.69	589	8	MWS	POC 'A'
9	0.538	0.398	74.0	Type D	0.69	757	9	MWS	POC 'A'
12	4.136	0.000	0.0	Type D	0.30	2522	12	BF-1	POC 'A'
13	5.517	0.000	0.0	Type D	0.30	3364	13	BF-1	POC 'A'
14a	1.189	0.000	0.0	Type D	0.30	725	14a	BF-1	POC 'A'
14b	1.610	0.539	33.5	Type D	0.63	2070	14b	MWS	POC 'A'
15	7.418	5.538	74.7	Type D	0.75	13092	15	MWS	POC 'A'
16	7.732	4.979	64.4	Type D	0.69	12523	16	MWS	POC 'A'
17	2.750	2.107	76.6	Type D	0.76	4019	17	MWS	POC 'A'
18	0.276	0.000	0.0	Type D	0.30	0	--	--	--


Summary of DMA Information (Must match project description and SWQMP Narrative)

No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp	Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)	No. of POCs
17	43.800	18.198	41.5	0.50	51497	43.800	1

MEGE 56 SWQMP
 CC'B' ADDENDUM
 PTS 697235 & 697236

Area Weighted Runoff Factor (DMA 14a)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete or Asphalt	0.9	-	-
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	-	-
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	51,775	15,533
Total		51,775	15,533
Composite C	0.30		

Worksheet B.2-1 DCV (DMA 14a)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	51,775	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.30	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	725	cubic-feet

		Project Name Merge 56 Onsite Units 1 & 2
		BMP ID 14a
Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1
1	Area draining to the BMP	51,775 sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.30
3	85 th percentile 24-hour rainfall depth	0.56 inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	725 cu. ft.
BMP Parameters		
5	Surface ponding [6 inch minimum, 12 inch maximum]	10 inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18 inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12 inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3 inches
9	Freely drained pore storage of the media	0.2 in/in
10	Porosity of aggregate storage	0.4 in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5 in/hr.
Baseline Calculations		
12	Allowable routing time for sizing	6 hours
13	Depth filtered during storm [Line 11 x Line 12]	30 inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	19.6 inches
15	Total Depth Treated [Line 13 + Line 14]	49.6 inches
Option 1 – Biofilter 1.5 times the DCV		
16	Required biofiltered volume [1.5 x Line 4]	1087 cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	263 sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding		
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	544 cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	333 sq. ft.
Footprint of the BMP		
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	466 sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	466 sq. ft.
23	Provided BMP Footprint	1150 sq. ft.
24	Is Line 23 ≥ Line 22?	Yes, Performance Standard is Met



Project Name

Merge 56 Onsite Units 1 & 2

BMP ID

14a

Sizing Method for Volume Retention Criteria

Worksheet B.5-2



Project Name

Merge 56 Onsite Units 1 & 2

BMP ID

14a

Volume Retention for No Infiltration Condition

Worksheet B.5-6

		1	2	3	4	5	
1	Area draining to the biofiltration BMP				51,775	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.30		
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				15533	sq. ft.	
4	Required area for Evapotranspiration [Line 3 x 0.03]				466	sq. ft.	
5	Biofiltration BMP Footprint				1150	sq. ft.	
Landscape Area (must be identified on DS-3247)							
	Identification	1	2	3	4	5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	0	0	0	0	0	
10	Sum of Landscape area [sum of line 9 (Id's 1 to 5)]				0	sq. ft.	
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				1150	sq. ft.	
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?					Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]				2.47		
14	Target Volume Retention [Line 10 from Worksheet B.5.2]				17	cu. ft.	
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]				-24,5071785	cu. ft.	
Site Design BMP							
	Identification	Site Design Type				Credit	
	1					cu. ft.	
	2					cu. ft.	
	3					cu. ft.	
	4					cu. ft.	
	5					cu. ft.	
16	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.				0	cu. ft.	
17	Is Line 16 ≥ Line 15?					Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 14b)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	23,203	20,883
Concrete or Asphalt	0.9	23,490	21,141
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Amended, Mulched soils or Landscape	0.1	23,439	2,344
Compacted Soils (Unpaved Parking)	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		70,132	44,368
Composite C	0.63		

Worksheet B.2-1 DCV (DMA 14b)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	70,132	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.63	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2070	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 14b)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2070	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	2070	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.61	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.63	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.204	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.306	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 14b

Sizing Method for Volume Retention Criteria

Worksheet B.5 - 2

1	Area draining to the BMP	70,132	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2070	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30	0.006	in/hr.
	When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C		
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
	Average annual volume reduction target (Figure B.5-2)		
8	When Line 7 > 0.01 in/hr. = Minimum (4.0, 166.9 x Line 7 +6.62)	3.5	%
	When Line 7 ≤ 0.01 in/hr. = 3.5%		
	Fracture of DCV to be retained (Figure B.5-3)		
	When Line 8 > 8% =		
9	0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014	0.023	
	When Line 8 ≤ 8% = 0.023		
10	Target volume retention [Line 9 x Line 4]	4.8	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 14b	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	70,132	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	44368	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1331	sq. ft.
5	Biofiltration BMP Footprint	201	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	4278	
7	Impervious area draining to the landscape area (sq. ft.)	5108	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	1.19	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5]	3405	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		3405
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		3606
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	2.71	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	48	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-81.43229304	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA

PROJECT NUMBER	76562	
PROJECT NAME	MERGE 56 - PHASE 2	
PROJECT LOCATION	SAN DIEGO, CA	
STRUCTURE ID	148	
TREATMENT REQUIRED		
VOLUME BASED (CF)	FLOW BASED (GFS)	
N/A	0.306	
TREATMENT HQL AVAILABLE (FT)	N/A	
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	5.89	
PIPE DATA	MATERIAL	DIAMETER
INLET PIPE 1	HDPE	18"
INLET PIPE 2	HDPE	12"
OUTLET PIPE	HDPE	18"
PRETREATMENT	BIOFILTRATION	DISCHARGE
RM ELEVATION	386.00	386.00
SURFACE LOAD	H2O	H2O
FRAME & COVER	2EA 830"	30"X48" & 830"
WETLAND MEDIA VOLUME (CY)		6.53
ORIFICE SIZE (DIA. INCHES)		42.66"

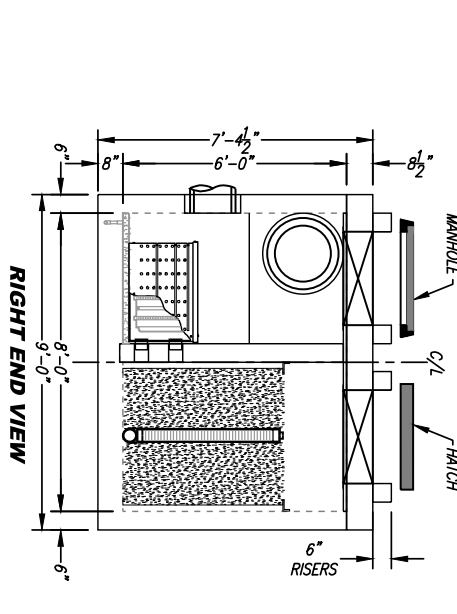
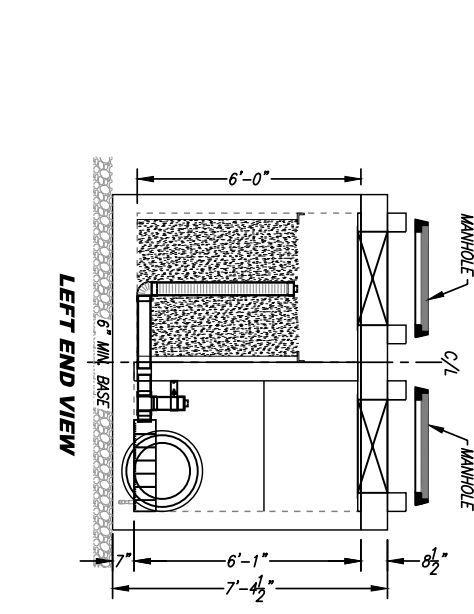
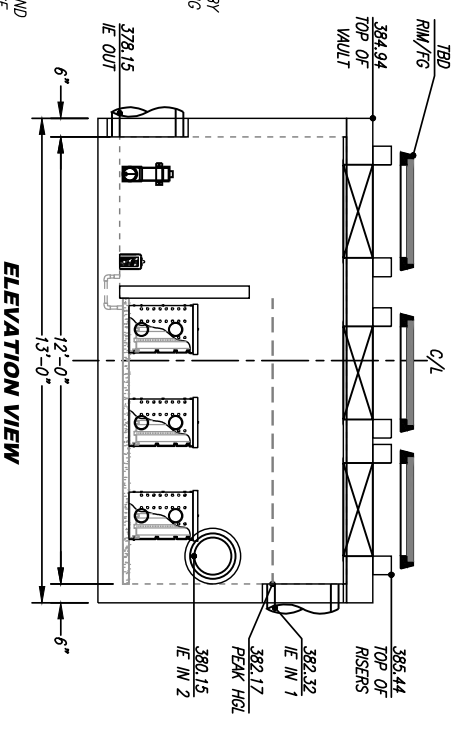
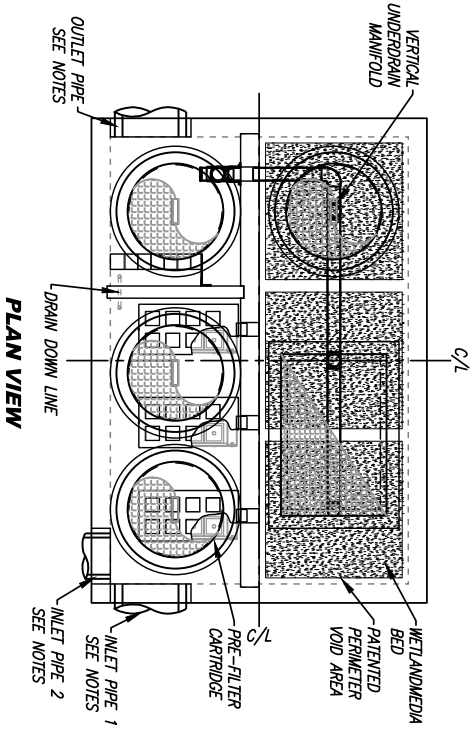
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. INLET PIPE 1 LOWERED TO FIT BELOW SOFT OF VAULT. ENGINEER TO VERIFY FOUR CORNER RM ELEVATIONS.

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INNER OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
4. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
5. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.
6. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



INTERNAL BYPASS DISCLOSURE:

THE DESIGN AND CAPACITY OF THE PEAK CONVEYANCE METHOD TO BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD. HGL(S) AT PEAK FLOW SHALL BE ASSESSED TO ENSURE NO UPSTREAM FLOODING. PEAK HGL AND BYPASS CAPACITY SHOWN ON DRAWING ARE USED FOR GUIDANCE ONLY.



PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF BIO CLEAN. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT FOR ANY PART THEREOF. ANY REPRODUCTION OR MODIFICATION IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF PORTERRA.



TREATMENT FLOW (GFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-12-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

This Form Applies to DMAs 1-9, 14b, 15-17

Compact (high rate) Biofiltration BMP Checklist	Form I-10	
<p>Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.</p> <p>A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA and the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.</p> <p>An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.</p>		
Section 1: Biofiltration Criteria Checklist (Appendix F)		
<p>Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.</p>		
Criteria	Answer	Progression
<p>Criteria 1 and 3:</p> <p>What is the infiltration condition of the DMA?</p> <p>Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p> <p>Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination:</p> <ul style="list-style-type: none"> • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. <p>Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal</p>	<p><input type="radio"/> Full Infiltration Condition</p> <p><input type="radio"/> Partial Infiltration Condition</p> <p><input checked="" type="radio"/> No Infiltration Condition</p>	<p>Stop. Compact biofiltration BMP is not allowed.</p> <p>Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction).</p> <p>If the required volume reduction is achieved proceed to Criteria 2.</p> <p>If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. Stop.</p> <p>Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP.</p> <p>If the criteria in Table B.5-1 is met proceed to Criteria 2.</p> <p>If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. Stop.</p>



This Form Applies to DMAs 1-9, 14b, 15-17

Compact (high rate) Biofiltration BMP Checklist	Form I-10	
<p>Provide basis for Criteria 1 and 3:</p> <p>Feasibility Analysis: Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.</p> <p>If Partial Infiltration Condition: Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.</p> <p>If No Infiltration Condition: Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met. Per Worksheet B.5-6 for this DMA, the volume retention criteria is met. This is met through Landscaped area that meets the criteria listed in SD-B and SD-F fact sheets.</p>		
Criteria	Answer	Progression
<p>Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit?</p> <p>Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p>	<p><input checked="" type="radio"/> Meets Flow based Criteria</p> <p><input type="radio"/> Meets Volume based Criteria</p> <p><input type="radio"/> Does not Meet either criteria</p>	<p>Use guidance from Appendix F.2.2 to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP.</p> <p>Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.)</p> <p>Proceed to Criteria 4.</p> <p>Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite.</p> <p>Proceed to Criteria 4.</p> <p>Stop. Compact biofiltration BMP is not allowed.</p>



This Form Applies to DMAs 1-9, 14b, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
<p>Provide basis for Criteria 2:</p> <p>Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).</p> <p>Per worksheet B.6-1 for this DMA, the proposed compact biofiltration BMP meets flow-based criteria. The proposed compact biofiltration BMP is sized per the manufacturer specs and guidelines and proposed flow rates are not in excess of recommended standards for proper operation.</p>		
Criteria	Answer	Progression
<p>Criteria 4:</p> <p>Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern?</p> <p>Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p>	<p><input checked="" type="radio"/> Yes, meets the TAPE certification.</p> <hr/> <p><input type="radio"/> Yes, through other third-party documentation</p> <hr/> <p><input type="radio"/> No</p>	<p>Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern.</p> <p>Proceed to Criteria 5.</p> <hr/> <p>Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2.</p> <p>Proceed to Criteria 5.</p> <hr/> <p>Stop. Compact biofiltration BMP is not allowed.</p>
<p>Provide basis for Criteria 4:</p> <p>Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.</p> <p>This device is sized per the manufacturer specs and guidelines and this device has TAPE certification.</p>		



This Form Applies to DMAs 1-9, 14b, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	Answer	Progression
<p>Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?</p>	<input checked="" type="radio"/> Yes, and the compact BMP is privately owned, operated and not in the public right of way.	<p>Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.</p> <p>Stop. The compact biofiltration BMP meets the required criteria.</p>
	<input type="radio"/> Yes, and the BMP is either owned or operated by the City or in the public right of way.	<p>Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination.</p> <p>Stop. Consult the City Engineer for a determination.</p>
	<input type="radio"/> No	<p>Stop. Compact biofiltration BMP is not allowed.</p>
<p>Provide basis for Criteria 7:</p> <p>Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.</p> <p>Maintenance information for the proposed compact biofiltration BMP and SWMDCMA (Maintenance Agreement) are contained in Attachment 3 of this report, outlining maintenance responsibilities, thresholds, and procedures.</p>		



This Form Applies to DMAs 1-9, 14b, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Section 2: Verification (For City Use Only)		
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	<input type="radio"/> Yes	<input type="radio"/> No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:		





December 2015

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

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CC'B' ADDENDUM
PTS 69235 & 697236

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

- Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a “one size fits all” maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
- Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

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CC'B' ADDRESS 697236
PTS 697236

maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.

- When inspections are performed, the following findings typically serve as maintenance triggers:

- Standing water remains in the vault between rain events, or
- Bypass occurs during storms smaller than the design storm.
- If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
- Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.

Applicant's Address: PO. Box 869
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan*: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data*, April 2014
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring*, April 2014.

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:

Download at <http://www.modularwetlands.com/>

Contact Information:

Applicant:

Greg Kent
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: <http://www.modularwetlands.com/>

Ecology web link: <http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html>

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants.

MEGE 56 SWQMP
CC'B' ADDENDUM
PTS 697235 & 697236

Attachment 2

Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

MEGE 56 SWQMP
CC'B' ADDENDUM
PTS 697235 & 697236

Attachment 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.



RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO AND
 WHEN RECORDED MAIL TO:
 Latitude 33 Planning & Engineering
 9968 Hibert St., 2nd Floor
 San Diego, CA 92131

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER: <u>2584674</u>	ASSESSORS PARCEL NUMBER: _____	PROJECT NUMBER: <u>697235</u>
------------------------------------	-----------------------------------	----------------------------------

This agreement is made by and between the City of San Diego, a municipal corporation [City] and SEA BREEZE 56, LLC,

the owner or duly authorized representative of the owner [Property Owner] of property located at 8092 1/3 Carmel Mountain Road San Diego, CA 92129
(PROPERTY ADDRESS)

and more particularly described as: Lots 1-5 of Map 16433, Parcel 1 of PM
(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): 40552-D.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): 40552-D.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): 40552-D.
2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) 40552-D.
3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): "A"

(Owner Signature)

Gary Levitt, President
(Print Name and Title)

Sea Breeze 56, LLC
(Company/Organization Name)

(Date)

THE CITY OF SAN DIEGO

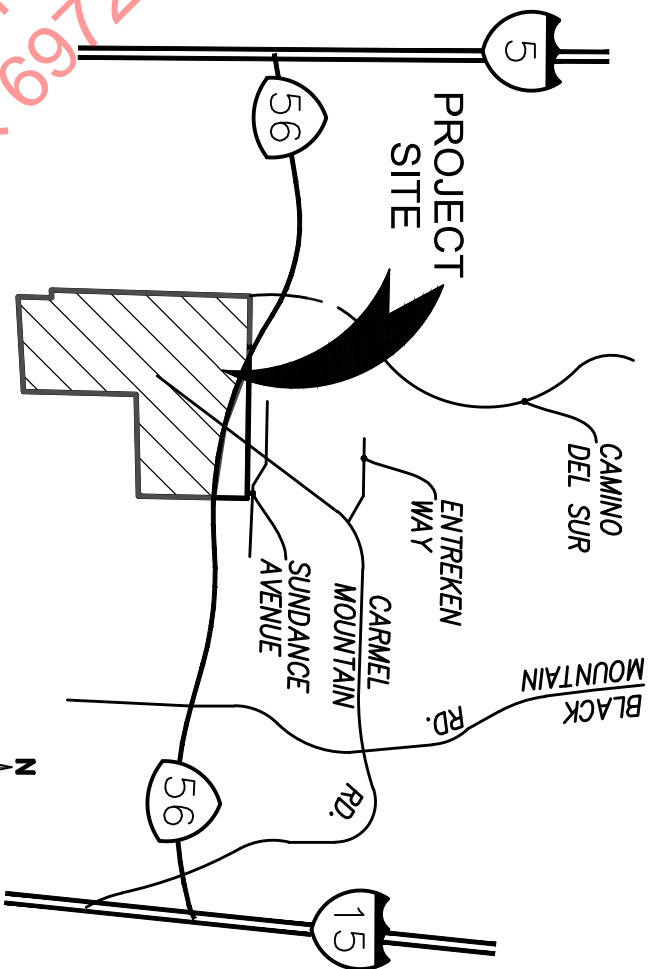
APPROVED:

(City Control Engineer Signature)

(Print Name)

(Date)

POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
MERGE 56 ONSITE DMAS 12-14a - SWMDCMA
SHEET 1 OF 5



VICINITY MAP
 NO SCALE

**POST-CONSTRUCTION
 BMP NOTES**

- ANY MODIFICATION(S) TO THE PERMANENT POST CONSTRUCTION BMP DEVICES/STRUCTURE SHOWN ON PLAN REQUIRES A CONSTRUCTION CHANGE TO BE PROCESSED AND APPROVED THROUGH DEVELOPMENT SERVICE DEPARTMENT BY THE ENGINEERING OF WORK. APPROVAL OF THE CONSTRUCTION CHANGE IS REQUIRED PRIOR TO CONSTRUCTION OF THE PERMANENT BMP.

