

19 E. Willamette Ave.  
Colorado Springs, CO 80903  
(719)-477-9429  
www.jpsegr.com

June 22, 2026

El Paso County Planning and Community Development Department  
2880 International Circle  
Colorado Springs, CO 80910

**SUBJECT: Walden Preserve 2 Filing No. 5 (SF2211)  
Engineer's Certification Letter – Permanent Control Measures**

Ladies and Gentlemen:

Drainage Permanent Control Measures (PCM's) for this project include one private Detention Basin (Detention Pond C8) and two private Rain Gardens (RG-C4 and RG-C12). The constructed facilities provide the required storage volume and meet the required release rates, as documented by the attached MHFD design forms. The As-Built drawings accurately depict the installation of the PCM improvements and verify that adequate detention volume has been provided.

Based upon information gathered from periodic site visits to the project, JPS Engineering, Inc. is of the opinion that the Permanent Control Measures have been constructed in general compliance with the approved design plans as filed with El Paso County.

The site and adjacent properties (as affected by work performed under the County permit) appear to be stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements.

Sincerely,  
**JPS Engineering, Inc.**

John P. Schwab, P.E.  
Colorado P.E. No. 29891

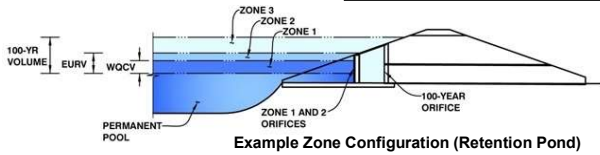




# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

**Project: WALDEN WP2 FILING NO. 5**  
**Basin ID: DETENTION BASIN C8 - AS-BUILT**



|                          | Estimated Stage (ft) | Estimated Volume (ac-ft) | Outlet Type          |
|--------------------------|----------------------|--------------------------|----------------------|
| Zone 1 (WQCV)            | 3.19                 | 0.377                    | Orifice Plate        |
| Zone 2 (EURV)            | 4.62                 | 0.368                    | Orifice Plate        |
| Zone 3 (100-year)        | 7.92                 | 1.351                    | Weir&Pipe (Restrict) |
| <b>Total (all zones)</b> |                      | <b>2.096</b>             |                      |

**User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)**

|                                   |     |  |                               |     |                 |
|-----------------------------------|-----|--|-------------------------------|-----|-----------------|
| Underdrain Orifice Invert Depth = | N/A | ft (distance below the filtration media surface) | Underdrain Orifice Area =     | N/A | ft <sup>2</sup> |
| Underdrain Orifice Diameter =     | N/A | inches   | Underdrain Orifice Centroid = | N/A | feet            |

**User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)**

|  |       |   |                            |     |                 |
|--|-------|---|----------------------------|-----|-----------------|
| Invert of Lowest Orifice =                 | 0.00  | ft (relative to basin bottom at Stage = 0 ft) | WQ Orifice Area per Row =  | N/A | ft <sup>2</sup> |
| Depth at top of Zone using Orifice Plate = | 4.19  | ft (relative to basin bottom at Stage = 0 ft) | Elliptical Half-Width =    | N/A | feet            |
| Orifice Plate: Orifice Vertical Spacing =  | 16.80 | inches  | Elliptical Slot Centroid = | N/A | feet            |
| Orifice Plate: Orifice Area per Row =      | N/A   | inches  | Elliptical Slot Area =     | N/A | ft <sup>2</sup> |

**User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)**

|                                | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Stage of Orifice Centroid (ft) | 0.00             | 1.40             | 2.79             |                  |                  |                  |                  |                  |
| Orifice Area (sq. inches)      | 1.62             | 1.62             | 1.62             |                  |                  |                  |                  |                  |

|                                | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|--------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Stage of Orifice Centroid (ft) |                  |                   |                   |                   |                   |                   |                   |                   |
| Orifice Area (sq. inches)      |                  |                   |                   |                   |                   |                   |                   |                   |

**User Input: Vertical Orifice (Circular or Rectangular)**

|   |              |              |   |                             |              |              |
|---|--------------|--------------|---|-----------------------------|--------------|--------------|
|   | Not Selected | Not Selected |   |                             | Not Selected | Not Selected |
| Invert of Vertical Orifice =                  | N/A          | N/A          | ft (relative to basin bottom at Stage = 0 ft) | Vertical Orifice Area =     | N/A          | N/A          |
| Depth at top of Zone using Vertical Orifice = | N/A          | N/A          | ft (relative to basin bottom at Stage = 0 ft) | Vertical Orifice Centroid = | N/A          | N/A          |
| Vertical Orifice Diameter =                   | N/A          | N/A          | inches  |                             |              |              |

