APPENDIX E

DRAINAGE TECHNICAL MEMORANDUM

TSD ENGINEERING, INC.
expect more.

Technical Memo

To: City of Sacramento, Department of Utilities
From: Chris Schulze; TSD Engineering, Inc.
Date: April 8, 2024
Re: **DRAINAGE**

This memo discusses the preliminary storm drain design for the Corporate Way Self-Storage project, located in Sacramento, CA. The project proposes to construct a 3-story, 152,625 square foot self-storage facility on approximately 2.3 acres of currently undeveloped land. The site is relatively flat and currently drains southwest. Underlying soils have a hydrologic classification of Type C/D. Type C/D soils have a relatively low infiltration rate.

The property is currently undeveloped. Proposed improvements include a self-storage building, paved travel lanes, curb and gutter, parking stalls, utilities, hardscape, and associated landscaping. Stormwater runoff will be collected and conveyed through gutter and curb cuts to bioretention planters, which are then collected into drainage pipes and discharged into the City's drainage system.

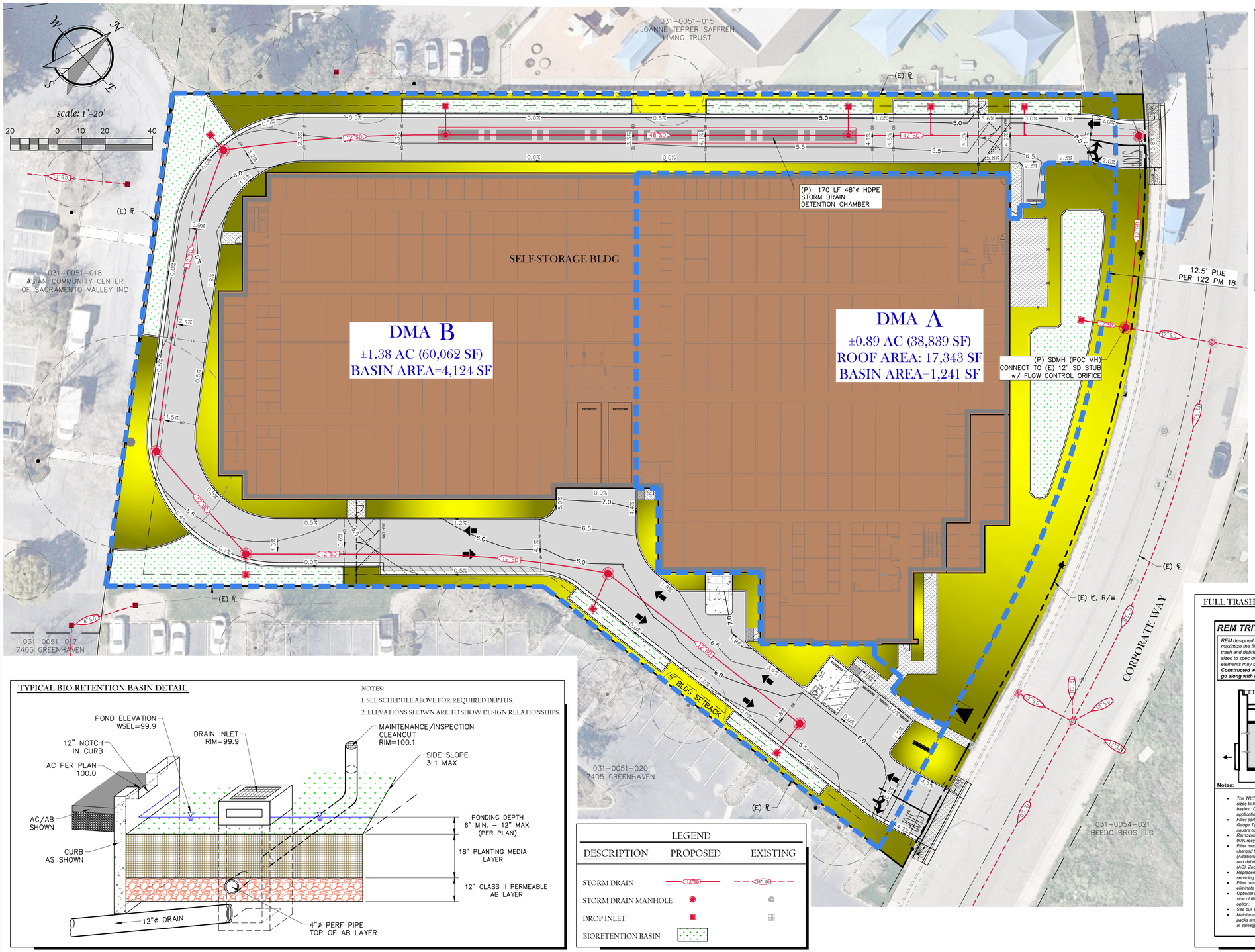
The project site is located within the Zone X area, as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) dated June, 15, 2015, Map Number 06067C0180J. There are no proposed building sites within a FEMA-designated Flood Zone or Special Flood Hazard Area.

