



CIVIL ENGINEERS | SURVEYORS

141 6th Street - P.O. Box 77042  
 Steamboat Springs, Colorado 80477  
 (970) 871-9884  
 www.LANDMARK-CO.com

PROJECT	Wild Blue Gondola
DESIGNER	Deb Spaustat
DATE	8/25/2021
LOCATION	Steamboat Springs, CO

**COMPOSITE RUNOFF COEFFICIENT CALCULATIONS**

Character of Surface		Percent Impervious		IDF	Soil Type	
Asphalt Parking and Walkways		100%		Steamboat		
Gravel		40%		Springs NOAA	C	
Roof		90%				
Burgess Creek Basin		85%				
Mini Golf		85%				
Ski Slope		10%				

  

Basin ID	Basin Area (sq.ft.)	Basin Area (acres)	Area of Asphalt Parking and Walkways(sq.ft.)	Area of Asphalt Parking and Walkways (acres)	Area of Gravel Surfaces (sq.ft.)	Area of Gravel Surfaces (acres)	Area of Roof (sq.ft.)	Area of Roof (acres)	Area of Mini Golf (sq.ft.)	Area of Mini Golf (acres)	Area of Ski Slope (sq.ft.)	Area of Ski Slope (acres)	Percent Impervious	5-year Composite Runoff Coefficient	100-year Composite Runoff Coefficient
H4	71539.07	1.64	6477.08	0.15	7912.50	0.18	5763.52	0.13	0.00	0.00	51385.97	1.18	28%	0.265	0.599
H5	20055.74	0.46	0.00	0.00	1437.84	0.03	0.00	0.00	7382.68	0.17	11235.22	0.26	40%	0.363	0.648
H6	20055.74	0.46	0.00	0.00	1437.84	0.03	0.00	0.00	7382.68	0.17	11235.22	0.26	40%	0.363	0.648
D4a	33872.93	0.78	2253.36	0.05			2377.42	0.05	0.00	0.00	29242.15	0.67	22%	0.215	0.574
D4b	29207.42	0.67	2847.15	0.07	488.16	0.01	1719.13	0.04	0.00	0.00	24152.98	0.55	24%	0.232	0.582
D4c	16125.71	0.37	7969.17	0.18	1967.20	0.05	1686.36	0.04	0.00	0.00	4502.98	0.10	67%	0.584	0.759
D4d	9152.56	0.21	0.00	0.00	3682.40	0.08	350.17	0.01	0.00	0.00	5119.99	0.12	25%	0.248	0.591
D5	3239.75	0.07	0.00	0.00	946.95	0.02	350.17	0.01	0.00	0.00	1942.63	0.04	27%	0.265	0.599



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141 9th Street ~ P.O. Box 774943  
Steamboat Springs, Colorado 80477  
(970) 871-9494  
www.LANDMARK-CO.com

PROJECT: Wild Blue Gondola

DESIGNER: D Spaustat

DATE: 8/25/2021

POND ID: Basin D4.c

### WQCV DESIGN CALCULATION - 12 HOUR DRAIN TIME Sand Filter or Bioretention (Rain Garden)

#### REQUIRED STORAGE & SAND FILTER SIZE:

BASIN AREA (AC) =  <-- INPUT from impervious calcs

BASIN IMPERVIOUSNESS PERCENT =  <-- INPUT from impervious calcs

BASIN IMPERVIOUSNESS RATIO =  <-- CALCULATED

d6 (in) =  <-- INPUT depth of average runoff producing storm

WQCV (watershed inches) =  <-- CALCULATED from MHFD Vol.3, Equation 3-1

V (ft<sup>3</sup>) =  <-- CALCULATED from MHFD Vol.3, Equation 3-2

A<sub>f</sub>, Minimum Flat Filter Area (ft<sup>2</sup>) =  <-- CALCULATED from USCDM Vol.3, Equation B-2

#### 4" UNDERDRAIN ORIFICE:

Pond Bottom Elev (ft) =  <-- INPUT per grading plan

Underdrain invert at outlet (ft) =  <-- INPUT per plan

Distance to center of orifice (ft) =  <-- CALCULATED

Orifice Diameter (in) =  <-- CALCULATED

#### OUTLET PIPE\*:

Q<sub>100</sub> (cfs) =  <-- INPUT from runoff calcs

120% \* Q<sub>100</sub> =  <-- CALCULATED

n =  <-- INPUT based on pipe material

S<sub>0</sub> =  <-- INPUT per plan

d<sub>100</sub> (in) =

#### Typical Manning's n Values

Material	n
CMP	0.024
HDPE	0.020
RCP	0.012

\* Calculate only if a stand alone waterquality pond (no detention)

**Design Procedure Form: Runoff Reduction**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

**Designer:** D. Spaustat  
**Company:** Landmark Consultants, Inc.  
**Date:** August 25, 2021  
**Project:** Wild Blue Gondola, upper terminal  
**Location:** Steamboat Springs, CO

**SITE INFORMATION (User Input in Blue Cells)**

WQCV Rainfall Depth = 0.25 inches  
 Depth of Average Runoff Producing Storm,  $d_6$  = 0.34 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA																			
Area ID	H1																			
Downstream Design Point ID	h1																			
Downstream BMP Type	None																			
DCIA (ft <sup>2</sup> )	--																			
UIA (ft <sup>2</sup> )	57,156																			
RPA (ft <sup>2</sup> )	9,000																			
SPA (ft <sup>2</sup> )	--																			
HSG A (%)	0%																			
HSG B (%)	0%																			
HSG C/D (%)	100%																			
Average Slope of RPA (ft/ft)	0.310																			
UIA:RPA Interface Width (ft)	100.00																			

**CALCULATED RUNOFF RESULTS**

Area ID	H1																			
UIA:RPA Area (ft <sup>2</sup> )	66,156																			
L / W Ratio	6.62																			
UIA / Area	0.8640																			
Runoff (in)	0.00																			
Runoff (ft <sup>3</sup> )	8																			
Runoff Reduction (ft <sup>3</sup> )	706																			

**CALCULATED WQCV RESULTS**

Area ID	H1																			
WQCV (ft <sup>3</sup> )	1883																			
WQCV Reduction (ft <sup>3</sup> )	1875																			
WQCV Reduction (%)	100%																			
Untreated WQCV (ft <sup>3</sup> )	8																			

**CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)**

Downstream Design Point ID	h1																			
DCIA (ft <sup>2</sup> )	0																			
UIA (ft <sup>2</sup> )	57,156																			
RPA (ft <sup>2</sup> )	9,000																			
SPA (ft <sup>2</sup> )	0																			
Total Area (ft <sup>2</sup> )	66,156																			
Total Impervious Area (ft <sup>2</sup> )	57,156																			
WQCV (ft <sup>3</sup> )	1,883																			
WQCV Reduction (ft <sup>3</sup> )	1,875																			
WQCV Reduction (%)	100%																			
Untreated WQCV (ft <sup>3</sup> )	8																			

**CALCULATED SITE RESULTS (sums results from all columns in worksheet)**

Total Area (ft <sup>2</sup> )	66,156
Total Impervious Area (ft <sup>2</sup> )	57,156
WQCV (ft <sup>3</sup> )	1,883
WQCV Reduction (ft <sup>3</sup> )	1,875
WQCV Reduction (%)	100%
Untreated WQCV (ft <sup>3</sup> )	8