SITE MAP NOTES

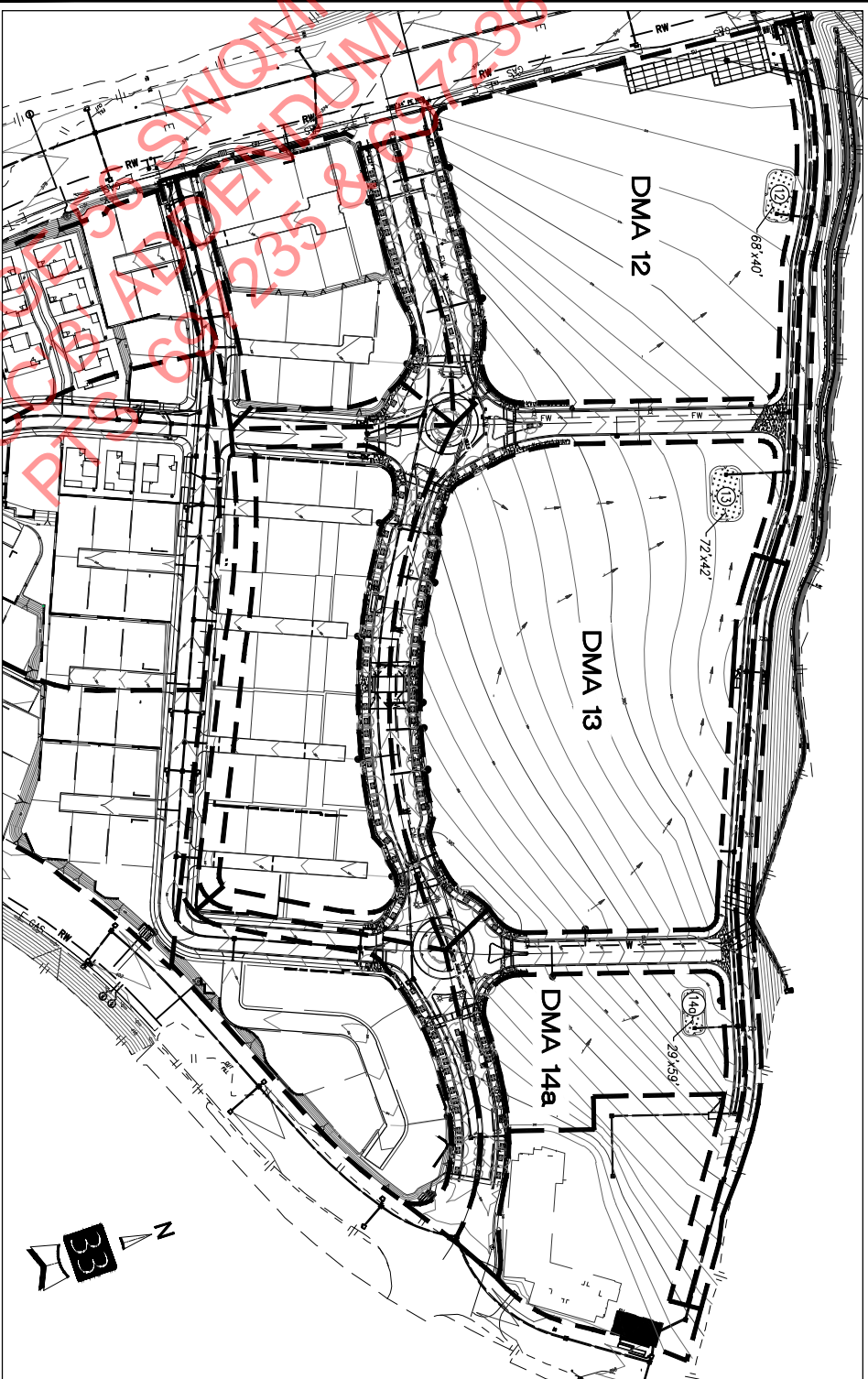
- NO MATERIALS TO BE EXPOSED TO STORMWATER RUNOFF
- NO BUILDING OR POLLUTANT GENERATING ACTIVITY AREAS ARE PROPOSED (FUELING, GARAGES, WASTE CONTAINERS, WASH RACKS, HAZARDOUS MATERIALS)
- NO ONSITE AREAS OF POTENTIAL EROSION
- NO EXISTING DRINKING WATER WELLS

MERGE 56 SWQMP
 CC'B' APPENDUM
 PTS 697235 & 697236

POST-CONSTRUCTION PERMANENT BMP EXHIBIT 'A'
MERGE 56 ONSITE DMAS 12-14a - SWMDCMA
SHEET 2 OF 5

FOR HMP MAINTENANCE OF VAULT,
 SEE SWMDCMA APPROVAL #2255199

BIOFILTRATION BASIN AREA TABLE		
BMP	AREA OR FLOW RATE	ORIFICE DIAMETER (IN)
12	BIOFILTRATION BASIN (1849 SF)	-
13	BIOFILTRATION BASIN (2201 SF)	-
14a	BIOFILTRATION BASIN (1150 SF)	-



ME
 692235
 859235
 SWMDCMA
 SWMDCMA

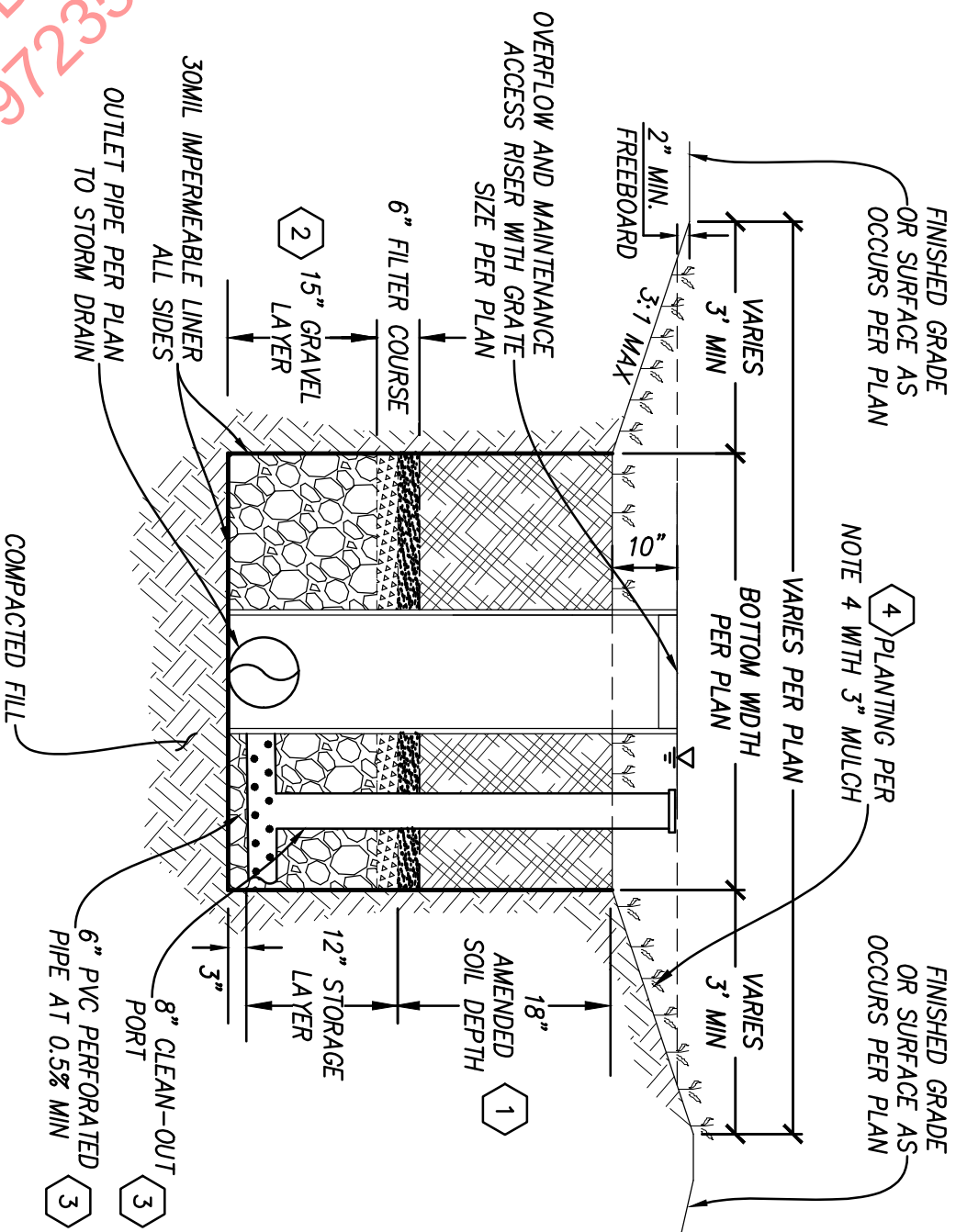
POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
MERGE 56 ONSITE DMAS 12 - 14a, 14b - SWMDCMA
SHEET 4 OF 5

BIOFILTRATION BASIN NOTES

- 1 AMENDED SOIL SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.4 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL MAINTAIN A MINIMUM INFILTRATION RATE OF 5 IN/HR OVER THE LIFETIME OF THE FACILITY.
- 2 GRAVEL STORAGE LAYER SHALL CONFORM TO THE STANDARD SPECIFICATION PER APPENDIX F.5 OF THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL AND SHALL CONSIST OF A MINIMUM 6" FILTER COURSE OVER MINIMUM 12" OF CLEAN WASHED ASTM #57 OPEN GRADED STONE (VARIES PER HYDROMOD CALCS).
FILTER COURSE SHALL CONSIST OF 3" LAYER OF CLEAN WASHED ASTM 33 FINE AGGREGATE SAND OVERLYING A 3" LAYER OF ASTM NO. 8 STONE.
- 3 UNDERDRAINS SHALL BE MINIMUM 6" SLOTTED PVC PIPE CONFORMING TO ASTM D3034 OR CORRUGATED HDPE CONFORMING TO AASHTO 252M. CLEANOUT PORTS SHALL BE A MINIMUM 8" DIAMETER WITH LOCKABLE CAP AND PLACED EVERY 50' OF UNDERDRAIN LENGTH.
- 4 BIOFILTRATION BASINS SHALL BE PLANTED WITH ADEQUATE GROUNDCOVER AS OUTLINED IN APPENDIX E OF THE SAN DIEGO LOW IMPACT DEVELOPMENT DESIGN MANUAL. SEE LANDSCAPE PLANS SHEETS FOR PLANTING PLAN.
- 5 BF-1 BIOFILTRATION BASINS WHICH DO NOT INCORPORATE ANY INFILTRATION SHALL BE FULLY LINED WITH A 30MIL IMPERMEABLE LINER ON BOTH SIDES AND THE BOTTOM OF THE BASIN EXCAVATION.

MERGE 56 SWQMP
CC'B' ADDENDUM
PTS 697235 & 697236

POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
 MERGE 56 ONSITE - SWMDCMA
 SHEET 5 OF 5



BIOFILTRATION BASIN DETAIL (PVT) (BF-1)

NOT TO SCALE

MERGE 56 SWQMP
 PVT ADDENDUM
 697235 & 697236



RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO AND
 WHEN RECORDED MAIL TO:
Latitude 33 Planning & Engineering
9968 Hibert St., 2nd Floor
San Diego, CA 92131

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER: <u>2584800</u>	ASSESSORS PARCEL NUMBER: _____	PROJECT NUMBER: <u>697236</u>
------------------------------------	-----------------------------------	----------------------------------

This agreement is made by and between the City of San Diego, a municipal corporation [City] and SEA BREEZE 56, LLC,

the owner or duly authorized representative of the owner [Property Owner] of property located at 8092 1/3 Carmel Mountain Road San Diego, CA 92129
(PROPERTY ADDRESS)

and more particularly described as: Parcels 2, 3 of PM
(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): 40552-D.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): 40552-D.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): 40552-D.
2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) 40552-D.
3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): "A"

(Owner Signature)

Gary Levitt, President
(Print Name and Title)

Sea Breeze 56, LLC
(Company/Organization Name)

(Date)

THE CITY OF SAN DIEGO

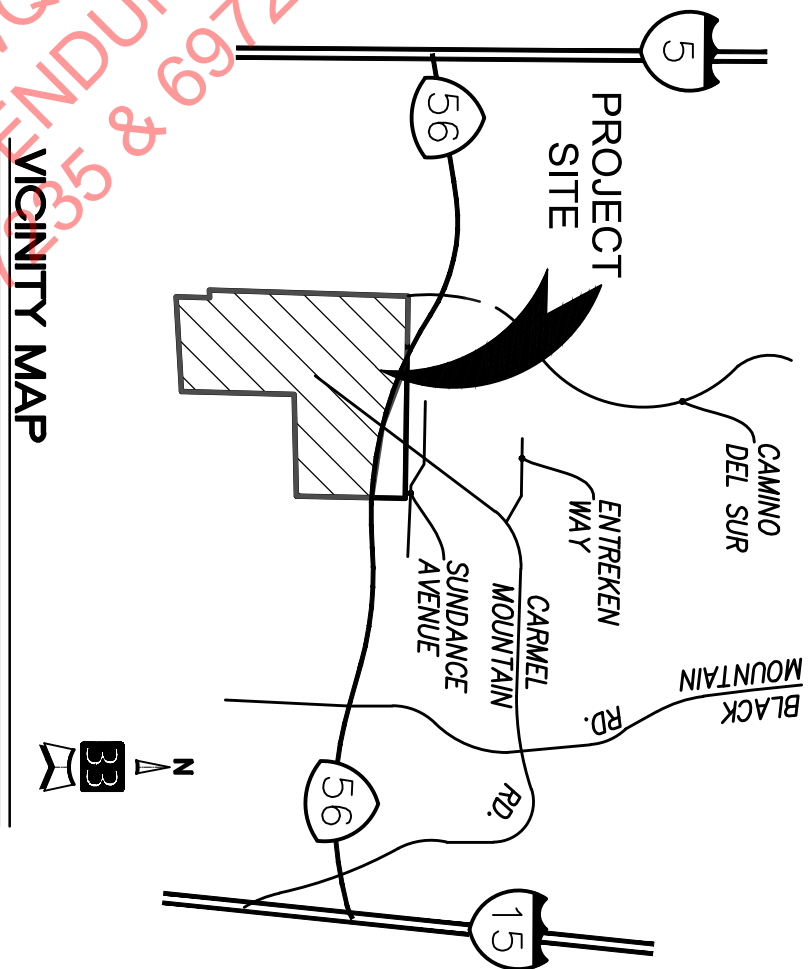
APPROVED:

(City Control Engineer Signature)

(Print Name)

(Date)

POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
MERGE 56 ONSITE DMA 14b - SWMDCMA
SHEET 1 OF 5



NO SCALE

VICINITY MAP

**POST-CONSTRUCTION
BMP NOTES**

- ANY MODIFICATION(S) TO THE PERMANENT POST CONSTRUCTION BMP DEVICES/STRUCTURE SHOWN ON PLAN REQUIRES A CONSTRUCTION CHANGE TO BE PROCESSED AND APPROVED THROUGH DEVELOPMENT SERVICE DEPARTMENT BY THE ENGINEERING OF WORK. APPROVAL OF THE CONSTRUCTION CHANGE IS REQUIRED PRIOR TO CONSTRUCTION OF THE PERMANENT BMP.

SITE MAP NOTES

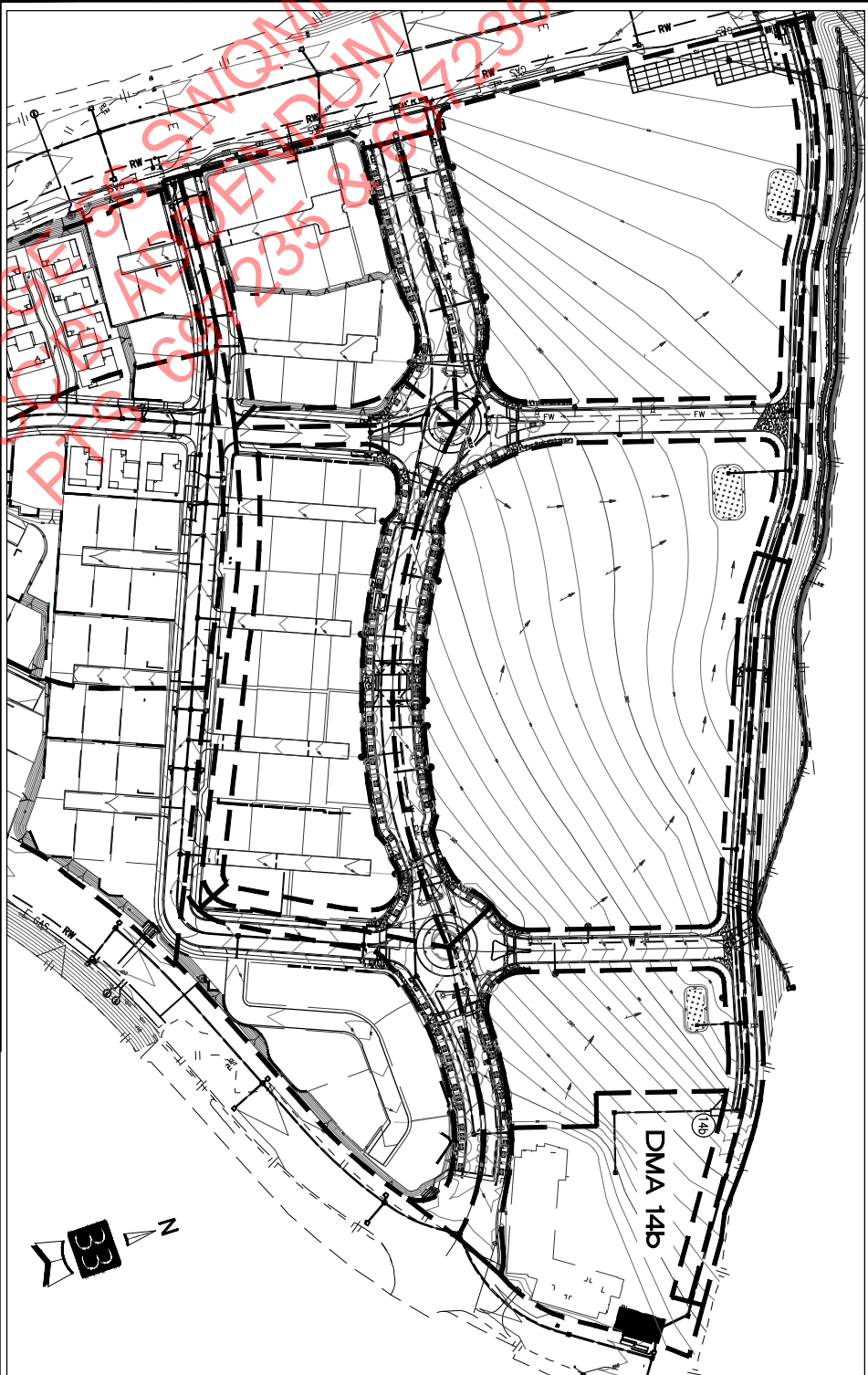
- NO MATERIALS TO BE EXPOSED TO STORMWATER RUNOFF
- NO BUILDING OR POLLUTANT GENERATING ACTIVITY AREAS ARE PROPOSED (FUELING, GARAGES, WASTE CONTAINERS, WASH RACKS, HAZARDOUS MATERIALS)
- NO ONSITE AREAS OF POTENTIAL EROSION
- NO EXISTING DRINKING WATER WELLS

MERGE 56 SWQMP
 CC'B' APPENDUM
 PTS 697235 & 697236

POST-CONSTRUCTION PERMANENT BMP EXHIBIT 'A'
 MERGE 56 ONSITE DMA 14b - SWMDCMA
 SHEET 2 OF 5

BIOFILTRATION BASIN AREA TABLE		
BMP	AREA OR FLOW RATE	ORIFICE DIAMETER (IN)
14b	MWS L-8-12 Q=0.346CFS (151 SF)	-

FOR HMP MAINTENANCE OF VAULT,
 SEE SWMDCMA APPROVAL #2255199



POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
MERGE 56 ONSITE DMA 14b - SWMDCMA
SHEET 3 OF 5

