California Northstate University Medical Center Project Drainage Study

Prepared for:

California Northstate University

&

City of Elk Grove

DRAFT SUBMITTAL

May 18, 2020



Prepared by:



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I. PROJECT OVERVIEW

California Northstate University is pursuing redevelopment of a 25.1-acre site as a new Medical Center Campus. The proposed development (Project) is located in the western part of the city of Elk Grove, California (City), just south of Elk Grove Boulevard and between Interstate 5 and West Taron Drive. **Figure 1** (attached) shows the location of the Project. The property is protected by a levee and currently mapped by the Federal Emergency Management Agency (FEMA) under the National Floodplain Insurance Program (NFIP) as 'Zone X', area with reduced risk due to levee during a 100-year event. The City of Elk Grove hired MBK Engineers to perform analysis and mapping of the current 200-year floodplain due to levee failure along the Sacramento River.

Wood Rodgers, Inc. (Wood Rodgers) has been directed to evaluate the impact of the Project to local drainage infrastructure. This drainage study presents a hydrologic analysis of pre-Project and post-Project conditions based on the current conceptual design consistent with the overall submittal dated April 1, 2020. A design level hydraulic analysis was not performed for this conceptual drainage study and will be provided when the Project reaches the design phase. The hydrologic analysis from this drainage study indicates that the current design concept will reduce peak flow leaving the site and will not require additional peak flow drainage mitigation.

II. PRE-PROJECT CONDITIONS

A. Existing Drainage Conditions

Currently the Project site accommodates a number of commercial businesses within various buildings and associated paved parking areas. The site was constructed in three phases. The southern third of the site was constructed between 1999 and 2002 as a single building with parking. It was originally occupied by the American Automobile Association (AAA), and is currently occupied by the California Northstate University Colleges of Pharmacy and Medicine. The northern third of the site was constructed between 2006 and 2007 with various commercial retail facilities and also includes paved parking. The central third of the site was constructed in 2009 as a single building with paved parking, and is currently occupied by an automotive repair software firm (ALLDATA LLC).

The Project site drains to an existing storm drain trunkline along West Taron Drive at 4 locations. The upstream end of this trunkline is adjacent to the project, just southwest of the West Taron Drive and Elk Grove Blvd intersection. The trunkline flows southwest and receives runoff from West Taron Drive and a portion of Riparian Drive to the southeast, in addition to runoff from the Project. The trunkline ultimately outfalls to a detention basin to the south which was evaluated by West Yost Associates under the City's Storm Drainage Master Plan.



B. Hydrologic Analysis

A watershed delineation was prepared by Wood Rodgers. The existing Project site was subdivided into 11 sub-watersheds based on topography and the existing storm drain system configuration. The watersheds representing the existing drainage conditions for the Project site are shown on **Figure 2**. Watershed Parameters were determined from soil, topography, land use, and storm drain data.

Figure 3 shows the soil types within and surrounding the Project area. The entire project is underlain by hydrologic type "D" soils, indicating that the soils have high natural runoff potential. This information was obtained from the Natural Resources Conservation Services website at <u>https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx</u>.

Figure 4 shows the topographic data used to delineate the existing watersheds within the Project area.

The existing land use is zoned as light industrial and general commercial throughout the Project site and consists of mostly impervious surfaces. The existing impervious areas of the Project area were delineated in detail to make an accurate comparison with post-Project conditions. **Figure 5** shows the existing site imperviousness. The existing imperviousness of the combined Project site is 75.8 percent.

Wood Rodgers prepared a hydrologic model using the SacCalc program to determine the 100-year flows exiting the Project site under existing conditions. Watershed lag was computed within SacCalc using the travel time method with a component for upstream overland flow and a component for pipe flow. The overland flow component is computed within the SacCalc program based on Sacramento County standards. The pipe flow lag component is computed based on pipe size, length, and slope which were estimated from the existing storm drain network.

Table 1 (attached) presents the key hydrologic parameters for each sub-watershed shown inFigure 2.

Watersheds were routed through pipe elements using the Muskingum-Cunge method. The locations of routing elements and junctions are also shown in Figure 2. Runoff was routed through the West Taron Drive trunkline to the junction with the most downstream outfall pipe from the Project site. The 100-year storm event was analyzed in this study. **Table 2** shows the estimated peak flow results for the 100-year storm event.



SacCalc Element EX003	Peak Flow Rate (cfs) 15
EX003	15
EX004	16
JNC001	31
C009	31
EX005	14
EX007	8.5
C008	8.5
EX011	4.4
C000	4.3
JNC009	13
C001	12
EX002	8.6
EX008	5.7
EX009	2.6
EX001	7.7
EX010	2.2
EX006	18
C002	18
JNC003	28
C003	27
JNC004	30
C004	29
JNC005	43
C005	41
JNC006	54
C006	52
JNC007	66
C007	64
JNC008	93

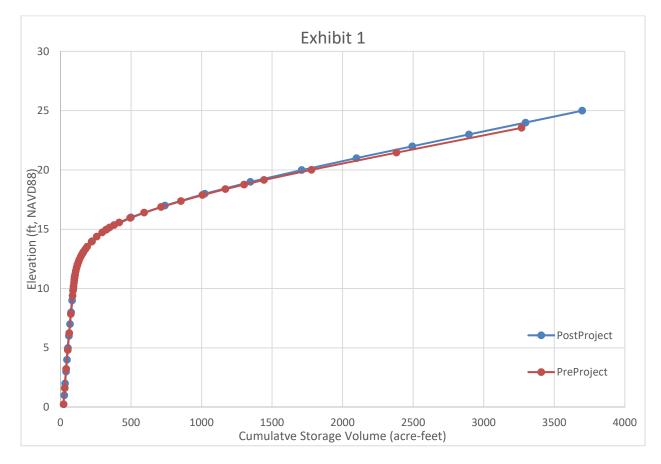
C. Hydraulic Analysis

A design level hydraulic analysis was not performed as part of this Drainage Study. Routing was performed using SacCalc methods to determine peak flow rates from the conceptual design of the Project. Wood Rodgers basis of design will be based on no increase in runoff from the site compared to existing development. Therefore, the focus of this study is the runoff generated within the Project boundary.

D. 200-Year Floodplain

The project site is within a defined 200-year floodplain based on a combination of levee failure scenarios of the Sacramento River levee and the existing levee along the western boundary of the City. A pdf copy of the existing conditions floodplain was obtained from a report developed by MBK Engineers and is shown on **Figure 6**.

Wood Rodgers was provided a copy of the existing conditions HEC-RAS modeling and modified the existing model geometry by reflecting the construction of the project above the 200-year floodplain levels. To define this condition, the storage area labeled "80.1" in the model was modified to redefine the elevation/storage relationship, reducing the volume of effective storage to entirely eliminate storage within the project boundary, as reported on Exhibit 1.





At this time, all ground floor levels are being proposed for parking only, with all habitable spaces floor elevations to be constructed above the 200-year water surface elevations. Furthermore, the conveyance (overland) flow capacity between storage areas was modified in the vicinity of the project by blocking flow over the connecting weir structures between storage areas where the project is located. The segment of overflow over Elk Grove Boulevard immediately north of the project, and the segment of existing levee west of the project were blocked to simulate preventing pass-through flow through the site. The results of the revised modeling show that the maximum water surface elevation increased by 0.01 feet in Scenarios L1 and L2 for storage area "80" and Scenario L3 for storage area "80.1". As the modeling results are reported to the nearest 0.1 feet in the MBK report, and the new values still round to the same values reported in MBK's report, Wood Rodgers proposes that these value changes are negligible. Figure 6A provides a zoomed-in version of the pre-project 200-year floodplain for the project. Figure 6B depicts the worst-case project impact to the 200-year floodplain, using the methodology described above. The updated modeling is provided in **Appendix A**.

III. POST-PROJECT CONDITIONS

A. Overview

The conceptual design of the Project includes elevating all structures to create parking underneath each structure. This will allow the conversion of part of the existing parking area to open space, reducing overall imperviousness. The Project will also re-direct the runoff of some areas based on preliminary site layout.

B. Hydrologic Analysis

In order to evaluate the conceptual drainage design for the Project, a hydrological analysis representing the post-project runoff conditions was performed by Wood Rodgers using the SacCalc program. The proposed development reduces the impervious area within the Project site. Re-orientation of roadways resulted in redirection of some areas to different watersheds. **Figure 7** shows the resulting watersheds based on the conceptual design grading and storm drain layout. The Project site was delineated into 12 watersheds which will eventually drain to the same outfalls at West Taron Drive as pre-Project conditions. Watershed parameters were calculated using the same methods as in the analysis of pre-Project watersheds.

Table 3 (attached) summarizes the key hydrologic parameters for the post-Project condition sub-watersheds.

The underlying soil conditions are assumed to remain relatively unchanged after grading in order to represent infiltrative conditions for pervious portions of development. If there is



any change to soil conditions it is anticipated that infill/import will be more pervious than existing soils, further increasing onsite infiltration and reducing runoff. However, for purposes of this analysis, the conservative estimate is based on existing soils.

The land use is proposed to be rezoned to include designations of Industrial-Office Park and Employment Center. The conceptual design will, however, reduce the total impervious area in the Project site to 70.2 percent. The post-Project site imperviousness is shown on **Figure 8**.

Watershed travel time lag parameters for pipe flow were estimated based on the proposed storm drain network shown in Figure 8.

Watersheds were similarly routed through pipe elements as in the analysis of pre-Project conditions. The locations of routing elements and junctions are shown in Figure 8. **Table 4** shows the estimated peak flow results for the 100-year storm event.

Hydrology was not reevaluated as part of the 200-year analysis. The modeling provided by MBK Engineers assumes that all water contributing to the 200-year floodplain originates from levee failure flow leaving the Sacramento River. No local rainfall is considered coincident or contributing to the floodplain.

Table 4 – Post-Proj	Table 4 – Post-Project 100-year Peak Flow Results						
SacCalc Element	Peak Flow Rate (cfs)						
PR005	3.8						
PR001	9.8						
C008	9.7						
PR006	4.4						
C000	4.3						
JNC009	14						
C001	14						
PR002	7						
PR007	3.6						
PR008	2.5						
PR003	2.5						
PR011	24						
C003	23						
JNC004	28						
C004	27						
JNC005	36						
C005	35						
JNC006	49						
C006	48						



51
51
2.6
13
14
12
12
37
36
39
39
87

C. Stormwater Quality and LID Strategy

The Project site's storm runoff quantities will be reduced, however, current stormwater quality treatment requirements will still need to be addressed. Since the original site was constructed (2002-2009), the state, Sacramento County and the City of Elk Grove are required to implement development approval processes referencing the current comprehensive water quality treatment best management practices. It is Wood Rodgers' professional opinion that the new site configuration of open-space and landscape areas will provide sufficient area to implement best management practices that will meet the state and local requirements as based on the National Pollution Discharge Elimination System program. Final sizing and locations of these facilities will be addressed at the time of design. However, the City has directed the project to provide a preliminary layout of Low Impact Development (LID) and water quality treatment facilities to prove that the proposed site building layout can accommodate a workable solution for ultimate buildout, as well as identifying what may be constructed within the Phase 1 footprint.

From an LID implementation standpoint, the target for a major project within the City is to achieve a minimum of 100 points, as calculated under Appendix D of the Sacramento County Storm Water Quality Design Manual (SCSWQDM), which is available online at the website <u>www.beriverfriendly.net</u>. Onsite LID facilities are intended to store and/or infiltrate runoff within the project area. Some types of allowed LID facilities include trees and flow across vegetated surfaces. Preliminary evaluations indicate that these types of facilities will not achieve the required LID minimum levels.

The project will utilize the bio-retention planter design option, which directs runoff through plant growing soil/root complex. With the presence of underlying clay soils on site, as described under the current soil survey from the Natural Resources Conservation Service, the project proposes using the bio-retention planter design with an underdrain. With the



underdrain configuration, this allows for the option of elevated planters to be constructed above existing ground, particularly within some areas adjacent to buildings. Final vertical locations will be determined during final design, and are not specified in this report. All bioretention facilities with underdrains will be appropriately connected to discharge via the storm drain system. With this "flow-through" planter configuration the engineered soil profile, roots, and plants with each planter area will allow for storage/attenuation and enhanced evaporation of runoff.

The use of LID facilities provides some treatment benefits while reducing the volume of runoff that must be treated before being discharged from the site. For the ultimate project site, **Figure 9** shows the potential siting locations of bioretention facilities, within the overall landscaped areas. Coupled with trees and landscaped features, a bio-retention area of 18,300 square feet produces greater than 100 LID points. In support of this configuration, the associated ultimate conditions calculation spreadsheet is attached in Appendix B. For Phase 1, the potential area of stormwater planters required to generate 100 LID points is approximately 9,100 square feet, which can be sited within the available landscaping areas shown on **Figure 10**. The associated Phase 1 conditions calculation spreadsheet is provided in Appendix B. Figure 11 shows the proposed LID facilities for Phase 2, with the associated calculation spreadsheet also provided in Appendix B. It is important to note that reconfiguration of some site areas is required in transitioning from Phase 1 to Phase 2 to ultimate conditions, which necessitates the elimination of some portion of facilities and construction of new facilities at new locations to compensate.

Achieving 100 LID points will not fully address treatment requirements associated with the project. Residual treatment is calculated in the spreadsheets provided in Appendix B. For purposes of this preliminary assessment the solution for treating residual runoff is through end-of-pipe treatment, which involves filtration consistent with the approved proprietary treatment devices referred to in Table 3-3 and 5-1 of the SCSWQDM. All hydraulically operated (passive) filtration devices will be located outside of the City's right-of-way and owned, operated and maintained by the private property owner. Preliminary sizing quotations from Contech (supporting documentation is provided in Appendix A) shows a Stormfilter Unit with the dimensions of 8 feet by 24 feet (with 12-inch cartridges) can accommodate a storm water quality flow (WQF) rate of 1.2 cfs, and can be outfitted to meet the latest trash capture requirements. The calculated peak WQF for each preliminary onsite watershed was calculated with proposed conditions watersheds while accounting for proposed LID features, as summarized on Figure 9. It is anticipated that up to six separate treatment vaults may be required, to be located at each of the six pipe discharge locations identified on Figure 9, to address any residual treatment and trash capture requirements. Two of the six locations can operate with a vault having maximum dimensions of 8 feet by 24 feet, with the other five locations requiring a vault less than half of these dimensions. For



purposes of this preliminary drainage study, Wood Rodgers proposes using a treatment vault with the maximum dimensions of 8 feet by 12 feet (WQF 0.6 cfs) for these smaller flow locations.

Hydromodification requirements are met as the project area is within the "Not Applicable" zone on Figure 5-2 of the SCSWQDM and is therefore exempt.

IV. Results Summary and Conclusions/Recommendations

Peak flow rates were compared at five "Points of Comparison" (POC), shown in **Table 5**. Four POC locations coincide with where runoff exits the project site and one POC is on the West Taron Drive trunkline. Peak flows were unchanged or reduced at the most upstream three outfall pipes. Re-orientation of watersheds caused a slight local increase in flow to the fourth (furthest downstream) outfall. However, the combined flow in the trunkline at this location is reduced by 7 cfs overall. Therefore, no adverse drainage impacts to adjacent properties will result from implementation of the Project.

The final storm water design configurations may be adjusted from that shown once final building layouts and final grading are defined during final design and improvement plan review. The overall approach will be maintained during all phases of design and implementation. Additional hydraulic analysis for the Project area will be conducted later during the design phase of the project to ensure all requirements are met.

	Table 5 – 100-year Storm Event Peak Flow Comparison									
POC	Existing SacCalc Element	Difference (cfs)								
1	JNC004	JNC004	30	28	-2					
2	JNC005	JNC005	43	36	-7					
3	JNC006	JNC006	54	49	-5					
4	JNC007	JNC007	66	51	-15					
5	JNC008	JNC008	93	86	-7					

The analysis performed and documented within this Preliminary Drainage Study verifies that the conceptual design of the Project will provide positive impacts from stormwater quality and flood control perspectives. As the project is a redevelopment site with no drainage work outside of known disturbed/developed areas, no outside agency permits are anticipated.



SacCalc modeling files and GIS mapping files used to determine the existing and Project conditions are provided in **Appendix A**.



PROJECT: 8673 - CALIFORNIA NORTHSTATE UNIVERSITY MEDICAL CAMPUS

LOCATION: ELK GROVE, CA

SUBJECT: EXISTING HYDROLOGIC PARAMETERS

METHOD: SACRAMENTO

Watershed Name	Node	Watershed Area	Mean Elevation	Impervious	Lag Method	Overland Flow Land Use	Pipe Length	Pipe Diameter	Pipe Slope	Manning's "n"
		(ac)	(in)	%	(ft)	(ft)	(ft)	(ft)	(ft/ft)	
EX001	EX001	2.16	17	82.80	Travel Time	Commercial	233.00	1.50	0.0030	0.0150
EX002	EX002	2.42	17	75.80	Travel Time	Commercial	169.00	1.00	0.0030	0.0150
EX003	EX003	4.49	17	83.90	Travel Time	Commercial	340.00	1.50	0.0030	0.0150
EX004	EX004	4.57	17	84.50	Travel Time	Commercial	425.00	3.00	0.0030	0.0150
EX005	EX005	4.27	17	83.90	Travel Time	Commercial	435.00	1.50	0.0030	0.0150
EX006	EX006	5.21	17	74.70	Travel Time	Commercial	265.00	1.50	0.0030	0.0150
EX007	EX007	2.50	17	76.50	Travel Time	Commercial	327.00	1.50	0.0030	0.0150
EX008	EX008	1.61	17	50.60	Travel Time	Commercial	-	-	-	-
EX009	EX009	0.73	17	80.80	Travel Time	Commercial	-	-	-	-
EX010	EX010	0.61	17	76.50	Travel Time	Commercial	-	-	-	-
EX011	EX011	1.25	17	80.00	Travel Time	Commercial	-	-	-	-

Table 1

Prepared by: Wood Rodgers, Inc 1 of 1

PROJECT: 8673 - CALIFORNIA NORTHSTATE UNIVERSITY MEDICAL CAMPUS

LOCATION: ELK GROVE, CA

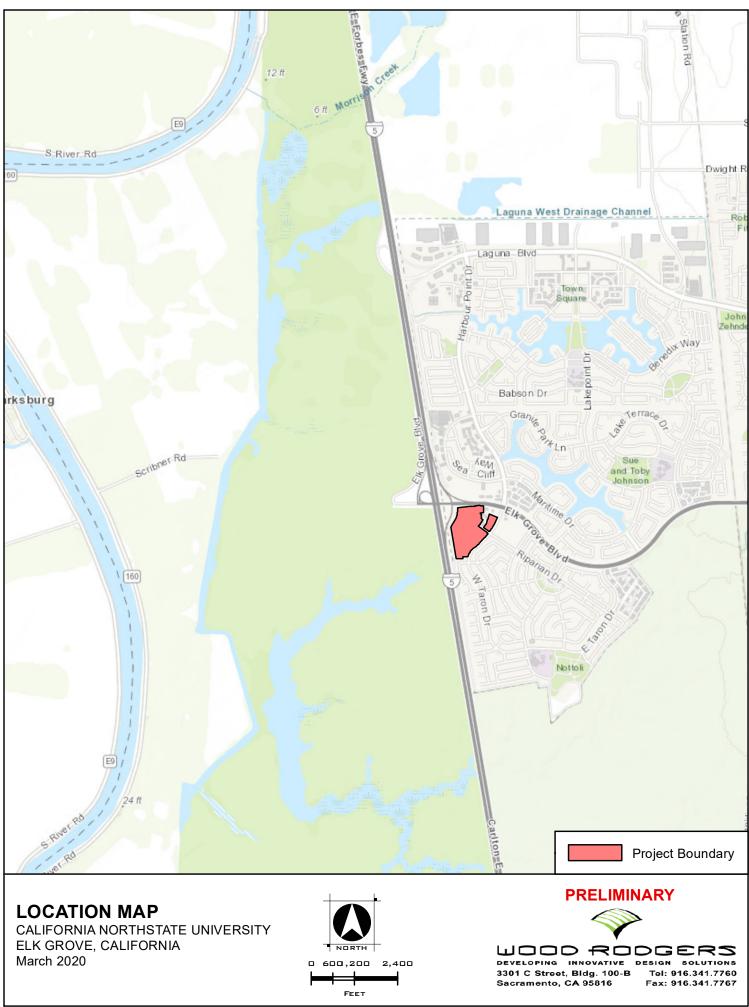
SUBJECT: POST-PROJECT HYDROLOGIC PARAMETERS