**User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))**

|                                       |              |              |   |  |             |              |
|---------------------------------------|--------------|--------------|---|--|-------------|--------------|
|                                       | Zone 3 Weir  | Not Selected |   |  | Zone 3 Weir | Not Selected |
| Overflow Weir Front Edge Height, Ho = | 4.06         | N/A          | ft (relative to basin bottom at Stage = 0 ft) | Height of Grate Upper Edge, H <sub>g</sub> = | 4.06        | N/A          |
| Overflow Weir Front Edge Length =     | 6.00         | N/A          | feet  | Overflow Weir Slope Length =                 | 6.00        | N/A          |
| Overflow Weir Grate Slope =           | 0.00         | N/A          | H:V   | Grate Open Area / 100-yr Orifice Area =      | 8.60        | N/A          |
| Horiz. Length of Weir Sides =         | 6.00         | N/A          | feet  | Overflow Grate Open Area w/o Debris =        | 25.06       | N/A          |
| Overflow Grate Type =                 | Type C Grate | N/A          |   | Overflow Grate Open Area w/ Debris =         | 12.53       | N/A          |
| Debris Clogging % =                   | 50%          | N/A          | %   |  |             |              |

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

|   |                   |              |  |  |                   |              |
|---|-------------------|--------------|--|--|-------------------|--------------|
|   | Zone 3 Restrictor | Not Selected |  |  | Zone 3 Restrictor | Not Selected |
| Depth to Invert of Outlet Pipe =            | 0.07              | N/A          | ft (distance below basin bottom at Stage = 0 ft) | Outlet Orifice Area =                            | 2.91              | N/A          |
| Outlet Pipe Diameter =                      | 24.00             | N/A          | inches   | Outlet Orifice Centroid =                        | 0.93              | N/A          |
| Restrictor Plate Height Above Pipe Invert = | 21.00             |              | inches   | Half-Central Angle of Restrictor Plate on Pipe = | 2.42              | N/A          |

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

|                                     |       |   |                                    |       |         |
|-------------------------------------|-------|---|------------------------------------|-------|---------|
| Spillway Invert Stage =             | 9.00  | ft (relative to basin bottom at Stage = 0 ft) | Spillway Design Flow Depth =       | 0.91  | feet    |
| Spillway Crest Length =             | 18.00 | feet  | Stage at Top of Freeboard =        | 10.91 | feet    |
| Spillway End Slopes =               | 4.00  | H:V   | Basin Area at Top of Freeboard =   | 0.75  | acres   |
| Freeboard above Max Water Surface = | 1.00  | feet  | Basin Volume at Top of Freeboard = | 4.01  | acre-ft |