**POST-CONSTRUCTION PERMANENT BMP OPERATION +
 MAINTENANCE PROCEDURE DETAILS**

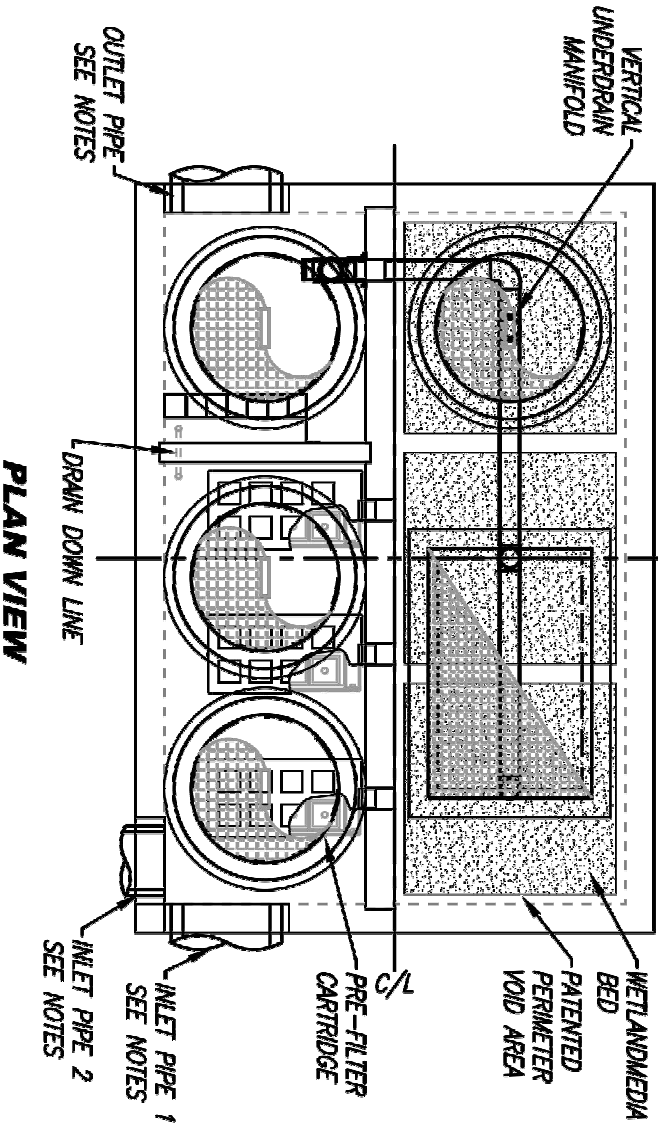
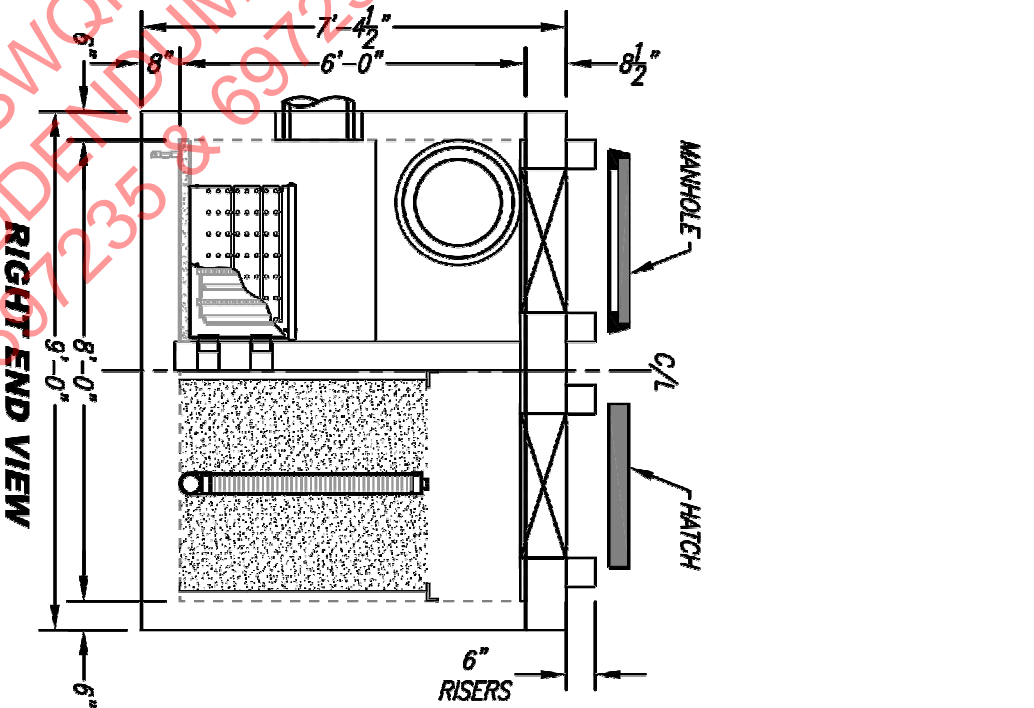
STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.: 2584800

O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER (SEA BREEZE PROPERTIES, LLC)

BMP DESCRIPTION	MAINTENANCE TASK	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
POLLUTANT CONTROL					
MODULAR WETLANDS SYSTEM	TRASH & SEDIMENT REMOVAL	EVERY 6-24 MONTHS	TASKS INCLUDE TRASH REMOVAL FROM SCREENING DEVICE AND SEDIMENT REMOVAL FROM SEPARATION CHAMBER.		24, 26, 35, 36, 41, 44
	REPLACE FILTER MEDIA	EVERY 12-24 MONTHS	REPLACE CARTRIDGE FILTER MEDIA AND DRAIN DOWN FILTER MEDIA.	1	
	TRIM VEGETATION	EVERY 6-12 MONTHS	PRUNE VEGETATION AND REMOVE AND REPLACE ANY DEAD PLANTS.		

MERGE 56 SWQMP
 CC'B' ADDENDUM
 PTS 697235 & 697236

POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
 MERGE 56 ONSITE - SWMDCMA
 SHEET 4 OF 5

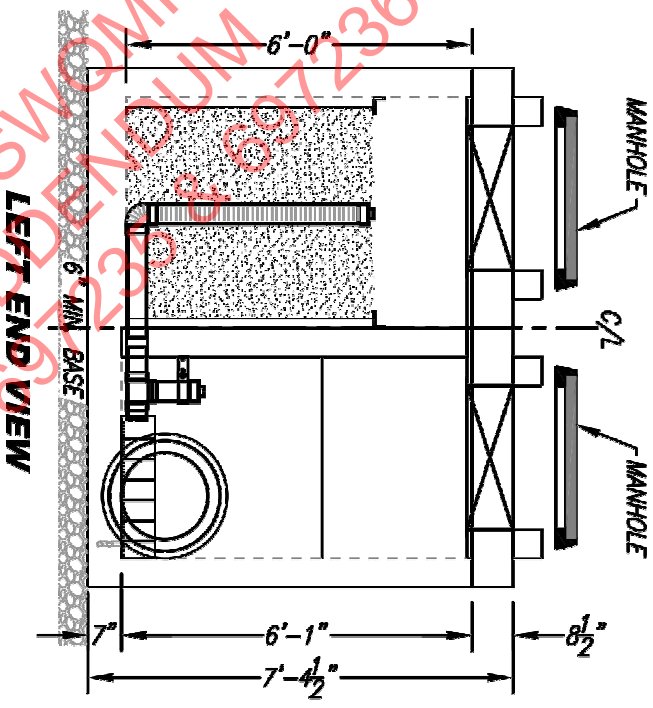


BMP #14b: MODULAR WETLANDS MWS-L-8-12

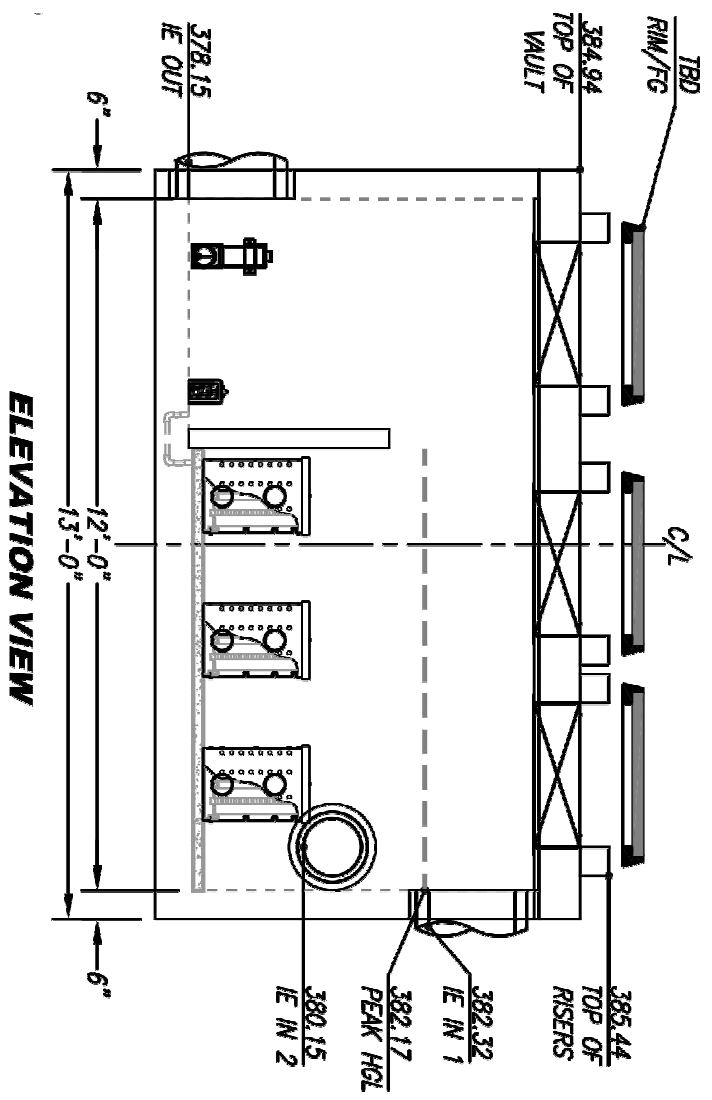
NOT TO SCALE

MERGE 56 SWMDCMA
 PROJECT ADDENDUM
 6972358 697236

POST-CONSTRUCTION PERMANENT BMP - EXHIBIT 'A'
 MERGE 56 ONSITE - SWMDCMA
 SHEET 5 OF 5



LEFT END VIEW



ELEVATION VIEW

BMP #14b: MODULAR WETLANDS MWS-L-8-12

NOT TO SCALE

MERGE 56 SWMDCMA
 PROJECT NUMBER 2308897236

Project Name: ONSITE MERGE 56 UNITS 1 & 2

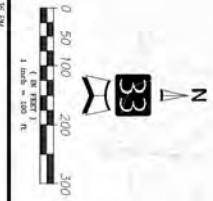
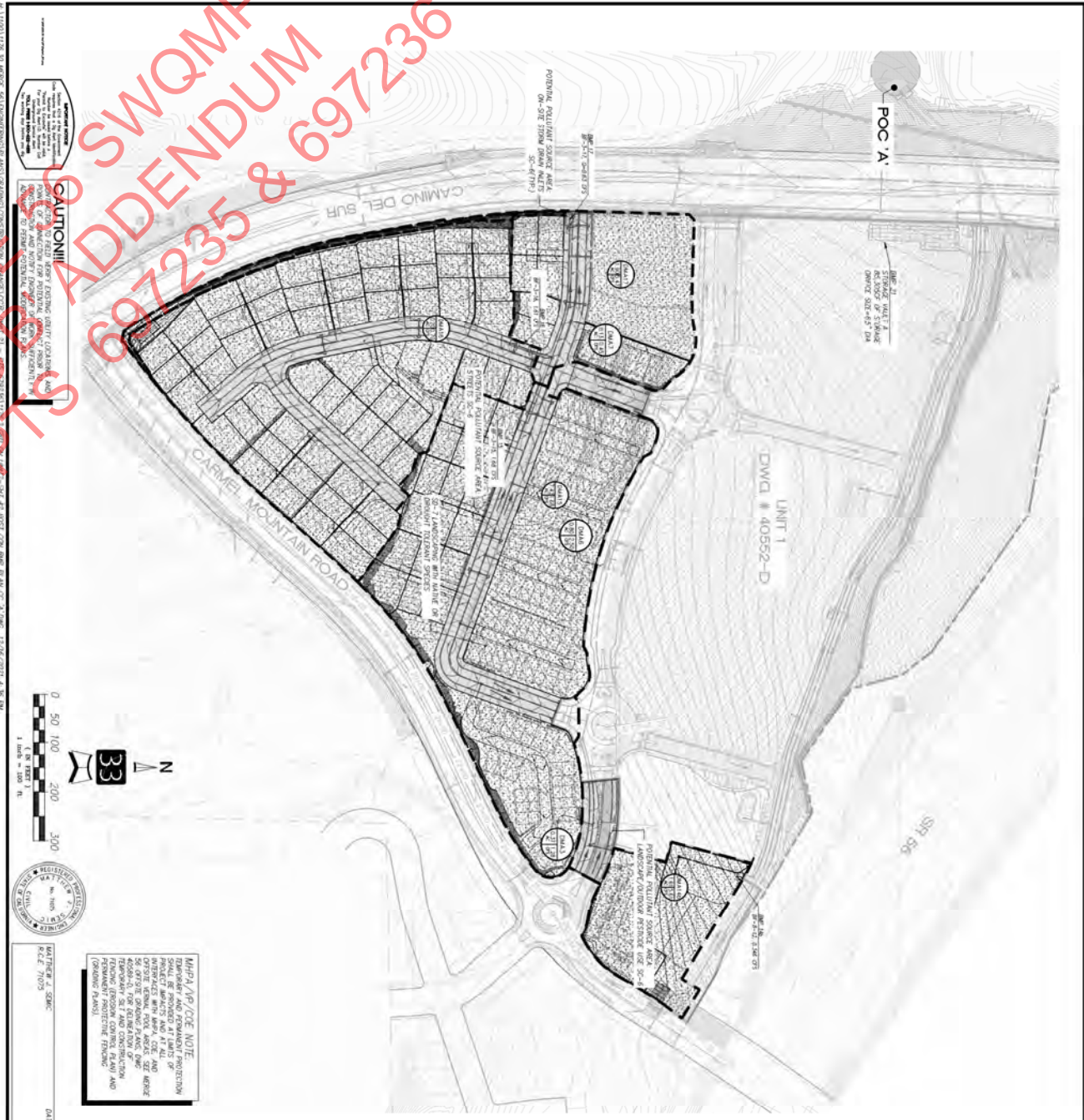
MEGE 56 SWQMP
CC'B' ADDENDUM
PTS 697235 & 697236

Attachment 4

Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

MEGE SWQMP
ADDENDUM
692235 & 692236



CAUTION!!!
 THIS PLAN IS FOR THE PROPOSED CONSTRUCTION OF THE PROJECT AND DOES NOT REPRESENT THE EXISTING CONDITIONS OF THE SITE. THE USER OF THIS PLAN SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF THE INFORMATION AND DATA PROVIDED HEREON. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES.

WHP/MP/OC/CE NOTE:
 EXISTING AND PROPOSED PROTECTION MEASURES SHALL BE INSTALLED AND MAINTAINED AT ALL TIMES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES.

DATE	DATE	DATE	DATE
DESIGNED BY	CHECKED BY	DATE	DATE
DRAWN BY	DATE	DATE	DATE
DATE	DATE	DATE	DATE

POST-CONSTRUCTION BMP PLAN FOR
MERGE 56 - UNIT 2
 LOTS 1-89 AND 'A'-T OF MAP 16457
 CITY OF SAN DIEGO, CALIFORNIA
 DEVELOPER: [Name]
 PROJECT NO. 40553-60-D

BMP AREA TABLE

BMP NO.	TREATMENT METHOD	TYPE	SYMBOLICAL APPROVAL #	
1	0.081(15)	0.091(15)	MMS-1-4-8	2502415
2	0.281(15)	0.281(15)	MMS-1-4-12	2502415
3	0.138(15)	0.138(15)	MMS-1-4-12	2502415
4	0.138(15)	0.138(15)	MMS-1-4-12	2502415
5	0.099(15)	0.091(15)	MMS-1-4-6	2502415
6	0.121(15)	0.121(15)	MMS-1-4-15	2502415
7	0.081(15)	0.115(15)	MMS-1-4-8	2502415
8	0.081(15)	0.115(15)	MMS-1-4-8	2502415
9	0.112(15)	0.115(15)	MMS-1-4-8	2502415
10	0.081(15)	0.081(15)	MMS-1-4-8	2502415
11	0.081(15)	0.081(15)	MMS-1-4-8	2502415
12	0.081(15)	0.081(15)	MMS-1-4-8	2502415
13	0.081(15)	0.081(15)	MMS-1-4-8	2502415
14	0.081(15)	0.081(15)	MMS-1-4-8	2502415
15	0.081(15)	0.081(15)	MMS-1-4-8	2502415
16	0.081(15)	0.081(15)	MMS-1-4-8	2502415
17	0.081(15)	0.081(15)	MMS-1-4-8	2502415
18	0.081(15)	0.081(15)	MMS-1-4-8	2502415
19	0.081(15)	0.081(15)	MMS-1-4-8	2502415
20	0.081(15)	0.081(15)	MMS-1-4-8	2502415
21	0.081(15)	0.081(15)	MMS-1-4-8	2502415
22	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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24	0.081(15)	0.081(15)	MMS-1-4-8	2502415
25	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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33	0.081(15)	0.081(15)	MMS-1-4-8	2502415
34	0.081(15)	0.081(15)	MMS-1-4-8	2502415
35	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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39	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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43	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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51	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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56	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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66	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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69	0.081(15)	0.081(15)	MMS-1-4-8	2502415
70	0.081(15)	0.081(15)	MMS-1-4-8	2502415
71	0.081(15)	0.081(15)	MMS-1-4-8	2502415
72	0.081(15)	0.081(15)	MMS-1-4-8	2502415
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77	0.081(15)	0.081(15)	MMS-1-4-8	2502415
78	0.081(15)	0.081(15)	MMS-1-4-8	2502415
79	0.081(15)	0.081(15)	MMS-1-4-8	2502415
80	0.081(15)	0.081(15)	MMS-1-4-8	2502415
81	0.081(15)	0.081(15)	MMS-1-4-8	2502415
82	0.081(15)	0.081(15)	MMS-1-4-8	2502415
83	0.081(15)	0.081(15)	MMS-1-4-8	2502415
84	0.081(15)	0.081(15)	MMS-1-4-8	2502415
85	0.081(15)	0.081(15)	MMS-1-4-8	2502415
86	0.081(15)	0.081(15)	MMS-1-4-8	2502415
87	0.081(15)	0.081(15)	MMS-1-4-8	2502415
88	0.081(15)	0.081(15)	MMS-1-4-8	2502415
89	0.081(15)	0.081(15)	MMS-1-4-8	2502415
90	0.081(15)	0.081(15)	MMS-1-4-8	2502415
91	0.081(15)	0.081(15)	MMS-1-4-8	2502415
92	0.081(15)	0.081(15)	MMS-1-4-8	2502415
93	0.081(15)	0.081(15)	MMS-1-4-8	2502415
94	0.081(15)	0.081(15)	MMS-1-4-8	2502415
95	0.081(15)	0.081(15)	MMS-1-4-8	2502415
96	0.081(15)	0.081(15)	MMS-1-4-8	2502415
97	0.081(15)	0.081(15)	MMS-1-4-8	2502415
98	0.081(15)	0.081(15)	MMS-1-4-8	2502415
99	0.081(15)	0.081(15)	MMS-1-4-8	2502415
100	0.081(15)	0.081(15)	MMS-1-4-8	2502415

- POST-CONSTRUCTION BMP NOTES**
1. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 2. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 3. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 4. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 5. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 6. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 7. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.
 8. THE BMP DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 10, AND THE CITY OF SAN DIEGO BMP MANUAL, CHAPTER 11.

LEGEND

- SHEET FLOW PATH
- DMA (DRAINAGE MANAGEMENT AREA) BOUNDARY
- DMA NUMBER AND AREA IN ACRES
- PERMITTED AREA
- RESTRICTED AREA
- PROPOSED STORM DRAIN

POC: A

UNIT 1
 DWG # 40552-D

0 50 100 200 300
 1 inch = 100 feet



WHP/MP/OC/CE NOTE:
 EXISTING AND PROPOSED PROTECTION MEASURES SHALL BE INSTALLED AND MAINTAINED AT ALL TIMES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES AND AGENCIES.

latitude 33
 ENGINEERING & ARCHITECTURE
 10000 LA JOLLA VILLAGE CENTER DRIVE
 SAN DIEGO, CA 92121

POST-CONSTRUCTION BMP PLAN FOR
MERGE 56 - UNIT 2
 LOTS 1-89 AND 'A'-T OF MAP 16457
 CITY OF SAN DIEGO, CALIFORNIA
 DEVELOPER: [Name]
 PROJECT NO. 40553-60-D

DATE	DATE	DATE	DATE
DESIGNED BY	CHECKED BY	DATE	DATE
DRAWN BY	DATE	DATE	DATE
DATE	DATE	DATE	DATE

NEW SHEET

April 19, 2021

**San Diego Developmental
Services Department**
101 Ash St, San Diego, CA 92101
ATTN: VILLASENOR, JUAN

**SUBJECT: MERGE 56 UNIT 1 & 2 CONSTRUCTION CHANGE "A", PTS 679136 & PTS 679132
ADDENDUM LETTER TO STORM WATER QUALITY MANAGEMENT PLAN**

The letter is to address the proposed changes in the Merge 56 Unit 2 Construction Change "A", PTS 679132 (Construction Change to PTS 599996) Water Quality assessment, and in the Merge 56 Unit 1 Construction Change "A", PTS 679136 (Construction Change to PTS 596359) Water Quality assessment, per request by the Stormwater reviewer.

Note: Please refer to the attached DMA exhibits for the Drainage Management Areas mentioned below.

PROPOSED PROJECT DESCRIPTION

This application proposes enacting changes to site grading and design across both Merge 56 Unit 1 and Merge 56 Unit 2 (for greater detail on these changes, please see respective PTS submittal.) These changes include, but are not limited to: changing the location of Unit 1 BMPs 12 and 21 (Basin and Vault), shifting the street alignment of Merge 56 Private Drive N further South, significantly redesigning the street alignments of Merge 56 Private Drive "Q" and Private Drive "P", and reworking Lot and building design within the entirety of Unit 2, as well as adjusting Drainage Management Area design and utilized BMPs onsite.

Previously Approved Conditions: Drainage from all lots within the Unit 2 area was parsed into 11 DMAs, managed by 6 BMP Biofiltration basins (BMP 14, 16-20), and 5 Modular Wetlands System units (BMP 3, 6, 7, 10, 11) for street treatment. Drainage from all lots within the Unit 1 area was parsed into 13 DMAs, managed by 4 BMP Biofiltration Basins (BMP 12-15), and 9 Modular Wetlands System units (BMP 1-6, 8-10) for street treatment.

Proposed Conditions: The proposed construction change has been designed to maintain overall drainage patterns of the previously approved Exhibit A, but with a greater emphasis on Modular Wetland System usage. The Unit 2 site is now subdivided into 4 DMAs (15-18). DMAs 15-17 will each be treated by Modular Wetlands Systems, while DMA 18 is classified as self-mitigating area. The Unit 1 site BMP 12 basin has shifted east from its original location to allow BMP 21 (Storage Vault A) to be shifted into the northwest corner of DMA 12. The configuration of BMP 21 has been adjusted while maintaining the minimum required volume. BMP 12 has only been relocated and has not changed dimensions.