No Hydraulic Analysis is provided at this time, but will be required with the improvement plans. At this time, the area comparison, reduction of the assumed impervious surface area and installation of storm water quality best management practices has been used to confirm the capacity of the storm drain system to convey and mitigate runoff from the site.

This site is a part of the City's master drainage basin Sump 142. Onsite Detention is required for the 100-Year Storm Event, at a rate of 6,000 CF per acre of increased impervious area. The total increased impervious area is 1.717 acres, which results in a total of 10,305 CF of detention required. This storage will be provided via the multiple basins around the site, as well as a 48"Ø HDPE Storm Drain Detention Chamber. The sizing is summarized on the DMA Map.

The Sump 142 basin also requires that drainage flows off the site be limited to 0.25 cfs per acre of increased imperviousness. An orifice will be placed in the point-of-connection manhole, in order to limit the flow to this required level.

Preliminary DMA Plan



STORMWATER REQUIREMENTS

DESIGN CRITERIA:

- CONVEY RUNOFF GENERATED BY THE 10YR STORM EVENT
- ONSITE HYDROMODIFICATION IS NOT REQUIRED.
- STORMWATER QUALITY TREATMENT
  (PER 2018 SACRAMENTO REGION STORMWATER QUALITY DESIGN MANUAL LID WORKSHEETS)
  - BIO-RETENTION BASINS HAVE BEEN SIZED TO RETAIN THE RUNOFF GENERATED BY THE 85TH PERCENTILE STORM EVENT.
- IMPLEMENT LOW IMPACT DEVELOPMENT
  (PER 2018 SACRAMENTO REGION STORMWATER QUALITY DESIGN MANUAL LID WORKSHEETS)
  - DISCONNECT ROOF DRAINS
  - INSTALL INTERCEPTOR TREES
- IMPLEMENT FULL TRASH CAPTURE
  - REMOVE PARTICLE LARGER THAN 5 MM PRIOR TO DISCHARGING TO THE CITY STORM DRAIN SYSTEM.
  - INSTALL REM TRITON CRESCENT PIPE SCREEN OR APPROVED EQUAL IN LAST MANHOLE PRIOR TO DISCHARGING TO THE CITY STORM DRAIN SYSTEM.
- PROVIDE ONSITE DRAINAGE DETENTION, AS DESCRIBED IN "STORAGE SUMMARY" BELOW
  (PER SUMP 142 DRAINAGE PLAN AND ONSITE DRAINAGE MANUAL)

STORAGE SUMMARY

STORAGE REQUIRED

100-YR STORAGE REQUIRED: 6,000 CF/AC OF INCREASED IMPERVIOUS AREA

TOTAL INCREASED IMPERVIOUS AREA = 74,811 SF = 1.717 AC

TOTAL 100YR STORAGE REQUIRED:
(1.717 AC) x (6000 SF/AC) = 10,305 CF

STORAGE PROVIDED

DMA A BASIN:
2' DEEP * 2,209 SF = 4,058 CF

DMA B BASINS:
1' DEEP * 4,125 SF = 4,125 CF

48"ø HDPE STORM DRAIN DETENTION CHAMBER
170 LF * 12.57 SF/LF = 2,137 CF

TOTAL 100YR STORAGE PROVIDED = 10,320 CF

TYPICAL BIO-RETENTION BASIN DETAIL

NOTES:
1. SEE SCHEDULE ABOVE FOR REQUIRED DEPTHS.
2. ELEVATIONS SHOWN ARE TO SHOW DESIGN RELATIONSHIPS.

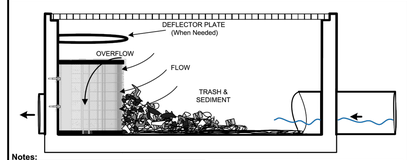
LEGEND

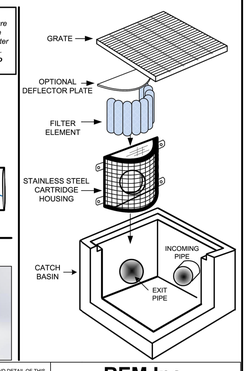
DESCRIPTION	PROPOSED	EXISTING
STORM DRAIN	12" SD	36" SD
STORM DRAIN MANHOLE		
DROP INLET		
BIORETENTION BASIN		

FULL TRASH CAPTURE DEVICE

REM TRITON CPS Series (Crescent Pipe Screen)