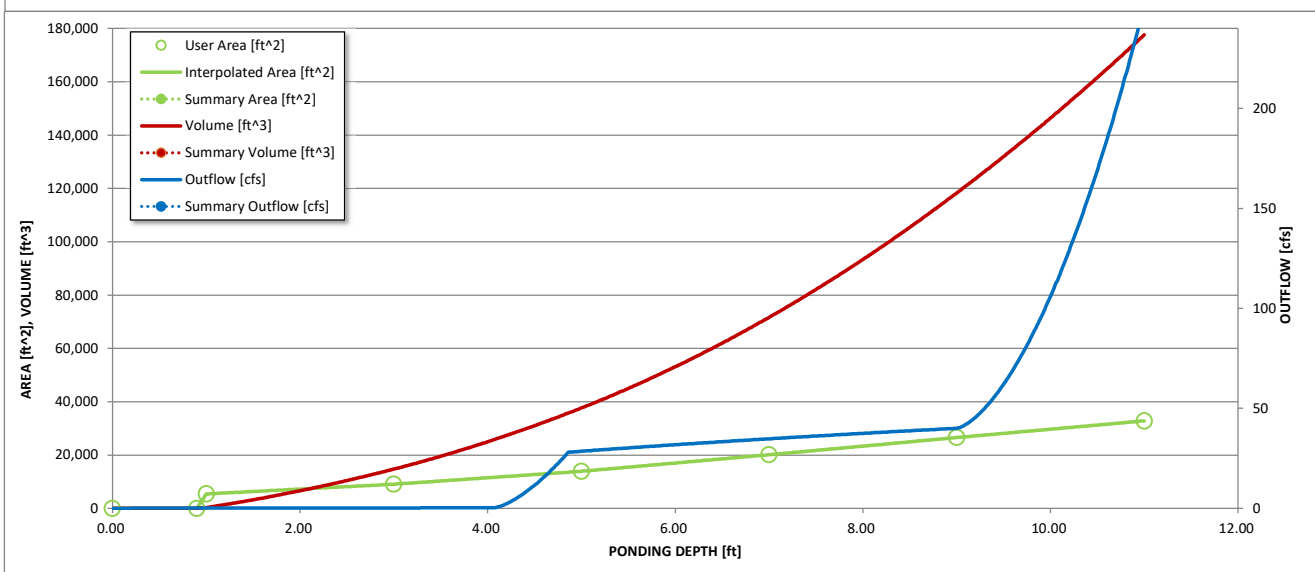
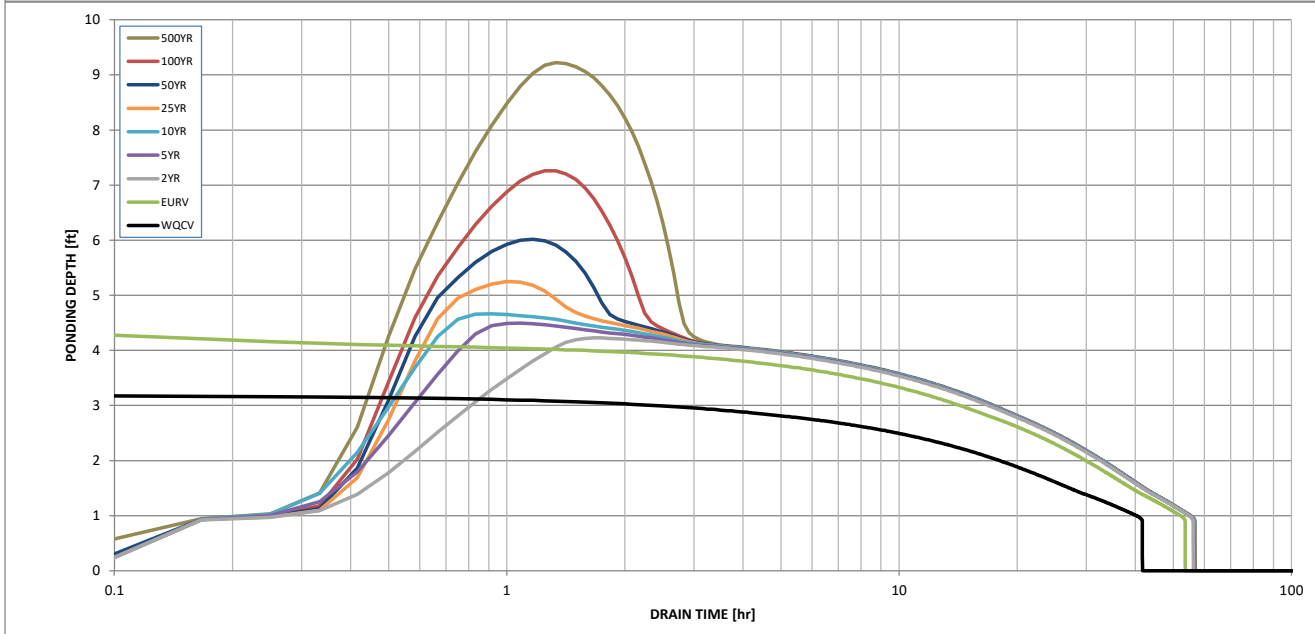
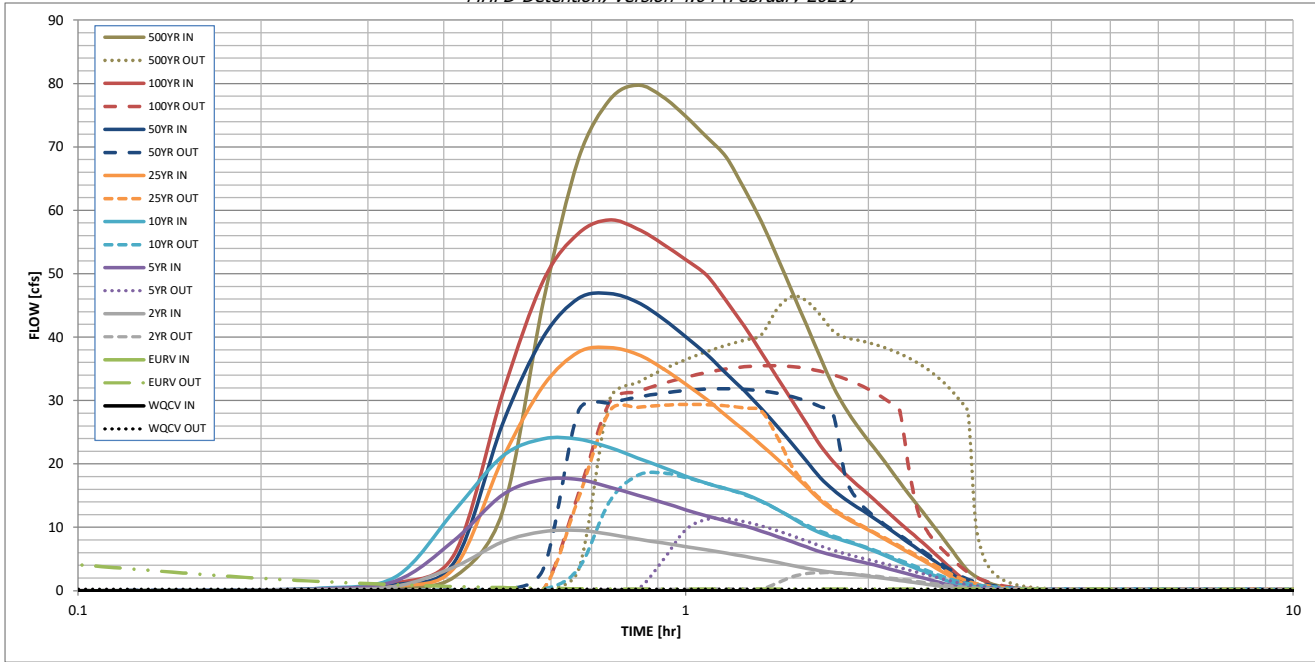
## Routed Hydrograph Results

