

Drainage Memo

To:

From: Christine Baker, PE

Date: January 21, 2022

Re: Mara Meadows – Hester

Project Overview

The Mara Meadows subdivision is accessed from Mineral Ridge Rd. in Bonner County, Idaho. The proposed subdivision consists of 10 lots. Two roads, Happy Meadows, and Sunshine Meadows will be constructed as part of this project.

The Mara Meadows project will add nearly 63,300 SF of gravel roadway:

- **Sunshine Meadows (Sta. 20+75.0 – Sta. 29+27.5):** 852.5-FT long, 22-FT wide roadway with 2-FT shoulders.
- **Happy Meadows (Sta. 62+00.0 – Sta. 65+74.8):** 374.8-FT long, 22-FT wide roadway with 2-FT shoulders.
- **Sunshine Meadows (Sta. 65+74.8 – 75+68.7):** 993.9-FT long, 22-FT wide roadway with 2-FT shoulders ending in a 100-FT Dia. Cul-de-sac.

Drainage Analysis

The proposed design will utilize bioinfiltration to treat all runoff within each delineated basin. Design criteria is listed below. The Bowstring method was used to estimate peak discharge and runoff volume for a 25-Year storm event. An infiltration rate of 0.57 IN/HR was used in the calculations, determined from mapping provided by USGS through Web Soil Survey. Time of Concentration was estimated at 5 min, and the gravel roadway runoff coefficient was estimated at 0.95 with a grass shoulders runoff coefficient of 0.25.

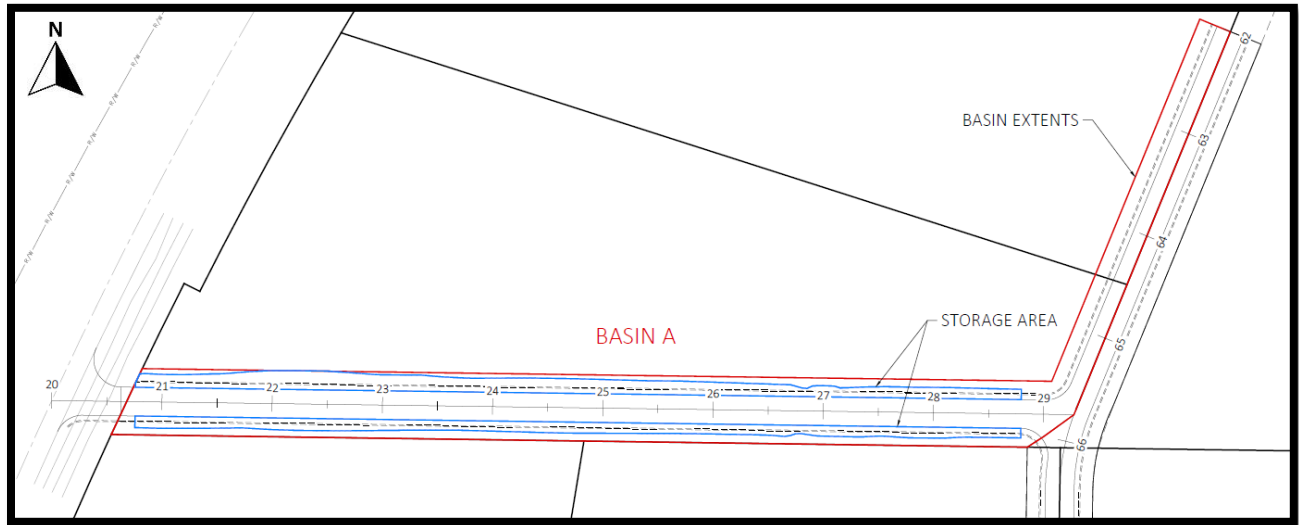
The roadways were broken into three different drainage basins based on the roadway profile:

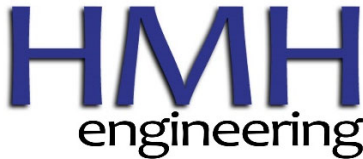
- **Basin A** requires 2,374 CF of roadside storage. A proposed storage volume of 9,780 CF with a 6-IN freeboard is provided.
- **Basin B** requires 3,717 CF of roadside storage. A proposed storage volume of 4,860 CF with a 6-IN freeboard is provided .
- **Basin C** requires 475 CF of roadside storage. A proposed storage volume of 3,296 CF with a 6-IN freeboard is provided.