REM designed the TRITON CPS Filter Series to provide a highly adaptable solution that allows the flexibility to maximize the filter treatment flow rates and TRASH capturing capacity. TRITON CPS filters are designed to capture trash and debris, and may be utilized in new construction or retrofitted in existing catch basin structures. They are sized to spec or modified in the field for drains with unusual dimensions and unique frame and grates. Optional filter elements may be easily removed when servicing. Media strategy may be optimized for specific pollutant concerns. ***Constructed with 10 Gauge Type 304 Welded Stainless Steel, the REM CPS unit offers superior strength to go along with its "Arched" design.***





Notes:

- *The TRITON - Crescent Series Filters are available in sizes to fit most industry standard pipes and catch basins. Custom sizes are also available to fit most applications.*
- *Filter cartridge housings are constructed utilizing 10 Gauge Type 304 Stainless Steel, with 2" welded square openings.*
- *Removable CPS tops are constructed utilizing over 90% recycled ABS plastic.*
- *Filter medium is configured with REM FOG media, charged to capture hydrocarbons, trash and debris. (Additional media options are available including trash and debris guard PERF & EPTG, granulated carbon (AC), Zeolite (ZEO) and mixed blends there of.)*
- *Replacement Media-Pak's are easily removed for servicing.*
- *Filter designs include a high flow overflow bypass to eliminate pooling or flooding during heavy rain events.*
- *Optional Deflector Plate routes flow onto the filtering side of filter. Certain application may not need this option.*
- *See our Specifier Sheet for sizes, and flow rates.*
- *Maintenance information and replacement media packs are available upon request by contacting REM at sales@remfilters.com or (888) 526-4736.*

TRITON CPS CRESCENT PIPE SCREEN SERIES FILTER
By REM Inc. (888.526.4736)

MADE IN USA

CPS size may vary by catch basin. Taller cartridge options provide greater volume capacity and increased treatment rates.

PATENT PENDING

PH: (888) 526-4736

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

REM Inc.

TRITON CPS SERIES
(Crescent Pipe Screen)

DRAWN BY:	FOR:	REV
C.F.	Inline Filtering	
SCALE: 1/4 : 1	DATE: 3/1/2015	SHEET NO. 1 OF 1

CORPORATE WAY SELF STORAGE C5.0

City of Sacramento, CA

Proposed By: Sacramento Corporate Way, LLC

In Association With: TSD ENGINEERING, INC. · SGV ARCHITECTURE & DESIGN · YAMASAKI · VIXXO

TSD ENGINEERING, INC.
expect more.
785 Orchard Drive, Suite #110
Folsom, CA 95630
Phone: (916) 608-0707
Fax: (916) 608-0701

APRIL 8, 2024 - ENTITLEMENTS - INITIAL SUBMITTAL

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TSD ENGINEERING, INC.
expect more.

Technical Memo

To: City of Sacramento, Department of Utilities
From: Chris Schulze; TSD Engineering, Inc.
Date: April 8, 2024
Re: STORM WATER QUALITY

This memo discusses the low impact development best management practices (BMPs) incorporated into the Corporate Way Self-Storage project, located in Sacramento, CA. The project proposes to construct a 3-story, 152,625 square foot self-storage facility on approximately 2.3 acres of currently undeveloped land. Proposed improvements include a self-storage building, paved travel lanes, curb and gutter, parking stalls, utilities, hardscape, and associated landscaping. The site is relatively flat and currently drains southwest. Underlying soils have a hydrologic classification of Type C/D. Type C/D soils have a relatively low infiltration rate.