*The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).*

|   | WQCV      | EURV            | 2 Year          | 5 Year          | 10 Year         | 25 Year        | 50 Year        | 100 Year       | 500 Year |
|---|-----------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------|
| Design Storm Return Period =                    |           |                 |                 |                 |                 |                |                |                |          |
| One-Hour Rainfall Depth (in) =                  | N/A       | N/A             | 1.19            | 1.50            | 1.75            | 2.00           | 2.25           | 2.52           | 3.14     |
| CUHP Runoff Volume (acre-ft) =                  | 0.377     | 0.746           | 0.849           | 1.600           | 2.321           | 3.517          | 4.365          | 5.551          | 7.760    |
| Inflow Hydrograph Volume (acre-ft) =            | N/A       | N/A             | 0.849           | 1.600           | 2.321           | 3.517          | 4.365          | 5.551          | 7.760    |
| CUHP Predevelopment Peak Q (cfs) =              | N/A       | N/A             | 4.2             | 11.7            | 17.8            | 32.0           | 40.2           | 51.2           | 71.6     |
| OPTIONAL Override Predevelopment Peak Q (cfs) = | N/A       | N/A             |                 |                 |                 |                |                |                |          |
| Predevelopment Unit Peak Flow, q (cfs/acre) =   | N/A       | N/A             | 0.10            | 0.28            | 0.42            | 0.75           | 0.94           | 1.20           | 1.68     |
| Peak Inflow Q (cfs) =                           | N/A       | N/A             | 9.5             | 17.5            | 23.9            | 38.3           | 46.9           | 58.5           | 79.7     |
| Peak Outflow Q (cfs) =                          | 0.2       | 11.1            | 2.9             | 11.3            | 18.6            | 29.4           | 31.9           | 35.5           | 46.4     |
| Ratio Peak Outflow to Predevelopment Q =        | N/A       | N/A             | N/A             | 1.0             | 1.0             | 0.9            | 0.8            | 0.7            | 0.6      |
| Structure Controlling Flow =                    | Plate     | Overflow Weir 1 | Overflow Weir 1 | Overflow Weir 1 | Overflow Weir 1 | Outlet Plate 1 | Outlet Plate 1 | Outlet Plate 1 | Spillway |
| Max Velocity through Grate 1 (fps) =            | N/A       | 0.65            | 0.10            | 0.4             | 0.7             | 1.2            | 1.3            | 1.4            | 1.6      |
| Max Velocity through Grate 2 (fps) =            | N/A       | N/A             | N/A             | N/A             | N/A             | N/A            | N/A            | N/A            | N/A      |
| Time to Drain 97% of Inflow Volume (hours) =    | 39        | 49              | 51              | 46              | 43              | 38             | 35             | 32             | 26       |
| Time to Drain 99% of Inflow Volume (hours) =    | <b>41</b> | 52              | 54              | 53              | 52              | 49             | 48             | 45             | 42       |
| Maximum Ponding Depth (ft) =                    | 3.19      | 4.62            | 4.22            | 4.49            | 4.67            | 5.25           | 6.02           | 7.26           | 9.22     |
| Area at Maximum Ponding Depth (acres) =         | 0.22      | 0.30            | 0.28            | 0.29            | 0.30            | 0.34           | 0.39           | 0.48           | 0.63     |
| Maximum Volume Stored (acre-ft) =               | 0.378     | 0.747           | 0.633           | 0.709           | 0.759           | 0.943          | 1.223          | 1.762          | 2.851    |

# DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.04 (February 2021)*



| S-A-V-D Chart Axis Override | X-axis | Left Y-axis | Right Y-axis |
|-----------------------------|--------|-------------|--------------|
| minimum bound               |        |             |              |
| maximum bound               |        |             |              |