PROJECT WATER QUALITY AND HYDROMODIFICATION

Proposed Construction Change: Site drainage has been modified to exclude biofiltration basins within the confines of Merge 56 Unit 2 (preserving the basins on the North end of the site within Merge 56 Unit 1), opting to instead treat runoff in the more dense residential areas primarily through BioClean's Modular Wetland System (MWS) units. The previously approved BMPs 10, 11, and 15-20 have been removed in this construction change proposal, and BMPs 15, 16, and 17 (Modular Wetland Systems) have been implemented to take up the necessary treatment volumes in the Unit 2 area. BMP 12, a biofiltration basin within the Unit 1 area, has been shifted east and reoriented while preserving size and treatment function. In addition, DMAs 3, 6, 7, and 9 have been revised from their approved condition to correlate with changes to the site grading and layout. DMA's 1 and 12-14 did not change and thus are not a part of this Addendum Study. With these proposed measures in place, runoff generated from the site will not result in any unmitigated drainage or storm water quality impacts on the existing downstream conditions.

Note: Updated pollutant control sizing calculations and updated DMA and HMP exhibits have been provided in this addendum study.

If you have any questions or need any further information please feel free to call me on my direct line (858-875-1718) or email me at Justin.Giles@latitude33.com.

Sincerely,



Justin R. Giles, PE C83540
Project Manager
Latitude 33 Planning and Engineering

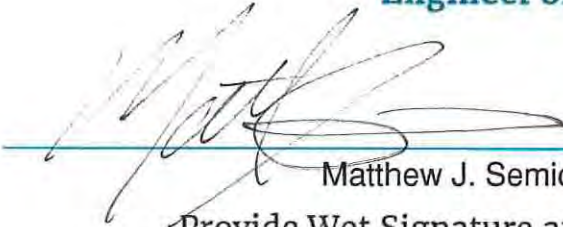
**Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)**

**ONSITE MERGE 56 UNITS 1 & 2 ADDENDUM CC 'A'
PTS 679136 & 679132**

DWG. 40552-D and 40553-D

Check if electing for offsite alternative compliance

Engineer of Work:

 4/19/21
Matthew J. Semic, PE C71075



Provide Wet Signature and Stamp Above Line

Prepared For:

SEA BREEZE PROPERTIES, LLC
5550 CARMEL MOUNTAIN ROAD, SUITE 204
SAN DIEGO, CA 92130
(858) 509-0484

Prepared By:

latitude 33
PLANNING & ENGINEERING

LATITUDE 33 PLANNING & ENGINEERING
9968 HIBERT STREET 2ND FLOOR
SAN DIEGO, CA 92131
(858) 751-0633

Date:

APRIL 2021

Approved by: City of San Diego

Date



Project Name: ONSITE MERGE 56 UNITS 1 & 2

Certification Page

Project Name: MERGE 56 - ONSITE UNITS 1 & 2
Permit Application: PTS 679136 & 679132

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.



Engineer of Record's Signature

71075

06-30-2021

PE#

Expiration Date

MATTHEW J. SEMIC

Print Name

LATITUDE 33 PLANNING & ENGINEERING

Company

Date

4/19/21



Summary of PDP Structural BMPs	Form I-6
PDP Structural BMPs	
<p>All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).</p>	
<p>PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).</p>	
<p>Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).</p>	
<p>Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.</p> <p>Step 1: Per the included Harvest and Use feasibility form I-7, the project is considered infeasible for harvest and use.</p> <p>Step 2: Per the included Form I-8 Categorization of Infiltration Feasibility Condition the feasibility screening category is No Infiltration due to the presence of expansive and poor draining NCRS type D soils.</p> <p>Step 3: Flow-thru Treatment is required to treat runoff from the proposed private streets for DMA's 1-9 and from the areas south of Merge Avenue (DMAs 15-17). Biofiltration basins were deemed infeasible due to lack of space within the parkways. A Modular Wetlands Device was chosen for its smaller footprint and biological processes. See worksheets B.5-6 for sizing. Due to the future commercial and residential development being subject to change, this report will show these areas as pervious mass graded pads with temporary biofiltration basins. See worksheets B.5-1 for basin sizing. Ultimate BMP's for the future development will be provided in a future amended SWQMP.</p> <p>(Continue on page 2 as necessary.)</p>	



(Continued from page 1)

Step 4: For HMP mitigation, an underground vault system will be utilized to mitigate the 0.5Q2-Q10 storm events. The streets/ parkways and the future developments were taken into account to assure the sizing of the storage vaults would be adequate once the entire site is developed. Conservative values for the pervious and impervious areas for the future developments were used in sizing the storage vaults. The San Diego Hydrology Model (SDHM) was used to size the vault system.

Structural BMP Summary Information

Structural BMP ID No. 3
 Construction Plan Sheet No. 40552-34-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Matthew J. Semic RCE 71075 858.751.1704 Latitude 33 Planning & Engineering - 9968 Hibert Street, 2nd Floor San Diego, CA 92132
Who will be the final owner of this BMP?	SeaBreeze Communities, or designated Property/Homeowner's Association
Who will maintain this BMP into perpetuity?	SeaBreeze Communities, or designated Property/Homeowner's Association
What is the funding mechanism for maintenance?	SeaBreeze Communities, or designated Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 6 of 42 (Copy as many as needed)

Structural BMP ID No. 3

Construction Plan Sheet No. 40553-5

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 3 (4' x 6' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 3 from worksheet B.6-1 is 0.072 cfs. The proposed BMP 3 has a treatment flowrate of 0.073 cfs.

Structural BMP Summary Information

Structural BMP ID No. 6

Construction Plan Sheet No. 40552-34-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification form DS-563

Matthew J. Semic | RCE 71075 | 858.751.1704
Latitude 33 Planning & Engineering -
9968 Hibert Street, 2nd Floor
San Diego, CA 92135

Who will be the final owner of this BMP?

SeaBreeze Communities, or designated
Property/Homeowner's Association

Who will maintain this BMP into perpetuity?

SeaBreeze Communities, or designated
Property/Homeowner's Association

What is the funding mechanism for maintenance?

SeaBreeze Communities, or designated
Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 12 of 42 (Copy as many as needed)

Structural BMP ID No. 6

Construction Plan Sheet No. 40552-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 6 (4' x 17' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 6 from worksheet B.6-1 is 0.173 cfs. The proposed BMP 6 has a treatment flowrate of 0.175 cfs.

Structural BMP Summary Information

Structural BMP ID No. 7

Construction Plan Sheet No. 40552-34-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Matthew J. Semic RCE 71075 858.751.1704 Latitude 33 Planning & Engineering - 9968 Hibert Street, 2nd Floor San Diego, CA 92136
Who will be the final owner of this BMP?	SeaBreeze Communities, or designated Property/Homeowner's Association
Who will maintain this BMP into perpetuity?	SeaBreeze Communities, or designated Property/Homeowner's Association
What is the funding mechanism for maintenance?	SeaBreeze Communities, or designated Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 14 of 42 (Copy as many as needed)

Structural BMP ID No. 7

Construction Plan Sheet No. 40552-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 7 (4' x 4' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 7 from worksheet B.6-1 is 0.029 cfs. The proposed BMP 7 has a treatment flowrate of 0.052 cfs.

Structural BMP Summary Information

Structural BMP ID No. 9

Construction Plan Sheet No. 40552-34-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification form DS-563

Matthew J. Semic | RCE 71075 | 858.751.1704
Latitude 33 Planning & Engineering -
9968 Hibert Street, 2nd Floor
San Diego, CA 92138

Who will be the final owner of this BMP?

SeaBreeze Communities, or designated
Property/Homeowner's Association

Who will maintain this BMP into perpetuity?

SeaBreeze Communities, or designated
Property/Homeowner's Association

What is the funding mechanism for maintenance?

SeaBreeze Communities, or designated
Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 18 of 42 (Copy as many as needed)

Structural BMP ID No. 9

Construction Plan Sheet No. 40553-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 9 (4' x 8' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 9 from worksheet B.6-1 is 0.112 cfs. The proposed BMP 9 has a treatment flowrate of 0.115 cfs.

Structural BMP Summary Information

Structural BMP ID No. 15

Construction Plan Sheet No. 40553-42-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Matthew J. Semic RCE 71075 858.751.1704 Latitude 33 Planning & Engineering - 9968 Hibert Street, 2nd Floor San Diego, CA 92144
Who will be the final owner of this BMP?	Lennar Homes, or designated Property/Homeowner's Association
Who will maintain this BMP into perpetuity?	Lennar Homes, or designated Property/Homeowner's Association
What is the funding mechanism for maintenance?	Lennar Homes, or designated Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 30 of 42 (Copy as many as needed)

Structural BMP ID No. 15

Construction Plan Sheet No. 40553-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 15 (3- 8' x 20' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 15 from worksheet B.6-1 is 1.678 cfs. The proposed BMP 15 has a treatment rate of 1.680 cfs.

Structural BMP Summary Information

Structural BMP ID No. 16

Construction Plan Sheet No. 40553-42-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Matthew J. Semic RCE 71075 858.751.1704 Latitude 33 Planning & Engineering - 9968 Hibert Street, 2nd Floor San Diego, CA 92145
Who will be the final owner of this BMP?	Lennar Homes, or designated Property/Homeowner's Association
Who will maintain this BMP into perpetuity?	Lennar Homes, or designated Property/Homeowner's Association
What is the funding mechanism for maintenance?	Lennar Homes, or designated Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 32 of 42 (Copy as many as needed)

Structural BMP ID No. 16

Construction Plan Sheet No. 40553-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 16 (3- 8' x 20' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 16 from worksheet B.6-1 is 1.605 cfs. The proposed BMP 16 has a treatment rate of 1.629 cfs.

Structural BMP Summary Information

Structural BMP ID No. 17

Construction Plan Sheet No. 40553-42-D

Type of Structural BMP:

- Retention by harvest and use (e.g. HU-1, cistern)
- Retention by infiltration basin (INF-1)
- Retention by bioretention (INF-2)
- Retention by permeable pavement (INF-3)
- Partial retention by biofiltration with partial retention (PR-1)
- Biofiltration (BF-1)
- Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- Detention pond or vault for hydromodification management
- Other (describe in discussion section below)

Purpose:

- Pollutant control only
- Hydromodification control only
- Combined pollutant control and hydromodification control
- Pre-treatment/forebay for another structural BMP
- Other (describe in discussion section below)

Who will certify construction of this BMP?
Provide name and contact information for the party responsible to sign BMP verification form DS-563

Matthew J. Semic | RCE 71075 | 858.751.1704
Latitude 33 Planning & Engineering -
9968 Hibert Street, 2nd Floor
San Diego, CA 92146

Who will be the final owner of this BMP?

Lennar Homes, or designated
Property/Homeowner's Association

Who will maintain this BMP into perpetuity?

Lennar Homes, or designated
Property/Homeowner's Association

What is the funding mechanism for maintenance?

Lennar Homes, or designated
Property/Homeowner's Association Dues



Project Name: Merge 56 Units 1 & 2

Form I-6 Page 34 of 42 (Copy as many as needed)

Structural BMP ID No. 17

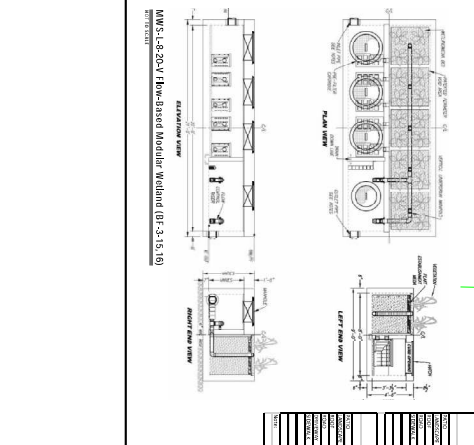
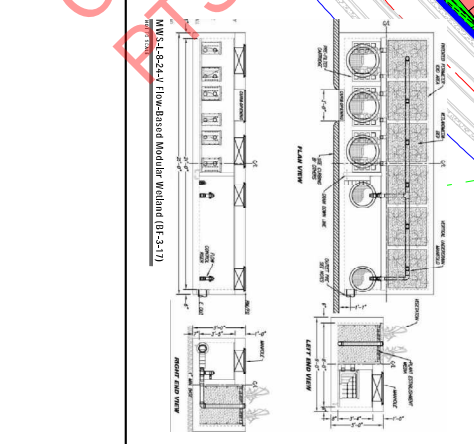
Construction Plan Sheet No. 40552-4

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMPs):

BMP 17 (8' x 24' Modular Wetlands System) was sized utilizing worksheet B.6-1 (see calculation worksheets in Attachment 1e). The required minimum treatment flow rate for BMP 17 from worksheet B.6-1 is 0.632 cfs. The proposed BMP 17 has a treatment rate of 0.693 cfs.

MEGA 56 SWOMP
 CC'A, APPENDUM 67

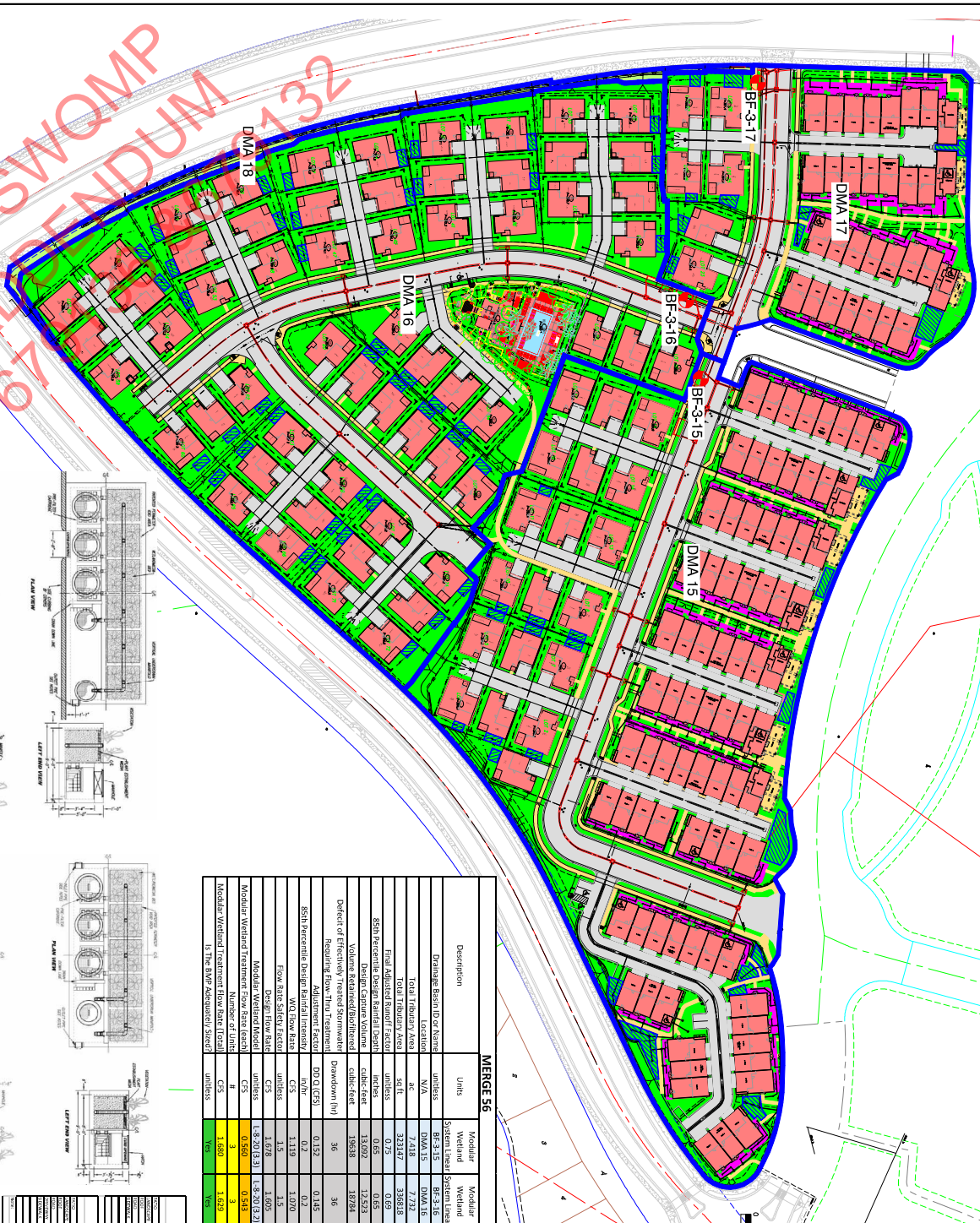
UNDERLYING SOIL GROUP: D
 APPROXIMATE DEPTH TO GROUNDWATER = 20'
 NO CRITICAL COARSE AREAS REQUIRE PRESERVATION



Model	Flow Rate (gpm)	Area (sq ft)	Volume (cu ft)	Flow Velocity (ft/min)	Flow Depth (ft)	Flow Velocity (ft/min)	Flow Depth (ft)
HWS-LS-2-11	100	100	100	1.0	1.0	1.0	1.0
HWS-LS-2-20V	200	200	200	2.0	2.0	2.0	2.0

PREPARED BY:
HUNSAKER & ASSOCIATES
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 SAN DIEGO, CA 92108
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 WWW.HUNSAKERANDASSOCIATES.COM

CITY OF SAN DIEGO, CALIFORNIA
 DMA MAP
MERGE 56
 1 OF 1



MERGE 56									
Description	Units	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear
Damage Basin ID or Name	units	BF-3-15	BF-3-16	BF-3-17	BF-3-18	BF-3-19	BF-3-20	BF-3-21	BF-3-22
Location	N/A	DMA 15	DMA 16	DMA 17	DMA 18	DMA 19	DMA 20	DMA 21	DMA 22
Total Tributary Area	ac	2,748	2,748	2,748	2,748	2,748	2,748	2,748	2,748
First Flush Volume (SF)	cu-ft	3,234	3,234	3,234	3,234	3,234	3,234	3,234	3,234
Design Capacity Volume	cu-ft	13,002	13,002	13,002	13,002	13,002	13,002	13,002	13,002
Volume Retained/Discharged	cu-ft	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968
Deficit of Effectively Treated Stormwater	cu-ft	36	36	36	36	36	36	36	36
Required Flow Through Treatment	gpm	0.132	0.132	0.132	0.132	0.132	0.132	0.132	0.132
Adjustment Factor	BDQ (CFS)	0.132	0.132	0.132	0.132	0.132	0.132	0.132	0.132
SDQ Percentage Design Rainfall Intensity	in/hr	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Flow Through Rate	in/hr	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
Design Flow Rate	CFS	1.678	1.678	1.678	1.678	1.678	1.678	1.678	1.678
Modular Wetland Model	units	1-8-20(13)	1-8-20(13)	1-8-20(13)	1-8-20(13)	1-8-20(13)	1-8-20(13)	1-8-20(13)	1-8-20(13)
Modular Wetland Treatment Flow Rate (each)	CFS	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
Number of Units	#	3	3	3	3	3	3	3	3
Modular Wetland Treatment Flow Rate (Total)	CFS	1.680	1.680	1.680	1.680	1.680	1.680	1.680	1.680
Is the BMP Adequately Sized?	units	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Model	Flow Rate (gpm)	Area (sq ft)	Volume (cu ft)	Flow Velocity (ft/min)	Flow Depth (ft)	Flow Velocity (ft/min)	Flow Depth (ft)
HWS-LS-2-11	100	100	100	1.0	1.0	1.0	1.0
HWS-LS-2-20V	200	200	200	2.0	2.0	2.0	2.0

- LEGEND**
- PROJECT BOUNDARY
 - DMA BOUNDARY
 - SUBAREA ACREAGE
 - DMA 1
 - DMA ICON
 - IMPERVIOUS - ROAD/DRIVEWAY
 - IMPERVIOUS - SIDEWALK
 - IMPERVIOUS - ROOF/BUILDING
 - IMPERVIOUS - ASSUME 70% IMPERVIOUSNESS FOR PRIVATE REAR YARD
 - PERVIOUS - LANDSCAPE ONSITE
 - LANDSCAPE AREAS SERVING AS VOLUME RETENTION
 - PERVIOUS - PARK
 - SELF-MITIGATING
 - SELF-RETAINING AREAS/POOLS
 - HYDROLOGIC SOIL TYPE
 - POINT OF COMPLIANCE
 - STRUCUTURAL BMPs
 - COMPACT PROPRIETARY BIOPIT/TATION