The peak runoff and volume calculations can be found in the attached tables.

Please contact Christine Baker at 208-635-5825 or cbaker@hmh-llc.com with any questions or concerns.

Basin A




PEAK DISCHARGE AND RUNOFF VOLUME BOWSTRING METHOD
Project Name: *Mara Meadows Basin A*

Designer: C Baker

Date: 1/20/2021

This calculation sheet estimates peak runoff and runoff volumes as described in the April 2008 *Spokane Regional Stormwater Manual*.

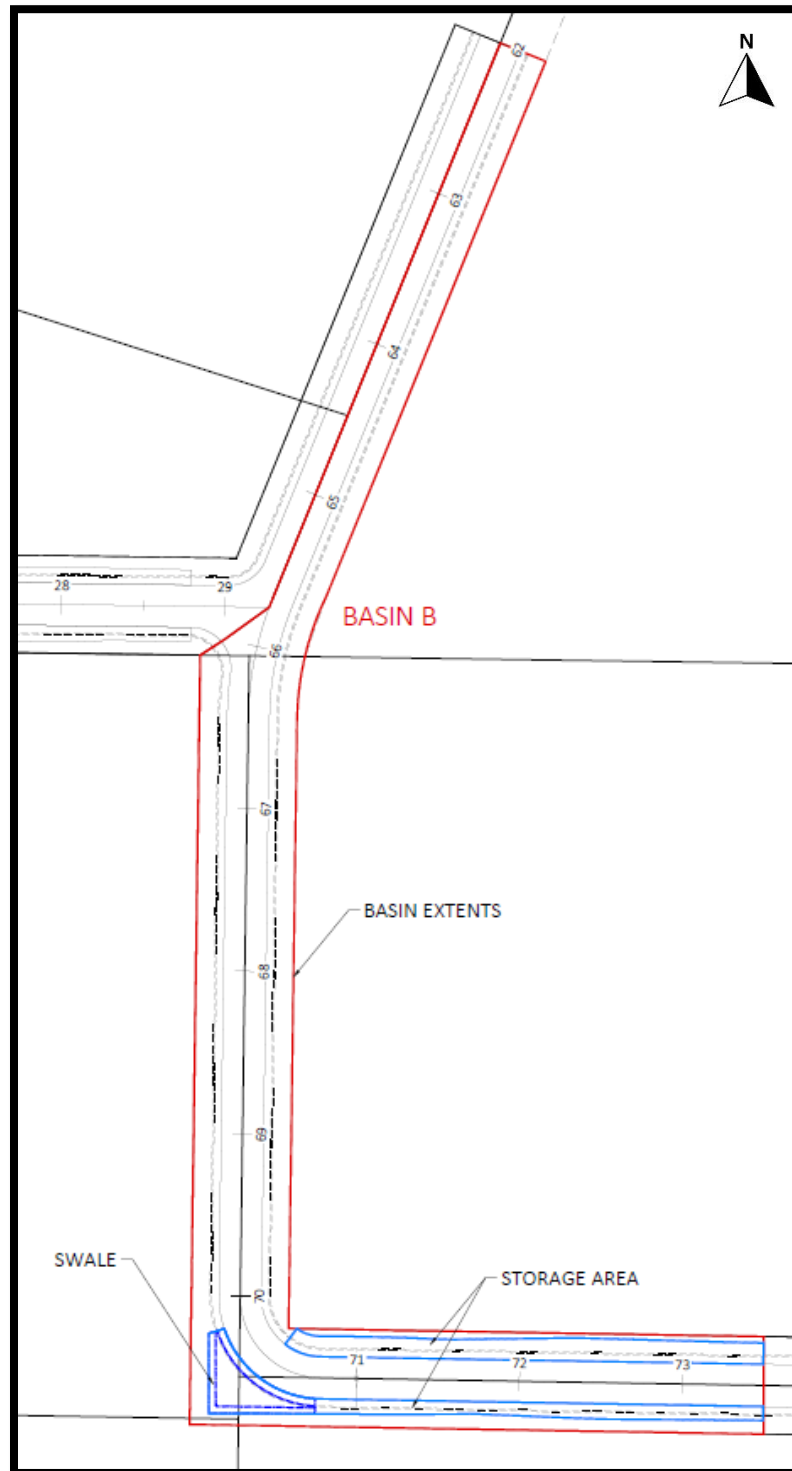
Zone C, 25-YR	
Area (ACRE):	1.414
Time of Conc. (MIN):	5
Weighted "C":	0.56
Outflow (CFS):	0.1056
Detention (CU FT):	—