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: \_\_\_\_\_

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

| Time Interval | SOURCE  | CUHP       | CUHP       | CUHP         | CUHP         | CUHP          | CUHP          | CUHP          | CUHP           | CUHP           |
|---------------|---------|------------|------------|--------------|--------------|---------------|---------------|---------------|----------------|----------------|
|               | TIME    | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 5.00 min      | 0:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.02          | 0.00           | 0.07           |
|               | 0:15:00 | 0.00       | 0.00       | 0.18         | 0.29         | 0.37          | 0.25          | 0.31          | 0.30           | 0.45           |
|               | 0:20:00 | 0.00       | 0.00       | 0.70         | 1.55         | 2.21          | 0.71          | 0.92          | 1.19           | 2.19           |
|               | 0:25:00 | 0.00       | 0.00       | 3.76         | 8.01         | 12.63         | 3.67          | 4.57          | 5.83           | 12.48          |
|               | 0:30:00 | 0.00       | 0.00       | 7.72         | 15.14        | 21.23         | 20.85         | 26.35         | 31.11          | 45.58          |
|               | 0:35:00 | 0.00       | 0.00       | 9.30         | 17.52        | 23.94         | 32.31         | 39.99         | 48.90          | 68.12          |
|               | 0:40:00 | 0.00       | 0.00       | 9.51         | 17.53        | 23.89         | 37.63         | 46.10         | 56.38          | 77.41          |
|               | 0:45:00 | 0.00       | 0.00       | 8.90         | 16.33        | 22.57         | 38.34         | 46.85         | 58.47          | 79.75          |
|               | 0:50:00 | 0.00       | 0.00       | 8.15         | 15.08        | 20.95         | 37.30         | 45.53         | 57.09          | 77.93          |
|               | 0:55:00 | 0.00       | 0.00       | 7.52         | 13.92        | 19.48         | 35.07         | 42.95         | 54.72          | 74.84          |
|               | 1:00:00 | 0.00       | 0.00       | 6.94         | 12.77        | 18.07         | 32.56         | 40.06         | 52.22          | 71.55          |
|               | 1:05:00 | 0.00       | 0.00       | 6.45         | 11.79        | 16.93         | 30.17         | 37.27         | 49.74          | 68.38          |
|               | 1:10:00 | 0.00       | 0.00       | 5.92         | 11.00        | 16.06         | 27.59         | 34.25         | 45.71          | 63.31          |
|               | 1:15:00 | 0.00       | 0.00       | 5.42         | 10.22        | 15.25         | 25.27         | 31.52         | 41.65          | 58.16          |
|               | 1:20:00 | 0.00       | 0.00       | 4.93         | 9.38         | 14.13         | 22.97         | 28.68         | 37.53          | 52.54          |
|               | 1:25:00 | 0.00       | 0.00       | 4.45         | 8.53         | 12.79         | 20.73         | 25.88         | 33.56          | 47.01          |
|               | 1:30:00 | 0.00       | 0.00       | 3.98         | 7.68         | 11.42         | 18.51         | 23.11         | 29.85          | 41.79          |
|               | 1:35:00 | 0.00       | 0.00       | 3.53         | 6.87         | 10.12         | 16.32         | 20.38         | 26.26          | 36.77          |
|               | 1:40:00 | 0.00       | 0.00       | 3.16         | 6.13         | 9.13          | 14.24         | 17.81         | 22.91          | 32.21          |
|               | 1:45:00 | 0.00       | 0.00       | 2.90         | 5.57         | 8.41          | 12.68         | 15.91         | 20.39          | 28.78          |
|               | 1:50:00 | 0.00       | 0.00       | 2.70         | 5.11         | 7.81          | 11.48         | 14.43         | 18.41          | 26.04          |
|               | 1:55:00 | 0.00       | 0.00       | 2.50         | 4.69         | 7.22          | 10.47         | 13.18         | 16.70          | 23.66          |
|               | 2:00:00 | 0.00       | 0.00       | 2.30         | 4.29         | 6.60          | 9.56          | 12.05         | 15.17          | 21.51          |