- SITE DESIGN BMPs**
- SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
 - SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
 - SD-3 MINIMIZE IMPERVIOUS AREAS
 - SD-4 MINIMIZE SOIL COMPACTION
 - SD-5 IMPERVIOUS AREA DISPERSION
 - SD-6 RUNOFF COLLECTION
 - SD-7 SUBSURFACE INFILTRATION OR BROUGHT TOLERANT SPECIES
- SOURCE CONTROL BMPs**
- SC-1 PREVENTION OF FUTURE DISCHARGES TO NS4
 - SC-2 STORM DRAIN STENCILING OR SIGNAGE
 - SC-3 PROTECT TRASH STORAGE AREAS
 - SC-6 ADDITIONAL BMPs BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
 - SC-8A OASIS STORM DRAIN INLETS
 - SC-8B STORM DRAIN AND ELEVATOR SHAFT
 - SC-8C SLUMP PUMPS
 - SC-8D NEED FOR FUTURE INDOOR & STRUCTURAL PEST CONTROL
 - SC-8E LANDSCAPE/OUTDOOR PESTICIDE USE
 - SC-8F WATER FEATURES
 - SC-8H REFUSE AREA
 - SC-8J MISCELLANEOUS DRAIN OR WASH WATER
 - SC-8K PLAZAS, SIDEWALKS, AND PARKING LOTS

Model Summary of OMM										Worksheet B-1		
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated by (BMP ID)	Pollutant Control Type	Drains to (POC ID)			
1	0.449	0.282	62.8	Type D	0.60	412	1	MWS	POC 'A'			
2	1.340	1.030	76.8	Type D	0.71	1947	2	MWS	POC 'A'			
3	0.366	0.251	68.5	Type D	0.65	485	3	MWS	POC 'A'			
4	1.550	1.214	78.3	Type D	0.73	2290	4	MWS	POC 'A'			
5	0.295	0.211	71.4	Type D	0.67	302	5	MWS	POC 'A'			
6	0.804	0.622	77.3	Type D	0.72	1175	6	MWS	POC 'A'			
7	0.130	0.106	81.8	Type D	0.75	199	7	MWS	POC 'A'			
8	0.422	0.309	73.2	Type D	0.69	589	8	MWS	POC 'A'			
9	0.538	0.398	74.0	Type D	0.69	757	9	MWS	POC 'A'			
12	4.136	0.000	0.0	Type D	0.30	2522	12	BF-1	POC 'A'			
13	5.517	0.000	0.0	Type D	0.30	3364	13	BF-1	POC 'A'			
14	2.799	0.000	0.0	Type D	0.30	1707	14	BF-1	POC 'A'			
15	7.418	5.538	74.7	Type D	0.75	13092	15	MWS	POC 'A'			
16	7.732	4.979	64.4	Type D	0.69	12523	16	MWS	POC 'A'			
17	2.750	2.107	76.6	Type D	0.76	4019	17	MWS	POC 'A'			
18	0.276	0.000	0.0	Type D	0.30	0	--	--	--			
Summary of DMA Information (Must match project description and SWQMP Narrative)												
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs			
18	43.800	17.659	40.3		0.48	50409	43.800		1			



MECA 96 ADDMS 19

Area Weighted Runoff Factor (DMA 2)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	44,846	40,361
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	13,517	1,352
Compacted Soils (Unpaved Parking)	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		58,363	41,713
Composite C	0.71		

Worksheet B.2-1 DCV (DMA 2)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	58,363	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.71	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	1947	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 2)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1947	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	1947	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.34	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.71	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.192	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.287	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 2

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	58,363	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.71	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1947	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	45	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 2	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	58,363	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.71	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	41713	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1251	sq. ft.
5	Biofiltration BMP Footprint	117	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	8658	
7	Impervious area draining to the landscape area (sq. ft.)	7215	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.83	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	4810	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		4810
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		4927
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	3.94	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	45	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-131.6298584	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

Area Weighted Runoff Factor (DMA 3)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	10,924	9,832
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	289	87
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	4,737	474
Compacted Soils (Unpaved Parking)	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		15,950	10,392
Composite C	0.65		

Worksheet B.2-1 DCV (DMA 3)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	15,950	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.65	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	485	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 3)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	485	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	485	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.37	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.65	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.048	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.072	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 3

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	15,950	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.65	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	485	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	11	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 3	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	15,950	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.65	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	10392	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	312	sq. ft.
5	Biofiltration BMP Footprint	32	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	2327	
7	Impervious area draining to the landscape area (sq. ft.)	1420	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.61	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	947	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		947
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		979
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	3.14	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	11	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-23.8697312	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

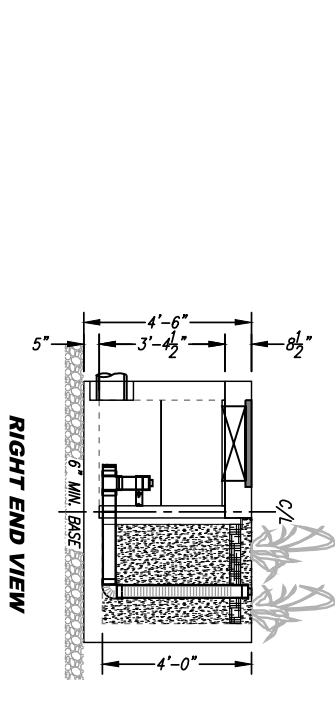
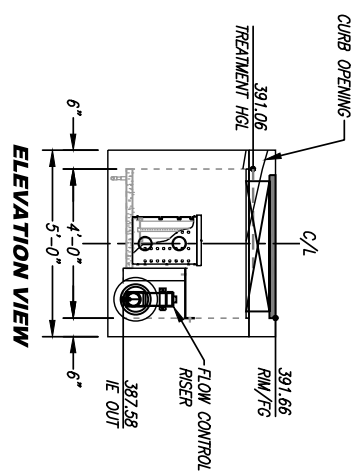
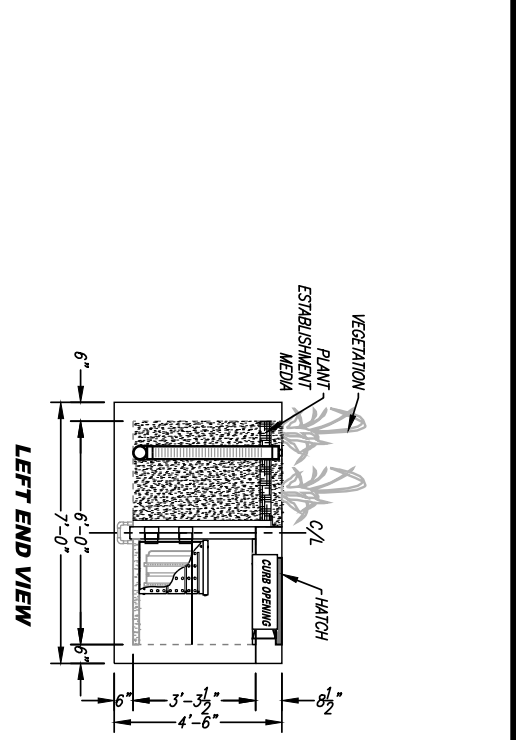
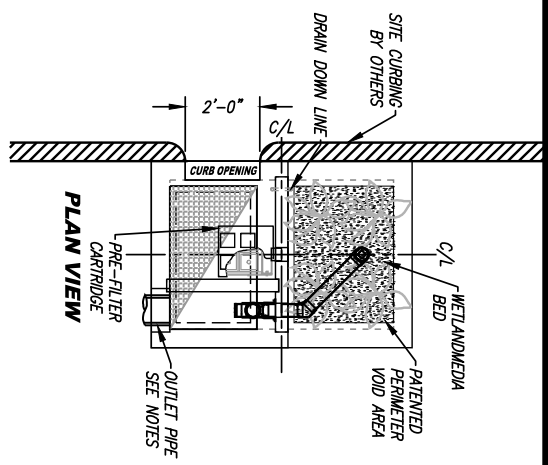
SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BMP 3
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.072
TREATMENT HGL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	FLOW BYPASS REQUIRED
PIPE DATA I.E. MATERIAL	DIAMETER
INLET PIPE 1 N/A	N/A
INLET PIPE 2 N/A	N/A
OUTLET PIPE 387.58	HDP E
PRETREATMENT	DISCHARGE
BIOFILTRATION	
RIM ELEVATION 391.66	391.66
SURFACE LOAD	PEDESTRIAN
FRAME & COVER 24" X 42"	N/A
WETLAND MEDIA VOLUME (CY)	0.82
ORIFICE SIZE (DIA. INCHES)	Ø1.22"

NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO VERIFY OUTLET PIPE I.E. AND SIZE AND PEAK FLOW BYPASS METHOD.

INSTALLATION NOTES

- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
- UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
- CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INNER OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRY- OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- CONTRACTOR RESPONSIBLE FOR CONTRACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

- GENERAL NOTES**
- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
 - ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF WETLANDS BIO CLEAN. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT BE REPRODUCED OR MODIFIED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF WETLANDS BIO CLEAN.



MWS-L-4-6-4'-0"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

TREATMENT FLOW (GFS)	0.073
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.6
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

Area Weighted Runoff Factor (DMA 4)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	52,896	47,606
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	14,619	1,462
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		67,515	49,068
Composite C	0.73		

Worksheet B.2-1 DCV (DMA 4)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	67,515	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.73	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	2290	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 4)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	2290	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	2290	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	1.55	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.73	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.225	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.338	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 4

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	67,515	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.73	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2290	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	53	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 4	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	67,515	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.73	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	49068	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	1472	sq. ft.
5	Biofiltration BMP Footprint	117	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	15103	
7	Impervious area draining to the landscape area (sq. ft.)	10730	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.71	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5)	7153	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		7153
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		7270
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	4.94	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	53	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-207.5065695	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BMP 4
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.338
TREATMENT HQL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	FLOW BY DIAMETER
PIPE DATA I.E.	MATERIAL
INLET PIPE 1	N/A
INLET PIPE 2	N/A
OUTLET PIPE	HDPE
PRETREATMENT	BIOFILTRATION
RIM ELEVATION	368.62
SURFACE LOAD	PEDESTRIAN
FRAME & COVER	2EA 48" & 30" & 30"
WETLANDMEDIA VOLUME (CY)	5.20
ORIFICE SIZE (DIA. INCHES)	5EA 1.45"

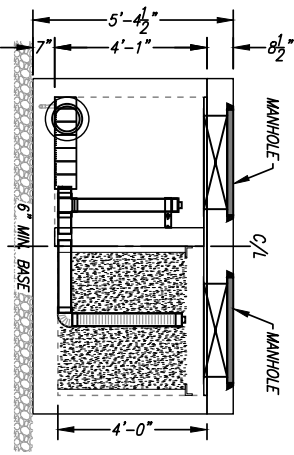
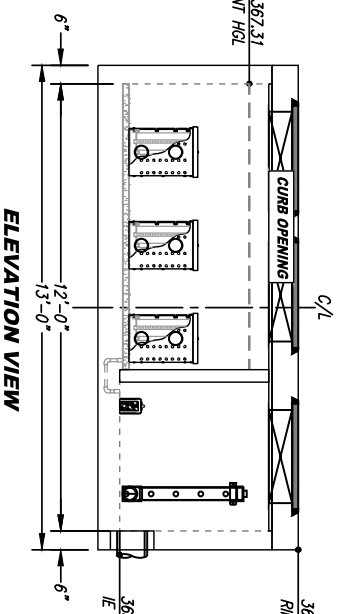
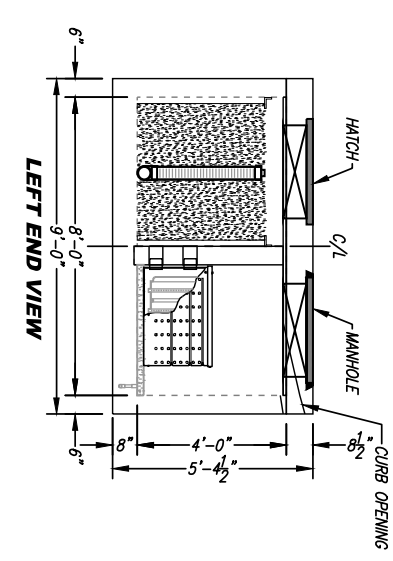
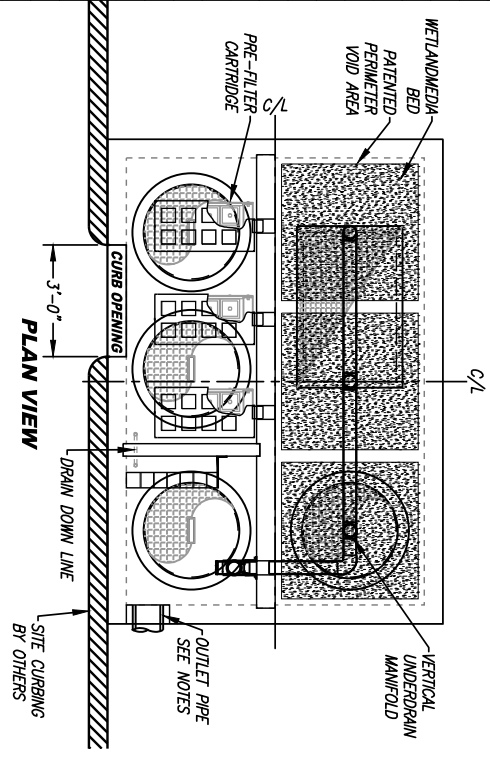
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO VERIFY OUTLET PIPE I.E. AND SIZE AND PEAK BYPASS METHOD.

INSTALLATION NOTES

- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
- UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
- CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INNER OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
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GENERAL NOTES

- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EACH DIMENSION, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



TREATMENT FLOW (GFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-12-4'-0"-C-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



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THE PRODUCT AND IS REGISTERED BY ONE OR MORE OF THE FOLLOWING STATES: CALIFORNIA, FLORIDA, ILLINOIS, INDIANA, IOWA, KANSAS, MISSOURI, NEBRASKA, NEVADA, NEW YORK, NORTH CAROLINA, NORTH DAKOTA, OHIO, PENNSYLVANIA, SOUTH CAROLINA, TEXAS, VIRGINIA, WISCONSIN, WYOMING.

MEGA BLDG 679

Area Weighted Runoff Factor (DMA 6)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	27,085	24,377
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	7,943	794
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		35,028	25,171
Composite C	0.72		

Worksheet B.2-1 DCV (DMA 6)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	35,028	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	1175	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 6)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1175	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	1175	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.80	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.72	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.116	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.173	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 6

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	35,028	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.72	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1175	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	27	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 6	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	35,028	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.72	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	25171	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	755	sq. ft.
5	Biofiltration BMP Footprint	90	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	6085	
7	Impervious area draining to the landscape area (sq. ft.)	4478	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.74	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	2985	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		2985
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		3075
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	4.07	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	27	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-82.94114211	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.), [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BNP 6
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.175
TREATMENT HQL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	DIERT
PIPE DATA	MATERIAL
INLET PIPE 1	380.74
INLET PIPE 2	N/A
OUTLET PIPE	378.68
RIM ELEVATION	382.76
SURFACE LOAD	PEDESTRIAN
FRAME & COVER	Ø30"
WETLAND MEDIA VOLUME (CY)	5.21
ORIFICE SIZE (DIA. INCHES)	Ø1.97"

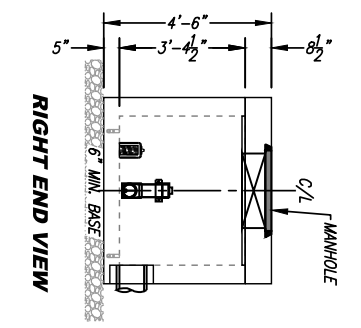
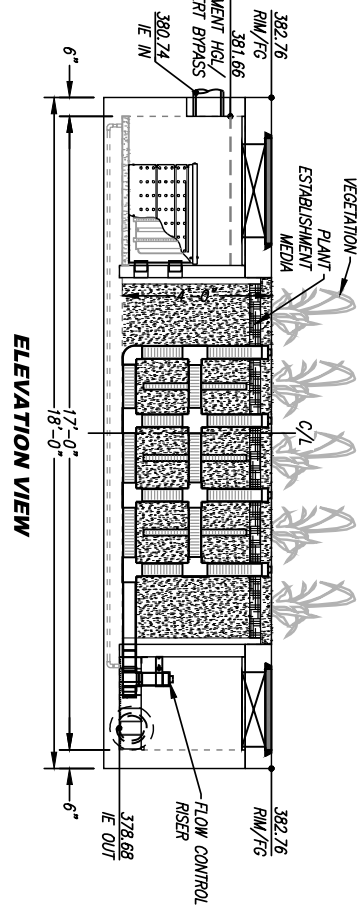
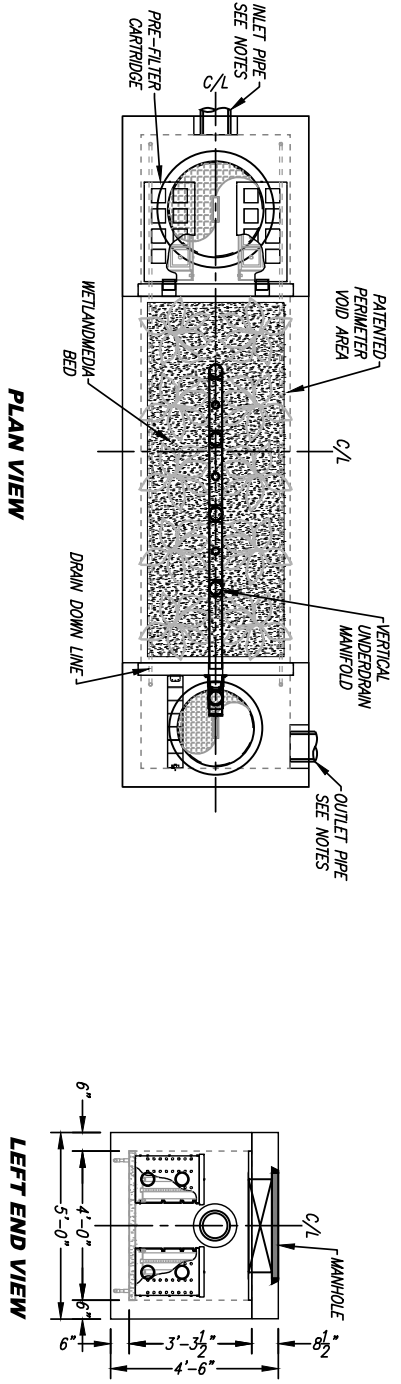
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET 9' DIERT IN UPSTREAM CATCH BASIN WITH I.E. OUT TO MWS AT 380.99.

INSTALLATION NOTES

- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
- UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
- CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INNER OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRY-OR-SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
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TREATMENT FLOW (GFS)	0.175
OPERATING HEAD (FT)	2.9
PRETREATMENT LOADING RATE (GPM/SF)	1.5
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-17-4'-0"-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECT

Area Weighted Runoff Factor (DMA 7)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	4,632	4,169
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	1,032	103
Compacted Soils (Unpaved Parking)	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		5,664	4,272
Composite C	0.75		

Worksheet B.2-1 DCV (DMA 7)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	5,664	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.75	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	199	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 7)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	199	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	199	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.13	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.75	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.020	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.029	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 7

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	5,664	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	199	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	5	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 7	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	5,664	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	4272	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	128	sq. ft.
5	Biofiltration BMP Footprint	25	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	1094	
7	Impervious area draining to the landscape area (sq. ft.)	841	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.77	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5)	561	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		561
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		586
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	4.57	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	5	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-16.3694496	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BMP 7
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.0339
TREATMENT HGL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	FLOW BYPASS
PIPE DATA	MATERIAL
INLET PIPE 1	N/A
INLET PIPE 2	N/A
OUTLET PIPE	HDPE
PRETREATMENT	BIOFILTRATION
DISCHARGE	
RIM ELEVATION	382.84
SURFACE LOAD	PEDESTRIAN
FRAME & COVER	24" X 42"
WETLAND MEDIA VOLUME (CY)	0.82
ORIFICE SIZE (DIA. INCHES)	Ø1.03"

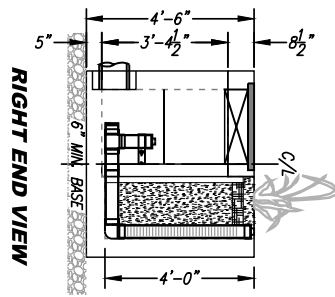
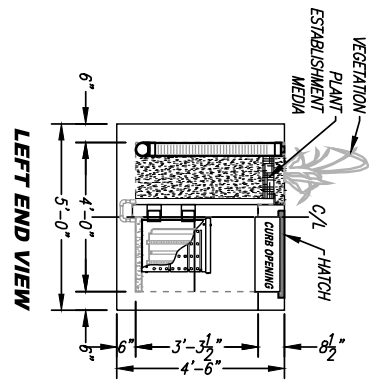
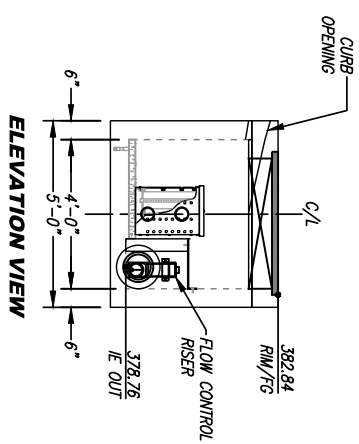
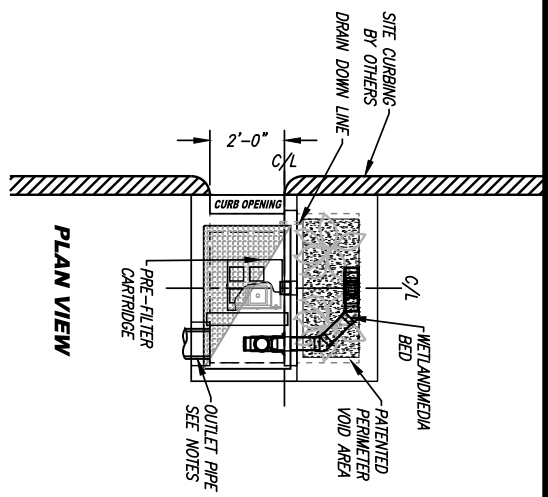
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO VERIFY OUTLET PIPE I.E. AND SIZE AND PEAK BYPASS METHOD.