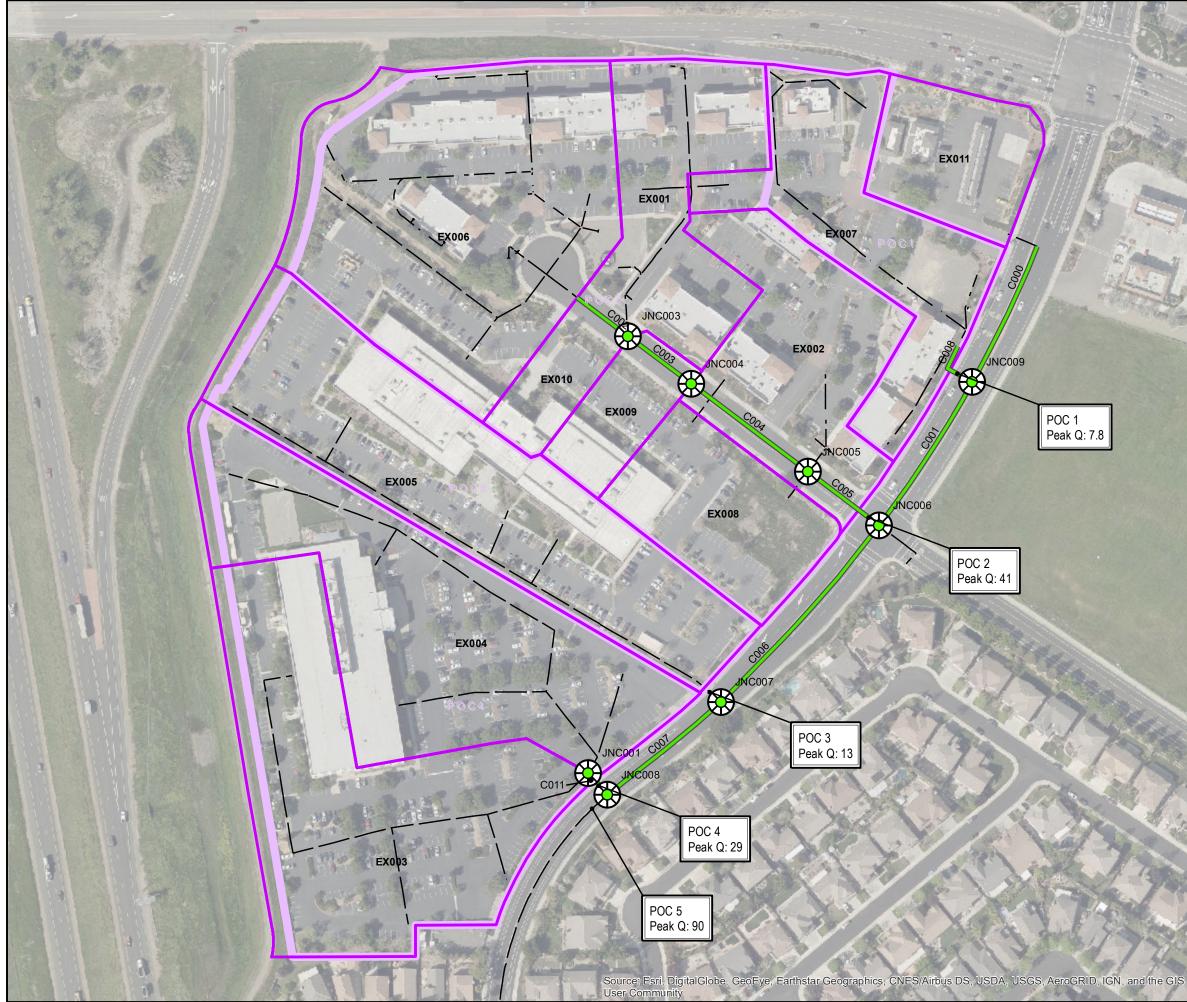
METHOD: SACRAMENTO

Watershed Name	Node	Watershed Area	Mean Elevation	Impervious	Lag Method	Overland Flow Land Use	Pipe Length	Pipe Diameter	Pipe Slope	Manning's "n"
		(ac)	(in)	%	(ft)	(ft)	(ft)	(ft)	(ft/ft)	
PR001	PR001	2.85	17	80.86	Travel Time	Commercial	327.00	1.50	0.0030	0.0150
PR002	PR002	2.07	17	51.30	Travel Time	Commercial	252.50	1.00	0.0030	0.0150
PR003	PR003	0.71	17	30.90	Travel Time	Commercial	76.00	1.00	0.0030	0.0150
PR004	PR004	3.55	17	77.20	Travel Time	Commercial	270.00	1.50	0.0030	0.0150
PR005	PR005	1.28	17	69.30	Travel Time	Commercial	500.00	3.00	0.0030	0.0150
PR006	PR006	1.25	17	80.00	Travel Time	Commercial	-	-	-	-
PR007	PR007	1.89	17	42.90	Travel Time	Commercial	250.00	3.00	0.0030	0.0350
PR008	PR008	0.72	17	76.80	Travel Time	Commercial	95.00	1.00	0.0030	0.0150
PR009	PR009	0.74	17	76.70	Travel Time	Commercial	75.00	1.00	0.0030	0.0150
PR010	PR010	3.44	17	82.50	Travel Time	Commercial	205.00	1.00	0.0030	0.0150
PR011	PR011	7.24	17	83.40	Travel Time	Commercial	420.00	1.50	0.0030	0.0150
PR012	PR012	3.82	17	45.40	Travel Time	Commercial	180.00	3.00	0.0030	0.0150

Table 3

Prepared by: Wood Rodgers, Inc 1 of 1

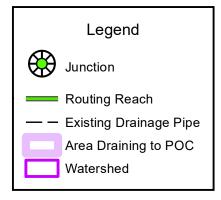


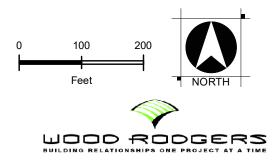


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EXISTING DRAINAGE CONDITIONS CALIFORNIA NORTHSTATE UNIVERSITY

ELK GROVE, CA MARCH 2020





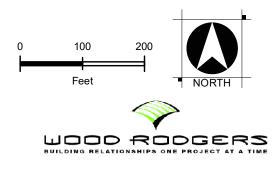


SOILS MAP

CALIFORNIA NORTHSTATE UNIVERSITY

ELK GROVE, CA MARCH 2020

Legend								
Site Boundary								
NRCS Soil Type HydroGroup								
A								
B								
B/D								
C								
C/D								
D								





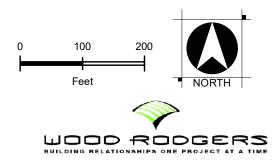
EXISTING TOPOGRAPHY

CALIFORNIA NORTHSTATE UNIVERSITY

ELK GROVE, CA MARCH 2020

Legend

— 1-ft Contour



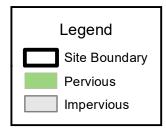


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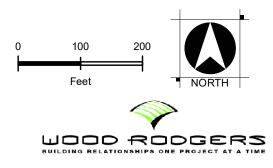
FIGURE 5

EXISTING SITE IMPERVIOUSNESS CALIFORNIA NORTHSTATE UNIVERSITY

ELK GROVE, CA MARCH 2020



Pervious Area: 6.11 Acres Impervious Area: 19.19 Acres Impervious Percentage: 75.8%



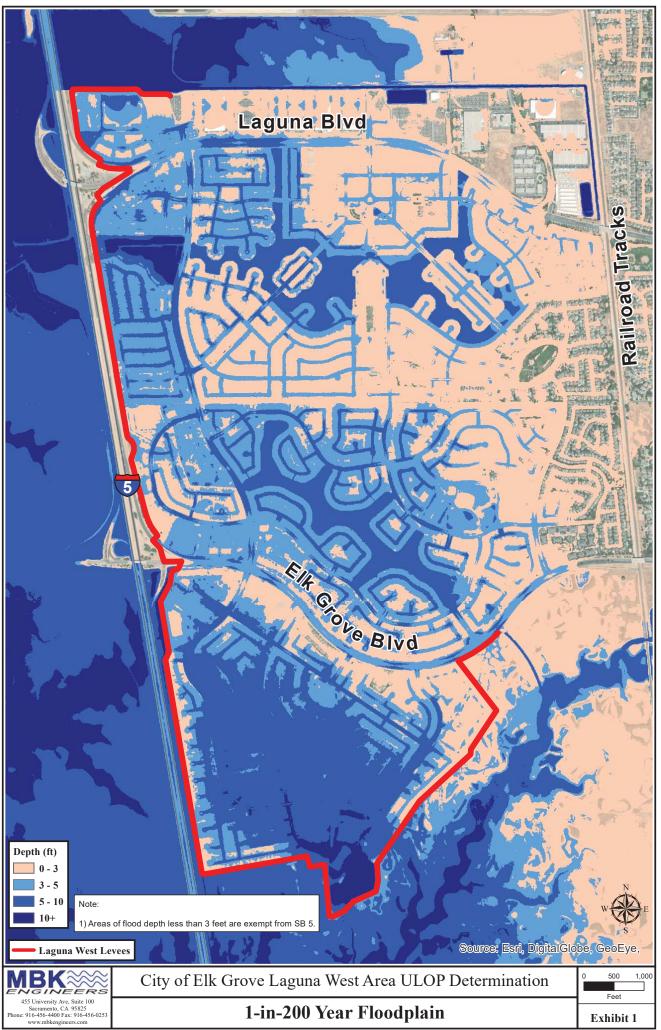


Figure 6

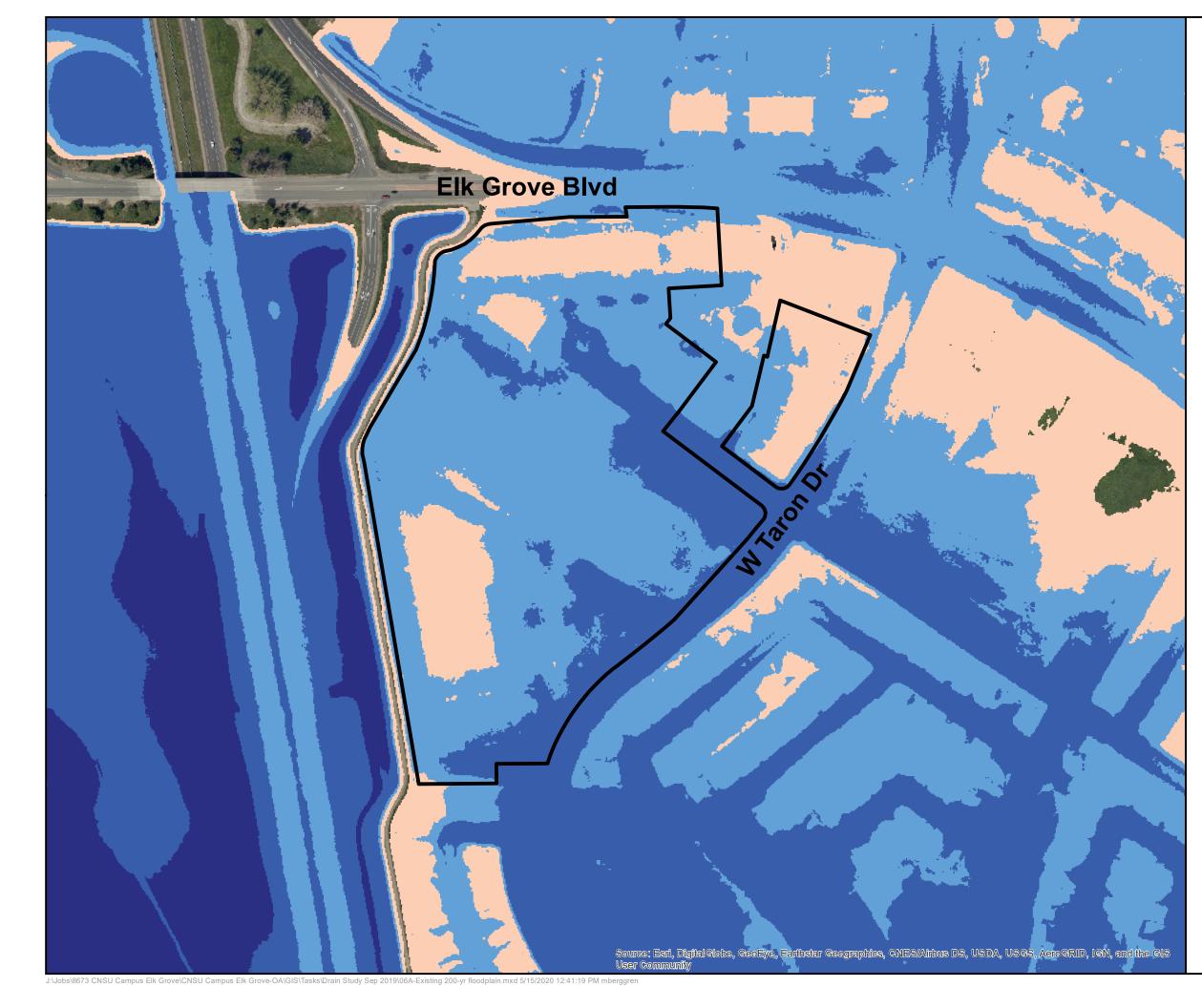
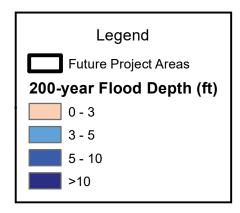
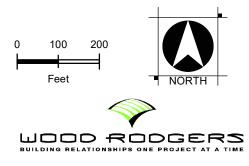


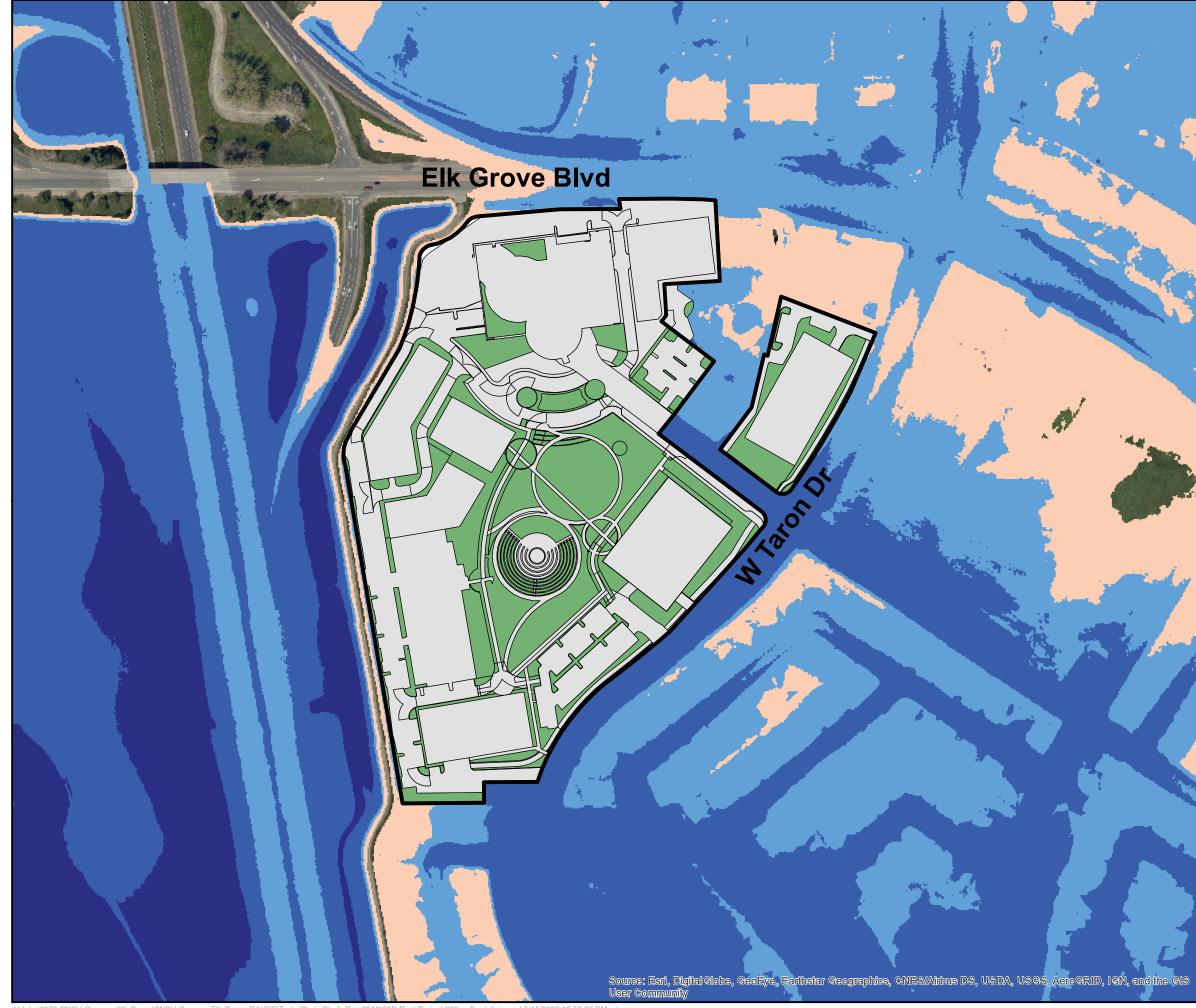
FIGURE 6A EXISTING 200-YEAR FLOODPLAIN DEPTH CALIFORNIA NORTHSTATE UNIVERSITY ELK GROVE, CA MAY 2020



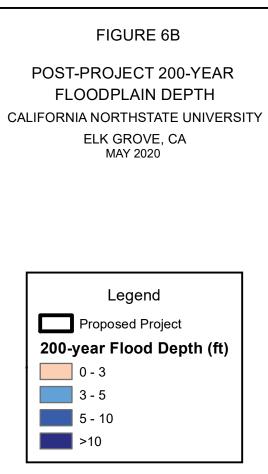
Notes:

 Existing building footprints not mapped
 Source: 200-year floodplain depths provided by MBK Engineers



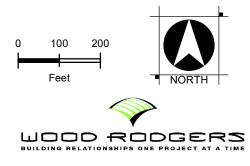


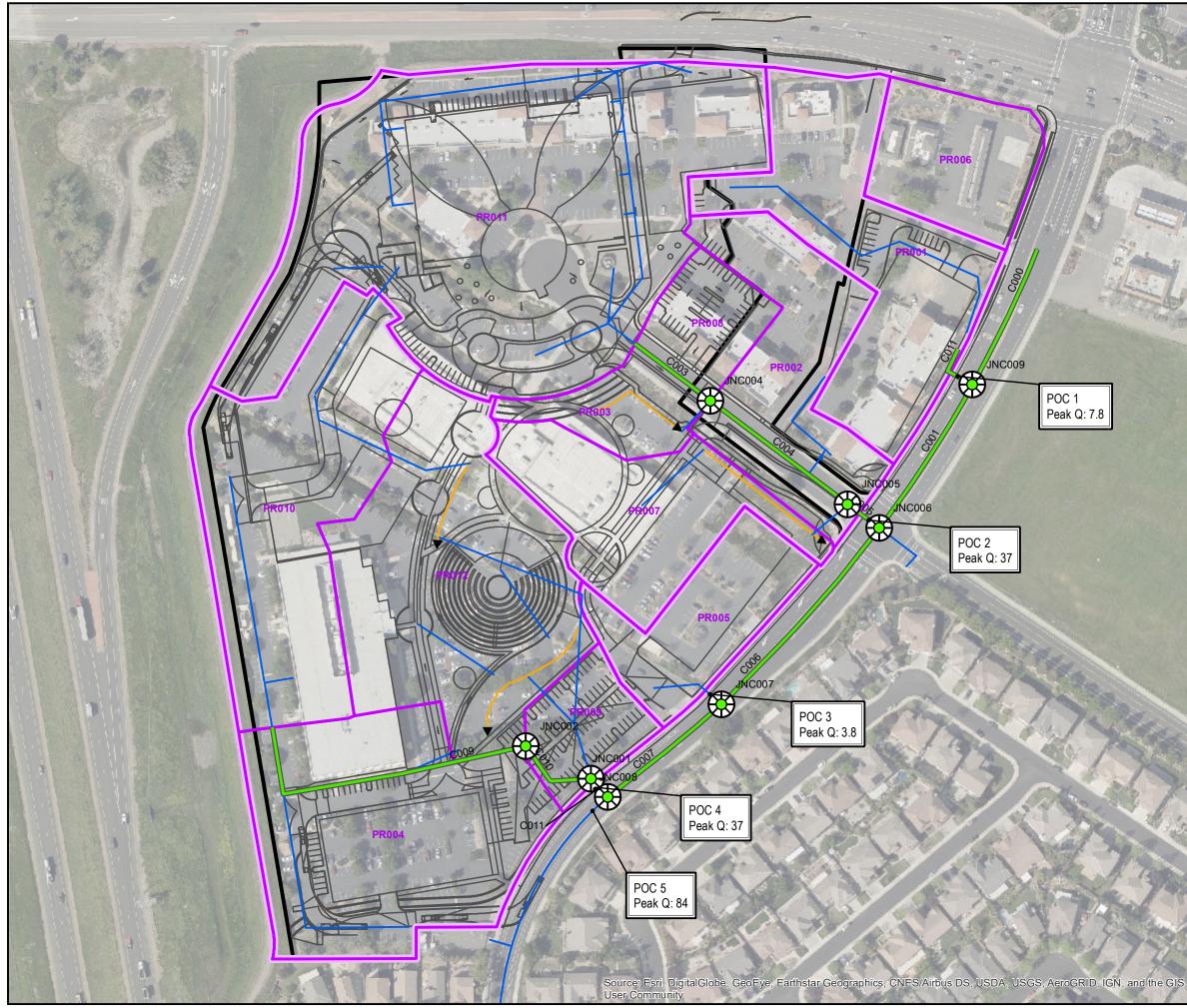
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Notes:

Proposed project was analyzed as fully removed from the 200-year floodplain with no impacts to flooding outside of the project boundary
 Source: 200-year floodplain depths provided by MBK Engineers





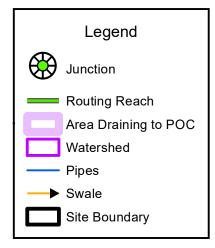
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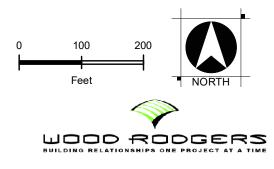
FIGURE 7

POST-PROJECT DRAINAGE CONDITIONS

CALIFORNIA NORTHSTATE UNIVERSITY

ELK GROVE, CA MARCH 2020



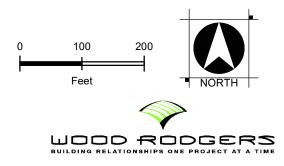




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FIGURE 8 POST-PROJECT SITE IMPERVIOUSNESS CALIFORNIA NORTHSTATE UNIVERSITY ELK GROVE, CA MAY 2020 Legend Pervious Impervious Site Boundary Pervious Area: 7.53 Acres

Impervious Area: 17.77 Acres Impervious Percentage: 70.2%





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STORM WATER QUALITY ULTIMATE CONDITIONS CALIFORNIA NORTHSTATE UNIVERSITY ELK GROVE, CA MAY 2020

Legend



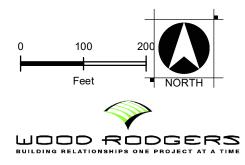
Mechanical Filtration Point

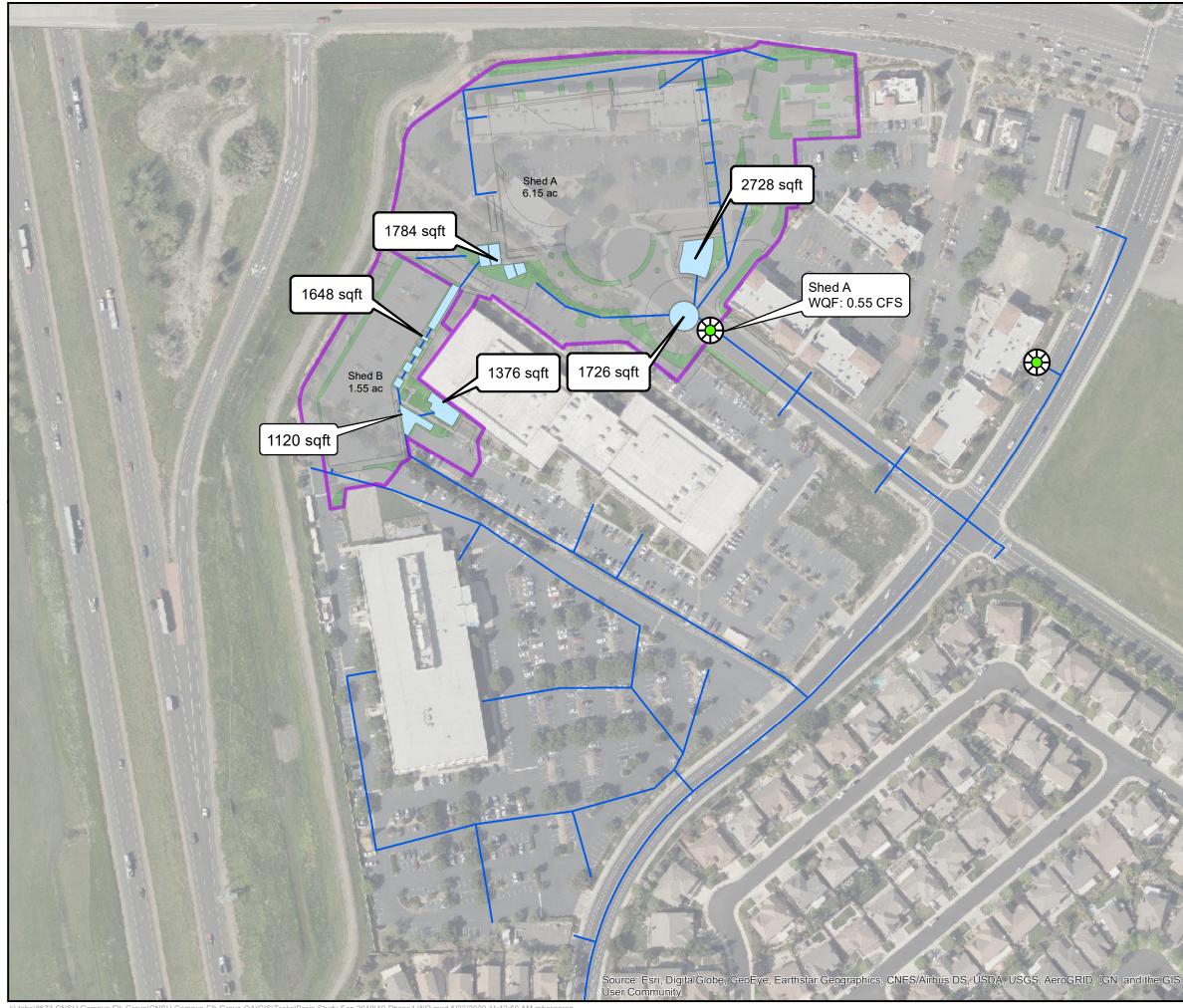
Bio Retention Area

Watershed

- Drainage Pipe

→ Drainage Swale



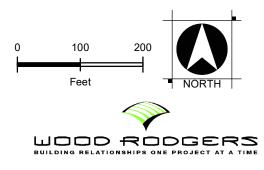


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FIGURE 10

STORM WATER QUALITY PHASE 1 CALIFORNIA NORTHSTATE UNIVERSITY ELK GROVE, CA MAY 2020

Legend									
\bigotimes	Mechanical Filtration Point								
	Water Quality Shed								
	Bioretention Area								
	Pervious Area								
	Impervious Area								
	Drainage Pipe								





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STORM WATER QUALITY **PHASE 2 CONDITIONS** CALIFORNIA NORTHSTATE UNIVERSITY ELK GROVE, CA MAY 2020

Legend



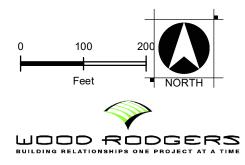
Mechanical Filtration Point

Bio Retention Area

Watershed

Drainage Pipe

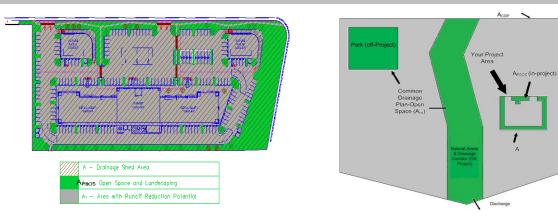
Drainage Swale



APPENDIX A

APPENDIX B

Name of Drainage Shed: Phase 1		Fill	in Blue Highlighted	boxes
Location of project: Sacramente				
Step 1 - Open Space and Pervious Area	Credits			
Is your project within the drainage area of a common drainag	e plan that includes open space? If not, skip			
1 a. Common Drainage Plan Area		9 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-proje	ct)	0 acres	A _{os}	see area example
a. Natural storage reservoirs and drainage corrido	rs	0 acres		below
b. Buffer zones for natural water bodies		0 acres		Delow
c. Natural areas including existing trees, other veg	etation, 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) Project-Specific Open Space (In-project, comm	unal**)	8.88 acres	A A _{PSOS}	
a. Natural storage reservoirs and drainage corrido	rs	0.00 acres		
b. Buffer zones for natural water bodies		0.00 acres		
c. Natural areas including existing trees, other veg	etation, and soil	0.00 acres		see area example
d. Landscape area/park		1.40 acres		below
e. Flood Control/Drainage basins		0.00 acres		
** Doesn't include impervious areas within individu	al lots and surrounding individual ur		ng Form D-1a in Step 2	2.
Area with Runoff Reduction Potential	A - A _{PSOS} =	7.48 acres	A _T	
Assumed Initial Impervious Fraction	A _T / A =	0.84	Ι	
Open Space & Pervious Area LID Credit (Step 1	l)			
(Δ	aa/Aaaa+Aaaaa/A)x100 -	16 pts		



Step 2 - Runoff Reduction Credits						
Runoff Reduction Treatments	Impervious Area Managed			icienc Factor	Effective Area Managed (A _C)	
Porous Pavement:						
Option 1: Porous Pavement	0	acres	х	=	0.000	acres
(see Fact Sheet, excludes porous pavement used in Option 2)						
Option 2: Disconnected Pavement use For (see Fact Sheet, excludes porous pavement used in Option 1)	orm D-2a for credits				0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0	acres		=	0.00	acres
Disconnected Roof Drains	0	acres		=	0.00	acres
(see Fact Sheet and/or Table D-2b for summary of requirements)						
Ecoroof	0	acres		=	0.00	acres
(see Fact Sheet) Interceptor Trees use Form D-2b for credits (see Fact Sheet)					0.02	acres
Total Effective Area Managed by Runoff Reduction Mea	isures			A _c	0.02	acres
Runoff Reduction Credit (Step 2)				(A _C / A _T)*100	= 0	pts

Table	D-2a

Table D-2b

Minimum roof size Minimum roof size Minimum roof size Minimum roof size Cobblestone Block Pavement 1 0.60 55,000 sq ft 21 ft Modular Block Pavement 1 0.60 55,000 sq ft 22 ft Status Concrete Status IIII Status Concentrate Pavement 1 1000 sq ft 22 ft Status IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		
Cobblestone Block Pavement 0.40 Status Concreted Apphalt 0.60 Wodular Block Pavement & 0.75 Reinforced Grass Pavement 1.00 Form D-21: Disconnected Pavement Worksheet Gee Fact Sheet for more information regarding Disconnected Pavement credit guidelines Pavement Draining to Porous Pavement 0.00 acres Box K1 3. Enter area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 4. Ratio of Areas (Box K1 5. Select multiplier using ratio from Box K3 and enter into Box K4 Mating Box D3 0.00 Ratio is > 15 and < 20		
Pervious Concrete/Asphalt 0.60 Meinforced Grass Pavement 0.75 1.00 \$1,00 Selection Block Pavement 0.75 1.00 \$1,00 Selection Block Pavement 0.75 Selection Block Pavement 0.75 Selection Block Pavement 0.00 Selection Infinition on Porous Pavement 0.00 Selection Infinition Selection Block K3 0.00 Selection Infinition Selection Block K3 0.00 Selection Infinition Selection Block K4 Block K4 Ratio Is > 1.5 and < 1.5		
Reinforced Grass Pavement 1.00 \$ 10,000 sq ft 32 ft Form D-2a: Disconnected Pavement Worksheet Electric Area Manager Pavement Draining to Porous Pavement 2. Enter area draining on Porous Pavement 0.00 acres Box K1 3. Enter area draining onto Porous Pavement 0.00 acres Box K1 4. Ratio of Areas (Box K1 / Devos Pavement) 0.00 Box K2 4. Ratio of Areas (Box K1 / Devos Pavement) 0.00 Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Box K4 Box K4 Ratio (Box D) Multiplier Multiplier Box K4 Ratio (Box D) 0.00 Box K4 Box K4 Ratio is > 1.5 and < 2.0		
Form D-2a: Disconnected Pavement Worksheet Effective Area Manager Base Fact Sheet for more information regarding Disconnected Pavement credit guidelines Determination regarding Disconnected Pavement credit guidelines Pavement Draining to Porous Pavement 0.000 acres Box K1 3. Enter area d Receiving Porous Pavement 0.000 acres Box K1 3. Enter area d Receiving Porous Pavement 0.000 acres Box K2 Calculate area entered in Step 2 under Porous Pavement) 4. Ratio of Areas (Box K1 / Box K2) Box K3 Select multiplier using ratio from Box K3 and enter into Box K4 Ratio is s 0.5 and <1.0		
Bee Fact Street for more information regarding Disconnected Pavement 0.000 acres Box K1 Pavement Draining to Porous Pavement 0.000 acres Box K1 3. Enter area of Receiving Porous Pavement 0.000 acres Box K2 4. Ratio of Areas (Box K1 / Box K2) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Box K3 7. Ratio is 5.0 5 1.00 0.03 Box K4 Ratio is 5.0 5 0.01 Box K4 Box K4 Ratio is 5.1 5 and < 1.0		
See Fact Street for more information regarding Disconnected Pavement credit guidelines Effective Area Manages Pavement Draining to 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) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Note that the source of the source source of the source of th		
Effective Area Managed 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 4. Ratio of Areas (Box K1 / Box K2) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Box K3 Box K3 6. Select multipler using ratio from Box K3 and enter into Box K4 Box K3 Box K4 Box K4 Ratio (Box D) Multiplier Box K3 Box K4 Box K4 Ratio Is 5 0.5 and < 1.0		
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) 0.00 acres Box K2 4. Ratio of Areas (Box K1 / Box K2) 0.00 Box K3 Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 0.03 Box K3 7. Select multiplier using ratio from Box K3 and enter into Box K4 0.05 Box K4 Ratio is > 0.5 of Ratio is > 1.5 and < 1.0		
3. Enter area of Recving Porous Pavement (excludes area entered in Step 2 under Porous Pavement) 0.00 acres Box K2 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 s 0.5 and < 1.0		
3. Enter area of Recving Porous Pavement (excludes area entered in Step 2 under Porous Pavement) 0.00 acres Box K2 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 s 0.5 and < 1.0		
(excludes area entered in Step 2 under Porous Pavement) Box K3 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 0.00 Box K3 7. Ratio is > 0.5 and < 1.0		
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 (80 D) Multiplier Ratio (s > 0.5 and < 1.0		
5. Select multiple ratio from Box K3 and enter into Box K4 Ratio (Box D) Multiplier Ratio (is > 0.5 and < 1.0		
Ratio (Box D) Multiplier Ratio is 5 0.5 and < 1.0		
Ratio is \$ 0.5 1.00 Ratio is \$ 0.6 and < 1.0		
Ratio is > 1.0 and < 1.5 Ratio is > 1.5 and < 2.0		
Ratio is > 1.5 and < 2.0		
Porous Pavement Type Efficiency Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 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 0.00 acres		
Porous Pavement Type Efficiency Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 Porous Gravel 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 0.00 acres		
Porous Pavement Type Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 Modular Block Pavement 0.75 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		
Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Modular Block 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 0.00		
Pervious Concrete 0.60 Asphalt Pavement 0.75 Modular Block Pavement 0.75 Porous Gravel 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 0.00		
Asphalt Pavement 0.75 Modular Block Pavement 0.75 Porous Gravel 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 0.00] acres		
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 0.00		
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 0.00 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2 0.00 acres 0.00		
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 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2 0.00 acres		
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 0.00 acres This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2		
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 0.00 acres This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2		
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.		
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. 50 trees Box L3		
4. Multiply Box L3 by 100 and enter result in Box L4 5000 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		
Total Interceptor Tree EAM Credits Add Boxes L2, L4, and L6 and enter it into Box L7 5000 sq. ft. Box L7		

	Step 3 - Runoff Management Credits					
	Capture and Use Credits Impervious Area Managed by Rain barrels, Cis	sterns, and automatically-emp	tied systems			
	(see Fact Sheet)		ons, for simple rain barrels	[0.00	acres
	Automated-Control Capture and Use System			_		
	(see Fact Sheet, then enter impervious area managed b	y the system)		[0.00	acres
	Bioretention/Infiltration Credits Impervious Area Managed by Bioretention BM	Ps Bioretention Area	10,382 sq ft			
	(see Fact Sheet)	Subdrain Elevation		r	3.55	
		Ponding Depth, inches	12 inches	L	3.00	acres
	Impervious Area Managed by Infiltration BMP	s				
	(see Fact Sheet)	Drawdown Time, hrs				
		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	<u> </u>	0.00	acres
	Basin or t	trench?	approximate BMP depth	.00 ft		
		- Madala Dada				
	Impervious Area Managed by Amended Soil o (see Fact Sheet)	r Mulch Beds Mulched Infiltration Area, sq ft	- mulch_area	Г	0.00	acres
		Walched Innitiation Area, sq ft	ndon_area	L	0.00	40103
	Total Effective Area Managed by Capture-and-Us	e/Bioretention/Infiltration BM	Ps	[3.55	A _{LIDc}
	Runoff Management Credit (Step 3)			$A_{LIDC}/A_{T}^{*}200 =$	95.0	pts
					00.0	pto
	Total LID Credits (Step 1+2+3)		neck for treatment sizi	ng in Step 4	111.1	
	Does project require hydromodification manage	ment? If yes, proceed to usin	g SacHM.			
	Adjusted Area for Flow-Based, Non-LID Treatme	nt	A _T - A _C -A _{LI}	oc = 3.90		A _{AT}
	Adjusted Impensious Fraction of A for Volume P	and Non LID Treatment	Δ/	A - 0.44		_] т.
	Adjusted Impervious Fraction of A for Volume-B	ased, Non-LID Treatment	A _{AT} /	A = 0.44		I IA
	· · ·					IA
	Adjusted Impervious Fraction of A for Volume-B Further treatment is required, see				ł	IA
Step 4	Further treatment is required, see	choose flow-based			ł] I _A
	Further treatment is required, see	choose flow-based	or volume-based siz		ļ] I _A
	Further treatment is required, see	choose flow-based	or volume-based siz		-] I _A
Calcula	Further treatment is required, see	choose flow-based	or volume-based siz		Table D-2c	Intensity
Calcula Look up	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity)	choose flow-based bd) Flow = Runoff Coefficient x R 0.18	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i :	Intensity = 0.20 in/hr
Calcula Look up	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs):	choose flow-based	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up	Further treatment is required, see a Treatment - Flow-Based (Rational Methodes) te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3	choose flow-based bd) Flow = Runoff Coefficient x R 0.18	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr
Calcula Look up Obtain	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 : 0.95	choose flow-based	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain	Further treatment is required, see a Treatment - Flow-Based (Rational Methodes) te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3	choose flow-based d) Flow = Runoff Coefficient x R 0.18 3.90 A _{AT}	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 : 0.95	choose flow-based	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 : 0.95	choose flow-based	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain Use C =	Further treatment is required, see a Treatment - Flow-Based (Rational Metho te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 : 0.95	choose flow-based od) Flow = Runoff Coefficient x R 0.18 3.90 AAT 0.95 0.67	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain Use C =	Further treatment is required, see a Treatment - Flow-Based (Rational Methor te treatment flow (cfs): • value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 • 0.95 Flow = 0.95 * i * A _{AT}	choose flow-based od) Flow = Runoff Coefficient x R 0.18 3.90 AAT 0.95 0.67	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr
Calcula Look up Obtain Use C = <u>Step 4</u> Calcula	Further treatment is required, see a Treatment - Flow-Based (Rational Methor te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 :0.95 Flow = 0.95 * i * A _{AT} b Treatment - Volume-Based (ASCE-WEF)	choose flow-based	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i : Sacramento i :	Intensity = 0.20 in/hr = 0.18 in/hr = 0.20 in/hr
Calcula Look up Obtain Use C = Step 4 Calcula Obtain	Further treatment is required, see a Treatment - Flow-Based (Rational Method te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 • 0.95 Flow = 0.95 * i * A _{AT} b Treatment - Volume-Based (ASCE-WEF) te water quality volume (Acre-Feet): A from Step 1 P ₀ : Maximized Detention Volume from figures E-1 to E	choose flow-based od) Flow = Runoff Coefficient x R 0.18 i 3.90 AAT 0.95 c 0.67 cfs WQV = Area x Maximized Det 8.88	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i Sacramento i Folsom i	Intensity = 0.20 in/hr = 0.18 in/hr = 0.20 in/hr
Calcula Look up Obtain Use C = <u>Step 4</u> Calcula Obtain 4 in App	Further treatment is required, see a Treatment - Flow-Based (Rational Method te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 to .95 Flow = 0.95 * i * A _{AT} b Treatment - Volume-Based (ASCE-WEF) te water quality volume (Acre-Feet): A from Step 1 P ₀ : Maximized Detention Volume from figures E-1 to Exercise of this manual using I _A from Step 2.	choose flow-based od) Flow = Runoff Coefficient x R 0.18 i 3.90 AAT 0.95 c 0.67 cfs WQV = Area x Maximized Det 8.88	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i Sacramento i Folsom i	Intensity = 0.20 in/hr = 0.18 in/hr = 0.20 in/hr
Calcula Look up Obtain Use C = <u>Step 4</u> Calcula Obtain 4 in App	Further treatment is required, see a Treatment - Flow-Based (Rational Method te treatment flow (cfs): value for i in Table D-2c (Rainfall Intensity) A _{AT} from Step 3 • 0.95 Flow = 0.95 * i * A _{AT} b Treatment - Volume-Based (ASCE-WEF) te water quality volume (Acre-Feet): A from Step 1 P ₀ : Maximized Detention Volume from figures E-1 to E	choose flow-based od) Flow = Runoff Coefficient x R 0.18 i 3.90 AAT 0.95 c 0.67 cfs WQV = Area x Maximized Det 8.88	or volume-based siz	ing in Step 4	Table D-2c Rainfall Roseville i Sacramento i Folsom i	Intensity = 0.20 in/hr = 0.18 in/hr = 0.20 in/hr