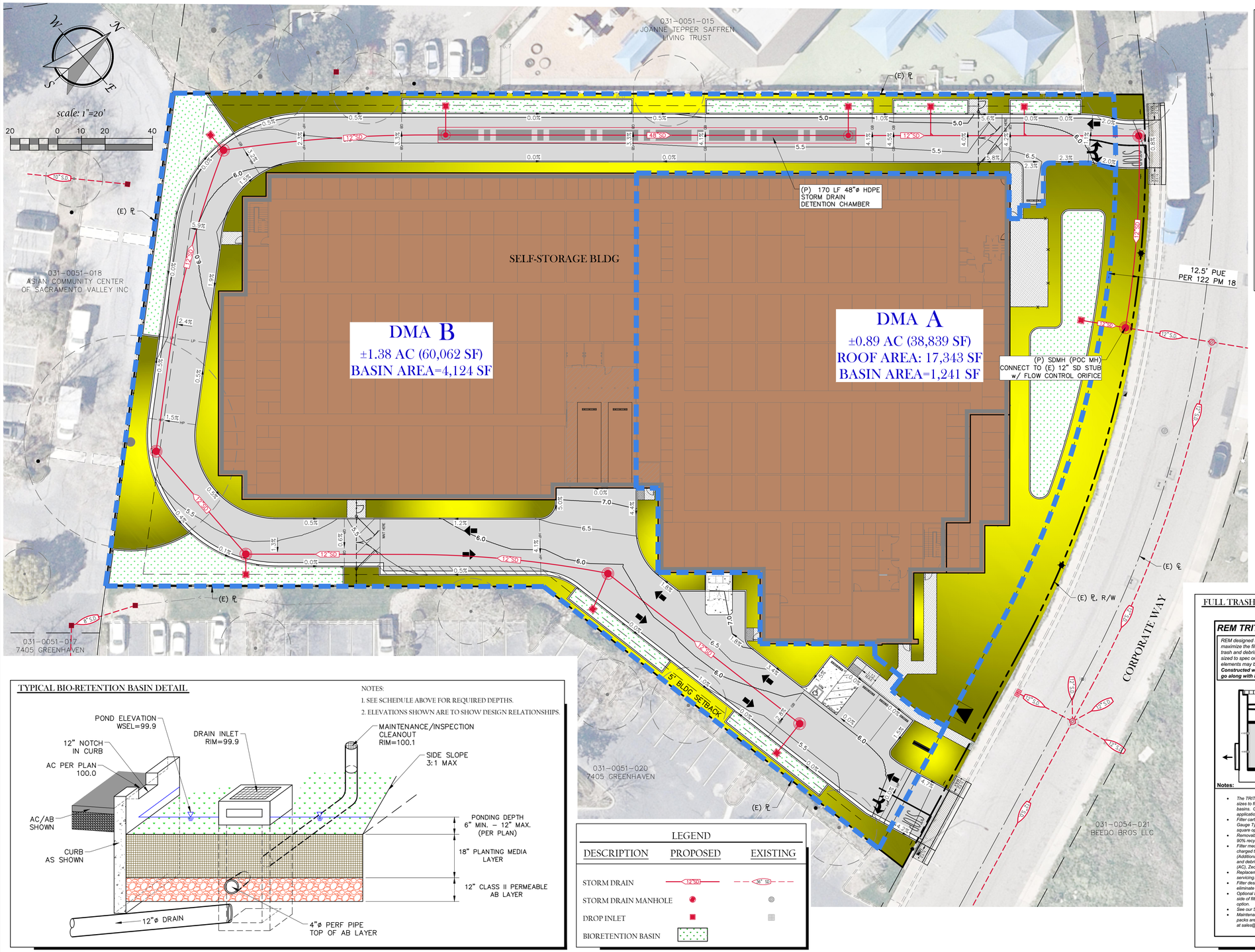
The site is required to provide LID and onsite treatment, as well as source control features and full trash capture control. The project is exempt from the City's hydromodification requirements.

Bio-retention basins have been proposed throughout the site, and have been designed in accordance with the Stormwater Quality Design Manual for the Sacramento Region. The site grading plan has been designed to convey runoff to the bio-retention basins to capture and treat runoff from the impervious areas prior to discharging to the underground storm drain system. The Preliminary Stormwater Control Plan can be seen in the Appendix.

The LID worksheet provided with the Manual was used to size the basins and confirm adequate LID points were achieved and the stormwater volume equivalent to twice the 85th percentile storm is retained. The LID worksheets used to size the bio-retention basins can be seen in the Appendix.

The owner bears sole responsibility for Inspection and Maintenance of the bio-retention basins. The owners will sign and record a Maintenance Agreement that will outline the required inspection and maintenance schedule and activities.

Preliminary DMA Plan



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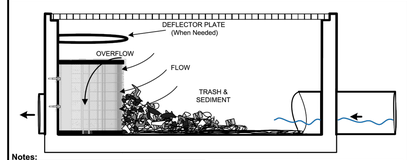

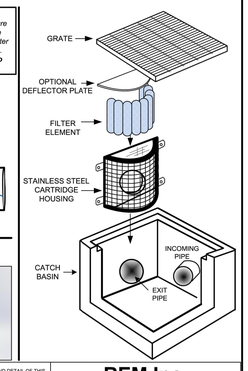

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA A
Location of project: Sacramento