INSTALLATION NOTES

- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
- UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
- CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INNER OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRY-OR-SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- CONTRACTOR RESPONSIBLE FOR CONTRACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF WETLANDS. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT BE REPRODUCED OR TRANSMITTED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF WETLANDS.



TREATMENT FLOW (GFS)	0.052
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-4-4'-0"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECT

Area Weighted Runoff Factor (DMA 8)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	13,465	12,119
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	4,934	493
Compacted Soils (Unpaved Parking	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		18,399	12,612
Composite C	0.69		

Worksheet B.2-1 DCV (DMA 8)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	18,399	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.69	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	589	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 8)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	589	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	589	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.42	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.69	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.058	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.087	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 8

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	18,399	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	589	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	14	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 8	
Volume Retention for No Infiltration Condition			Worksheet B.5-6
1	Area draining to the biofiltration BMP	18,399	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	12612	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	378	sq. ft.
5	Biofiltration BMP Footprint	45	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	3332	
7	Impervious area draining to the landscape area (sq. ft.)	1960	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.59	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	1307	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		1307
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		1352
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	3.57	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	14	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-34.78950575	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.	0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BMP 8
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.087
TREATMENT HGL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	FLOW BYPASS
PIPE DATA I.E. MATERIAL	DIAMETER
INLET PIPE 1	N/A
INLET PIPE 2	N/A
OUTLET PIPE	8"
PRETREATMENT	DISCHARGE
BIOFILTRATION	
RIM ELEVATION	373.97
SURFACE LOAD	PEDESTRIAN
FRAME & COVER	36" X 36"
WETLAND MEDIA VOLUME (CY)	2.03
ORIFICE SIZE (DIA. INCHES)	Ø1.53"

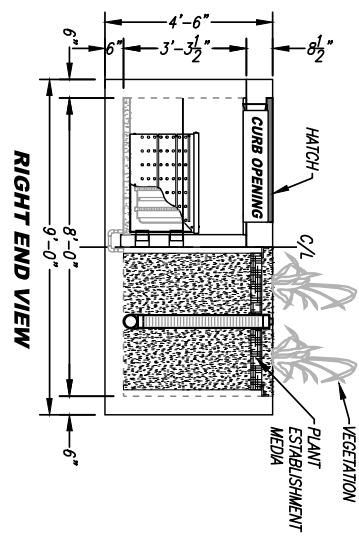
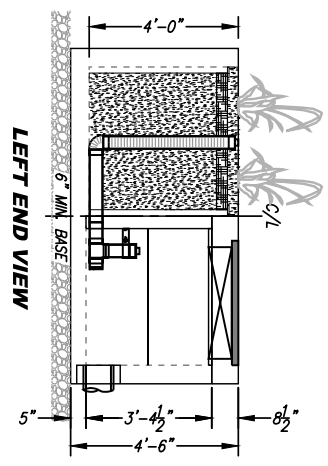
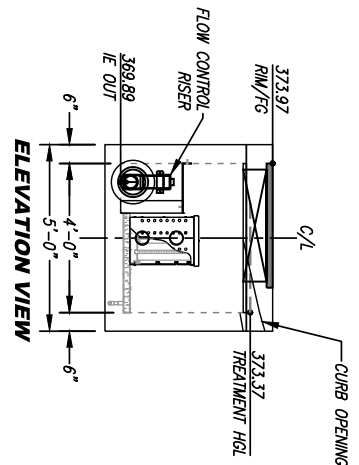
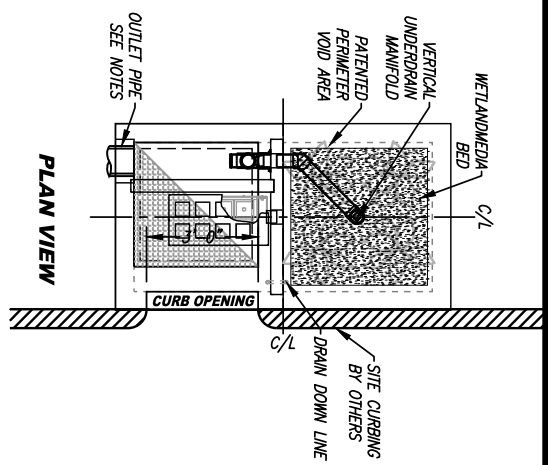
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO VERIFY OUTLET PIPE I.E. AND SIZE AND PEAK BYPASS METHOD.

INSTALLATION NOTES

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TREATMENT FLOW (GFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-48-4'-0"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



PROPRIETARY AND CONFIDENTIAL:
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MWS-L-48-4'-0"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECT

Area Weighted Runoff Factor (DMA 9)			
Surface	Runoff Factor	Area (sq. ft)	Weighted Area
Roof	0.9	-	-
Concrete of Asphalt	0.9	17,344	15,610
Unit Pavers (Grouted)	0.9	-	-
Decomposed Granite	0.3	-	-
Cobbles or Crushed Aggregate	0.3	-	-
Ammended, Mulched soils or Landscape	0.1	6,107	611
Compacted Soils (Unpaved Parking)	0.3	-	-
Natural (A Soil)	0.1	-	-
Natural (B Soil)	0.14	-	-
Natural (C Soil)	0.23	-	-
Natural (D Soil)	0.3	-	-
Total		23,451	16,220
Composite C	0.69		

Worksheet B.2-1 DCV (DMA 9)				
Design Capture Volume		Worksheet B.2-1		
1	85 th percentile 24-hr storm depth from Figure B.1-1	d=	0.56	inches
2	Area tributary to BMP (s)	A=	23,451	square-feet
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.69	unitless
4	Trees Credit Volume	TCV=		cubic-feet
5	Rain barrels Credit Volume	RCV=		cubic-feet
6	Calculate DCV = $(3630 \times C \times d \times (A/43560)) - TCV - RCV$	DCV=	757	cubic-feet

Worksheet B.6-1: Flow-Thru Design Flows (BMP 9)

Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	757	cubic-feet
2	DCV retained	DCV _{retained}	0	cubic-feet
3	DCV biofiltered	DCV _{biofiltered}	0	cubic-feet
4	DCV requiring flow-thru (Line 1 – Line 2 – 0.67*Line 3)	DCV _{flow-thru}	757	cubic-feet
5	Adjustment factor (Line 4 / Line 1)*	AF=	1	unitless
6	Design rainfall intensity	i=	0.20	in/hr
7	Area tributary to BMP (s)	A=	0.54	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.69	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.074	cfs
10*	Design Flow Rate = (Line 9 x 1.5)	Q=	0.112	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.

2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed either by volume in Line 4 or flow rate in Line 9.

3) Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.



Project Name

MERGE 56 ONSITE UNITS 1 & 2


BMP ID

BMP 9

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	23,451	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85 th percentile 24-hour rainfall depth	0.56	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	757	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note:		
5	When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.006	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.003	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.0000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	17	cu. ft.

		Project Name MERGE 56 ONSITE UNITS 1 & 2	
		BMP ID BMP 9	
Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	23,451	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	16220	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	487	sq. ft.
5	Biofiltration BMP Footprint	50	sq. ft.
Landscape Area (must be identified on DS-3247)			
	Identification	1	2
		3	4
		5	
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	3491	
7	Impervious area draining to the landscape area (sq. ft.)	2162	
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.62	0.00
9	Effective Credit Area If (Line 8 > 1.5, Line 6, Line 7/1.5)	1441	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]		1441
11	Provided footprint for evapotranspiration [Line 5 + Line 10]		1491
Volume Retention Performance Standard			
12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	3.06	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	17	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-35.86416465	cu. ft.
Site Design BMP			
	Identification	Site Design Type	Credit
16	1		cu. ft.
	2		cu. ft.
	3		cu. ft.
	4		cu. ft.
	5		cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met	

SITE SPECIFIC DATA	
PROJECT NUMBER	7656
PROJECT NAME	MERGE 56 ONSITE DESIGN
PROJECT LOCATION	SAN DIEGO, CA
STRUCTURE ID	BMP 9
TREATMENT REQUIRED	
VOLUME BASED (CF)	FLOW BASED (GFS)
N/A	0.112
TREATMENT HGL AVAILABLE (FT)	N/A
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE	FLOW BY DIAMETER
PIPE DATA I.E.	MATERIAL
INLET PIPE 1	N/A
INLET PIPE 2	N/A
OUTLET PIPE	HDPPE
PRETREATMENT	BIOFILTRATION
DISCHARGE	
RIM ELEVATION	373.97
SURFACE LOAD	PEDESTRIAN
FRAME & COVER	36" X 36"
WETLAND MEDIA VOLUME (CY)	2.03
ORIFICE SIZE (DIA. INCHES)	Ø1.53"

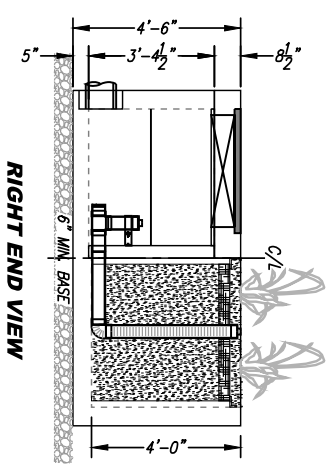
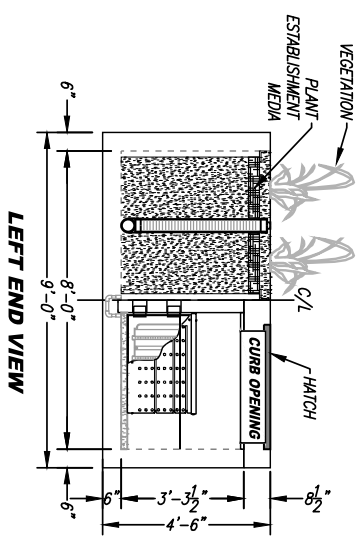
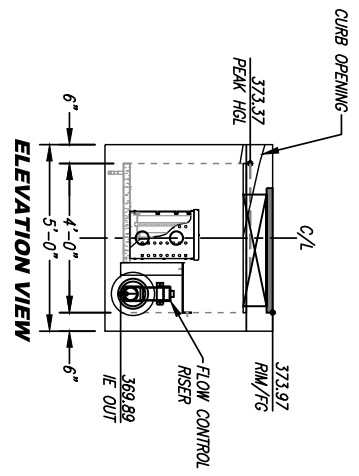
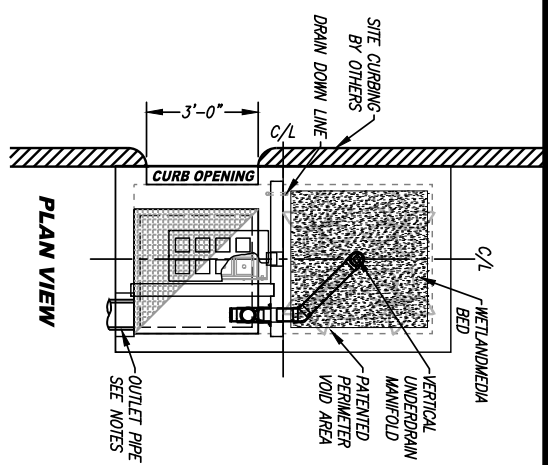
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO VERIFY OUTLET PIPE I.E. AND SIZE AND PEAK BYPASS METHOD.

INSTALLATION NOTES

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- CONTRACTOR RESPONSIBLE FOR CONTRACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

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- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EACH DIMENSION, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



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TREATMENT FLOW (GFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-48-4'-0"-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECT

MERGE 56

Description	Units	Modular Wetland System Linear	Modular Wetland System Linear	Modular Wetland System Linear
Drainage Basin ID or Name	unitless	BF-3-15	BF-3-16	BF-3-17
Location	N/A	DMA 15	DMA 16	DMA 17
Total Tributary Area	ac	7.418	7.732	2.750
Total Tributary Area	sq ft	323147	336818	119772
Final Adjusted Runoff Factor	unitless	0.75	0.69	0.76
85th Percentile Design Rainfall Depth	inches	0.65	0.65	0.53
Design Capture Volume	cubic-feet	13,092	12,523	4,019
Volume Retained/Biofiltered	cubic-feet	19638	18784	6029
Defecit of Effectively Treated Stormwater Requiring Flow-Thru Treatment	Drawdown (hr)	36	36	36
Adjustment Factor	DD Q (CFS)	0.152	0.145	0.047
85th Percentile Design Rainfall Intensity	in/hr	0.2	0.2	0.2
WQ Flow Rate	CFS	1.119	1.070	0.421
Flow Rate Safety Factor	unitless	1.5	1.5	1.5
Design Flow Rate	CFS	1.678	1.605	0.632
Modular Wetland Model	unitless	L-8-20 (3.3)	L-8-20 (3.2)	L-8-24 (3.4)
Modular Wetland Treatment Flow Rate (each)	CFS	0.560	0.543	0.693
Number of Units	#	3	3	1
Modular Wetland Treatment Flow Rate (Total)	CFS	1.680	1.629	0.693
Is The BMP Adequately Sized?	unitless	Yes	Yes	Yes

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 MEGERE 56
 CC'ATP



Project Name
BMP ID

Merge 56
BF-3-15

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	323147	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.75	
3	85 th percentile 24-hour rainfall depth	0.65	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	13128	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.1	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.05	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	15.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.106	
10	Target volume retention [Line 9 x Line 4]	1392	cu. ft.



Project Name Merge 56
BMP ID BF-3-15

Volume Retention for No Infiltration Condition

Worksheet B-5-6

		1	2	3	4	5
1	Area draining to the biofiltration BMP	323147				sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B:1 and B:2)	0.75				
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	242360				sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	7271				sq. ft.
5	Biofiltration BMP Footprint	0				sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	8100				
7	Impervious area draining to the landscape area (sq. ft.)	18100				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	2.23	0.00	0.00	0.00	0.00
9	Effective Credit Area [Line 8 > 1.5, Line 6, Line 7/1.5]	8100	0	0	0	0
10	Sum of Landscape area [sum of Line 9 [d's 1 to 5]	8100				sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	8100				sq. ft.

Volume Retention Performance Standard

	Identification	1	2	3	4	5
12	Is Line 11 ≥ Line 4?					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	1.11				
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	1392				cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-153,070633				cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit		
1				cu. ft.	
2				cu. ft.	
3				cu. ft.	
4				cu. ft.	
5				cu. ft.	
16	Sum of volume retention benefits from other site design BMPs (e.g. trees, rain barrels etc.); [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.			0	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met		

MEGE 56 SWQMP
CC'A, APPENDUM
PTS 136 & 679132

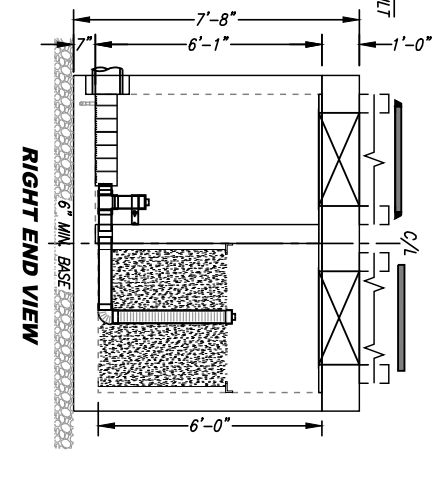
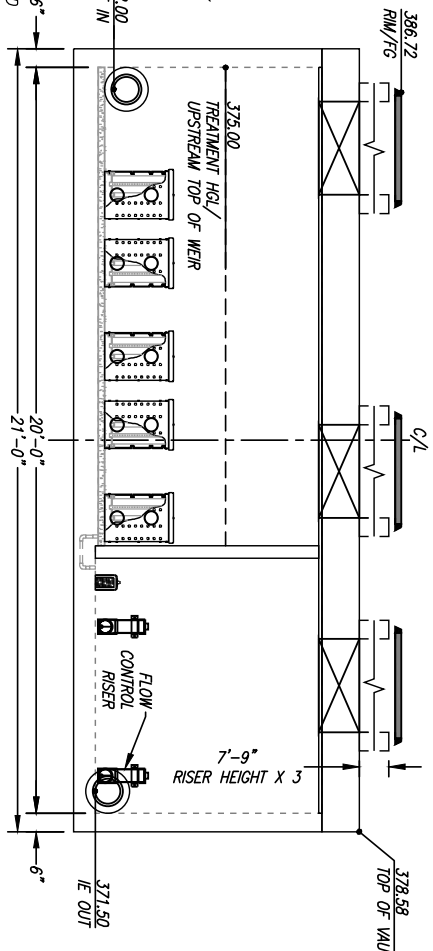
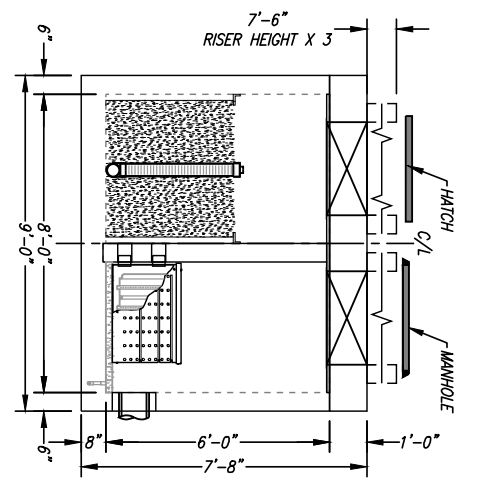
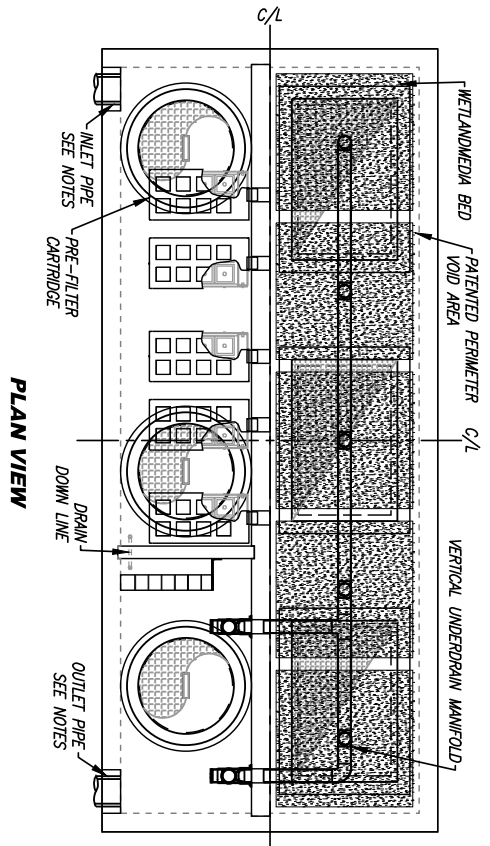
SITE SPECIFIC DATA		
PROJECT NUMBER	11986	
PROJECT NAME	MERGE 56 PHASE 2	
PROJECT LOCATION	SAN DIEGO, CA	
STRUCTURE ID	BF-3-15-2	
TREATMENT REQUIRED		
VOLUME BASED (CF)	FLOW BASED (GFS)	
N/A	0.560	
TREATMENT HQL AVAILABLE (FT)		3.4
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE		
PIPE DATA	MATERIAL	OFFLINE DIAMETER
INLET PIPE 1	PVC	8"
INLET PIPE 2	N/A	N/A
OUTLET PIPE	PVC	8"
PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	386.72	386.72
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA 30" X 48"	0.30"
WETLAND MEDIA VOLUME (CY)		8.66
ORIFICE SIZE (DIA. INCHES)		0.238 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. UNIT PENDING FINAL STRUCTURAL REVIEW - DIMENSIONS MAY VARY.		