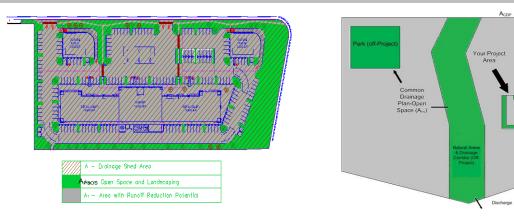
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Appendix D-2: Commercial Sites: Low Impact	Developmen	t (LID) Credits and Treatment B	MP Sizing Calculations	
Name of Drainage Shed: Phase 1 Shed A			Fill in Blue Highlighted boxe	S
Location of project: Sacramento				
Step 1 - Open Space and Pervious Area Credits				
Is your project within the drainage area of a common drainage plan that in	ncludes open spac	e? If not, skip to 1 b.		
1 a. Common Drainage Plan Area	loiddoo opoin opdo	9 acres	A _{CDP}	
·	L			
Common Drainage Plan Open Space (Off-project)		0 acres	A _{os}	see area example
a. Natural storage reservoirs and drainage corridors		0 acres		below
b. Buffer zones for natural water bodies		0 acres		DEIOW
c. Natural areas including existing trees, other vegetation, a	nd 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)	[7.30 acres	A A	
Project-Specific Open Space (In-project, communal**)		0.90 acres	Apsos	
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, a	nd soil	0.00 acres		see area example
d. Landscape area/park		0.90 acres		below
e. Flood Control/Drainage basins		0.00 acres		
** Doesn't include impervious areas within individual lots and	d surrounding i	individual units. That is accounted for b	pelow using Form D-1a in Step 2.	
Area with Runoff Reduction Potential	A - A _{PSOS} =	6.40 acres	A _T	
	L			
Assumed Initial Impervious Fraction	$A_T / A =$	0.88	I	
·	L			
Open Space & Pervious Area LID Credit (Step 1)	_			
(A _{OS} /A _{CDP} +A	PSOS/A x100 =	12 pts		

ACDP 1

A_{PSOS} (in-project)

1



Step 2 - Runoff Reduction Credits							
Runoff Reduction Treatments	Impervious Area Managed		Effic y Fa		Effective Area Managed (A _C)		
Porous Pavement:							
Option 1: Porous Pavement	0	acres	x	=	0.000	acres	
(see Fact Sheet, excludes porous pavement used in Option 2)							
Option 2: Disconnected Pavement used in Option 1) (see Fact Sheet, excludes porous pavement used in Option 1)	Form D-2a for credits			→	0.00	acres	
Landscaping used to Disconnect Pavement (see Fact Sheet)	0	acres		=	0.00	acres	
(see Fact Sheet and/or Table D-2b for summary of requirement	0	acres		=	0.00	acres	
Ecoroof (see Fact Sheet)	0	acres		=	0.00	acres	
Interceptor Trees use Form D-2b for credit (see Fact Sheet)	s			→	0.02	acres	
Total Effective Area Managed by Runoff Reduction Me	asures		A	c	0.02	acres	
Runoff Reduction Credit (Step 2)				(A _C / A _T)*100 =	= 0	pts	

Table	D-2a

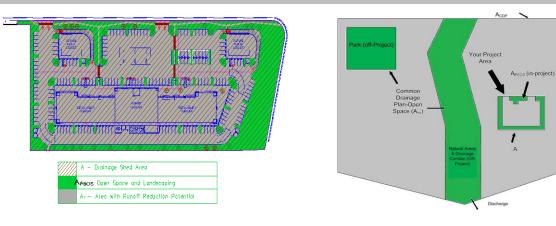
Table D-2b

Minimum roof size Minimum roof size Minimum roof size Minimum roof size Cobblestone Block Pavement 1 0.60 55,000 sq ft 21 ft Modular Block Pavement 1 0.60 55,000 sq ft 22 ft Status Concrete Status IIII Status Concentrate Pavement 1 1000 sq ft 22 ft Status IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		
Cobblestone Block Pavement 0.40 Status Concreted Apphalt 0.60 Wodular Block Pavement & 0.75 Reinforced Grass Pavement 1.00 Form D-21: Disconnected Pavement Worksheet Gee Fact Sheet for more information regarding Disconnected Pavement credit guidelines Pavement Draining to Porous Pavement 0.00 acres Box K1 3. Enter area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 0.00 acres Box K2 Vexture area draining onto Porous Pavement 4. Ratio of Areas (Box K1 5. Select multiplier using ratio from Box K3 and enter into Box K4 Mating Box D3 0.00 Ratio is > 15 and < 20		
Pervious Concrete/Asphalt 0.60 Meinforced Grass Pavement 0.75 1.00 \$1,00 Selection Block Pavement 0.75 1.00 \$1,00 Selection Block Pavement 0.75 Selection Block Pavement 0.75 Selection Block Pavement 0.00 Selection Infinition on Porous Pavement 0.00 Selection Infinition Selection Block K3 0.00 Selection Infinition Selection Block K3 0.00 Selection Infinition Selection Block K4 Block K4 Ratio Is > 1.5 and < 1.5		
Reinforced Grass Pavement 1.00 \$ 10,000 sq ft 32 ft Form D-2a: Disconnected Pavement Worksheet Electric Area Manager Pavement Draining to Porous Pavement 2. Enter area draining on Porous Pavement 0.00 acres Box K1 3. Enter area draining onto Porous Pavement 0.00 acres Box K1 4. Ratio of Areas (Box K1 / Devos Pavement) 0.00 Box K2 4. Ratio of Areas (Box K1 / Devos Pavement) 0.00 Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Box K4 Box K4 Ratio (Box D) Multiplier Multiplier Box K4 Ratio (Box D) 0.00 Box K4 Box K4 Ratio is > 1.5 and < 2.0		
Form D-2a: Disconnected Pavement Worksheet Effective Area Manager Base Fact Sheet for more information regarding Disconnected Pavement credit guidelines Determination regarding Disconnected Pavement credit guidelines Pavement Draining to Porous Pavement 0.000 acres Box K1 3. Enter area d Receiving Porous Pavement 0.000 acres Box K1 3. Enter area d Receiving Porous Pavement 0.000 acres Box K2 Calculate area entered in Step 2 under Porous Pavement) 4. Ratio of Areas (Box K1 / Box K2) Box K3 Select multiplier using ratio from Box K3 and enter into Box K4 Ratio is s 0.5 and <1.0		
Bee Fact Street for more information regarding Disconnected Pavement 0.000 acres Box K1 Pavement Draining to Porous Pavement 0.000 acres Box K1 3. Enter area of Receiving Porous Pavement 0.000 acres Box K2 4. Ratio of Areas (Box K1 / Box K2) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Box K3 7. Ratio is 5.0 5 1.00 0.03 Box K4 Ratio is 5.0 5 0.01 Box K4 Box K4 Ratio is 5.1 5 and < 1.0		
See Fact Street for more information regarding Disconnected Pavement credit guidelines Effective Area Manages Pavement Draining to 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) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Note that the source of the source source of the source of th		
Effective Area Managed 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 4. Ratio of Areas (Box K1 / Box K2) 0.00 acres Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 Multiplier Box K3 Box K3 6. Select multipler using ratio from Box K3 and enter into Box K4 Box K3 Box K4 Box K4 Ratio (Box D) Multiplier Box K3 Box K4 Box K4 Ratio Is 5 0.5 and < 1.0		
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) 0.00 acres Box K2 4. Ratio of Areas (Box K1 / Box K2) 0.00 Box K3 Box K3 5. Select multiplier using ratio from Box K3 and enter into Box K4 0.03 Box K3 7. Select multiplier using ratio from Box K3 and enter into Box K4 0.05 Box K4 Ratio is > 0.5 of Ratio is > 1.5 and < 1.0		
3. Enter area of Recving Porous Pavement (excludes area entered in Step 2 under Porous Pavement) 0.00 acres Box K2 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 s 0.5 and < 1.0		
3. Enter area of Recving Porous Pavement (excludes area entered in Step 2 under Porous Pavement) 0.00 acres Box K2 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 s 0.5 and < 1.0		
(excludes area entered in Step 2 under Porous Pavement) Box K3 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 0.00 Box K3 7. Ratio is > 0.5 and < 1.0		
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 (80 D) Multiplier Ratio (s > 0.5 and < 1.0		
5. Select multiple ruising ratio from Box K3 and enter into Box K4 Ratio (Box D) Multiplier Ratio (is > 0.5 and < 1.0		
Ratio (Box D) Multiplier Ratio is 5 0.5 and < 1.0		
Ratio is \$ 0.5 1.00 Ratio is \$ 0.6 and < 1.0		
Ratio is > 1.0 and < 1.5 Ratio is > 1.5 and < 2.0		
Ratio is > 1.5 and < 2.0		
Porous Pavement Type Efficiency Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 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 0.00 acres		
Porous Pavement Type Efficiency Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 Porous Gravel 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 0.00		
Porous Pavement Type Multiplier Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Asphalt Pavement 0.75 Modular Block Pavement 0.75 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		
Cobblestone Block Pavement 0.40 Pervious Concrete 0.60 Modular Block 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 0.00		
Pervious Concrete 0.60 Asphalt Pavement 0.75 Modular Block Pavement 0.75 Porous Gravel 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 0.00		
Asphalt Pavement 0.75 Modular Block Pavement 0.75 Porous Gravel 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 0.00] acres		
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 0.00		
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 0.00 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2 0.00 acres 0.00		
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 This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2 0.00 acres		
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 0.00 acres This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2		
9. Add Box K6 to Box K7 and multiply by 60%, and enter the Result in Box K8 0.00 acres This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2		
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.		
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. 50 trees Box L3		
4. Multiply Box L3 by 100 and enter result in Box L4 5000 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		
Total Interceptor Tree EAM Credits Add Boxes L2, L4, and L6 and enter it into Box L7 5000 sq. ft. Box L7		

Step 3 - Runoff Management Credits			
Capture and Use Credits Impervious Area Managed by Rain barrels, C	Sisterns, and automatically-emptied systems		_
(see Fact Sheet)	enter gallons, for simple rain barrels	0.0	0 acres
Automated-Control Capture and Use System (see Fact Sheet, then enter impervious area managed		0.0	0 acres
Bioretention/Infiltration Credits			_
Impervious Area Managed by Bioretention E (see Fact Sheet)	MPs Bioretention Area 6,238 sq ft Subdrain Elevation 6 inches		
(See Fact Sheet)	Ponding Depth, inches 12 inches	2.1	4 acres
Impervious Area Managed by Infiltration BM (see Fact Sheet)		rn_hrs_inf	
	Soil Infiltration Rate, in/hrsoil_inf_r	ate	
Sizing Option	1: Capture Volume, acre-ft 0.00 capture_	vol_inf 0.0	0 acres
Sizing Option	2: Infiltration BMP surface area, sq ft0 soil_surface	ace_area 0.0	0 acres
Basin o	r trench? approximate BMP d	epth 0.00 ft	
Impervious Area Managed by Amended Soil	or Mulch Beds		
(see Fact Sheet)	Mulched Infiltration Area, sq ft mulch_ar	ea 0.0	0 acres
Total Effective Area Managed by Capture-and-	Use/Bioretention/Infiltration BMPs	2.1	4 A _{LIDc}
Runoff Management Credit (Step 3)		$A_{LIDC}/A_{T}^{*}200 = 66$	7 pts
Total LID Credits (Step 1+2+3)	Warning: M	ore LID Is Required 79.	Δ
Does project require hydromodification manage			•
Adjusted Area for Flow-Based, Non-LID Treatm	ant A	AT - AC -ALIDC = 4.24	A _{AT}
Aujusted Area for Flow-based, Non-LID fream	ient r		-AI
Adjusted Impervious Fraction of A for Volume	Based, Non-LID Treatment	A _{AT} / A = 0.58	I _A
Further treatment is required, se	e choose flow-based or volume-bas	ed sizing in Step 4	
		. .	
Step 4a Treatment - Flow-Based (Rational Meth	nod)		
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	Table D-20	fall Intensity
		Roseville	i = 0.20 in/hr
Obtain A _{AT} from Step 3	4.24 A _{AT}	Sacramento Folsom	i = 0.18 in/hr i = 0.20 in/hr
Use C = 0.95	0.95 C	<u>r diodini</u>	. 0.20
Flow = 0.95 * i * A₄⊤	0.73 cfs		
Step 4b Treatment - Volume-Based (ASCE-WE	F)		
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized Detention Volume (P_0)		
Obtain A from Step 1	7.30 A	48 hrs Specified Dra	
Obtain Po: Maximized Detention Volume from figures E-1 to			aw Down time
	P0 E- 0.43 P0		aw Down time
4 in Appendix E of this manual using I _A from Step 2. Calculate treatment volume (acre-ft):	PE 0.43 Po		aw Down time

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Appendix D-2: Commercial Sites: Low Impact Develop	nent (LID) Credits and Treatment BMP Sizing Calculations	
Name of Drainage Shed: Phase 1 Shed B	Fill in Blue Highlighte	ed boxes
Location of project: Sacramento		
Step 1 - Open Space and Pervious Area Credits		
Is your project within the drainage area of a common drainage plan that includes oper	space? If not, skip to 1 b.	
1 a. Common Drainage Plan Area	9 acres A _{CDP}	
Common Drainage Plan Open Space (Off-project)	0 acres A _{os}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres	below
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)	2.10 acres A	
Project-Specific Open Space (In-project, communal**)	0.50 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
d. Landscape area/park	0.50 acres	below
e. Flood Control/Drainage basins	0.00 acres	
** Doesn't include impervious areas within individual lots and surround	ling individual units. That is accounted for below using Form D-1a in Ste	p 2.
Area with Runoff Reduction Potential A - A _{PSO}	s = 1.60 acres A _T	
Assumed Initial Impervious Fraction A _T / A	= 0.76 I	
Open Space & Pervious Area LID Credit (Step 1)		
(A _{OS} /A _{CDP} +A _{PSOS} /A)x10	00 = 24 pts	



Step 2 - Runoff Reduction Credits						
Runoff Reduction Treatments	Impervious Area Manaded		Effici y Fa		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 use Fo (see Fact Sheet, excludes porous pavement used in Option 1)	rm D-2a for credits			→	0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0	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 use Form D-2b for credits (see Fact Sheet)				→	0.02	acres
Total Effective Area Managed by Runoff Reduction Mea	sures		A	с	0.02	acres
Runoff Reduction Credit (Step 2)				(A _C / A _T)*100 =	1	pts

Table	D-2a

Porous Pavement Type	Efficiency Multiplier	Maximum roof size		m travel ance
Cobblestone Block Pavement	t 0.40	≤ 3,500 sq ft	2	21 ft
Pervious Concrete/Asphalt Modular Block Pavement &	0.60 0.75	≤ 5,000 sq ft ≤ 7,500 sq ft		24 ft 28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft		32 ft
Form D-2a: Disconnected Pavemer	nt Worksheet			
See Fact Sheet for more information regarding Dis	connected Pavement credit guidelines			Effective Area Managed
				Effective Area Managed
Pavement Draining to Porous Pavement				
Enter area draining onto Porous Paveme	nt	0.00	acres	Box K1
3. Enter area of Receiving Porous Pavemen		0.00	acres	Box K2
(excludes area entered in Step 2 under Porc	bus Pavement)	0.00		5 1/2
4. Ratio of Areas (Box K1 / Box K2)		0.00		Box K3
5. Select multiplier using ratio from Box K3 a	and enter into Box K4			
Ratio (Box D) Ratio is ≤ 0.5	Multiplier 1.00			
Ratio is > 0.5 and < 1.0	0.83			Box K4
Ratio is > 1.0 and < 1.5	0.71	1		
Ratio is > 1.5 and < 2.0	0.55			
Enter Efficiency of Porous Pavement (se	ee table below)			Box K5
D	Efficiency			
Porous Pavement Type Cobblestone Block Pavement	Multiplier 0.40			
Pervious Concrete				
Asphalt Pavement	0.60			
Modular Block Pavement	0.75			
Porous Gravel Pavement Reinforced Grass Pavement	1.00			
7. Multiply Box K2 by Box K5 and enter into		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	0%, and enter the Result in Box K8			0.00 acres
This is the amount of area credit to enter inter	to the "Disconnected Pavement" Box of Form D-2			
	l		_	
Form D-2b: Interceptor Tree Works	sheet	_	_	
See Fact Sheet for more information regarding Inte				
See Fact Sheet for more information regarding Inte	erceptor Tree credit guidelines		ne Box I 1	
See Fact Sheet for more information regarding Inte	erceptor Tree credit guidelines	0 tre	es Box L1	
Form D-2b: Interceptor Tree Works See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1.	0 tre		-
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1.			
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2	0 sq.	ft. Box L2	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees tha 2. Multiply Box L1 by 200 and enter result in	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2		ft. Box L2	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3.	0 sq.	ft. Box L2	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3.	0 sq.	ft. Box L2	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3.	0 sq.	ft. Box L2	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3.	0 sq.	ft. Box L2 es Box L3 ft. Box L4	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4	0 sq.	ft. Box L2 es Box L3 ft. Box L4	
See Fact Sheet for more information regarding Inter New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4	0 sq.	ft. Box L2 as Box L3 ft. Box L4 ft. Box L5	
See Fact Sheet for more information regarding Inter New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4	0 sq.	ft. Box L2 as Box L3 ft. Box L4 ft. Box L5	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can 6. Multiply Box L5 by 0.5 and enter the resu	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4	0 sq.	ft. Box L2 as Box L3 ft. Box L4 ft. Box L5	
See Fact Sheet for more information regarding Inter New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can 6. Multiply Box L5 by 0.5 and enter the result Total Interceptor Tree EAM Credits	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4 hopy that qualifies as Existing Tree canopy in Box L5.	0 sq. 10 sq. 5000 sq. 0 sq. 0 sq.	ft. Box L2 es Box L3 ft. Box L4 ft. Box L5 ft. Box L6	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can 6. Multiply Box L5 by 0.5 and enter the result Total Interceptor Tree EAM Credits	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4 hopy that qualifies as Existing Tree canopy in Box L5.	0 sq.	ft. Box L2 es Box L3 ft. Box L4 ft. Box L5 ft. Box L6	
See Fact Sheet for more information regarding Inte New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in New Deciduous Trees 3. Enter number of new deciduous trees that 4. Multiply Box L3 by 100 and enter result in Existing Tree Canopy 5. Enter square footage of existing tree can 6. Multiply Box L5 by 0.5 and enter the result Total Interceptor Tree EAM Credits Add Boxes L2, L4, and L6 and enter it into E	erceptor Tree credit guidelines at qualify as Interceptor Trees in Box L1. n Box L2 at qualify as Interceptor Trees in Box L3. n Box L4 hopy that qualifies as Existing Tree canopy in Box L5. ult in Box L6 Box L7 % to get effective area managed and enter result in Box L	o sq. tre 5000 sq. o sq. o sq. sq. sq.	ft. Box L2 es Box L3 ft. Box L4 ft. Box L5 ft. Box L6 ft. Box L7	