|               | 2:05:00 | 0.00       | 0.00       | 2.07         | 3.86         | 5.91          | 8.63          | 10.87         | 13.62          | 19.30          |
|               | 2:10:00 | 0.00       | 0.00       | 1.84         | 3.42         | 5.23          | 7.72          | 9.70          | 12.14          | 17.17          |
|               | 2:15:00 | 0.00       | 0.00       | 1.62         | 3.00         | 4.59          | 6.84          | 8.59          | 10.74          | 15.16          |
|               | 2:20:00 | 0.00       | 0.00       | 1.40         | 2.60         | 3.97          | 5.99          | 7.52          | 9.44           | 13.29          |
|               | 2:25:00 | 0.00       | 0.00       | 1.20         | 2.21         | 3.38          | 5.18          | 6.49          | 8.18           | 11.49          |
|               | 2:30:00 | 0.00       | 0.00       | 1.00         | 1.83         | 2.82          | 4.37          | 5.49          | 6.93           | 9.73           |
|               | 2:35:00 | 0.00       | 0.00       | 0.81         | 1.47         | 2.28          | 3.59          | 4.51          | 5.70           | 7.98           |
|               | 2:40:00 | 0.00       | 0.00       | 0.62         | 1.11         | 1.76          | 2.81          | 3.54          | 4.48           | 6.27           |
|               | 2:45:00 | 0.00       | 0.00       | 0.44         | 0.78         | 1.27          | 2.05          | 2.59          | 3.28           | 4.60           |
|               | 2:50:00 | 0.00       | 0.00       | 0.30         | 0.55         | 0.95          | 1.34          | 1.71          | 2.19           | 3.17           |
|               | 2:55:00 | 0.00       | 0.00       | 0.22         | 0.42         | 0.76          | 0.92          | 1.21          | 1.52           | 2.27           |
|               | 3:00:00 | 0.00       | 0.00       | 0.18         | 0.34         | 0.62          | 0.66          | 0.88          | 1.08           | 1.65           |
|               | 3:05:00 | 0.00       | 0.00       | 0.14         | 0.28         | 0.50          | 0.48          | 0.65          | 0.76           | 1.19           |
|               | 3:10:00 | 0.00       | 0.00       | 0.12         | 0.22         | 0.41          | 0.35          | 0.48          | 0.53           | 0.85           |
|               | 3:15:00 | 0.00       | 0.00       | 0.10         | 0.18         | 0.33          | 0.26          | 0.36          | 0.36           | 0.60           |
|               | 3:20:00 | 0.00       | 0.00       | 0.08         | 0.15         | 0.26          | 0.20          | 0.27          | 0.24           | 0.41           |
|               | 3:25:00 | 0.00       | 0.00       | 0.06         | 0.11         | 0.20          | 0.15          | 0.20          | 0.17           | 0.29           |
|               | 3:30:00 | 0.00       | 0.00       | 0.05         | 0.09         | 0.15          | 0.12          | 0.16          | 0.13           | 0.22           |
|               | 3:35:00 | 0.00       | 0.00       | 0.04         | 0.07         | 0.11          | 0.09          | 0.12          | 0.10           | 0.17           |
|               | 3:40:00 | 0.00       | 0.00       | 0.03         | 0.05         | 0.09          | 0.07          | 0.10          | 0.08           | 0.14           |
|               | 3:45:00 | 0.00       | 0.00       | 0.02         | 0.04         | 0.07          | 0.05          | 0.07          | 0.07           | 0.11           |
|               | 3:50:00 | 0.00       | 0.00       | 0.02         | 0.02         | 0.05          | 0.04          | 0.05          | 0.05           | 0.08           |
|               | 3:55:00 | 0.00       | 0.00       | 0.01         | 0.02         | 0.03          | 0.03          | 0.04          | 0.03           | 0.06           |
|               | 4:00:00 | 0.00       | 0.00       | 0.01         | 0.01         | 0.02          | 0.02          | 0.03          | 0.02           | 0.04           |
|               | 4:05:00 | 0.00       | 0.00       | 0.00         | 0.01         | 0.01          | 0.01          | 0.02          | 0.01           | 0.02           |
|               | 4:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.01          | 0.01          | 0.01           | 0.01           |
|               | 4:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 6:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |

## Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 2

**Designer:** JPS  
**Company:** JPS  
**Date:** June 19, 2026  
**Project:** Walden WP2 Filing No. 5  
**Location:** Rain Garden C4 - As-Built

|  |   |
|--|---|
| <p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math><br/>(100% if all paved and roofed areas upstream of rain garden)</p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a/100</math>)</p> <p>C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time<br/>(<math>WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)</math>)</p> <p>D) Contributing Watershed Area (including rain garden area)</p> <p>E) Water Quality Capture Volume (WQCV) Design Volume<br/><math>Vol = (WQCV / 12) * Area</math></p> <p>F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume<br/>(Only if a different WQCV Design Volume is desired)</p> | <p><math>I_a = </math> <input style="width: 50px;" type="text" value="20.0"/> %</p> <p><math>i = </math> <input style="width: 50px;" type="text" value="0.200"/></p> <p>WQCV = <input style="width: 50px;" type="text" value="0.09"/> watershed inches</p> <p>Area = <input style="width: 50px;" type="text" value="767,963"/> sq ft</p> <p><math>V_{WQCV} = </math> <input style="width: 50px;" type="text" value="5,923"/> cu ft</p> <p><math>d_g = </math> <input style="width: 50px;" type="text" value=""/></p> <p><math>V_{WQCV\ OTHER} = </math> <input style="width: 50px;" type="text" value=""/> cu ft</p> <p><math>V_{WQCV\ USER} = </math> <input style="width: 50px;" type="text" value=""/> cu ft</p> |
| <p>2. Basin Geometry</p> <p>A) WQCV Depth (12-inch maximum)</p> <p>B) Rain Garden Side Slopes (<math>Z = 4</math> min., horiz. dist per unit vertical)<br/>(Use "0" if rain garden has vertical walls)</p> <p>C) Minimum Flat Surface Area</p> <p>D) Actual Flat Surface Area</p> <p>E) Area at Design Depth (Top Surface Area)</p> <p>F) Rain Garden Total Volume<br/>(<math>V_T = ((A_{Top} + A_{Actual}) / 2) * Depth</math>)</p>   | <p><math>D_{WQCV} = </math> <input style="width: 50px;" type="text" value="12"/> in</p> <p><math>Z = </math> <input style="width: 50px;" type="text" value="4.00"/> ft / ft</p> <p><math>A_{Min} = </math> <input style="width: 50px;" type="text" value="3072"/> sq ft</p> <p><math>A_{Actual} = </math> <input style="width: 50px;" type="text" value="4888"/> sq ft</p> <p><math>A_{Top} = </math> <input style="width: 50px;" type="text" value="7200"/> sq ft</p> <p><math>V_T = </math> <input style="width: 50px;" type="text" value="6,044"/> cu ft</p>   |
| <p>3. Growing Media</p>  | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Choose One</p> <p><input checked="" type="radio"/> 18" Rain Garden Growing Media</p> <p><input type="radio"/> Other (Explain):</p> </div> <hr/>   |
| <p>4. Underdrain System</p> <p>A) Are underdrains provided?</p> <p>B) Underdrain system orifice diameter for 12 hour drain time</p> <p style="margin-left: 20px;">i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice</p> <p style="margin-left: 20px;">ii) Volume to Drain in 12 Hours</p> <p style="margin-left: 20px;">iii) Orifice Diameter, 3/8" Minimum</p>   | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Choose One</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p> </div> <p><math>y = </math> <input style="width: 50px;" type="text" value="2.0"/> ft</p> <p><math>Vol_{12} = </math> <input style="width: 50px;" type="text" value="5,923"/> cu ft</p> <p><math>D_o = </math> <input style="width: 50px;" type="text" value="1 3/4"/> in <span style="color: red;">As-Built 2" Orifice</span></p>  |

Design Procedure Form: Rain Garden (RG)

Sheet 2 of 2

Designer: JPS  
Company: JPS  
Date: June 19, 2026  
Project: Walden WP2 Filing No. 5  
Location: Rain Garden C4 - As-Built

|   |   |
|---|---|
| <p>5. Impermeable Geomembrane Liner and Geotextile Separator Fabric</p> <p>A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?</p> | <p>Choose One</p> <p><input type="radio"/> YES</p> <p><input checked="" type="radio"/> NO</p>   |
| <p>6. Inlet / Outlet Control</p> <p>A) Inlet Control</p>  | <p>Choose One</p> <p><input type="radio"/> Sheet Flow- No Energy Dissipation Required</p> <p><input checked="" type="radio"/> Concentrated Flow- Energy Dissipation Provided</p>                              |
| <p>7. Vegetation</p>  | <p>Choose One</p> <p><input checked="" type="radio"/> Seed (Plan for frequent weed control)</p> <p><input type="radio"/> Plantings</p> <p><input type="radio"/> Sand Grown or Other High Infiltration Sod</p> |
| <p>8. Irrigation</p> <p>A) Will the rain garden be irrigated?</p>   | <p>Choose One</p> <p><input type="radio"/> YES</p> <p><input type="radio"/> NO</p>  |
| <p>Notes: _____</p> <p>_____</p> <p>_____</p>   |   |

## Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 2

**Designer:** JPS  
**Company:** JPS  
**Date:** June 19, 2026  
**Project:** Walden WP2 Filing No. 5  
**Location:** Rain Garden C12 - As-Built