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TREATMENT FLOW (GFS)	0.560
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	0.99

MWS-1-8-20-6'-0''-V-UG STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

MEGA BUDGET

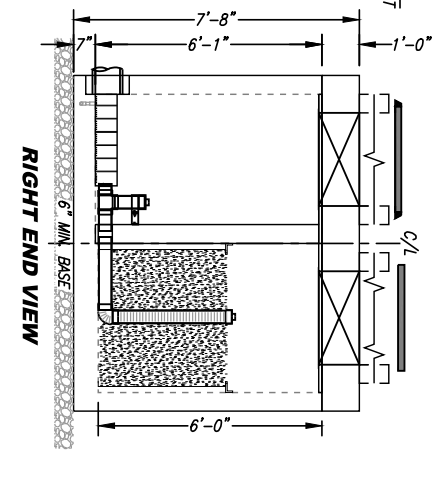
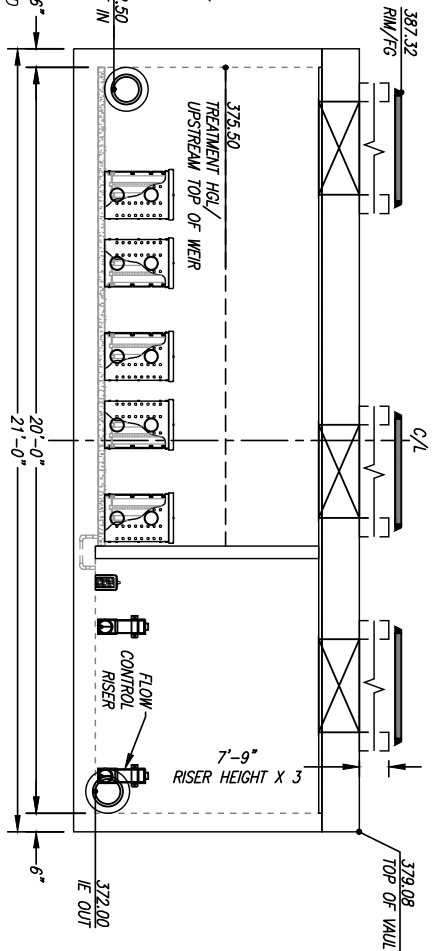
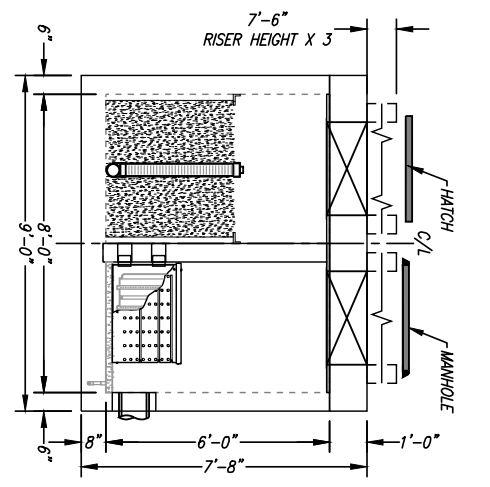
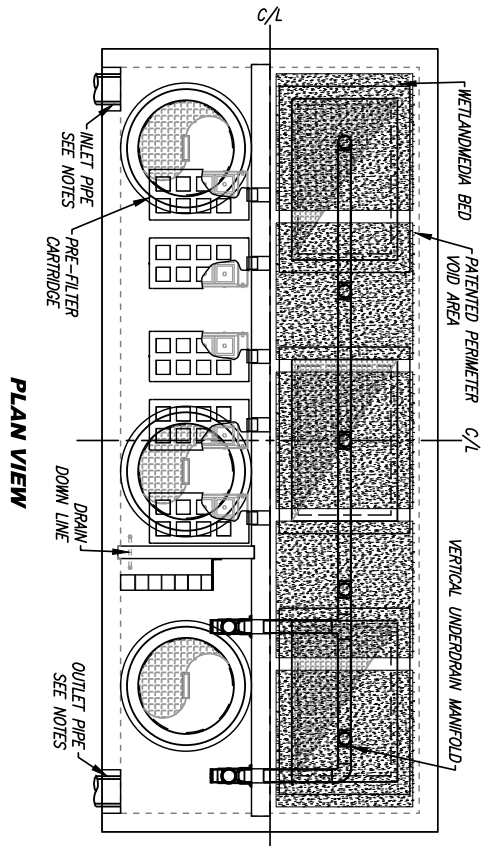
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PROJECT NUMBER	11986		
PROJECT NAME	MERGE 56 PHASE 2		
PROJECT LOCATION	SAN DIEGO, CA		
STRUCTURE ID	BF-3-15-3		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (GFS)		
N/A	0.560		
TREATMENT HGL AVAILABLE (FT)		3.4	
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE			
PIPE DATA	MATERIAL	OFFLINE	
	I.E.	DIAMETER	
INLET PIPE 1	PVC	8"	
INLET PIPE 2	N/A	N/A	
OUTLET PIPE	PVC	8"	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	387.32	387.32	387.32
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA 30" X 48"	3EA 30" X 48"	0.30"
WETLAND MEDIA VOLUME (CY)			8.66
ORIFICE SIZE (DIA. INCHES)			Ø2.38 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. UNIT PENDING FINAL STRUCTURAL REVIEW - DIMENSIONS MAY VARY.			

INSTALLATION NOTES

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TREATMENT FLOW (GFS)	0.560
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	0.99

MWS-L-8-20-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECT



Project Name
BMP ID

Merge 56
BF-3-16

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	336818	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85 th percentile 24-hour rainfall depth	0.65	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	12589	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.1	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.05	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	15.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.106	
10	Target volume retention [Line 9 x Line 4]	1334	cu. ft.



Project Name
Merge 56

BMP ID
BF-3-16

Volume Retention for No Infiltration Condition

Worksheet B-5-6

1	Area draining to the biofiltration BMP					336818	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B-1 and B-2)					0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					232405	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					6972	sq. ft.
5	Biofiltration BMP Footprint					0	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	7100				
7	Impervious area draining to the landscape area (sq. ft.)	13000				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	1.83	0.00	0.00	0.00	0.00
9	Effective Credit Area [Line 8 > 1.5, Line 6, Line 7/1.5]	7100	0	0	0	0
10	Sum of Landscape area [sum of Line 9 [d's 1 to 5]					7100
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					7100

Volume Retention Performance Standard

	Identification	1	2	3	4	5
12	Is Line 11 ≥ Line 4?					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					1.02
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					1334
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-26.68780117

Site Design BMP

	Identification	Site Design Type	Credit		
16	1	BF-3-2 (3 Modular Wetland Systems)			
	2			cu. ft.	
	3			cu. ft.	
	4			cu. ft.	
	5			cu. ft.	
17	Sum of volume retention benefits from other site design BMPs (e.g. trees, rain barrels etc.). [sum of Line 16 Credits for [d's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.			0	cu. ft.
Is Line 16 ≥ Line 15?				Volume Retention Performance Standard is Met	

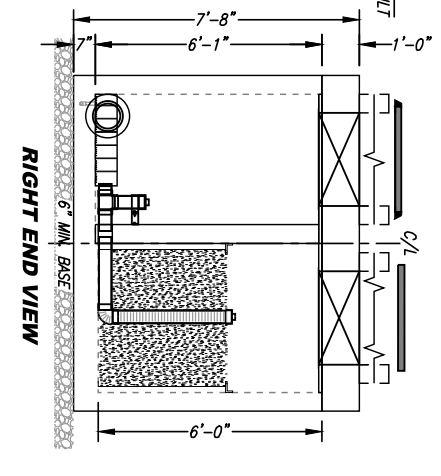
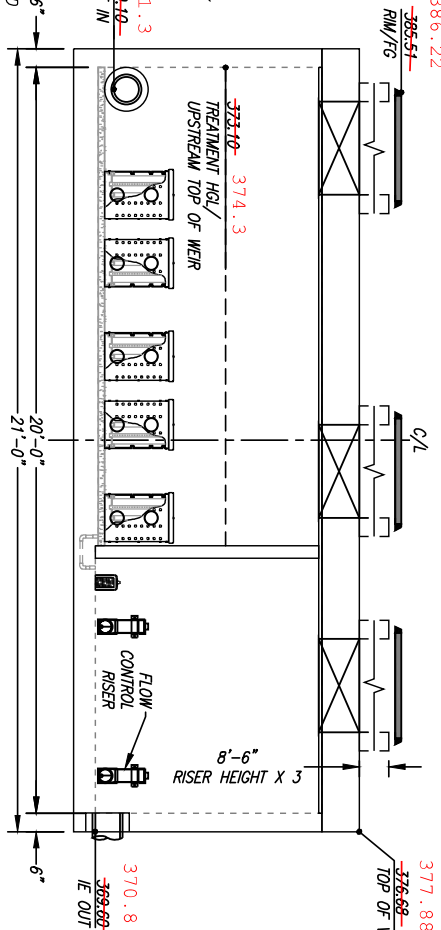
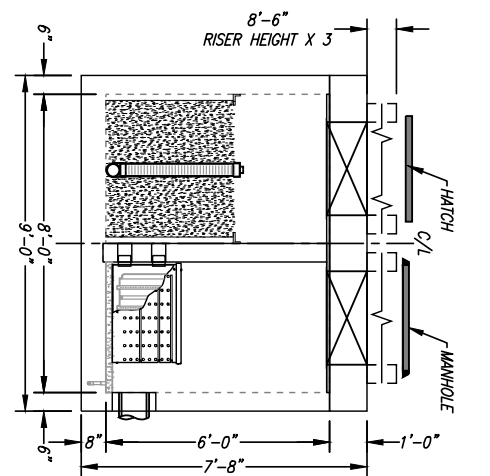
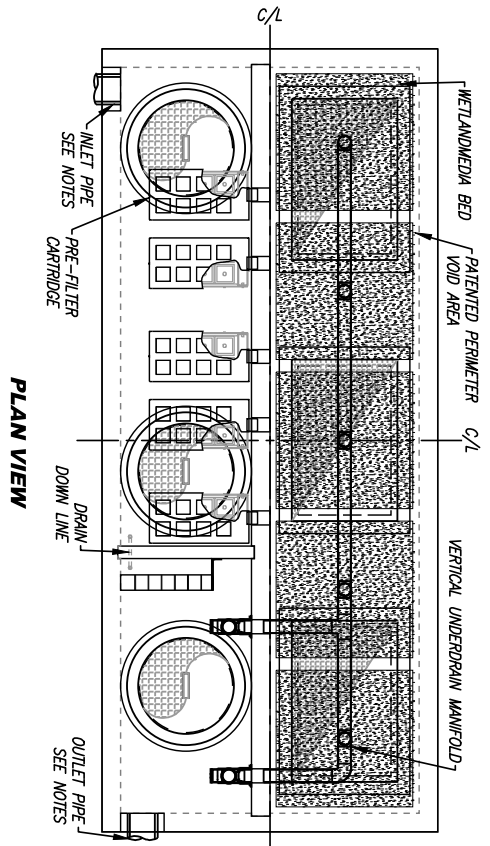
SITE SPECIFIC DATA			
PROJECT NUMBER	11986		
PROJECT NAME	MERGE 56 PHASE 2		
PROJECT LOCATION	SAN DIEGO, CA		
STRUCTURE ID	BT-3-16-1		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (GFS)		
N/A	0.540		
TREATMENT HGL AVAILABLE (FT)		3.4	
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE			
PIPE DATA	MATERIAL	OFFLINE	
	I.E.	DIAMETER	
INLET PIPE 1	PVC	8"	
INLET PIPE 2	N/A	N/A	
OUTLET PIPE	PVC	8"	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	385.51		385.51
SURFACE LOAD	PEDESTRIAN		PEDESTRIAN
FRAME & COVER	2EA 30" X 48"		0.30"
WETLAND MEDIA VOLUME (CY)			8.66
ORIFICE SIZE (DIA. INCHES)			Ø2.34 EA
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MWS-L-8-20-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

TREATMENT FLOW (GFS)	0.540
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.9
WETLAND MEDIA LOADING RATE (GPM/SF)	0.95

MEGA PROJECT

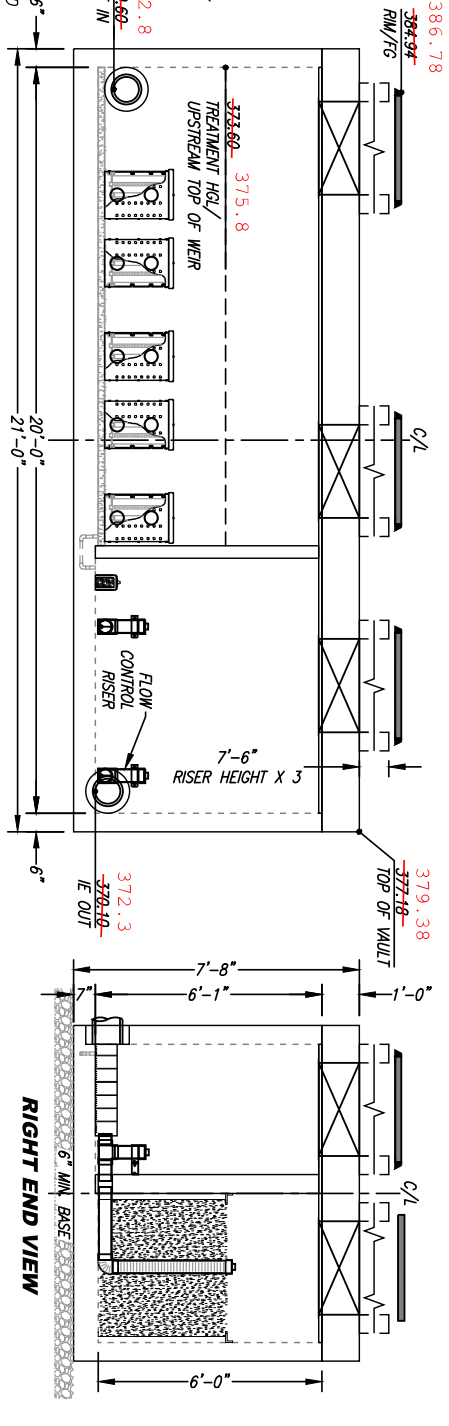
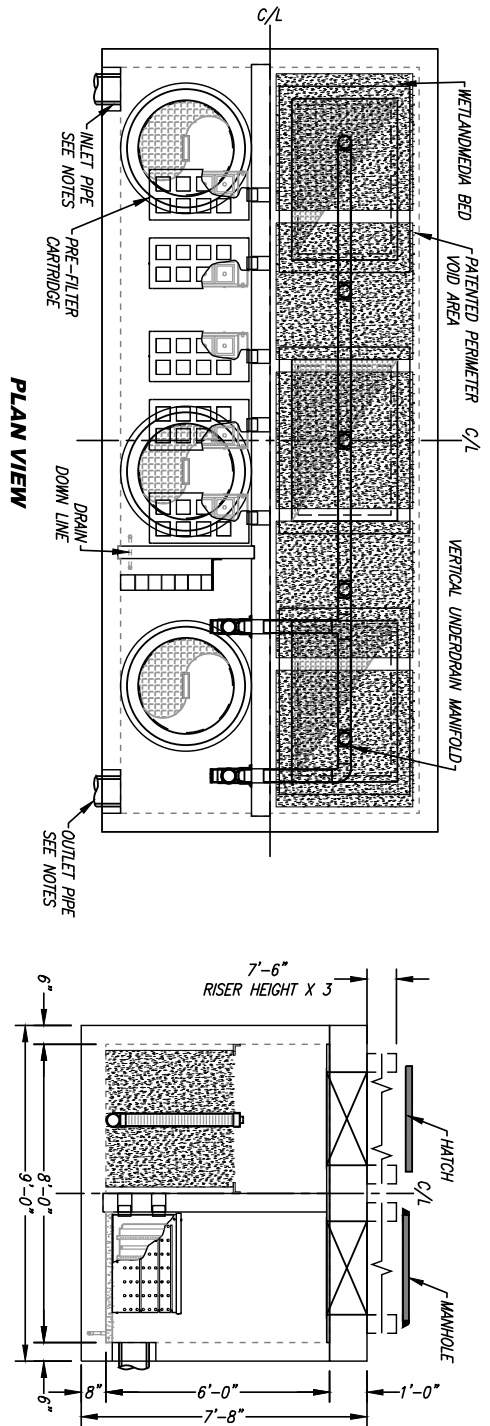
SITE SPECIFIC DATA			
PROJECT NUMBER	11986		
PROJECT NAME	MERGE 56 PHASE 2		
PROJECT LOCATION	SAN DIEGO, CA		
STRUCTURE ID	BT-3-16-2		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (GFS)		
N/A	0.540		
TREATMENT HQL AVAILABLE (FT)		3.4	
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE			
PIPE DATA	MATERIAL	OFFLINE	
	I.E.	DIAMETER	
INLET PIPE 1	PVC	8"	
INLET PIPE 2	N/A	N/A	
OUTLET PIPE	PVC	8"	
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	384.94	384.94	384.94
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	PEDESTRIAN
FRAME & COVER	2EA 30" X 48"	3EA 30" X 48"	0.30"
WETLAND/MEDIA VOLUME (CY)			8.66
ORIFICE SIZE (DIA. INCHES)			Ø2.34 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. UNIT PENDING FINAL STRUCTURAL REVIEW - DIMENSIONS MAY VARY.			

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MWS-L-8-20-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

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OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.9
WETLAND MEDIA LOADING RATE (GPM/SF)	0.95

MEGA BUDGET

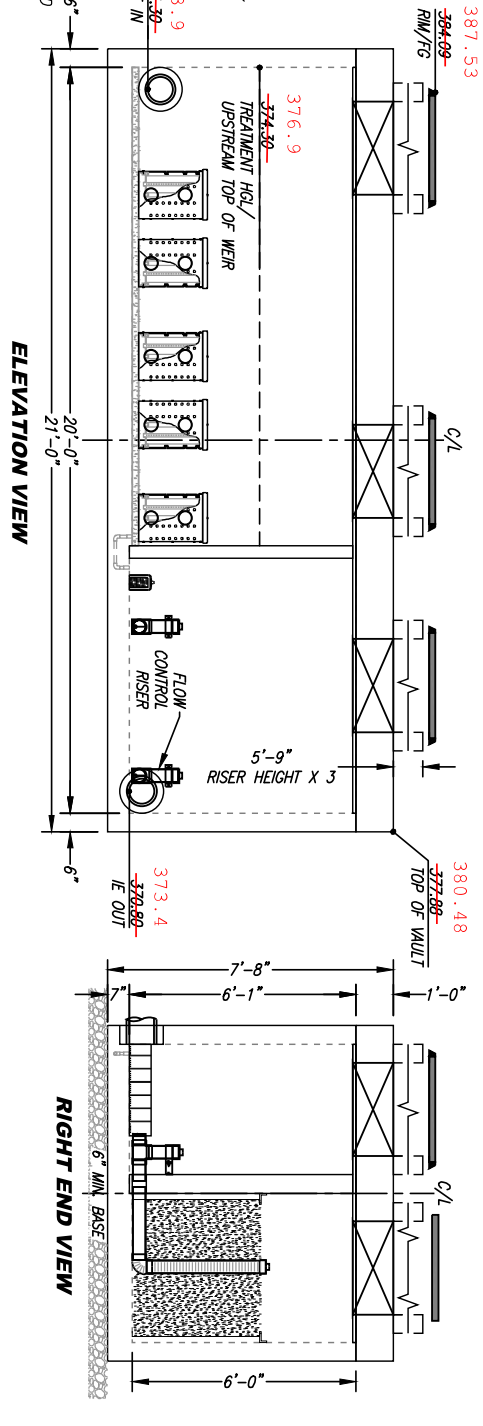
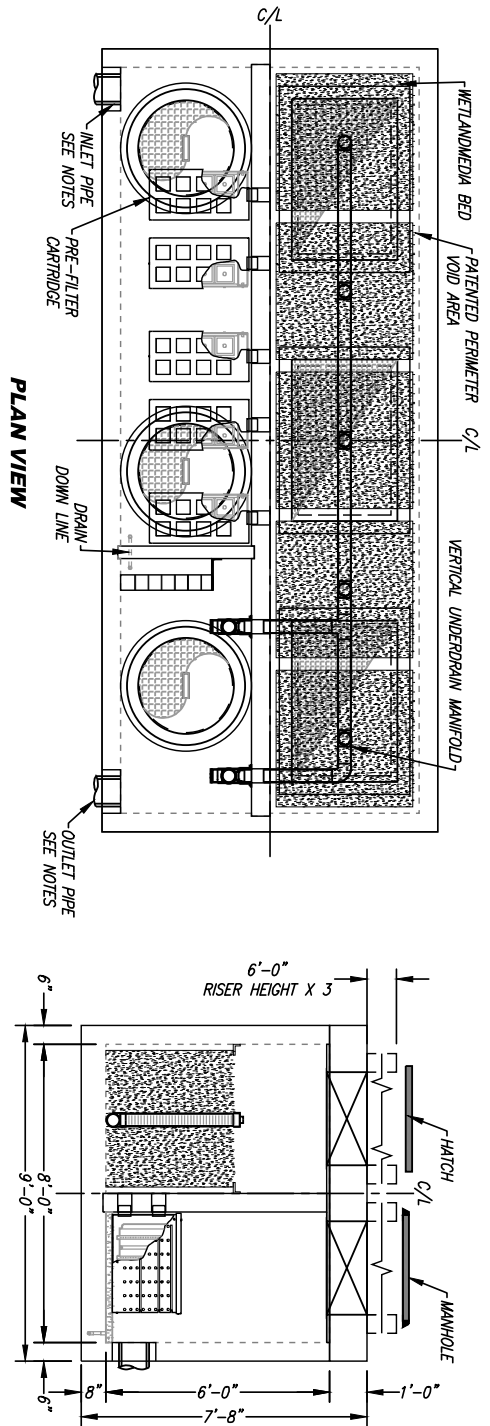
SITE SPECIFIC DATA			
PROJECT NUMBER	11986		
PROJECT NAME	MERGE 56 PHASE 2		
PROJECT LOCATION	SAN DIEGO, CA		
STRUCTURE ID	BF-3-16-3		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (GFS)		
N/A	0.540		
TREATMENT HGL AVAILABLE (FT)		3.4	
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	OFFLINE DIAMETER
INLET PIPE 1	371.30	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	370.80	PVC	8"
PRETREATMENT	BIOFILTRATION		DISCHARGE
RIM ELEVATION	384.09		384.09
SURFACE LOAD	PEDESTRIAN		PEDESTRIAN
FRAME & COVER	2EA 30" X 48"		3EA 30" X 48"
WETLAND/MEDIA VOLUME (CY)			8.66
ORIFICE SIZE (DIA. INCHES)			Ø2.34 EA
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MWS-L-8-20-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



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MEGA PROJECT



Project Name
BMP ID

Merge 56
BF-3-17

Sizing Method for Volume Retention Criteria

Worksheet B.5-2

1	Area draining to the BMP	119772	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.76	
3	85 th percentile 24-hour rainfall depth	0.65	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	4931	cu. ft.
Volume Retention Requirement			
	Measured infiltration rate in the DMA		
	Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.1	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.05	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	15.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8 ³ - 0.000057 x Line 8 ² + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.106	
10	Target volume retention [Line 9 x Line 4]	523	cu. ft.