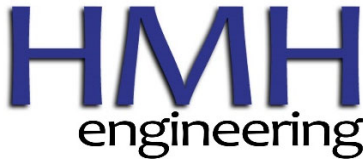
Time (MIN)	Time (SEC)	Intensity (IN/HR)	Q DEV. (CFS)	V In (CU FT)	V Out (CU FT)	Storage (CU FT)
5	300	2.90	2.29	921	32	889
5	300	2.90	2.29	921	32	889
10	600	2.05	1.62	1,137	63	1,073
15	900	1.70	1.34	1,345	95	1,250
20	1,200	1.50	1.18	1,543	127	1,416
25	1,500	1.35	1.07	1,708	158	1,550
30	1,800	1.20	0.95	1,803	190	1,613
35	2,100	1.05	0.83	1,826	222	1,605
40	2,400	0.96	0.76	1,897	253	1,644
45	2,700	0.93	0.73	2,058	285	1,773
50	3,000	0.87	0.69	2,132	317	1,815
55	3,300	0.82	0.65	2,203	348	1,855
60	3,600	0.77	0.61	2,251	380	1,871
70	4,200	0.70	0.55	2,379	443	1,935
80	4,800	0.65	0.51	2,517	507	2,010
90	5,400	0.61	0.48	2,651	570	2,081
100	6,000	0.57	0.45	2,747	633	2,114
120	7,200	0.51	0.40	2,941	760	2,181
180	10,800	0.4	0.32	3,444	1,140	2,304
240	14,400	0.34	0.27	3,894	1,520	2,374
300	18,000	0.29	0.23	4,146	1,900	2,246
360	21,600	0.27	0.21	4,628	2,280	2,348
480	28,800	0.23	0.18	5,250	3,040	2,210
600	36,000	0.19	0.15	5,418	3,800	1,618
720	43,200	0.17	0.13	5,814	4,560	1,254
1,080	64,800	0.13	0.10	6,664	6,840	-176
1,440	86,400	0.11	0.09	7,515	9,120	-1,605

Maximum Storage Required by Bowstring = 2,374

PW: HMH

Basin B




PEAK DISCHARGE AND RUNOFF VOLUME BOWSTRING METHOD
Project Name: *Mara Meadows Basin B*

Designer: C Baker

Date: 1/20/2021

This calculation sheet estimates peak runoff and runoff volumes as described in the April 2008 *Spokane Regional Stormwater Manual*.