Fill in Blue Highlighted boxes

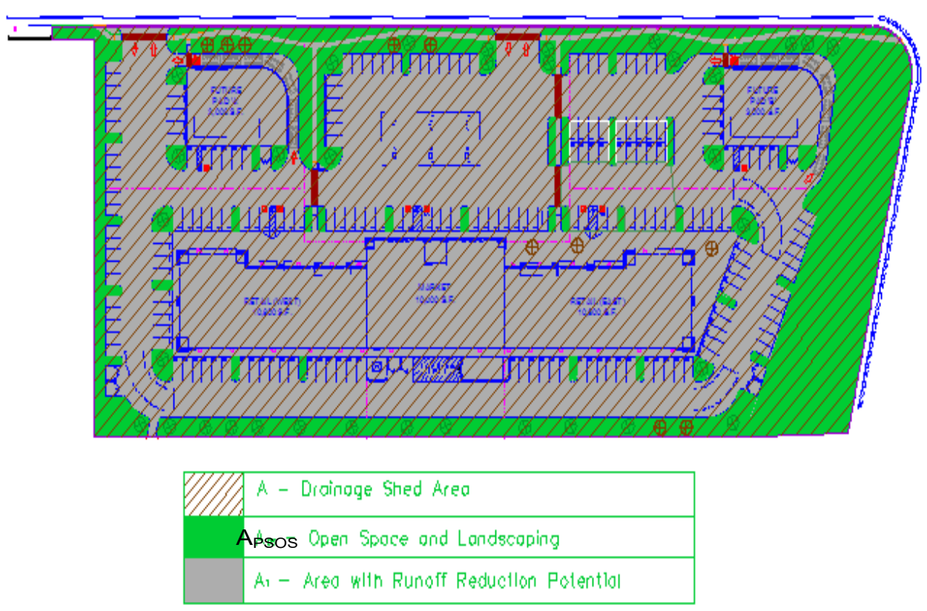
Step 1 - Open Space and Pervious Area Credits

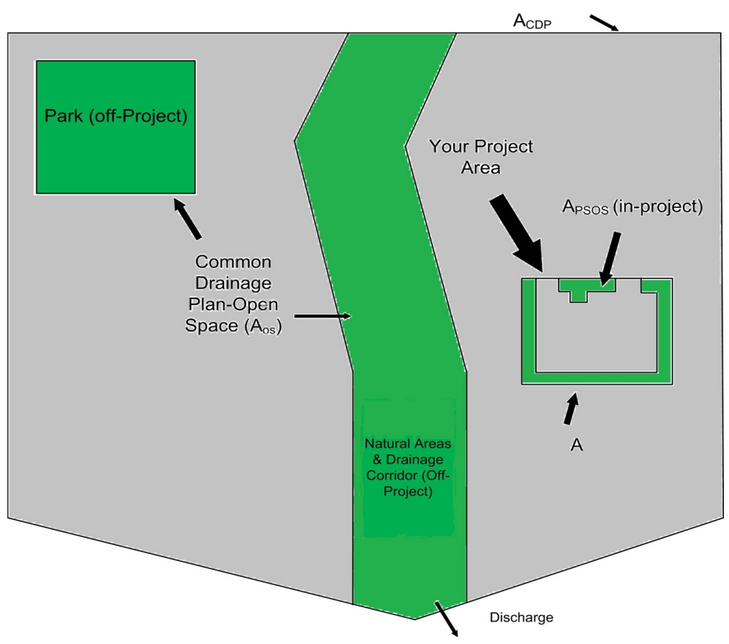
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, and soil	0	acres		
d. Common landscape area/park	0	acres		
e. Regional Flood Control/Drainage basins	0	acres		
1 b. Project Drainage Shed Area (Total)	0.89	acres	A	
Project-Specific Open Space (In-project, communal)**	0.23	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.23	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	0.66	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.74		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	26	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement — 0.00 — acres — Box K1

3. Enter area of Receiving Porous Pavement — 0.00 — acres — Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas (Box K1 / Box K2) — 0.00 — Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

1 — Box K4

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 — 0.00 — acres — Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 — 0.00 — acres — Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres — Box K8
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	Box L1
2. Multiply Box L1 by 200 and enter result in Box L2	0	sq. ft.	Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	0	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) - enter gallons, for simple rain barrels: 0.00 acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system): 0.00 acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area: 2,029 sq ft
Subdrain Elevation: 6 inches
Ponding Depth, inches: 12 inches

0.69 acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs: drawdown_hrs_inf
Soil Infiltration Rate, in/hr: soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft: 0.00 capture_vol_inf — 0.00 acres

Sizing Option 2: Infiltration BMP surface area, sq ft: 0 soil_surface_area — 0.00 acres

Basin or trench? approximate BMP depth: 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) Mulched Infiltration Area, sq ft: mulch_area — 0.00 acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs	0.69	A_{LIDc}
Runoff Management Credit (Step 3)	A_{LIDC}/A_T*200 = 211.1	pts

Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4: 237.3

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC}$ = -0.04	A_{AT}
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	A_{AT} / A = -0.04	I_A

