SHED A- VEGETATED SWALE

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	17,053	100	0.673	67
Roofs	1,075	90	0.042	4
Lawn/turf	7,215	0	0.285	0
Total Contributing Area[(a)]	25,342	–	–	71

a. Total contributing area = sum of unit areas
b. Weighting factor = unit area / total tributary area
c. Weighted imperviousness = weighting factor x percent imperviousness
d. Design imperviousness = sum of weighted imperviousness
e. Variable with product type; assumes porous subsoil and use of underdrains

Swale Calculations

Shed Area	0.58	ac
Intensity	0.2	in/hr
C	0.50	
n	0.2	
Qdesign=	0.059	cfs

swale bottom width	0.5	ft	
side slope	3	:1	
design slope	0.005	ft/ft	
Design flow velocity	0.16	ft/sec	from flowmaster
Flow Depth	3.24	in	from flowmaster
Design Length	96	ft	
Length per plan	96	ft	

Check Swale Length Ok

Notes:
Design length calculated using the 10 min. minimum contact
Design Length = Tc x Design Flow Velocity x 60
Intensity determined as 2X the 85th percentile hourly
Rainfall intensity (City of Woodland rain gauge = 0.10 in/hr)
Q_{design} = C x I x A
Storm Quality Design Flow (SQDF)
C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

SHED B- PERVIOUS PAVEMENT

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[b]	Weighted % Imperviousness[c,d]
Asphalt/concrete pavement	8,304	100	0.603	60
Gravel pavement	0	40	0.000	0
Roofs	0	90	0.000	0
Porous pavement [e]	1,726	35	0.125	4
Lawn/turf	3,737	0	0.271	0
Total Contributing Area[a]	13,767	–	–	65

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

e. Variable with product type; assumes porous subsoil and use of underdrains

Pervious Pavers-

Shed Area:	0.32 ac
C	0.45
desired capture (for 48 hr storm)	80%
Voids:	30%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	V (cf)	Design Surface Area (sf)	Required Media Depth (in)	Provided Media Depth (in)
0.32	367	1,726	8.51	9

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858\ (I_{WQ})^3 - 0.78\ (I_{WQ})^2 + 0.774\ (I_{WQ}) + 0.04$

storage depth is based on 30% void space

SHED C- STORMWATER PLANTER

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	11,808	100	0.66	66
Roofs	0	90	0.00	0
Lawn/turf	6,102	0	0.34	0
Total Contributing Area[(a)]	17,910	–	–	66

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

Rain Garden Calculations

Shed Area:	0.41 ac
C	0.46
desired capture (for 48 hr storm)	80%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	Required V (cf)	Design V (cf)
0.32	478	487

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

SHED D- PERVIOUS PAVEMENT

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[b]	Weighted % Imperviousness[c,d]
Asphalt/concrete pavement	19,747	100	0.440	44
Gravel pavement	492	40	0.011	0
Roofs	10,310	90	0.230	21
Porous pavement [e]	6,823	35	0.152	5
Lawn/turf	7,517	0	0.167	0
Total Contributing Area[a]	44,888	–	–	70

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

e. Variable with product type; assumes porous subsoil and use of underdrains

Pervious Pavers-

Shed Area:	1.03 ac
C	0.50
desired capture (for 48 hr storm)	80%
Voids:	30%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	V (cf)	Design Surface Area (sf)	Required Media Depth (in)	Provided Media Depth (in)
0.36	1,347	6,823	7.9	8

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858\ (I_{WQ})^3 - 0.78\ (I_{WQ})^2 + 0.774\ (I_{WQ}) + 0.04$

storage depth is based on 30% void space

SHED E- PERVIOUS PAVEMENT

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	19,353	100	0.463	46
Gravel pavement	799	40	0.019	1
Roofs	9,294	90	0.222	20
Porous pavement [(e)]	4,417	35	0.106	4
Lawn/turf	7,938	0	0.190	0
Total Contributing Area[(a)]	41,801	–	–	71

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

e. Variable with product type; assumes porous subsoil and use of underdrains

Pervious Pavers-

Shed Area:	0.96 ac
C	0.50
desired capture (for 48 hr storm)	80%
Voids:	30%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	V (cf)	Design Surface Area (sf)	Required Media Depth (in)	Provided Media Depth (in)
0.36	1,254	4,417	11	11

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858\ (I_{WQ})^3 - 0.78\ (I_{WQ})^2 + 0.774\ (I_{WQ}) + 0.04$

storage depth is based on 30% void space

SHED F- STORMWATER PLANTER

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	11,662	100	0.446	45
Roofs	0	90	0.000	0
Lawn/turf	14,504	0	0.554	0
Total Contributing Area[(a)]	26,166	–	–	45