Project Name
Merge 56

BMP ID
BF-3-17

Volume Retention for No Infiltration Condition

Worksheet B-5-6

1	Area draining to the biofiltration BMP					119772	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.76	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					91027	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					2731	sq. ft.
5	Biofiltration BMP Footprint						sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)	2800				
7	Impervious area draining to the landscape area (sq. ft.)	4300				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	1.54	0.00	0.00	0.00	0.00
9	Effective Credit Area [Line 8 > 1.5, Line 6, Line 7/1.5]	2800	0	0	0	0
10	Sum of Landscape area [sum of Line 9 d's 1 to 5]					2800
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					2800

Volume Retention Performance Standard

	Identification	1	2	3	4	5
12	Is Line 11 ≥ Line 4?					
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					1.03
14	Target Volume Retention [Line 10 from Worksheet B.5.2]					523
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					-15.67939703

Site Design BMP

	Identification	Site Design Type	Credit		
16	1	BF-3-3 (3 Modular Wetland Systems)			
	2				
	3				
	4				
	5				
17	Sum of volume retention benefits from other site design BMPs (e.g. trees, rain barrels etc.). [sum of Line 16 Credits for d's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.			0	cu. ft.
Volume Retention Performance Standard is Met					

SITE SPECIFIC DATA			
PROJECT NUMBER	11986		
PROJECT NAME	MERGE 56 PHASE 2		
PROJECT LOCATION	SAN DIEGO, CA		
STRUCTURE ID	BF-3-17-1		
TREATMENT REQUIRED			
VOLUME BASED (CF)	FLOW BASED (GFS)		
N/A	0.690		
TREATMENT HQL AVAILABLE (FT)	3.4		
PEAK BYPASS REQUIRED (GFS) - IF APPLICABLE			
PIPE DATA	MATERIAL	OFFLINE	
	I.E.	DIAMETER	
INLET PIPE 1	PVC	8"	
INLET PIPE 2	N/A	N/A	
OUTLET PIPE	PVC	8"	
	362.83		
PRETREATMENT	BIOFILTRATION	DISCHARGE	
RIM ELEVATION	377.15	377.15	
SURFACE LOAD	PEDESTRIAN	PEDESTRIAN	
FRAME & COVER	2EA 830"	3EA 30" X 48"	2EA Ø30"
WETLAND MEDIA VOLUME (CY)			10.52
ORIFICE SIZE (DIA. INCHES)			Ø2.66 EA

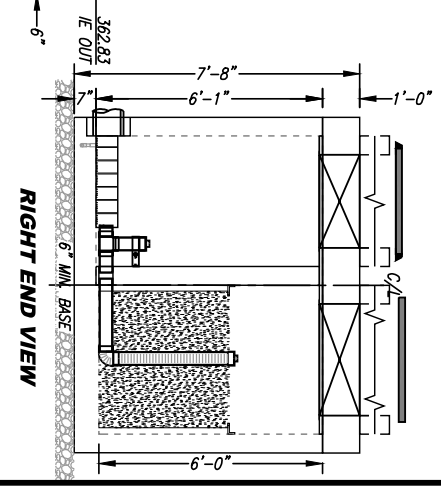
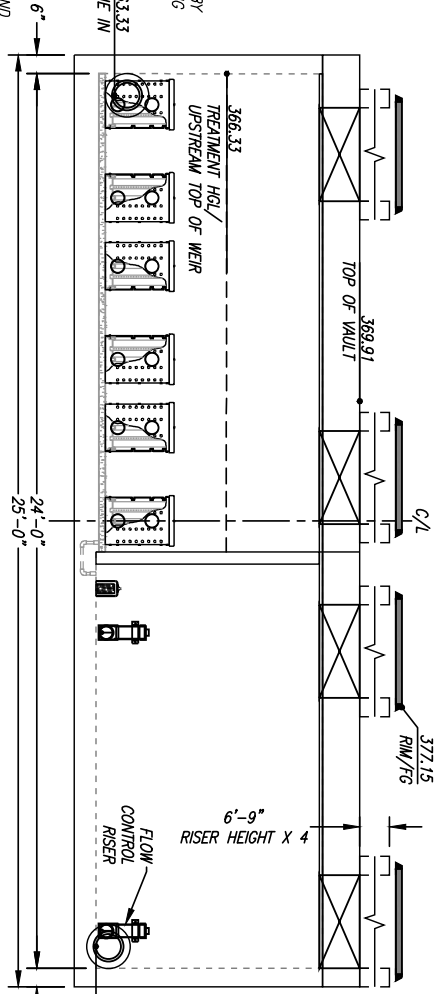
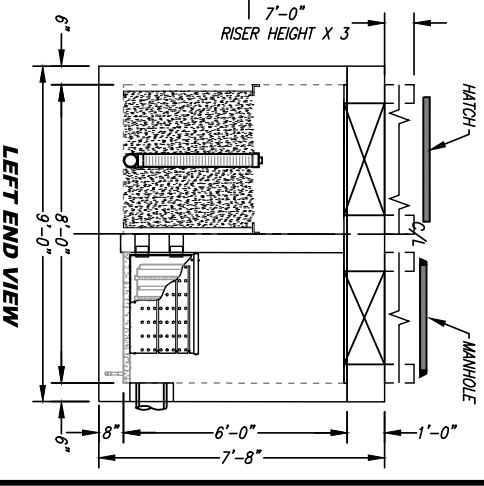
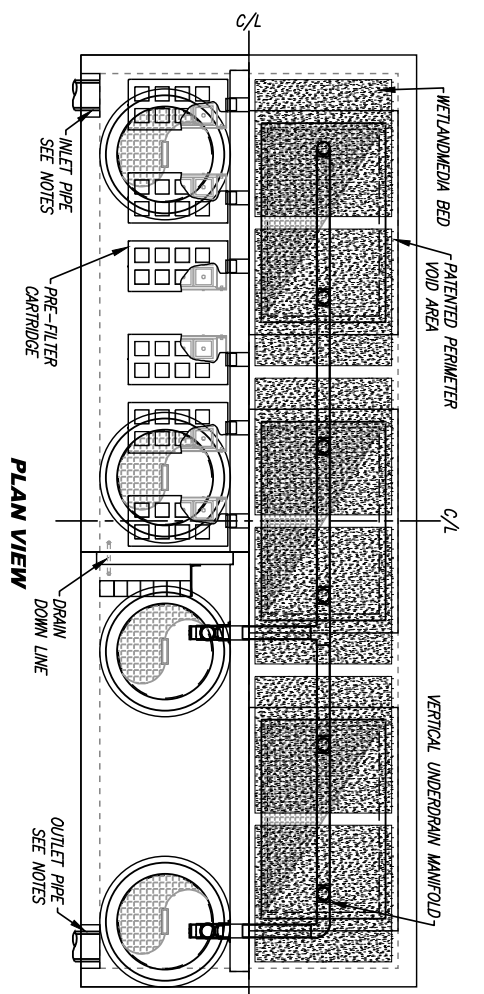
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OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-24-6'-0"-V-UG
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

MEGA PROJECTS

11/28/2025 MTH

Equation B.2-1: Tree Credit Volume

$TCV = \text{Minimum}(SV \times 0.3, 3, 630 \times d \times C \times A)$; With no underdrains installed
 $TCV = \text{Minimum}(SV \times 0.1, 3, 630 \times d \times C \times A)$; When an underdrain is installed

where:

- TCV = Tree credit volume (ft³); maximum of 400 ft³ for one tree and not more than 0.25*DCV from the project footprint for all trees proposed as site design BMPs
- SV = Soil volume installed with the tree (ft³)
- d = 85th percentile 24-hr storm depth (inches) from Figure B.1-1
- C = Area weighted runoff factor (calculate using Appendix B.1.1 and B.2.1)
- A = Area tributary to the tree (acres)

Design Parameters:

SV =	40 s ³ tree root zone x 42" depth of soil = 140.0 cu.ft.
d =	0.56
C =	Varies, found in worksheet B.2-1
A =	Varies, average of landscape area / tree total

TCV (min)		
DMA	SV * 0.3	3630*d*C*A
1	42	10.228
5	42	6.398

Area to Tree			
DMA	Landscaped Area (acres)	Tree Count	Avg. Area (acres)
1	0.16706	20	0.00835
5	0.08439	18	0.00469

Tree Credit			
DMA	DCV*0.25	TCV per DCV	Tree Credit Used (cu.ft.)
1	137.50	204.56	138
5	100.75	115.16	101

MEGE 56 SWQMP
 CC'A, ADDENDUM
 PTS 679136 & 679132

This Form Applies to DMAs 1-9, 15-17

Compact (high rate) Biofiltration BMP Checklist	Form I-10	
<p>Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.</p> <p>A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA and the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.</p> <p>An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.</p>		
Section 1: Biofiltration Criteria Checklist (Appendix F)		
<p>Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.</p>		
Criteria	Answer	Progression
<p>Criteria 1 and 3:</p> <p>What is the infiltration condition of the DMA?</p> <p>Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p> <p>Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination:</p> <ul style="list-style-type: none"> • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. <p>Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal</p>	<input type="radio"/> Full Infiltration Condition	<p>Stop. Compact biofiltration BMP is not allowed.</p>
	<input type="radio"/> Partial Infiltration Condition	<p>Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction).</p> <p>If the required volume reduction is achieved proceed to Criteria 2.</p> <p>If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. Stop.</p>
	<input checked="" type="radio"/> No Infiltration Condition	<p>Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP.</p> <p>If the criteria in Table B.5-1 is met proceed to Criteria 2.</p> <p>If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. Stop.</p>



This Form Applies to DMAs 1-9, 15-17

Compact (high rate) Biofiltration BMP Checklist	Form I-10	
<p>Provide basis for Criteria 1 and 3:</p> <p>Feasibility Analysis:</p> <p>Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.</p> <p>If Partial Infiltration Condition:</p> <p>Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.</p> <p>If No Infiltration Condition:</p> <p>Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.</p> <p>Per Worksheet B.5-6 for this DMA, the volume retention criteria is met. This is met through Landscaped area that meets the criteria listed in SD-B and SD-F fact sheets.</p>		
Criteria	Answer	Progression
<p>Criteria 2:</p> <p>Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit?</p> <p>Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p>	<p><input checked="" type="radio"/> Meets Flow based Criteria</p> <p><input type="radio"/> Meets Volume based Criteria</p> <p><input type="radio"/> Does not Meet either criteria</p>	<p>Use guidance from Appendix F.2.2 to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP.</p> <p>Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.)</p> <p>Proceed to Criteria 4.</p> <p>Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite.</p> <p>Proceed to Criteria 4.</p> <p>Stop. Compact biofiltration BMP is not allowed.</p>



This Form Applies to DMAs 1-9, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
<p>Provide basis for Criteria 2:</p> <p>Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).</p> <p>Per worksheet B.6-1 for this DMA, the proposed compact biofiltration BMP meets flow-based criteria. The proposed compact biofiltration BMP is sized per the manufacturer specs and guidelines and proposed flow rates are not in excess of recommended standards for proper operation.</p>		
Criteria	Answer	Progression
<p>Criteria 4:</p> <p>Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern?</p> <p>Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.</p>	<p><input checked="" type="radio"/> Yes, meets the TAPE certification.</p> <hr/> <p><input type="radio"/> Yes, through other third-party documentation</p> <hr/> <p><input type="radio"/> No</p>	<p>Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern.</p> <p>Proceed to Criteria 5.</p> <hr/> <p>Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2.</p> <p>Proceed to Criteria 5.</p> <hr/> <p>Stop. Compact biofiltration BMP is not allowed.</p>
<p>Provide basis for Criteria 4:</p> <p>Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.</p> <p>This device is sized per the manufacturer specs and guidelines and this device has TAPE certification.</p>		



This Form Applies to DMAs 1-9, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	Answer	Progression
<p>Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?</p>	<input checked="" type="radio"/> Yes, and the compact BMP is privately owned, operated and not in the public right of way.	<p>Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.</p> <p>Stop. The compact biofiltration BMP meets the required criteria.</p>
	<input type="radio"/> Yes, and the BMP is either owned or operated by the City or in the public right of way.	<p>Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination.</p> <p>Stop. Consult the City Engineer for a determination.</p>
	<input type="radio"/> No	<p>Stop. Compact biofiltration BMP is not allowed.</p>
<p>Provide basis for Criteria 7:</p> <p>Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.</p> <p>Maintenance information for the proposed compact biofiltration BMP and SWMDCMA (Maintenance Agreement) are contained in Attachment 3 of this report, outlining maintenance responsibilities, thresholds, and procedures.</p>		



This Form Applies to DMAs 1-9, 15-17

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Section 2: Verification (For City Use Only)		
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	<input type="radio"/> Yes	<input type="radio"/> No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:		





December 2015

GENERAL USE LEVEL DESIGNATION FOR BASIC, ENHANCED, AND PHOSPHORUS TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on Modular Wetland Systems, Inc. application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
2. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Phosphorus treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.
3. General use level designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
 - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of wetland cell surface area. For moderate pollutant loading rates (low to medium density residential basins), size the Prefilters at 3.0 gpm/sq ft of cartridge surface area. For high loading rates (commercial and industrial basins), size the Prefilters at 2.1 gpm/sq ft of cartridge surface area.

MEGE 56 911QMP
CC'A' ADDENDUM 8570132
PTS 67830

4. Ecology approves the MWS - Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:

- Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

5. These use level designations have no expiration date but may be revoked or amended by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2. Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3. MWS – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to, and approved by, Ecology.
4. The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a “one size fits all” maintenance cycle for a particular model/size of manufactured filter treatment device.

- Typically, Modular Wetland Systems, Inc. designs MWS - Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
- Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
- Owners/operators must inspect MWS - Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific

MEGE 56 SWQMP
CC'A' ADDRESS 619-365-570132
PTS

maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
 - Standing water remains in the vault between rain events, or
 - Bypass occurs during storms smaller than the design storm.
 - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
 - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant: Modular Wetland Systems, Inc.
Applicant's Address: PO. Box 869
Oceanside, CA 92054

Application Documents:

- *Original Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- *Quality Assurance Project Plan: Modular Wetland system – Linear Treatment System performance Monitoring Project*, draft, January 2011.
- *Revised Application for Conditional Use Level Designation*, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011
- *Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data*, April 2014
- *Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring*, April 2014.

Applicant's Use Level Request:

General use level designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.005 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

Ecology Recommendations:

- Modular Wetland Systems, Inc. has shown Ecology, through laboratory and field-testing, that the MWS - Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Total phosphorus, and Enhanced treatment goals.

Findings of Fact:

Laboratory Testing

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:

Download at <http://www.modularwetlands.com/>

Contact Information:

Applicant:

Greg Kent
Modular Wetland Systems, Inc.
P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: <http://www.modularwetlands.com/>

Ecology web link: <http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html>

Ecology: Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS-Linear Modular Wetland installations with or without the inclusion of plants.

MEGE 56 SWQMP
CC'A' ADDENDUM
PTS 679136 & 679132

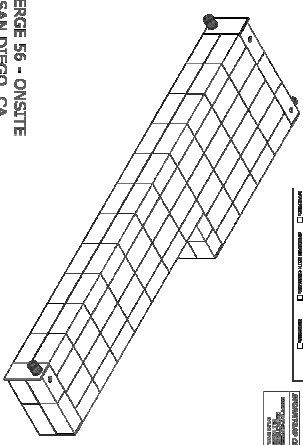
Attachment 2

Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

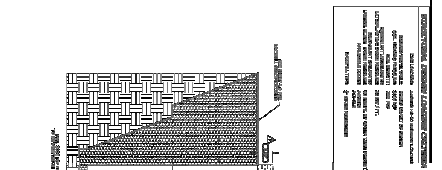
Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

MERGE 56 - ONSITE
 SAN DIEGO, CA



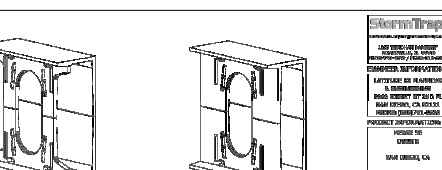
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PROJECT ADDRESS:	SAN DIEGO, CA
DATE:	08/15/2011
DESIGNER:	STORMTRAP, INC.
INSTALLER:	STORMTRAP, INC.
OPERATOR:	STORMTRAP, INC.
MAINTENANCE:	STORMTRAP, INC.
WARRANTY:	STORMTRAP, INC.
PERFORMANCE GUARANTEE:	STORMTRAP, INC.

SPECIFICATIONS	
UNIT TYPE:	STORMTRAP
UNIT SIZE:	6'0" x 6'0"
UNIT WEIGHT:	1500 LBS
UNIT HEIGHT:	18" (MAX)
UNIT MATERIAL:	FRP
UNIT COLOR:	BLACK
UNIT FINISH:	SMOOTH
UNIT ACCESSORIES:	GRATE, LID, HOLES
UNIT INSTALLATION:	CONCRETE
UNIT MAINTENANCE:	STORMTRAP, INC.
UNIT WARRANTY:	STORMTRAP, INC.
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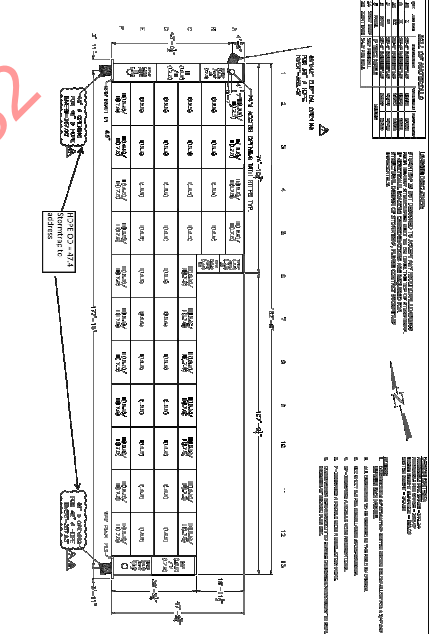
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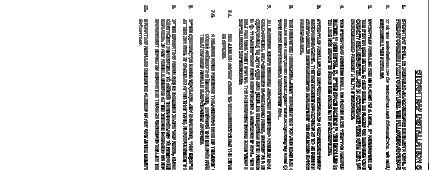


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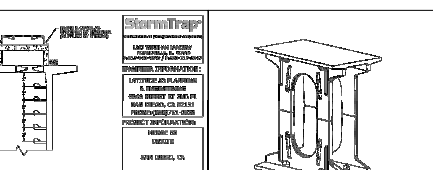


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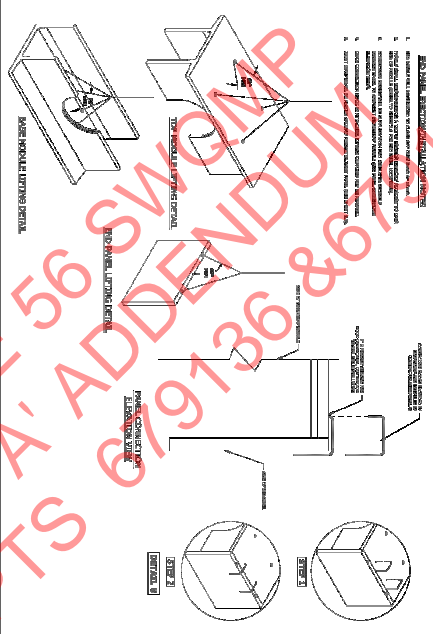
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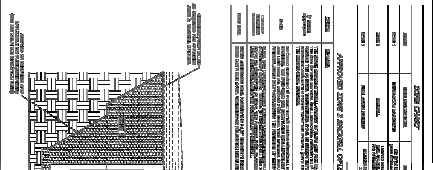


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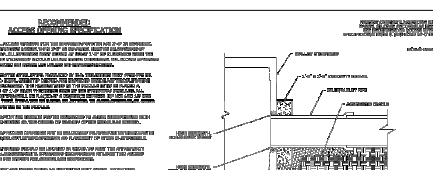


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