STOP: No additional treatment needed

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	-0.04	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	-0.01	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1	0.89	A	48	hrs	Specified Draw Down time
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.00	P_0			
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.00	Acre-Feet			

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Appendix D-2: Commercial Sites: Low Impact Development (LID) Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: DMA B
Location of project: Sacramento

Fill in Blue Highlighted boxes

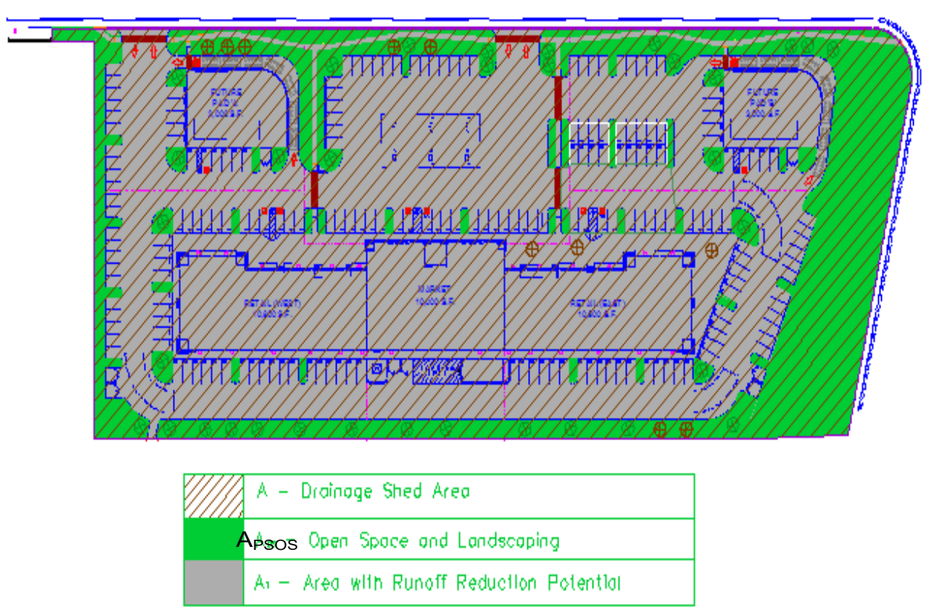
Step 1 - Open Space and Pervious Area Credits

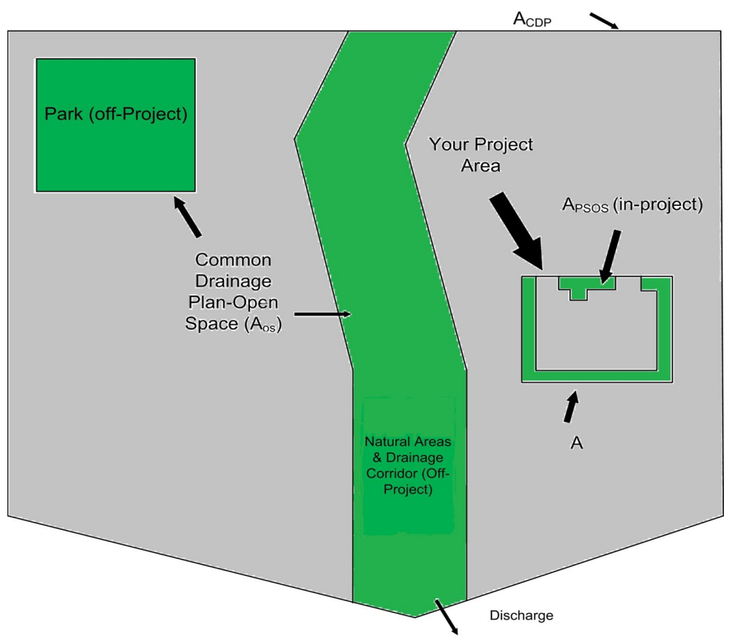
Is your project within the drainage area of a common drainage plan that includes open space? If not, skip to 1 b.

1 a. Common Drainage Plan Area	0	acres	A_{CDP}	
Common Drainage Plan Open Space (Off-project)	0	acres	A_{OS}	**see area example below**
a. Natural storage reservoirs and drainage corridors	0	acres		
b. Buffer zones for natural water bodies	0	acres		
c. Natural areas including existing trees, other vegetation, and soil	0	acres		
d. Common landscape area/park	0	acres		
e. Regional Flood Control/Drainage basins	0	acres		
1 b. Project Drainage Shed Area (Total)	1.38	acres	A	
Project-Specific Open Space (In-project, communal)**	0.31	acres	A_{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00	acres		
b. Buffer zones for natural water bodies	0.00	acres		
c. Natural areas including existing trees, other vegetation, and soil	0.00	acres		**see area example below**
d. Landscape area/park	0.31	acres		
e. Flood Control/Drainage basins	0.00	acres		

** Doesn't include impervious areas within individual lots and surrounding individual units. That is accounted for below using Form D-1a in Step 2.