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

Rain Garden Calculations

Shed Area:	0.60 ac
C	0.31
desired capture (for 48 hr storm)	80%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	Required V (cf)	Design V (cf)
0.22	480	505

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

SHED G- VEGETATED SWALE

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	6,996	100	0.226	23
Pool	1856	100	0.060	6
Roofs	16,933	90	0.547	49
Lawn/turf	5,190	0	0.168	0
Total Contributing Area[(a)]	30,976	–	–	78

a. Total contributing area = sum of unit areas
b. Weighting factor = unit area / total tributary area
c. Weighted imperviousness = weighting factor x percent imperviousness
d. Design imperviousness = sum of weighted imperviousness
e. Variable with product type; assumes porous subsoil and use of underdrains

Swale Calculations

Shed Area	0.71	ac
Intensity	0.2	in/hr
C	0.57	
n	0.2	
Qdesign=	0.082	cfs

swale bottom width	1	ft	
side slope	3	:1	
design slope	0.005	ft/ft	
Design flow velocity	0.17	ft/sec	from flowmaster
Flow Depth	3.24	in	from flowmaster
Design Length	102	ft	
Length per plan	108	ft	

Check Swale Length Ok

Notes:
Design length calculated using the 10 min. minimum contact
Design Length = Tc x Design Flow Velocity x 60
Intensity determined as 2X the 85th percentile hourly
Rainfall intensity (City of Woodland rain gauge = 0.10 in/hr)
Q_{design} = C x I x A
Storm Quality Design Flow (SQDF)
C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

SHED H- VEGETATED SWALE

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	6,840	100	0.336	34
Pool	2100	100	0.103	10
Roofs	7,986	90	0.393	35
Lawn/turf	3,412	0	0.168	0
Total Contributing Area[(a)]	20,337	–	–	79

a. Total contributing area = sum of unit areas
b. Weighting factor = unit area / total tributary area
c. Weighted imperviousness = weighting factor x percent imperviousness
d. Design imperviousness = sum of weighted imperviousness
e. Variable with product type; assumes porous subsoil and use of underdrains

Swale Calculations

Shed Area	0.47	ac
Intensity	0.2	in/hr
C	0.59	
n	0.2	
Qdesign=	0.055	cfs

swale bottom width	1	ft	
side slope	3	:1	
design slope	0.005	ft/ft	
Design flow velocity	0.15	ft/sec	from flowmaster
Flow Depth	3.24	in	from flowmaster
Design Length	90	ft	
Length per plan	90	ft	

Check Swale Length Ok

Notes:
Design length calculated using the 10 min. minimum contact
Design Length = Tc x Design Flow Velocity x 60
Intensity determined as 2X the 85th percentile hourly
Rainfall intensity (City of Woodland rain gauge = 0.10 in/hr)
Q_{design} = C x I x A
Storm Quality Design Flow (SQDF)
C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

SHED I- STORMWATER PLANTER

Calculation Table for Determination of Design Imperviousness (I_{WQ})

Site Element	Unit Area (ft^2)	Percent Imperviousness	Weighting Factor[(b)]	Weighted % Imperviousness[(c,d)]
Asphalt/concrete pavement	6,260	100	0.200	20
Roofs	11,664	90	0.373	34
Lawn/turf	13,384	0	0.427	0
Total Contributing Area[(a)]	31,307	–	–	54

a. Total contributing area = sum of unit areas

b. Weighting factor = unit area / total tributary area

c. Weighted imperviousness = weighting factor x percent imperviousness

d. Design imperviousness = sum of weighted imperviousness

Rain Garden Calculations

Shed Area:	0.72 ac
C	0.36
desired capture (for 48 hr storm)	80%

Vu (in) [From graph on page 333 of CASQA BMP Handbook, 48-hr drawdown]	Required V (cf)	Design V (cf)
0.25	652	690

Notes:

Calculations based on section 5.5 of the California Stormwater BMP Handbook, dated January 2003 per section E.12.e(ii),(c)2 of the State General Permit, dated February 5, 2013.

V=Required Capture Volume (cf)

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)

I_{WQ} =Design Imperviousness

C = runoff coefficient=$0.858 (I_{WQ})^3 - 0.78 (I_{WQ})^2 + 0.774 (I_{WQ}) + 0.04$

Vu=Unit Basin Storage Volume (in) (from graph on page 333 of CASQA BMP Handbook)