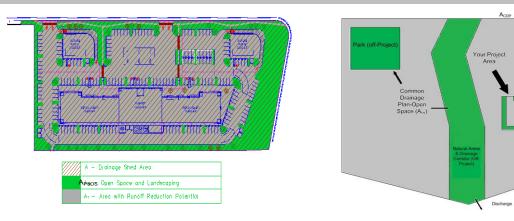
	Step 3 - Runoff Management Credits Capture and Use Credits		
	Impervious Area Managed by Rain barrels, Ci (see Fact Sheet)	sterns, and automatically-emptied systems - enter gallons, for simple rain barrels	0.00 acres
	Automated-Control Capture and Use System		
	(see Fact Sheet, then enter impervious area managed b	y the system)	0.00 acres
	Bioretention/Infiltration Credits Impervious Area Managed by Bioretention BM	IPs Bioretention Area 4,144 sq ft	
	(see Fact Sheet)	Subdrain Elevation 6 inches	4 42
		Ponding Depth, inches <u>12</u> inches	1.42 acres
	Impervious Area Managed by Infiltration BMP		
	(see Fact Sheet)	Drawdown Time, hrs drawdown_hrs_ii Soil Infiltration Rate, in/hr soil_inf_rate	nr
	Sizing Option 1	: Capture Volume, acre-ft 0.00 capture_vol_inf	0.00 acres
	Sizing Option 2	: Infiltration BMP surface area, sq ft0 soil_surface_are	a 0.00 acres
	Basin or	trench? approximate BMP depth	0.00]ft
	Impervious Area Managed by Amended Soil o	or Mulch Beds	
	(see Fact Sheet)	Mulched Infiltration Area, sq ft mulch_area	0.00 acres
	Tatal Effective Area Menered by Contine and U		1.42 A _{LDc}
	Total Effective Area Managed by Capture-and-U	se/Bioretention/Inflitration BMPS	1.42 A _{LDc}
	Runoff Management Credit (Step 3)		$A_{LDC}/A_{T}^{*}200 = 177.4$ pts
	Total LID Credits (Step 1+2+3)	LID compliant, check for treatment s	izing in Step 4 202.6
	Does project require hydromodification manage	ment? If yes, proceed to using SacHM.	
	Adjusted Area for Flow-Based, Non-LID Treatme	nt A _T - A _C	-A _{LIDC} = 0.16 A _{AT}
	Adjusted Impervious Fraction of A for Volume-E	Based, Non-LID Treatment A	AT / A = 0.08 IA
	Further treatment is required, see	choose flow-based or volume-based s	sizing in Step 4
Step 4	a Treatment - Flow-Based (Rational Metho	od)	
	e treatment flow (cfs):	Flow = Runoff Coefficient x Rainfall Intensity x Area	
			Table D-2c
Lоок ир	value for i in Table D-2c (Rainfall Intensity)	0.18 i	Rainfall IntensityRosevillei =0.20 in/hr
Obtain A	AAT from Step 3	0.16 A _{AT}	Sacramento i = 0.18 in/hr Folsom i = 0.20 in/hr
Use C =	0.95	0.95 C	
	Flow = 0.95 * i * A _{AT}	0.03 cfs	
Step 4	b Treatment - Volume-Based (ASCE-WEF)		
Calculat	e water quality volume (Acre-Feet):	WQV = Area x Maximized Detention Volume (P_0)	
Obtain A	from Stop 1	2.10 A	48 hrs Specified Draw Down time
	P ₀ : Maximized Detention Volume from figures E-1 to I	=P ₀	
4 in App		E P ₀	

Name of Drainage Shed: Area A		Fill	in Blue Highlighted	boxes
Location of project: Sacramento				
Step 1 - Open Space and Pervious Area	Credits			
Is your project within the drainage area of a common drainag	e plan that includes open space? If not, skip			
1 a. Common Drainage Plan Area		25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-proje	ct)	0 acres	A _{os}	see area example
a. Natural storage reservoirs and drainage corrido	rs	0 acres		below
b. Buffer zones for natural water bodies		0 acres		Delow
c. Natural areas including existing trees, other veg	etation, 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) Project-Specific Open Space (In-project, comm	unal**)	6.85 acres	A A _{PSOS}	
a. Natural storage reservoirs and drainage corrido	rs	0.00 acres		
b. Buffer zones for natural water bodies		0.00 acres		
c. Natural areas including existing trees, other veg	etation, and soil	0.00 acres		see area example
d. Landscape area/park		0.75 acres		below
e. Flood Control/Drainage basins		0.00 acres		
** Doesn't include impervious areas within individu	al lots and surrounding individual un	its. That is accounted for below usin	ng Form D-1a in Step 2	2.
Area with Runoff Reduction Potential	A - A _{PSOS} =	6.10 acres	A _T	
Assumed Initial Impervious Fraction	A _T / A =	0.89	I	
Open Space & Pervious Area LID Credit (Step 1)			
(Δ	aa/Aaaa+Aaaaa/A)x100 -	11 ptc		

ACDP 1

1

sos (in-project) Δ.,



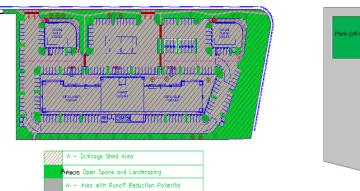
Step 2 - Runoff Reduction Credits							
Runoff Reduction Treatments	Impervious Area Manaced		Efficienc y Factor		Effective Area Managed (A _C)		
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x	=	0.000	acres	
Option 2: Disconnected Pavement use For (see Fact Sheet, excludes porous pavement used in Option 1)	orm 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 use Form D-2b for credits (see Fact Sheet)					0.00	acres	
Total Effective Area Managed by Runoff Reduction Mea	asures		A _C		0.00	acres	
Runoff Reduction Credit (Step 2)			(A _C /	A _T)*100 =	0	pts	

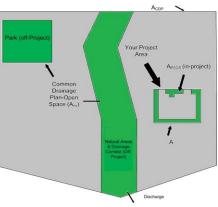
Table	D-2a
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			Table	5-2.5	
Porous Pavement Type Cobblestone Block Pavement Pervious Concrete/Asphalt Modular Block Pavement & Reinforced Grass Pavement	Efficiency Multiplier 0.40 0.60 0.75 1.00	Maximum roof ≤ 3,500 sq ft ≤ 5,000 sq ft ≤ 7,500 sq ft ≤ 10,000 sq ft		2	
Form D-2a: Disconnected Pavemen See Fact Sheet for more information regarding Disc					Effective Area Managed (A
Pavement Draining to Porous Pavement 2. Enter area draining onto Porous Pavemen		0.00		acres	Box K1
 Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porou 4. Ratio of Areas (Box K1 / Box K2) 		0.00		acres	Box K2 Box K3
5. Select multiplier using ratio from Box K3 at Ratio (Box D) Ratio is ≤ 0.5 Ratio is > 0.5 and < 1.0 Ratio is > 1.0 and < 1.5 Ratio is > 1.5 and < 2.0	nd enter into Box K4 <u>Multiplier</u> 1.00 0.83 0.71 0.55	1			Box K4
6. Enter Efficiency of Porous Pavement (see Porous Pavement Type Cobblestone Block Pavement Pervious Concrete Asphalt Pavement Modular Block Pavement Porous Gravel Pavement	Efficiency Multiplier 0.40 0.60 0.75				Box K5
Reinforced Grass Pavement 7. Multiply Box K2 by Box K5 and enter into 8. Multiply Boxes K1,K4, and K5 and enter it 9. Add Box K6 to Box K7 and multiply by 60° This is the amount of area credit to enter into	ne result in Box K7	0.00		acres acres	Box K6 Box K7 0.00 acres
Form D-2b: Interceptor Tree Works See Fact Sheet for more information regarding Inter			ī		
New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in		0	trees sq. ft.	Box L1 Box L2	
New Deciduous Trees 3. Enter number of new deciduous trees tha 4. Multiply Box L3 by 100 and enter result in		0	trees sq. ft.	Box L3 Box L4	
Existing Tree Canopy					
5. Enter square footage of existing tree canc	py that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5	
6. Multiply Box L5 by 0.5 and enter the resul	t in Box L6	0	sq. ft.	Box L6	
6. Multiply Box L5 by 0.5 and enter the resul Total Interceptor Tree EAM Credits	t in Box L6	0	sq. ft.	Box L6	

Step 3 - Runoff Managem Capture and Use Credits	ent Credits					
Capture and use credits						
Impervious Area Managed I	by Rain barrels, Cisterns	, and automatically-emp	tied systems			
(see Fact Sheet)		- enter gallo	ons, for simple rain barrels		0.00	acres
Automated-Control Capture	e and Use System					
(see Fact Sheet, then enter imp	pervious area managed by the sy	/stem)			0.00	acres
Bioretention/Infiltration C						
Impervious Area Managed I (see Fact Sheet)	by Bioretention BMPs	Bioretention Area Subdrain Elevation				
		Ponding Depth, inches			3.15	acres
Impervious Area Managed I (see Fact Sheet)	by Infiltration BMPs	Drawdown Time, hrs	drawdown_hrs_inf			
		Soil Infiltration Rate, in/hr				
	Sizing Option 1:	Capture Volume, acre-ft	0.00 capture_vol_inf		0.00	acres
	Olding Option 1.					40103
	Sizing Option 2: Infilt	tration BMP surface area, sq ft	0 soil_surface_area		0.00	acres
	Basin or trench	?	approximate BMP depth	0.00 ft		
Impervious Area Managed I	by Amended Soil or Mule	ch Beds				
(see Fact Sheet)		Mulched Infiltration Area, sq ft	mulch_area		0.00	acres
Total Effective Area Managed	by Capture-and-Use/Bio	retention/Infiltration BM	Ps		3.15	A _{LIDc}
Runoff Management Credit (S	Step 3)			$A_{LIDC}/A_{T}^{*}200 =$	103.3	pts
					100.0	pta
Total LID Credits (Sto			neck for treatment siz	ting in Step 4	114.2	
Does project require hydromo	odification management?	? If yes, proceed to usin	g SacHM.			
Adjusted Area for Flow-Based	Non-LID Treatment		AT - AC -A	unc = 2.95		AAT
Adjusted Area for Flow-Based	d, Non-LID Treatment		A _T - A _C -A			A _{AT}
Adjusted Area for Flow-Based Adjusted Impervious Fraction		Non-LID Treatment		LIDC = 2.95 / A = 0.43		A _{AT}
Adjusted Impervious Fraction	of A for Volume-Based,		A _{AT}	/ A = 0.43	1	-
	of A for Volume-Based,		A _{AT}	/ A = 0.43	4	-
Adjusted Impervious Fraction	n of A for Volume-Based, required, see cho		A _{AT}	/ A = 0.43	4	-
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based	n of A for Volume-Based, required, see cho I (Rational Method)	oose flow-based	A _{at} or volume-based siz	/ A = 0.43	4	-
Adjusted Impervious Fraction	n of A for Volume-Based, required, see cho I (Rational Method)		A _{at} or volume-based siz	/ A = 0.43		-
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based	n of A for Volume-Based, required, see cho I (Rational Method) Flov	oose flow-based	A _{at} or volume-based siz	/ A = 0.43	Table D-2c	-
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): bok up value for i in Table D-2c (Rainfal	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i =	Intensity 0.20 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs):	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity 0.20 in/hr 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): bok up value for i in Table D-2c (Rainfal	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i =	Intensity = 0.20 in/hr = 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): wok up value for i in Table D-2c (Rainfal btain A _{AT} from Step 3 se C = 0.95	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R 0.18 i 2.95 Aat 0.95 C	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity 0.20 in/hr 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): took up value for i in Table D-2c (Rainfal botain A _{AT} from Step 3	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT}	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity 0.20 in/hr 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): wok up value for i in Table D-2c (Rainfal btain A _{AT} from Step 3 se C = 0.95	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R 0.18 i 2.95 Aat 0.95 C	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity = 0.20 in/hr = 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): wok up value for i in Table D-2c (Rainfal btain A _{AT} from Step 3 se C = 0.95	n of A for Volume-Based, required, see cho I (Rational Method) Flov	v = Runoff Coefficient x R 0.18 i 2.95 Aat 0.95 C	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity = 0.20 in/hr = 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): wok up value for i in Table D-2c (Rainfal btain A _{AT} from Step 3 se C = 0.95	n of A for Volume-Based, required, see choon (Rational Method) (Rational Method) (I Intensity)	v = Runoff Coefficient x R 0.18 i 2.95 Aat 0.95 C	A _{at} or volume-based siz	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity = 0.20 in/hr = 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): took up value for i in Table D-2c (Rainfal totain A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT}	a of A for Volume-Based, required, see cho (Rational Method) Flov II Intensity)	v = Runoff Coefficient x R 0.18 i 2.95 Aat 0.95 C	A _{AT}	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity = 0.20 in/hr = 0.18 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): tok up value for i in Table D-2c (Rainfal otain A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT} tep 4b Treatment - Volume-Base alculate water quality volume (Acre-Fee	a of A for Volume-Based, required, see cho (Rational Method) Flov II Intensity)	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT} 0.95 C 0.50 cfs	A _{AT} or volume-based siz	/A= 0.43	Table D-2c Rainfall Roseville i = Sacramento i = Folsom i =	Intensity = 0.20 in/hr = 0.20 in/hr = 0.20 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): whok up value for i in Table D-2c (Rainfal botain A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT} tep 4b Treatment - Volume-Base	a of A for Volume-Based, required, see cho (Rational Method) Flov II Intensity)	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT} 0.95 C 0.50 cfs	A _{AT}	/ A = 0.43	Table D-2c Rainfall Roseville i = Sacramento i =	Intensity = 0.20 in/hr = 0.20 in/hr = 0.20 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): tok up value for i in Table D-2c (Rainfal totain A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT} tep 4b Treatment - Volume-Base alculate water quality volume (Acre-Fee totain A from Step 1 totain P ₀ : Maximized Detention Volume 1	a of A for Volume-Based, required, see cho (Rational Method) I (Rational Method) I (Intensity) I Intensity) Seed (ASCE-WEF) at): WQ from figures E-1 to E-	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT} 0.95 C 0.50 cfs	A _{AT} or volume-based siz	/A= 0.43	Table D-2c Rainfall Roseville i = Sacramento i = Folsom i =	Intensity = 0.20 in/hr = 0.20 in/hr = 0.20 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): who up value for i in Table D-2c (Rainfal batin A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT} tep 4b Treatment - Volume-Base alculate water quality volume (Acre-Fee batin A from Step 1 batin P ₀ : Maximized Detention Volume 1 in Appendix E of this manual using I _A fr	a of A for Volume-Based, required, see cho (Rational Method) I (Rational Method) I (Intensity) I Intensity) Seed (ASCE-WEF) at): WQ from figures E-1 to E-	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT} 0.95 C 0.50 cfs V = Area x Maximized Det 6.85	A _{AT} or volume-based siz ainfall Intensity x Area ention Volume (P ₀) A	/A= 0.43	Table D-2c Rainfall Roseville i = Sacramento i = Folsom i =	Intensity = 0.20 in/hr = 0.20 in/hr = 0.20 in/hr
Adjusted Impervious Fraction Further treatment is tep 4a Treatment - Flow-Based alculate treatment flow (cfs): tok up value for i in Table D-2c (Rainfal totain A_{AT} from Step 3 se C = 0.95 Flow = 0.95 * i * A_{AT} tep 4b Treatment - Volume-Base alculate water quality volume (Acre-Fee totain A from Step 1 totain P ₀ : Maximized Detention Volume 1	a of A for Volume-Based, required, see cho (Rational Method) (Rational Method) (I (Rational Method) (I (Intensity) (I (Intensity)) (I (Intensi	v = Runoff Coefficient x R 0.18 i 2.95 A _{AT} 0.95 C 0.50 cfs V = Area x Maximized Det 6.85	A _{AT} or volume-based siz ainfall Intensity x Area ention Volume (P ₀) A	/A= 0.43	Table D-2c Rainfall Roseville i = Sacramento i = Folsom i =	Intensity = 0.20 in/hr = 0.20 in/hr = 0.20 in/hr

Name of Drainage Shed: Shed B		Fill	in Blue Highlighted	hoves
Location of project: Sacramento			in blue i lighlighteu	DUXES
Step 1 - Open Space and Pervious Area Credits	S			
Is your project within the drainage area of a common drainage plan that	t includes open space? If not, s			
1 a. Common Drainage Plan Area		25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-project)		0 acres	A _{os}	see area example
a. Natural storage reservoirs and drainage corridors		0 acres		below
b. Buffer zones for natural water bodies		0 acres		Delow
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)		11.01 acres	А	
Project-Specific Open Space (In-project, communal**)		3.75 acres	Apsos	
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
d. Landscape area/park		3.75 acres		below
e. Flood Control/Drainage basins		0.00 acres		
** Doesn't include impervious areas within individual lots a	nd surrounding individual	units. That is accounted for below usin	ng Form D-1a in Step 2	2.
Area with Runoff Reduction Potential	A - A _{PSOS} =	7.26 acres	A _T	
Assumed Initial Impervious Fraction	A _T / A =	0.66	Ι	
Open Space & Pervious Area LID Credit (Step 1)				





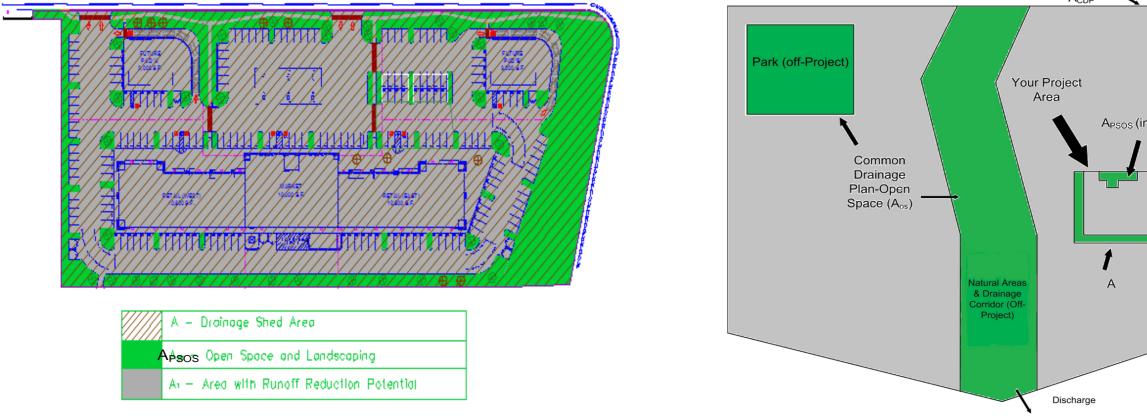
Step 2 - Runoff Reduction Credits							
Runoff Reduction Treatments	Impervious Area Manaɑed			Efficienc y Factor		Effective Area Managed (A _C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x		=	0.000	acres
Option 2: Disconnected Pavement use For (see Fact Sheet, excludes porous pavement used in Option 1)	orm D-2a for credits				I	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 use Form D-2b for credits (see Fact Sheet)	·				l	0.00	acres
Total Effective Area Managed by Runoff Reduction Mea	asures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C / /	A _T)*100 =	0	pts