Area with Runoff Reduction Potential	$A - A_{PSOS}$ =	1.07	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.78		I
Open Space & Pervious Area LID Credit (Step 1)	$(A_{OS}/A_{CDP}+A_{PSOS}/A)x100$ =	22	pts	





Step 2 - Runoff Reduction Credits

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits →					0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0.0000	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits →					0.00	acres
Total Effective Area Managed by Runoff Reduction Measures				A_C		0.00	acres
Runoff Reduction Credit (Step 2)				$(A_C / A_T)*100$ =		0	pts

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt	0.60
Modular Block Pavement &	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement — 0.00 — acres — Box K1

3. Enter area of Receiving Porous Pavement — 0.00 — acres — Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas (Box K1 / Box K2) — 0.00 — Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

1 — Box K4

6. Enter Efficiency of Porous Pavement (see table below) — Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 — 0.00 — acres — Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 — 0.00 — acres — Box K7

9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 — 0.00 acres — Box K8
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1.		trees	Box L1
2. Multiply Box L1 by 200 and enter result in Box L2	0	sq. ft.	Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3.		trees	Box L3
4. Multiply Box L3 by 100 and enter result in Box L4	0	sq. ft.	Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5
6. Multiply Box L5 by 0.5 and enter the result in Box L6	0	sq. ft.	Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7	0	sq. ft.	Box L7
Divide Box L7 by 43,560 and multiply by 20% to get effective area managed and enter result in Box L8 This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2	0.00	acres	Box L8

Step 3 - Runoff Management Credits

Capture and Use Credits

Impervious Area Managed by Rain barrels, Cisterns, and automatically-emptied systems

(see Fact Sheet) - enter gallons, for simple rain barrels: 0.00 acres

Automated-Control Capture and Use System

(see Fact Sheet, then enter impervious area managed by the system): 0.00 acres

Bioretention/Infiltration Credits

Impervious Area Managed by Bioretention BMPs

(see Fact Sheet)

Bioretention Area: 4,126 sq ft
Subdrain Elevation: 6 inches
Ponding Depth, inches: 12 inches

1.41 acres

Impervious Area Managed by Infiltration BMPs

(see Fact Sheet)

Drawdown Time, hrs: drawdown_hrs_inf
Soil Infiltration Rate, in/hr: soil_inf_rate

Sizing Option 1: Capture Volume, acre-ft: 0.00 capture_vol_inf — 0.00 acres

Sizing Option 2: Infiltration BMP surface area, sq ft: 0 soil_surface_area — 0.00 acres

Basin or trench? approximate BMP depth: 0.00 ft

Impervious Area Managed by Amended Soil or Mulch Beds

(see Fact Sheet) Mulched Infiltration Area, sq ft: mulch_area — 0.00 acres

Total Effective Area Managed by Capture-and-Use/Bioretention/Infiltration BMPs	1.41	A_{LIDc}
Runoff Management Credit (Step 3)	A_{LIDC}/A_T*200 = 263.5	pts

Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4: 285.7

Does project require hydromodification management? If yes, proceed to using SacHM.

Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC}$ = -0.34	A_{AT}
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	A_{AT} / A = -0.25	I_A

STOP: No additional treatment needed

Step 4a Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18	i
Obtain A_{AT} from Step 3	-0.34	A_{AT}
Use C = 0.95	0.95	C
Flow = 0.95 * i * A_{AT}	-0.06	cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Step 4b Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized Detention Volume (P_0)				
Obtain A from Step 1	1.38	A	48	hrs	Specified Draw Down time
Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2.	0.00	P_0			
Calculate treatment volume (acre-ft): **Treatment volume = A x (P_0 / 12)**	0.00	Acre-Feet			

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Table 3-3 Stormwater Quality Control Measure Selection Matrix

✓ **Required Based Upon Table 3-2** • **Acceptable Option** **"NA" Not applicable or allowed**