|  |  |
|--|--|
| <p>1. Basin Storage Volume</p> <p>A) Effective Imperviousness of Tributary Area, <math>I_a</math><br/>(100% if all paved and roofed areas upstream of rain garden)</p> <p>B) Tributary Area's Imperviousness Ratio (<math>i = I_a/100</math>)</p> <p>C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time<br/>(<math>WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)</math>)</p> <p>D) Contributing Watershed Area (including rain garden area)</p> <p>E) Water Quality Capture Volume (WQCV) Design Volume<br/><math>Vol = (WQCV / 12) * Area</math></p> <p>F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm</p> <p>G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume</p> <p>H) User Input of Water Quality Capture Volume (WQCV) Design Volume<br/>(Only if a different WQCV Design Volume is desired)</p> | <p><math>I_a = </math> <input style="width: 50px;" type="text" value="18.1"/> %</p> <p><math>i = </math> <input style="width: 50px;" type="text" value="0.181"/></p> <p>WQCV = <input style="width: 50px;" type="text" value="0.09"/> watershed inches</p> <p>Area = <input style="width: 50px;" type="text" value="1,274,566"/> sq ft</p> <p><math>V_{WQCV} = </math> <input style="width: 50px;" type="text" value="9,123"/> cu ft</p> <p><math>d_6 = </math> <input style="width: 50px;" type="text" value=""/> in</p> <p><math>V_{WQCV\ OTHER} = </math> <input style="width: 50px;" type="text" value=""/> cu ft</p> <p><math>V_{WQCV\ USER} = </math> <input style="width: 50px;" type="text" value=""/> cu ft</p> |
| <p>2. Basin Geometry</p> <p>A) WQCV Depth (12-inch maximum)</p> <p>B) Rain Garden Side Slopes (<math>Z = 4</math> min., horiz. dist per unit vertical)<br/>(Use "0" if rain garden has vertical walls)</p> <p>C) Minimum Flat Surface Area</p> <p>D) Actual Flat Surface Area</p> <p>E) Area at Design Depth (Top Surface Area)</p> <p>F) Rain Garden Total Volume<br/>(<math>V_T = ((A_{Top} + A_{Actual}) / 2) * Depth</math>)</p>   | <p><math>D_{WQCV} = </math> <input style="width: 50px;" type="text" value="12"/> in</p> <p><math>Z = </math> <input style="width: 50px;" type="text" value="4.00"/> ft / ft</p> <p><math>A_{Min} = </math> <input style="width: 50px;" type="text" value="4601"/> sq ft</p> <p><math>A_{Actual} = </math> <input style="width: 50px;" type="text" value="8886"/> sq ft</p> <p><math>A_{Top} = </math> <input style="width: 50px;" type="text" value="10603"/> sq ft</p> <p><math>V_T = </math> <input style="width: 50px;" type="text" value="9,745"/> cu ft</p>   |
| <p>3. Growing Media</p>  | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Choose One</p> <p><input checked="" type="radio"/> 18" Rain Garden Growing Media</p> <p><input type="radio"/> Other (Explain):</p> </div> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-top: 5px;"/>  |
| <p>4. Underdrain System</p> <p>A) Are underdrains provided?</p> <p>B) Underdrain system orifice diameter for 12 hour drain time</p> <p style="margin-left: 20px;">i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice</p> <p style="margin-left: 20px;">ii) Volume to Drain in 12 Hours</p> <p style="margin-left: 20px;">iii) Orifice Diameter, 3/8" Minimum</p>   | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>Choose One</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p> </div> <p><math>y = </math> <input style="width: 50px;" type="text" value="2.0"/> ft</p> <p><math>Vol_{12} = </math> <input style="width: 50px;" type="text" value="9,123"/> cu ft</p> <p><math>D_o = </math> <input style="width: 50px;" type="text" value="2 3/16"/> in <span style="color: red;">As-Built 3" Orifice</span></p>  |

Design Procedure Form: Rain Garden (RG)

Sheet 2 of 2

Designer: JPS  
Company: JPS  
Date: June 19, 2026  
Project: Walden WP2 Filing No. 5  
Location: Rain Garden C12 - As-Built

|   |   |
|---|---|
| <p>5. Impermeable Geomembrane Liner and Geotextile Separator Fabric</p> <p>A) Is an impermeable liner provided due to proximity of structures or groundwater contamination?</p> | <p>Choose One</p> <p><input type="radio"/> YES</p> <p><input checked="" type="radio"/> NO</p>   |
| <p>6. Inlet / Outlet Control</p> <p>A) Inlet Control</p>  | <p>Choose One</p> <p><input type="radio"/> Sheet Flow- No Energy Dissipation Required</p> <p><input checked="" type="radio"/> Concentrated Flow- Energy Dissipation Provided</p>                              |
| <p>7. Vegetation</p>  | <p>Choose One</p> <p><input checked="" type="radio"/> Seed (Plan for frequent weed control)</p> <p><input type="radio"/> Plantings</p> <p><input type="radio"/> Sand Grown or Other High Infiltration Sod</p> |
| <p>8. Irrigation</p> <p>A) Will the rain garden be irrigated?</p>   | <p>Choose One</p> <p><input type="radio"/> YES</p> <p><input type="radio"/> NO</p>  |
| <p>Notes: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>  |   |