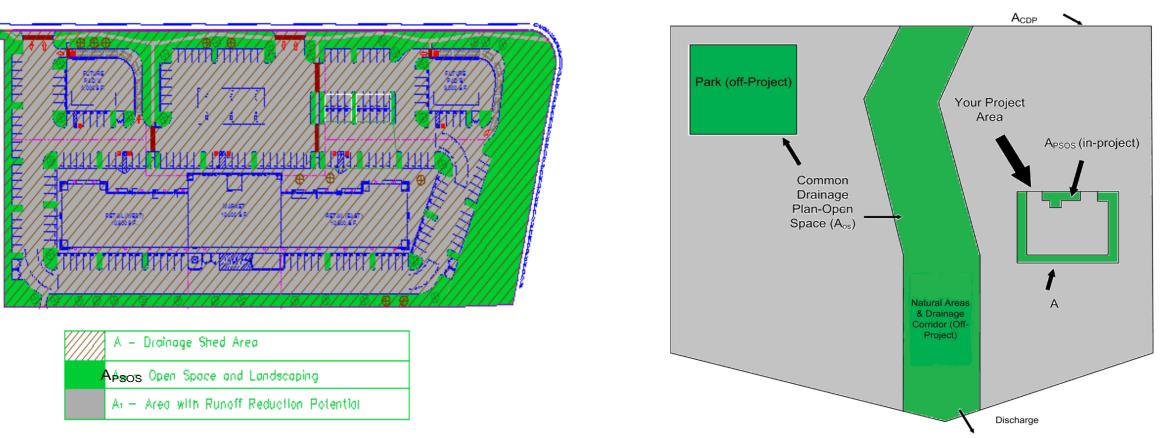
Table	D-2a
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			Table	5-2.5	
Porous Pavement Type Cobblestone Block Pavement Pervious Concrete/Asphalt Modular Block Pavement & Reinforced Grass Pavement	Efficiency Multiplier 0.40 0.60 0.75 1.00	Maximum roof ≤ 3,500 sq ft ≤ 5,000 sq ft ≤ 7,500 sq ft ≤ 10,000 sq ft		2	
Form D-2a: Disconnected Pavemen See Fact Sheet for more information regarding Disc					Effective Area Managed (A
Pavement Draining to Porous Pavement 2. Enter area draining onto Porous Pavemen		0.00		acres	Box K1
 Enter area of Receiving Porous Pavement (excludes area entered in Step 2 under Porou 4. Ratio of Areas (Box K1 / Box K2) 		0.00		acres	Box K2 Box K3
5. Select multiplier using ratio from Box K3 at Ratio (Box D) Ratio is ≤ 0.5 Ratio is > 0.5 and < 1.0 Ratio is > 1.0 and < 1.5 Ratio is > 1.5 and < 2.0	nd enter into Box K4 <u>Multiplier</u> 1.00 0.83 0.71 0.55	1			Box K4
6. Enter Efficiency of Porous Pavement (see Porous Pavement Type Cobblestone Block Pavement Pervious Concrete Asphalt Pavement Modular Block Pavement Porous Gravel Pavement	Efficiency Multiplier 0.40 0.60 0.75				Box K5
Reinforced Grass Pavement 7. Multiply Box K2 by Box K5 and enter into 8. Multiply Boxes K1,K4, and K5 and enter it 9. Add Box K6 to Box K7 and multiply by 60° This is the amount of area credit to enter into	ne result in Box K7	0.00		acres acres	Box K6 Box K7 0.00 acres
Form D-2b: Interceptor Tree Works See Fact Sheet for more information regarding Inter			ī		
New Evergreen Trees 1. Enter number of new evergreen trees that 2. Multiply Box L1 by 200 and enter result in		0	trees sq. ft.	Box L1 Box L2	
New Deciduous Trees 3. Enter number of new deciduous trees tha 4. Multiply Box L3 by 100 and enter result in		0	trees sq. ft.	Box L3 Box L4	
Existing Tree Canopy					
5. Enter square footage of existing tree canc	py that qualifies as Existing Tree canopy in Box L5.	0	sq. ft.	Box L5	
6. Multiply Box L5 by 0.5 and enter the resul	t in Box L6	0	sq. ft.	Box L6	
6. Multiply Box L5 by 0.5 and enter the resul Total Interceptor Tree EAM Credits	t in Box L6	0	sq. ft.	Box L6	

	Step 3 - Runoff Management Credits			
	Capture and Use Credits Impervious Area Managed by Rain barrels, Cir	sterns, 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 b	y the system)		0.00 acres
	Bioretention/Infiltration Credits			
	Impervious Area Managed by Bioretention BM (see Fact Sheet)	Ps Bioretention Area 15,750 sq ft Subdrain Elevation 6 inches		
		Ponding Depth, inches 12 inches		5.39 acres
	Incomision Anno Menomed by Jafiltantian DMD			
	Impervious Area Managed by Infiltration BMP (see Fact Sheet)	Drawdown Time, hrs drawdown		
		Soil Infiltration Rate, in/hrsoil_inf_rate	e	
	Sizing Option 1	Capture Volume, acre-ft 0.00 capture_vo	l_inf	0.00 acres
	Sizing Option 2	Infiltration BMP surface area, sq ft soil_surface	e_area	0.00 acres
	Basin or	rench? approximate BMP dep	0.00 ft	
	Impervious Area Managed by Amended Soil o	r Mulch Beds		
	(see Fact Sheet)	Mulched Infiltration Area, sq ft mulch_area		0.00 acres
	Total Effective Area Managed by Capture-and-Us	e/Bioretention/Infiltration BMPs		5.39 A _{LDc}
	Runoff Management Credit (Step 3)		$A_{LDC}/A_{T}^{*}200 =$	148.6 pts
	Total LID Credits (Step 1+2+3)	LID compliant, check for treatment	nt sizing in Step 1	182.6
	Does project require hydromodification manage			102.0
	Adjusted Area for Flow-Based, Non-LID Treatme	nt A _T	- Ac -ALIDC = 1.87	A _{AT}
			0.47	T
	Adjusted Impervious Fraction of A for Volume-B	ased, Non-LID Treatment	A _{AT} / A = 0.17	I _A
	Further treatment is required, see	choose flow-based or volume-base	ed sizing in Step 4	
Step 4	a Treatment - Flow-Based (Rational Metho	od)	_	
Calculat	e 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	L. L. L.	able D-2c Rainfall Intensity
Obtain /	AT from Step 3	1.87 A _{AT}		seville i = 0.20 in/hr cramento i = 0.18 in/hr
Obtain P	AT IOII Step 3	1.07 MAT		cramento i = 0.18 in/hr som i = 0.20 in/hr
Use C =	0.95	0.95 C		
	Flow = 0.95 * i * A _{AT}	0.32 cfs		
Cton 4	Tractment Valume Deced (ACCT MCC)			
	Treatment - Volume-Based (ASCE-WEF)			
	e water quality volume (Acre-Feet):	WQV = Area x Maximized Detention Volume (P_0)		
	from Step 1	A	48 hrs Sp	ecified Draw Down time
Obtain F				
4 in App	0: Maximized Detention Volume from figures E-1 to B endix E of this manual using I _A from Step 2.	0.16 Po		
	₀ : Maximized Detention Volume from figures E-1 to f endix E of this manual using I _A from Step 2. e treatment volume (acre-ft): Treatment volume = A x (P ₀ / 12)	0.16 Po		

Appendix D-2: Commercial Sites: Low Impact Developme	nt (LID) Credits and Treatment BMP Siz	ing Calculations	
Name of Drainage Shed: Shed C		Fill in Blue Highlighted boxes	
Location of project: Sacramento			
Step 1 - Open Space and Pervious Area Credits			
Is your project within the drainage area of a common drainage plan that includes oper	space? If not skip to 1 b		
1 a. Common Drainage Plan Area	25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-project)	0 acres	A _{OS}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres		below
b. Buffer zones for natural water bodies	0 acres		DCIOW
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)	0.51 acres	A	
Project-Specific Open Space (In-project, communal**)	0.42 acres	A _{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00 acres		
b. Buffer zones for natural water bodies	0.00 acres		ana araa ayamala
c. Natural areas including existing trees, other vegetation, and soil	0.00 acres		see area example
d. Landscape area/park	0.42 acres		below
e. Flood Control/Drainage basins	0.00 acres		
** Doesn't include impervious areas within individual lots and surroundin		ng Form D-1a in Step 2.	
Area with Runoff Reduction Potential A - A _{PS}	_{os} = 0.09 acres	A _T	
Assumed Initial Impervious Fraction A _T / A	= 0.18	Ι	
Open Space & Pervious Area LID Credit (Step 1)			
(A _{OS} /A _{CDP} +A _{PSOS} /A)x	00 = 82 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 used in Option 1	se 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 requirement	0_	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for cr (see Fact Sheet)	edits					0.00	acres
Total Effective Area Managed by Runoff Reduction M	easures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C /	A _T)*100 =	- 0	pts

Table D-2b

Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum travel distance
Cobblestone Block Pavement	0.40	≤ 3,500 sq ft	21 ft
Pervious Concrete/Asphalt	0.60	≤ 5,000 sq ft	24 ft
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement	Worksheet				
See Fact Sheet for more information regarding Disc	connected Pavement cre	edit 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			Box K4
Ratio is > 1.0 and < 1.5		0.71	1		
Ratio is > 1.5 and < 2.0		0.55			
6. Enter Efficiency of Porous Pavement (see t	able below)				Box K5
	Efficiency				
Porous Pavement Type	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 Bo			0.00	acres	Box K6
				0.0100	2 0
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	n Box K8			0.00 acres

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 Subdrain Elevation Ponding Depth, inches	sq ft inches inches	0.00	acres	
Impervious Area Managed by Infiltration BMPs (see Fact Sheet)	Drawdown Time, hrs Soil Infiltration Rate, in/hr	drawdown_hrs_inf 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 tre	ench?	approximate BMP depth 0.0	0 ft		
Impervious Area Managed by Amended Soil or Mu (see Fact Sheet)	Ich Beds Mulched Infiltration Area, sq ft	mulch_area	0.00	acres	
Total Effective Area Managed by Capture-and-Use/B	oretention/Infiltration BMPs		0.00	A _{LIDc}	
Runoff Management Credit (Step 3)			$A_{LIDC}/A_{T}^{*}200 = 0.0$	pts	

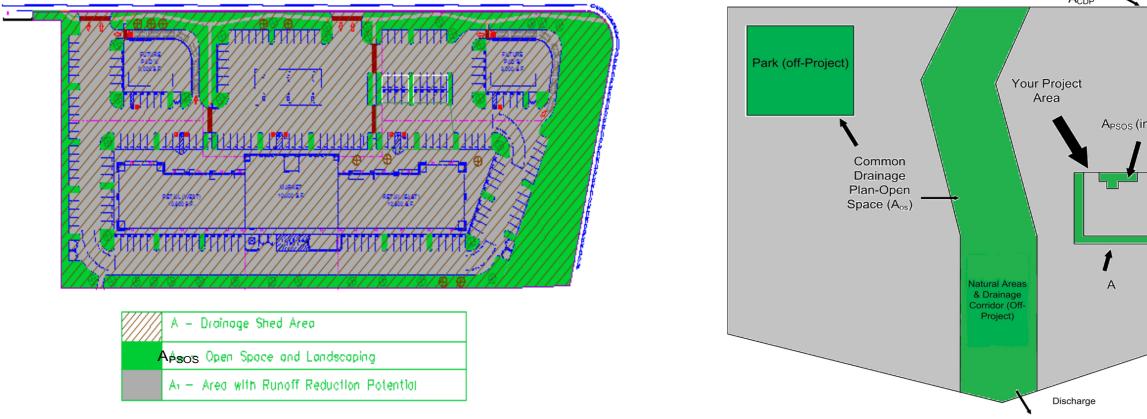
t	Further treatment is required, see choose flow-based or	· volume-based sizing i	n Step 4		
4	Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	A _{AT} / A =	0.18	I _A	
4	Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC} =$	0.09	A _{AT}	
	Does project require hydromodification management? If yes, proceed to using Sac	HM.			
	Total LID Credits (Step 1+2+3)	Warning: More LID Is Re	equired	82.2	

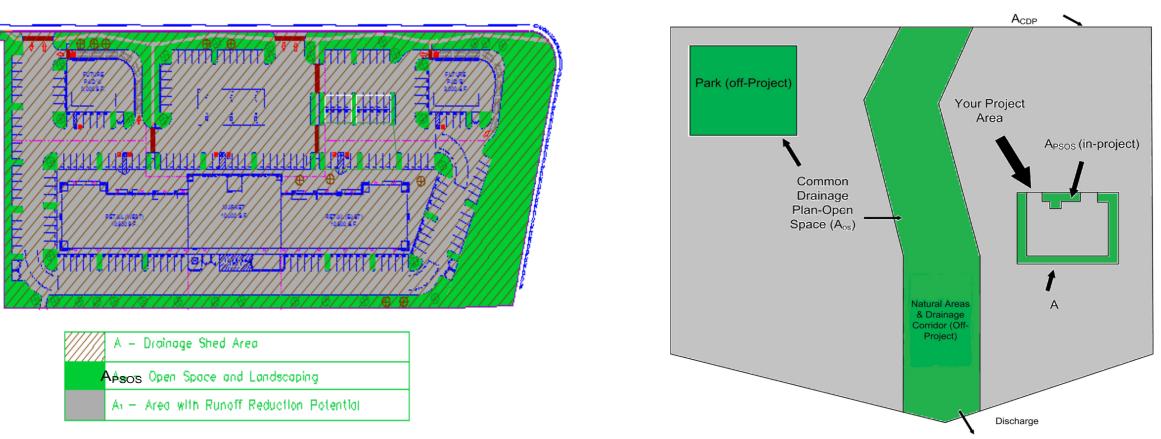
Step 4a Treatment - Flow-Based (Rational Method	()
Calculate treatment flow (cfs):	Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18 i	Rainfall Intensity	
		Roseville	i = 0.20 in/hr
Obtain A _{AT} from Step 3	0.09 A _{AT}	Sacramento	i = 0.18 in/hr
		Folsom	i = 0.20 in/hr
Use C = 0.95	0.95 C		
Flow = 0.95 * i * A _{AT}	0.0156 cfs		

Step 4b Treatment - Volume-Based (ASCE-WEF)					
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized Det	ention Volume (P ₀)			
Obtain A from Step 1	0.51	Α	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.	0.17	P ₀			
Calculate treatment volume (acre-ft): Treatment volume = A x (P ₀ / 12)	0.01	Acre-Feet			v06232012

Appendix D-2: Commercial Sites: Low Impact Develop	pment (LID) Credits and Treatment BMP Sizi	ing Calculations	
Name of Drainage Shed: Shed D		Fill in Blue Highlighted boxes	
Location of project: Sacramento			
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	25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-project)	0 acres	A _{OS}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres		below
b. Buffer zones for natural water bodies	0 acres		bolow
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)	1.90 acres	А	
Project-Specific Open Space (In-project, communal**)	1.09 acres	A _{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00 acres		
b. Buffer zones for natural water bodies	0.00 acres		soo aroa ayampia
c. Natural areas including existing trees, other vegetation, and soil	0.00 acres		see area example
d. Landscape area/park	1.09 acres		below
e. Flood Control/Drainage basins	0.00 acres		
** Doesn't include impervious areas within individual lots and surrou	nding individual units. That is accounted for below usir	ng Form D-1a in Step 2.	
Area with Runoff Reduction Potential A -	A _{PSOS} = 0.80 acres	A _T	
Assumed Initial Impervious Fraction A	A _T / A = 0.42	Ι	
Open Space & Pervious Area LID Credit (Step 1)			
(A _{OS} /A _{CDP} +A _{PSOS} /	/A)x100 = 58 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 used in Option 1	se 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 requirement	0_	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for cr (see Fact Sheet)	edits					0.00	acres
Total Effective Area Managed by Runoff Reduction M	easures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C /	A _T)*100 =	- 0	pts

Table D-2b

Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum travel distance
Cobblestone Block Pavement	0.40	≤ 3,500 sq ft	21 ft
Pervious Concrete/Asphalt	0.60	≤ 5,000 sq ft	24 ft
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement	Worksheet				
See Fact Sheet for more information regarding Disc	connected Pavement cre	edit 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			Box K4
Ratio is > 1.0 and < 1.5		0.71	1		
Ratio is > 1.5 and < 2.0		0.55			
6. Enter Efficiency of Porous Pavement (see t	able below)				Box K5
	Efficiency				
Porous Pavement Type	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 Bo			0.00	acres	Box K6
				0.0100	201110
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	n Box K8			0.00 acres

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, Cistern	s, and automatically-emptied sys	tems			
(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	Bioretention Area	sq ft			
(see Fact Sheet)	Subdrain Elevation	inches			
	Ponding Depth, inches	inches		0.00	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 tre	nch?	approximate BMP depth 0.	00 ft		
Impervious Area Managed by Amended Soil or Mul			_	0.00	
(see Fact Sheet)	Mulched Infiltration Area, sq ft	mulch_area		0.00	acres
			_		
Total Effective Area Managed by Capture-and-Use/Big	pretention/Infiltration BMPs			0.00	A _{LIDc}
Runoff Management Credit (Step 3)			$A_{LIDC}/A_{T}^{*}200 =$	0.0	pts

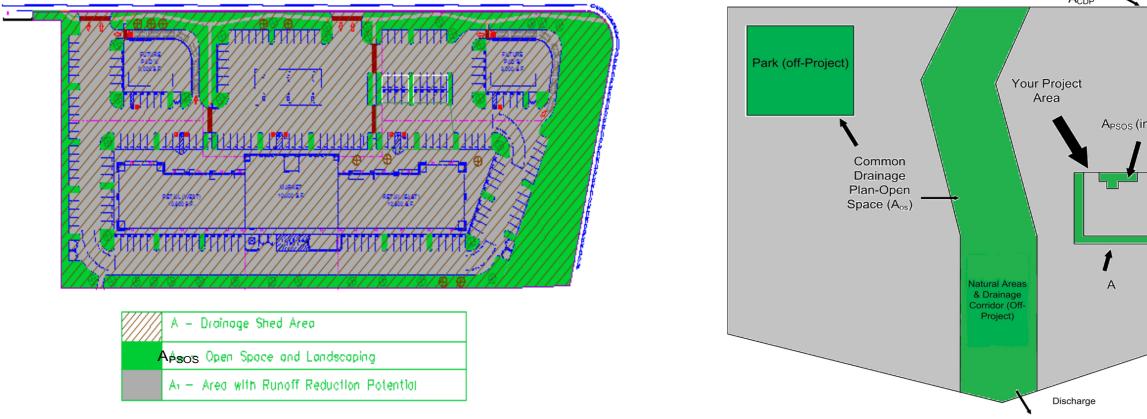
Total LID Credits (Step 1+2+3)	Warning: More LID Is I	Required 57	7.6			
Does project require hydromodification management? If y	ves, proceed to using SacHM.					
Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC} =$	0.80	A _{AT}			
Adjusted Impervious Fraction of A for Volume-Based, Non	-LID Treatment A _{AT} / A =	0.42	I _A			
Further treatment is required, see choose flow-based or volume-based sizing in Step 4						

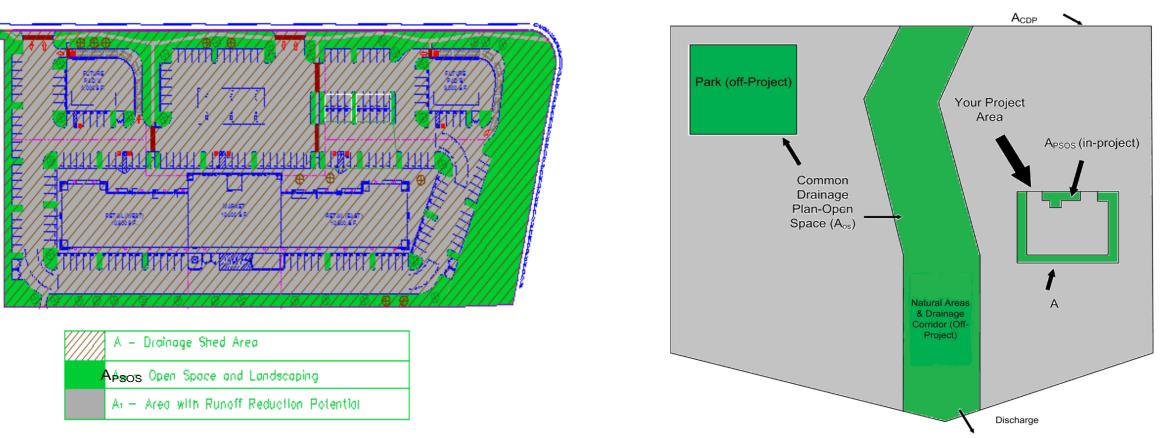
Step 4a Treatment - Flow-Based (Rational Method	
Calculate treatment flow (cfs):	Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18 i	Rainf	all Intensity
		Roseville	i = 0.20 in/hr
Obtain A _{AT} from Step 3	0.80 A _{AT}	Sacramento	i = 0.18 in/hr
		Folsom	i = 0.20 in/hr
Use C = 0.95	0.95 C		
Flow = 0.95 * i * A _{AT}	0.137 cfs		