Priority Project Category [a]	**Residential**			**Commercial/Industrial**							
Control Measure	**Single Family Residential Impervious area ≥ 1 ac**	**Single Family Residential Gross area ≥ 20 ac**	**Multi-family Residential Impervious area ≥ 1 ac**	**Commercial Impervious area ≥ 1 ac**	**Auto Repair Shops Impervious area ≥ 1 ac**	**Retail Gasoline Outlets Impervious area ≥ 1 ac**	**Restaurants Impervious area ≥ 1 ac**	**Industrial Impervious area ≥ 1 ac**	**Hillside Developments ≥ 25% slope**	**Parking lots [b] ≥ 5,000 sf or 25 spaces**	**Streets/Roads [c] Impervious area ≥ 5 ac**
Source Control [d]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Efficient Irrigation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fueling Areas	NA	NA	NA	✓	✓	✓	✓	✓	✓	NA	NA
Landscaping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Loading Areas	NA	NA	NA	✓	✓	✓	✓	✓	✓	NA	NA
Outdoor Storage Areas	NA	NA	NA	✓	✓	✓	✓	✓	✓	NA	NA
Outdoor Work Areas	NA	NA	NA	✓	✓	✓	✓	✓	✓	NA	NA
Storm Drain Markings and Signs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vehicle/Equipment Wash Areas	NA	NA	✓	✓	✓	✓	✓	✓	✓	NA	NA
Waste Management Areas	NA	NA	✓	✓	✓	✓	✓	✓	✓	✓	NA
Hydromodification Control, LID, and Treatment Control [e][f]	**(LID Only)**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alternative Driveways	•	•	•	NA	NA	NA	NA	NA	•	NA	NA
Capture and Re-Use	•	•	•	•	•	•	•	•	•	NA	NA
Compost-Amended Soil	•	•	•	•	NA	NA	•	•	NA	•	NA
Constructed Wetland Basin	•	•	•	•	NA	NA	•	•	NA	•	•
Disconnected Pavement	•	•	•	•	•	•	•	•	•	•	•
Disconnected Roof Drains	•	•	•	•	•	•	•	•	•	NA	NA
Green Roof	NA	NA	NA	•	•	•	•	•	•	NA	NA
Infiltration Basin	•	•	•	•	NA	NA	•	NA	NA	•	•
Infiltration Trench	•	•	•	•	NA	NA	•	NA	NA	•	•

Table 3-3, continued

✓ **Required Based Upon Table 3-2** • **Acceptable Option** **"NA" Not applicable or allowed**

Priority Project Category [a]	**Residential**			**Commercial/Industrial**							
Control Measure	**Single Family Residential Impervious area ≥ 1 ac**	**Single Family Residential Gross area ≥ 20 ac**	**Multi-family Residential Impervious area ≥ 1 ac**	**Commercial Impervious area ≥ 1 ac**	**Auto Repair Shops Impervious area ≥ 1 ac**	**Retail Gasoline Outlets Impervious area ≥ 1 ac**	**Restaurants Impervious area ≥ 1 ac**	**Industrial Impervious area ≥ 1 ac**	**Hillside Developments ≥ 25% slope**	**Parking lots [b] ≥ 5,000 sf or 25 spaces**	**Streets/Roads [c] Impervious area ≥ 5 ac**
Interceptor Trees	•	•	•	•	•	•	•	•	•	•	•
Porous Pavement	(e)	(e)	(e)	•	NA	NA	•	NA	•	•	(e)
Sand Filter (Austin Sand Filter)	•	•	•	•	•	•	•	•	•	•	•
Bioretention Planter (Flow-Through)	•	•	•	•	•	•	•	•	•	•	•
Bioretention Planter (Infiltration)	•	•	•	•	NA	NA	•	NA	•	•	•
Underground Storage (Tanks, Vaults, etc.)	•	•	•	•	•	•	•	•	•	•	•
Vegetated Filter Strip	•	•	•	•	NA	NA	•	NA	•	•	•
Vegetated Swale	•	•	•	•	•	•	•	•	•	•	•
Water Quality Detention Basin	•	•	•	•	•	•	•	•	•	•	•
Proprietary Devices[g]	•	•	•	•	•	•	•	•	•	•	•
Full Capture Trash Control[h]	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓

(a) Refer to Table 1-2 for more information on how each priority project category is generally defined and check with the local zoning code for the specific definition in a given jurisdiction.
(b) Only applies to stand-alone parking lots exposed to rainfall. Parking lots associated with buildings/facilities need to meet requirements of associated land use (commercial, industrial, etc.)
(c) Municipal road projects and expansions that are not a part of new residential, commercial or industrial developments.
(d) Storm drain markings required for all projects. Other source controls required for all projects with applicable site activities. Choice of source control for hillside development depends on type of land use (commercial, residential, etc.)
(e) Consult local permitting agency to determine acceptability for use in public right-of-way.
(f) Alternative treatment controls may be proposed; subject to review and approval of local permitting agency. The need for treatment may be reduced through LID measures; see Appendix D. If the project drains to an adequately sized/designed regional treatment facility (e.g., detention basin), additional on-site treatment controls may not be needed.
(g) See discussion in Chapter 5 of this manual and www.beriverfriendly.net for list of acceptable devices.
(h) Refer to Appendix H for further information related to full capture trash control.