Step 4b Treatment - Volume-Based (ASCE-WEF)					
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized Det	ention Volume (P ₀)			
Obtain A from Step 1	1.90	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.	0.31	P ₀			
Calculate treatment volume (acre-ft): Treatment volume = A x (P₀ / 12)	0.05	Acre-Feet			v06232012

Appendix D-2: Commercial Sites: Low Impact Developmen	t (LID) Credits and Treatment BMP Sizi	ng Calculations	
Name of Drainage Shed: Shed E		Fill in Blue Highlighted boxes	
Location of project: Sacramento		0 0	
Step 1 - Open Space and Pervious Area Credits			
Is your project within the drainage area of a common drainage plan that includes open s	bace? If not, skip to 1 b.		
1 a. Common Drainage Plan Area	25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-project)	0 acres	A _{OS}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres		below
b. Buffer zones for natural water bodies	0 acres		bolon
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)	1.28 acres	А	
	_		
Project-Specific Open Space (In-project, communal**)	0.50 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
d. Landscape area/park	0.50 acres		below
e. Flood Control/Drainage basins	0.00 acres		
** Doesn't include impervious areas within individual lots and surrounding i		g Form D-1a in Step 2.	
Area with Runoff Reduction Potential A - A _{PSOS}	= 0.78 acres	A _T	
Assumed Initial Impervious Fraction $A_T / A =$	0.61	I	
		-	
Open Space & Pervious Area LID Credit (Step 1)			
(A _{OS} /A _{CDP} +A _{PSOS} /A)x10	0 = 39 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 used in Option 1	se 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 requirement	0_	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for cr (see Fact Sheet)	edits					0.00	acres
Total Effective Area Managed by Runoff Reduction M	easures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C /	A _T)*100 =	- 0	pts

Table D-2b

Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum travel distance
Cobblestone Block Pavement	0.40	≤ 3,500 sq ft	21 ft
Pervious Concrete/Asphalt	0.60	≤ 5,000 sq ft	24 ft
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement	Worksheet				
See Fact Sheet for more information regarding Disc	connected Pavement cre	edit 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			Box K4
Ratio is > 1.0 and < 1.5		0.71	1		
Ratio is > 1.5 and < 2.0		0.55			
6. Enter Efficiency of Porous Pavement (see t	able below)				Box K5
	Efficiency				
Porous Pavement Type	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 Bo			0.00	acres	Box K6
				0.0100	2 0
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	n Box K8			0.00 acres

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	nd automatically-emptied sy	vstems		
(see Fact Sheet)	- enter gallons, f	or simple rain barrels	0.00	acres
Automated-Control Capture and Use System	v v	·		
(see Fact Sheet, then enter impervious area managed by the syste	em)		0.00	acres
	,			
Bioretention/Infiltration Credits				
Impervious Area Managed by Bioretention BMPs	Bioretention Area	sq ft		
(see Fact Sheet)	Subdrain Elevation	inches		
	Ponding Depth, inches	inches	0.00	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: Infi	tration BMP surface area, sq ft	0 soil_surface_area	0.00	acres
Basin or trench	?	approximate BMP depth 0.00 ft		
Immemiana Area Managad by Amandad Cail or Mulab I	De de			
Impervious Area Managed by Amended Soil or Mulch I			0.00	
(see Fact Sheet)	Mulched Infiltration Area, sq ft	mulch_area	0.00	acres
				٨
Total Effective Area Managed by Capture-and-Use/Bioret	ention/Infiltration BMPs		0.00	A _{LIDc}
Runoff Management Credit (Step 3)		A _{LIE}	$_{\rm DC}/A_{\rm T}^{*}200 = 0.0$	pts

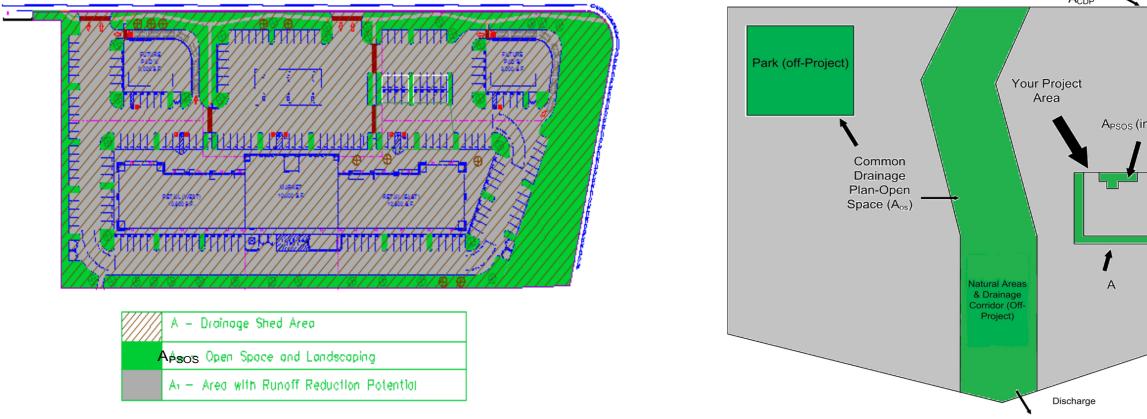
Total LID Credits (Step 1+2+3)	Warning: More LID Is F	Required 38	.9
Does project require hydromodification management? If yes, pr	oceed to using SacHM.		
Adjusted Area for Flow-Based, Non-LID Treatment	$A_{T} - A_{C} - A_{LIDC} =$	0.78	A _{AT}
		0.04	,
Adjusted Impervious Fraction of A for Volume-Based, Non-LID T	reatment $A_{AT} / A =$	0.61	I _A
Further treatment is required, see choose f	low-based or volume-based sizind	a in Step 4	

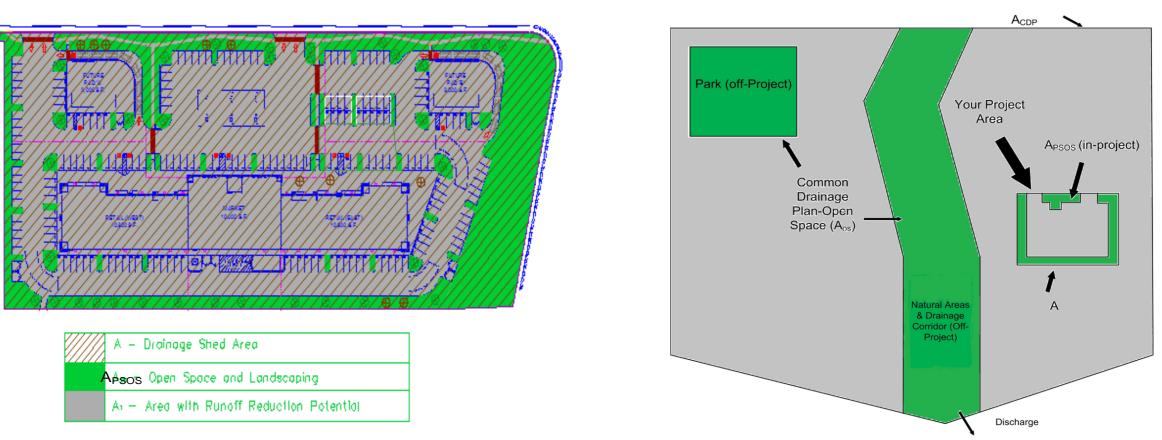
Step 4a Treatment - Flow-Based (Rational Method)	
Calculate treatment flow (cfs):	Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18 i	Rainfall Intensity
		Roseville i = 0.20 in/hr
Obtain A _{AT} from Step 3	0.78 A _{AT}	Sacramento i = 0.18 in/hr
		Folsom i = 0.20 in/hr
Use $C = 0.95$	0.95 C	
Flow = 0.95 * i * A _{AT}	0.134 cfs	
$FIOW = 0.33 \mathbf{I} \mathbf{A}_{AT}$	0.134 CIS	

Step 4b Treatment - Volume-Based (ASCE-WEF)					
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized De	etention Volume (P ₀)			
Obtain A from Step 1	1.28	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.	0.45	P ₀			
Calculate treatment volume (acre-ft): Treatment volume = A x (P ₀ / 12)	0.05	Acre-Feet		vC	06232012

Appendix D-2: Commercial Sites: Low Impact Develo	pment (LID) Credits and Treatment BMP \$	Sizing Calculations	
Name of Drainage Shed: Shed F		Fill in Blue Highlighted boxes	
Location of project: Sacramento			
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	25 acres	A _{CDP}	
		<u> </u>	
Common Drainage Plan Open Space (Off-project)	0 acres	A _{OS}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres	i	below
b. Buffer zones for natural water bodies	0 acres		DEIOW
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)	1.53 acres	A	
Project-Specific Open Space (In-project, communal**)	0.20 acres	A _{PSOS}	
a. Natural storage reservoirs and drainage corridors	0.00 acres	;	
b. Buffer zones for natural water bodies	0.00 acres		soo aroa oyampia
c. Natural areas including existing trees, other vegetation, and soil	0.00 acres		see area example
d. Landscape area/park	0.20 acres		below
e. Flood Control/Drainage basins	0.00 acres	i	
** Doesn't include impervious areas within individual lots and surrou			
Area with Dunoff Deduction Detential	A = 1.22 arras	Δ	
Area with Runoff Reduction Potential	A _{PSOS} = 1.33 acres	A _T	
Assumed Initial Impervious Fraction	A _T / A = 0.87	I	
Open Space & Pervious Area LID Credit (Step 1)			
(A _{OS} /A _{CDP} +A _{PSOS}	/A)x100 = 13 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 used in Option 1	se 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 requirement	0_	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for cr (see Fact Sheet)	edits					0.00	acres
Total Effective Area Managed by Runoff Reduction M	easures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C /	A _T)*100 =	- 0	pts

Table D-2b

Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum travel distance
Cobblestone Block Pavement	0.40	≤ 3,500 sq ft	21 ft
Pervious Concrete/Asphalt	0.60	≤ 5,000 sq ft	24 ft
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement	Worksheet				
See Fact Sheet for more information regarding Disc	connected Pavement cre	edit 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			Box K4
Ratio is > 1.0 and < 1.5		0.71	1		
Ratio is > 1.5 and < 2.0		0.55			
6. Enter Efficiency of Porous Pavement (see t	able below)				Box K5
	Efficiency				
Porous Pavement Type	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 Bo			0.00	acres	Box K6
				0.0100	2 0
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	n Box K8			0.00 acres

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 auto	omatically-emptied sy	/stems				
(see Fact Sheet)	- enter gallons, f	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	Bioretention Area	sq ft				
(see Fact Sheet)	Subdrain Elevation	inches				
	Ponding Depth, inches	inches		0.00	acres	
Impervious Area Managed by Infiltration BMPs						
(see Fact Sheet)	Drawdown Time, hrs	drawdown_hrs_inf				
50	bil Infiltration Rate, in/hr	soil_inf_rate				
Sizing Option 1: C	Capture Volume, acre-ft	0.00 capture_vol_inf		0.00	acres	
Sizing Option 2: Infiltration B	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						
	d Infiltration Area and ft	mulah area		0.00	0.0100	
(see Fact Sheet) Mulcher	d Infiltration Area, sq ft	mulch_area		0.00	acres	
Total Effective Area Managed by Capture-and-Use/Bioretention	/Infiltration BMPs			0.00	A _{LIDc}	
Runoff Management Credit (Step 3)			$A_{LIDC}/A_{T}^{*}200 =$	0.0	pts	
Total LID Credits (Step 1+2+3)		Warning: More LID	Is Required	13.1		
				10.1		

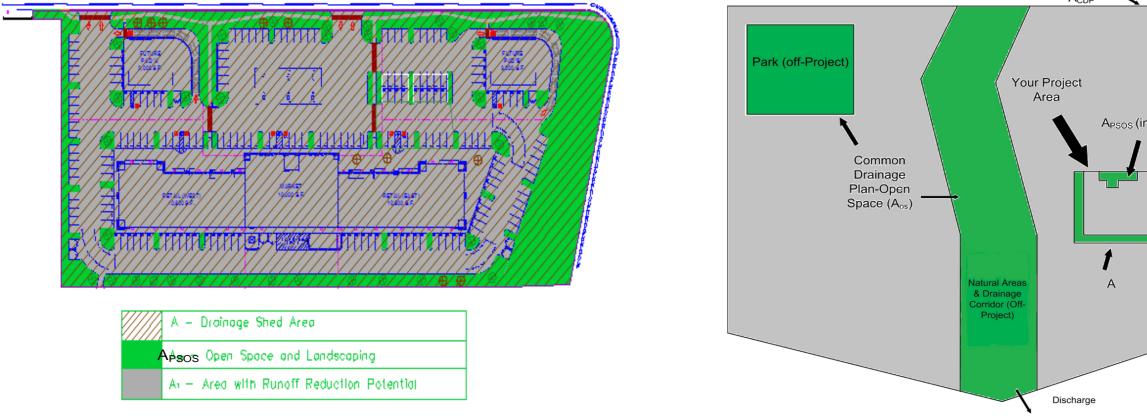
Does project require hydromodification management? If yes, proceed to using SacHM.						
Adjusted Area for Flow-Based, Non-LID Treatment	$A_{T} - A_{C} - A_{LIDC} = 1.33 \qquad A_{AT}$					
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	A _{AT} / A = 0.87 I _A					
Further treatment is required, see choose flow-based or volume-based sizing in Step 4						

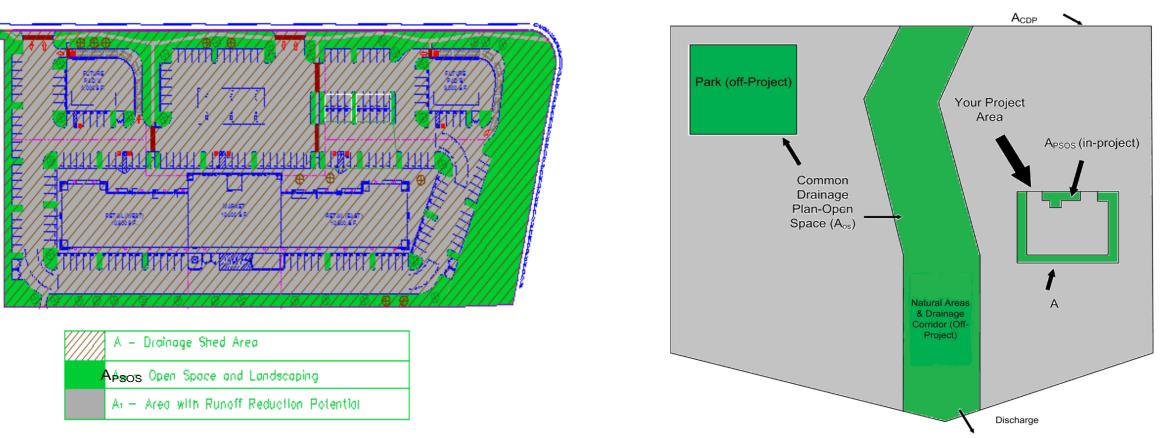
Step 4a Treatment - Flow-Based (Rational Method	
Calculate treatment flow (cfs):	Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity)	0.18 i	Rainf	all Intensity
		Roseville	i = 0.20 in/hr
Obtain A _{AT} from Step 3	1.33 A _{AT}	Sacramento	i = 0.18 in/hr
		Folsom	i = 0.20 in/hr
Use C = 0.95	0.95 C		
Flow = 0.95 * i * A _{AT}	0.227 cfs		

Step 4b Treatment - Volume-Based (ASCE-WEF)					
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized De	tention Volume (P ₀)			
Obtain A from Step 1	1.53	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.	0.73	P ₀			
Calculate treatment volume (acre-ft): Treatment volume = A x (P₀ / 12)	0.09	Acre-Feet			v06232012

Appendix D-2: Commercial Sites: Low Impact Developmen	t (LID) Credits and Treatment BMP Sizing Calculations	
Name of Drainage Shed: Shed G	Fill in Blue Highlighted boxes	
Location of project: Sacramento		
Step 1 - Open Space and Pervious Area Credits		
Is your project within the drainage area of a common drainage plan that includes open s	pace? If not, skip to 1 b.	
1 a. Common Drainage Plan Area	25 acres A _{CDP}	
Common Drainage Plan Open Space (Off-project)	0 acres A _{os}	see area example
a. Natural storage reservoirs and drainage corridors	0 acres	below
b. Buffer zones for natural water bodies	0 acres	DEIOW
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)	2.53 acres A	
T b. T Toject Dramage oned Area (Total)	2.00 acres	
Project-Specific Open Space (In-project, communal**)	0.63 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
d. Landscape area/park	0.63 acres	below
e. Flood Control/Drainage basins	0.00 acres	
** Doesn't include impervious areas within individual lots and surrounding		
Area with Runoff Reduction Potential A - A _{PSOS}	= 1.89 acres A _T	
Assumed Initial Impervious Fraction $A_T / A =$	0.75 I	
·		
Open Space & Pervious Area LID Credit (Step 1)		
(A _{OS} /A _{CDP} +A _{PSOS} /A)x10	0 = 25 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 used in Option 1	se 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 requirement	0_	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees use Form D-2b for cr (see Fact Sheet)	edits					0.00	acres
Total Effective Area Managed by Runoff Reduction M	easures			A _C		0.00	acres
Runoff Reduction Credit (Step 2)				(A _C /	A _T)*100 =	- 0	pts

Table D-2b

Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum travel distance
Cobblestone Block Pavement	0.40	≤ 3,500 sq ft	21 ft
Pervious Concrete/Asphalt	0.60	≤ 5,000 sq ft	24 ft
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft

Form D-2a: Disconnected Pavement	Worksheet				
See Fact Sheet for more information regarding Disc	connected Pavement cre	edit 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			Box K4
Ratio is > 1.0 and < 1.5		0.71	1		
Ratio is > 1.5 and < 2.0		0.55			
6. Enter Efficiency of Porous Pavement (see t	able below)				Box K5
	Efficiency				
Porous Pavement Type	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 Bo			0.00	acres	Box K6
				0.0100	2 0
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	n Box K8			0.00 acres

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 sq ft Subdrain Elevation inches Ponding Depth, inches inches	0.00 acres
Impervious Area Managed by Infiltration BMPs (see Fact Sheet) Drawdown Time, hrs Soil Infiltration Rate, in/hr soil_inf_rate	f
Sizing Option 1: Capture Volume, acre-ft 0.00 capture_vol_inf	0.00 acres
Sizing Option 2: Infiltration BMP surface area, sq ft0 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	0.00 A _{LIDc}
Runoff Management Credit (Step 3)	$A_{LIDC}/A_{T}^{*}200 = 0.0$ pts

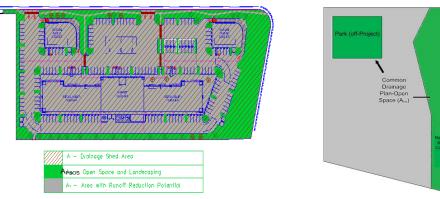
Total LID Credits (Step 1+2+3)	Warning: More LID Is Re	equired	25.0					
Does project require hydromodification management? If yes, proceed to using S	acHM.							
Adjusted Area for Flow-Based, Non-LID Treatment	$A_T - A_C - A_{LIDC} =$	1.89	A _{AT}					
Adjusted Impervious Fraction of A for Volume-Based, Non-LID Treatment	$A_{AT} / A =$	0.75	I _A					
Adjusted impervious reaction of A for Volume Bused, Non Elb freatment		0.10	~A					
Further treatment is required, see choose flow-based or volume-based sizing in Step 4								
i artifor a cathorit lo roquinca, coo chococo non bacca or rotanio bacca cizing in otop i								

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	Rainf	all Intensity
		Roseville	i = 0.20 in/hr
Obtain A _{AT} from Step 3	1.89 A _{AT}	Sacramento	i = 0.18 in/hr
		Folsom	i = 0.20 in/hr
Use C = 0.95	0.95 C		
Flow = 0.95 * i * A _{AT}	0.32 cfs		

Step 4b Treatment - Volume-Based (ASCE-WEF)					
Calculate water quality volume (Acre-Feet):	WQV = Area x Maximized De	tention Volume (P ₀)			
Obtain A from Step 1	2.53	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.	0.59	P ₀			
Calculate treatment volume (acre-ft): Treatment volume = A x (P ₀ / 12)	0.12	Acre-Feet		V	06232012

Name of Drainage Shed: Overall		Fill	in Blue Highlighted	d boxes
Location of project: Sacramento				
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, s			
1 a. Common Drainage Plan Area		25 acres	A _{CDP}	
Common Drainage Plan Open Space (Off-projec	:t)	0 acres	A _{os}	see area example
a. Natural storage reservoirs and drainage corridors	S	0 acres		below
b. Buffer zones for natural water bodies		0 acres		Delow
c. Natural areas including existing trees, other vege	etation, 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)		25.14 acres	A	
Project-Specific Open Space (In-project, commu	unal**)	7.20 acres	A _{PSOS}	
a. Natural storage reservoirs and drainage corridors	s	0.00 acres		
b. Buffer zones for natural water bodies		0.00 acres		see area example
c. Natural areas including existing trees, other vege	etation, and soil	0.00 acres		below
d. Landscape area/park		7.20 acres		woied
e. Flood Control/Drainage basins		0.00 acres		
** Doesn't include impervious areas within individua	al lots and surrounding individual	units. That is accounted for below usir	ng Form D-1a in Step	2.
Area with Runoff Reduction Potential	A - A _{PSOS} =	17.94 acres	A _T	
Assumed Initial Impervious Fraction	A _T / A =	0.71	I	
Open Space & Pervious Area LID Credit (Step 1))			
()	-/A/A)x100 -	20 ptc		



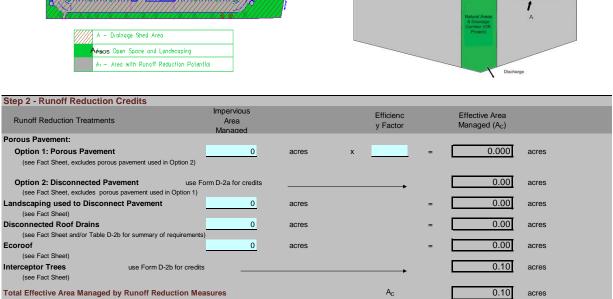
Porous Pavement:

Ecoroof

(see Fact Sheet) Interceptor Trees

(see Fact Sheet)

Runoff Reduction Credit (Step 2)



(A_C / A_T)*100 =

ACDP

s (in-project)

acres

1 pts

Your Project Area

Table	D-2a
-------	------

Table D-2a		i du	Ne D-20	
Porous Pavement Type	Efficiency Multiplier	Maximum roof size	Minimum trav distance	el
Cobblestone Block Pavement Pervious Concrete/Asphalt		≤ 3,500 sq ft ≤ 5,000 sq ft	21 ft 24 ft	
Modular Block Pavement &	0.75	≤ 7,500 sq ft	28 ft	
Reinforced Grass Pavement	1.00	≤ 10,000 sq ft	32 ft	
rm D-2a: Disconnected Pavemen	t Worksheet			
Fact Sheet for more information regarding Disc	onnected Pavement credit guidelines			
				Effective Area Ma
vement Draining to Porous Pavement				
Enter area draining onto Porous Pavemer	.t	0.00	acres Box	K1
Enter area of Receiving Porous Pavement cludes area entered in Step 2 under Poro		0.00	acres Box	K2
Ratio of Areas (Box K1 / Box K2)		0.00	Box	кз
Select multiplier using ratio from Box K3 a	nd enter into Box K4			
Ratio (Box D) Ratio is ≤ 0.5	Multiplier 1.00			
Ratio is > 0.5 and < 1.0 Ratio is > 1.0 and < 1.5	0.83 0.71	1	Box	K4
Ratio is > 1.5 and < 2.0	0.55	<u> </u>		
Enter Efficiency of Porous Pavement (see	e table below)		Box	K5
	Efficiency			
Porous Pavement Type	Multiplier			
Cobblestone Block Pavement Pervious Concrete	0.40			
Asphalt Pavement	0.60			
Modular Block Pavement Porous Gravel Pavement	0.75			
Reinforced Grass Pavement	1.00	0.00	D	KC
Multiply Box K2 by Box K5 and enter into			acres Box	KO
Multiply Boxes K1,K4, and K5 and enter t	ne result in Box K7	0.00	acres Box	K7
Add Box K6 to Box K7 and multiply by 60				0.00 acres
s is the amount of area credit to enter into	the "Disconnected Pavement" Box of Form D-2			
rm D-2b: Interceptor Tree Works	heet			
Fact Sheet for more information regarding Inter	ceptor Tree credit guidelines			
w Evergreen Trees				
Enter number of new evergreen trees that	qualify as Interceptor Trees in Box L1.	57 tree	es Box L1	
Multiply Box L1 by 200 and enter result in	Box L2	11400 sq. f	it. Box L2	
w Deciduous Trees Enter number of new deciduous trees tha	t qualify as Interceptor Trees in Box L3.	100 tree	es Box L3	
Multiply Box L3 by 100 and enter result in	Box L4	<u> </u>	it. Box L4	
sting Tree Canopy				
Enter square footage of existing tree canc	opy that qualifies as Existing Tree canopy in Box L5.	0 sq. f	it. Box L5	
			DOVED	
Multiply Box L5 by 0.5 and enter the resul	t in Box L6	0 sq. f	it. Box L6	
al Interceptor Tree EAM Credits				
d Boxes L2, L4, and L6 and enter it into Be	5x L7	21400 sq. f	it. Box L7	
ide Box L7 by 43,560 and multiply by 20%	5 to get effective area managed and enter result in B	Box L8 0.10 acre	es Box L8	

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(be first list, first reaction reaction particles of the state of the sta	(see Fact Sheet)		- enter gallons	, for simple rain barrels	[0.00	acres
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Pudig Daysh, holes 12 holes 8.55 aces Imparvious Area Managed by infiltration BMPs		by Bioretention BMPs					
(see Fad Shee) Dearwork The, in					[8.55	acres
(see Fad Shee) Dearwork The, in							
Image: Internet in the set internet intern		by Infiltration BMPs	Drawdown Time, hrs	drawdown hrs inf			
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(see Fact Sheet) Mudchel infitzion Area, sg ftmeddt_area 0.00 acres Total Effective Area Managed by Capture-and-Use/Bioretention/Infitzation BMPs 0.55 A.co. Runoff Management Credit (Step 3) A.co./Ar,200 - 0.95.3 pts Total LID Credits (Step 1+2+3) LID compliant, check for treatment sizing in Step 4 124.5 Des project require hydromodification management? If yes, proceed to using SacHM. Ar. Ar. A.co 0.30 Art Adjusted Area for Flow-Based, Non-LID Treatment Ar. Ar. A.co 0.37 I.a Further treatment is required, see choose flow-based or volume-based sizing in Step 4 20.0 inhit Clockup value for in Table D-2c (Rainfall Intensity) 0.18 /r. Fable D-2c Lock up value for in Table D-2c (Rainfall Intensity) 0.18 /r. Rainfall Intensity Obtain Ar, from Step 3 0.9.30 /r. Rainfall Intensity Use C = 0.95 0.95 °c Roop5 °c Flow = 0.95 * i * Ar 1.58 /r. 4.8 /r. Step 4b Treatment - Volume-Based (ASCE-WEF) WDV = Area x Maximized Detention Volume (Pa) Calculate water quality volume (Acre-Feet): WDV = Area x Maximized Detention Volume (Pa) Obtain Ar from Step 1 2.5.14 A 48 /rs Specified							
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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 25.14 A 48 hrs Specified Draw Down time Obtain P ₀ : Maximized Detention Volume from figures E-1 to E 0.28 P ₀ 4 in Appendix E of this manual using I _A from Step 2. Calculate treatment volume (acre-ft): P ₀	iculate treatment flow (cfs): ok up value for i in Table D-2c (Rainfall tain A _{AT} from Step 3		0.18 i 9.30 A _{AT}	nfall Intensity x Area		Rainfall Roseville i = Sacramento i =	0.20 in/hr 0.18 in/hr
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Mike Nowlan

From:Erickson, Neil < NErickson@conteches.com>Sent:Thursday, April 2, 2020 2:21 PMTo:Mike NowlanSubject:Contech: City of Elk Grove Project

Hello Mike,

The following is being provided for preliminary estimating only.

Note:

- 1. An online and offline option are provided for WQ areas C, D, E and F.
- 2. An offline option would require an upstream bypass structure.
 - a. The smaller bypass flows a 48" manhole should be sufficient.
 - b. The larger bypass flows may need a 6'x6' vault for bypass.
- 3. Minimum finished grade to flow line out heights are provided.
 - a. Vaults can be manufactured as deep as needed.
 - b. Shallow and custom systems can be designed when needed.

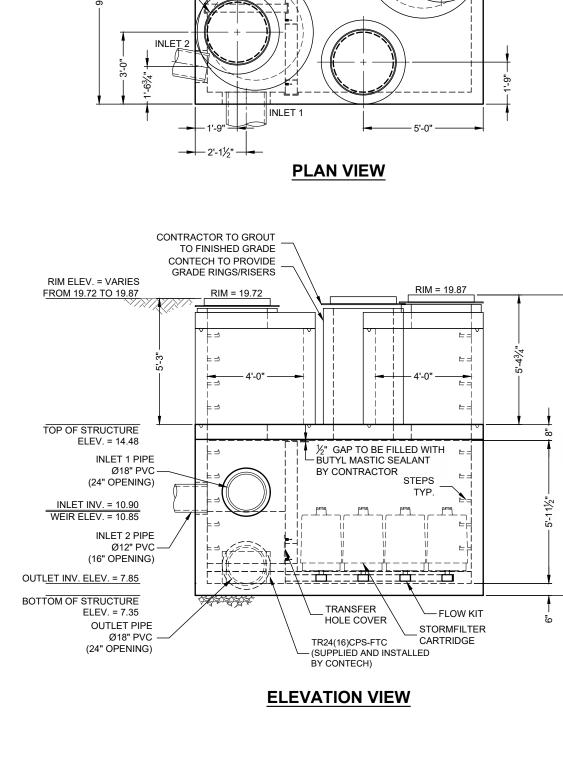
WQ Area	WQF	SacCalc Element	Q10	Q100	Bypass10	Bypass100	StormFilter	Maximum Treatment Flow	Minimum FG to FL Out	Online	Peak In
A	0.76	PR011	15	25	14.2	24.2	8'x11' Peak Diversion	0.902 cfs	5.17'	Y	H.O.W.
В	0.32	JNC001	23	39	22.7	38.7	6'x8' Peak Diversion	0.401 cfs	5.17'	Y	H.O.W.
С	0.02	PR003	1.4	2.5	1.4	2.5	CatchBasin, Deep 18"	0.134 cfs	3.3' - 4.25'	Y	1.8 cfs
С	0.02	PR003	1.4	2.5	1.4	2.5	48" Manhole	0.150 cfs	5.17'	N	Require
D	0.14	PR007	1.9	3.6	1.8	3.5	6'x6' Vault	0.301 cfs	5.17'	Y	1.8 cfs
D	0.14	PR007	1.9	3.6	1.8	3.5	48" Manhole	0.150 cfs	5.17'	N	Require
E	0.13	PR005	2.3	3.8	2.2	3.7	6'x8' Peak Diversion	0.401 cfs	5.17'	Y	H.O.W.
E	0.13	PR005	2.3	3.8	2.2	3.7	48" Manhole	0.150 cfs	5.17'	N	Require
F	0.23	PR001	5.9	9.8	5.7	9.6	6'x8' Peak Diversion	0.401 cfs	5.17'	Y	H.O.W.
F	0.23	PR001	5.9	9.8	5.7	9.6	72" Manhole	0.351 cfs	5.17'	N	Require
1. Peak flow	v is only limit	ed by the wa	ter surface	e elevation ov	er bypass wier	(H.O.W. = hei	ght over wier)				

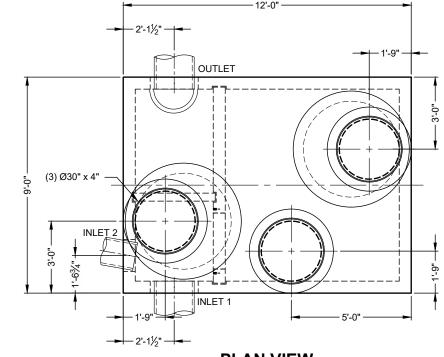
Best regards,

Neil Erickson Sr. Stormwater Consultant

Contech Engineered Solutions LLC 5 Sierra Gates Plaza, Suite 390 | Roseville, CA 95678 Mob: 916-635-0760 nerickson@conteches.com www.ContechES.com

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STRUCTURE WEIGHT APPROXIMATE HEAVIEST PICK = 40,000 LBS OF 2 PIECES BASE SECTION SHIPPED WITH CARTRIDGES INSTALLED

MAX FOOTPRINT = 9' x 12'

B. BE SPECIFIED BY ENGINEER OF RECORD. C. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL

INSTALLATION NOTES

- 5. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING WITH ASTM C-857 AND AASHTO LOAD FACTOR DESIGN METHOD.
- CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
- OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- 4. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' 6' AND GROUNDWATER ELEVATION AT,
- 3. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
- ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
- 2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH
- 1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- **GENERAL NOTES**

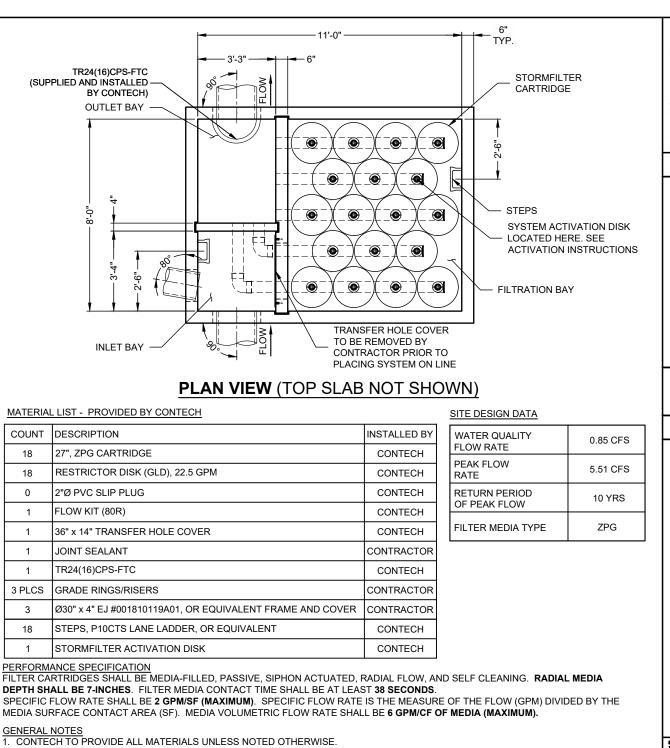
DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.

	18	RESTRICTOR DISK (GLD), 22.5 GPM	CONT					
	0	2"Ø PVC SLIP PLUG	CONT					
	1	FLOW KIT (80R)	CONT					
	1	36" x 14" TRANSFER HOLE COVER	CONT					
	1	JOINT SEALANT	CONTRA					
	1	TR24(16)CPS-FTC	CONT					
	3 PLCS	GRADE RINGS/RISERS	CONTRA					
	3	Ø30" x 4" EJ #001810119A01, OR EQUIVALENT FRAME AND COVER	CONTRA					
	18	STEPS, P10CTS LANE LADDER, OR EQUIVALENT	CONT					
	1	STORMFILTER ACTIVATION DISK	CONT					
F	PERFORMANCE SPECIFICATION							

MATERIAL LIST - PROVIDED BY CONTECH

COUNT

18



D. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.

E. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.

F. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF. G. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH	
PROPOSAL	
DRAWING	

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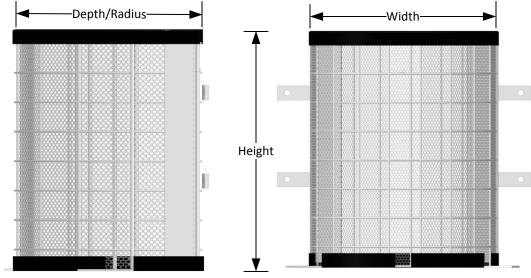
Revel Environmental Manufacturing Inc.

Northern California	Southern California
960-B Detroit Avenue	2110 South Grand Avenue
Concord, California 9451	
	P: (714) 557-2676
F: (925) 676-8676	F: (714) 557-2679
	960-B Detroit Avenue

Model:	TR20(12)CPS-FTC	TR24(16)CPS-FTC	TR40(18)CPS-FTC
Width:	20"	24"	40"
Height:	12"	16"	18"
Depth/Radius:	8"	12"	20"
Filtered Flow Rate:	5.56 (CFS)	9.89 (CFS)	18.54 (CFS)
Bypass Radius:	6"	10"	18"
Bypass Flow:	19.24 (CFS)	25.65 (CFS)	42.55 (CFS)

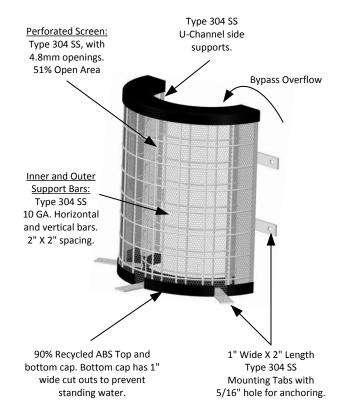
REM TRITON CPS - FTC

Standard size dimensions



Side View

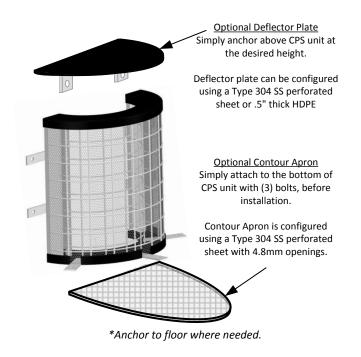
Front View



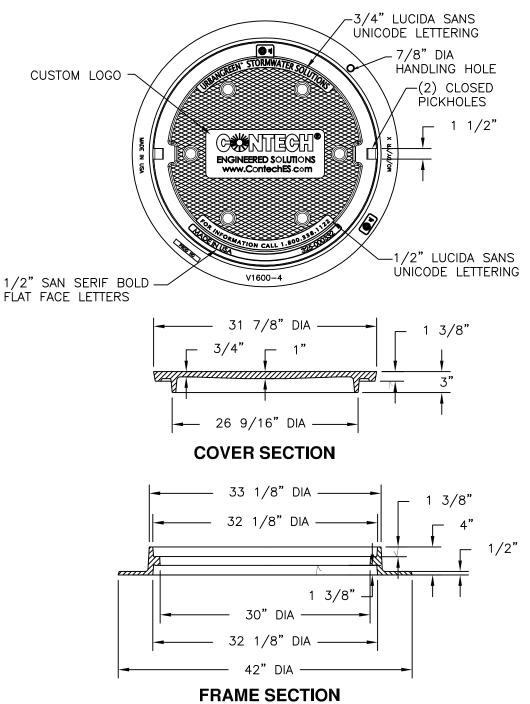
*APPROVED Full Trash Capture Device through the California State Water Resource Control Board

Notes:

- Units are constructed using a 10 GA. Stainless Steel inner and outer housing support for added structural integrity.
- Perforated Stainless Steel is configured with a 51% Open Area for excellent flow rates comparative to its size.
- CPS Stainless Steel housing and additional attached SS parts are welded.
- Custom sizes and configurations are available.
- Multiple units can be mounted vertically to increase capture capacity.
- CPS unit is capable of housing an absorbent media if ever required, with no retrofitting or modifications needed.
- CPS unit can also be elevated off the basin floor in "Sump" type basins.
- MADE IN THE USA.



V1600-4 1810A4 Assembly Solid, Sediment Tight





Product Number 001810119A01 Design Features

- -Materials Cover Gray Iron (CL35B) Frame Gray Iron (CL35B)
- -Design Load Heavy Duty -Open Area n/a -Coating Undipped -√Designates Machined Surface

Certification

- ASTM A48
- -Country of Origin: USA

Major Components

001810119 41600419

Drawing Revision

2/1/2016 Designer: MAH 7/14/2016 Revised By: SBO

Disclaimer

Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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