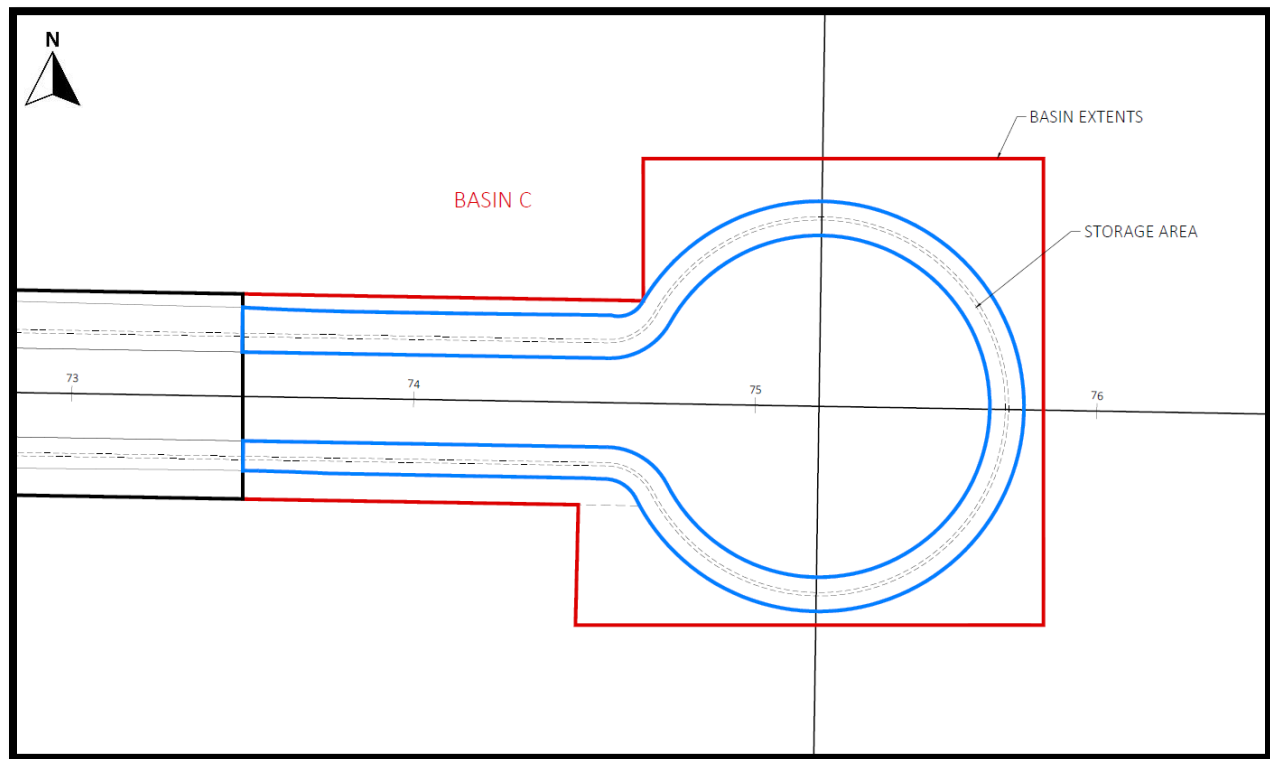
Zone C, 25-YR	
Area (ACRE):	1.3415
Time of Conc. (MIN):	5
Weighted "C":	0.55
Outflow (CFS):	0.0406
Detention (CU FT):	—

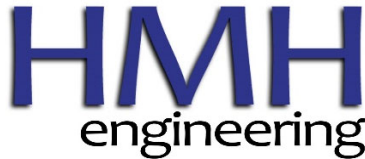
Time (MIN)	Time (SEC)	Intensity (IN/HR)	Q DEV. (CFS)	V In (CU FT)	V Out (CU FT)	Storage (CU FT)
5	300	2.90	2.13	857	12	845
5	300	2.90	2.13	857	12	845
10	600	2.05	1.51	1,058	24	1,033
15	900	1.70	1.25	1,252	37	1,215
20	1,200	1.50	1.10	1,435	49	1,387
25	1,500	1.35	0.99	1,590	61	1,529
30	1,800	1.20	0.88	1,678	73	1,605
35	2,100	1.05	0.77	1,699	85	1,614
40	2,400	0.96	0.71	1,765	97	1,668
45	2,700	0.93	0.68	1,915	110	1,806
50	3,000	0.87	0.64	1,984	122	1,862
55	3,300	0.82	0.60	2,050	134	1,917
60	3,600	0.77	0.57	2,095	146	1,949
70	4,200	0.70	0.51	2,213	170	2,043
80	4,800	0.65	0.48	2,342	195	2,147
90	5,400	0.61	0.45	2,467	219	2,248
100	6,000	0.57	0.42	2,556	243	2,313
120	7,200	0.51	0.37	2,737	292	2,445
180	10,800	0.4	0.29	3,205	438	2,767
240	14,400	0.34	0.25	3,624	584	3,040
300	18,000	0.29	0.21	3,858	730	3,128
360	21,600	0.27	0.20	4,307	876	3,430
480	28,800	0.23	0.17	4,886	1,169	3,717
600	36,000	0.19	0.14	5,042	1,461	3,581
720	43,200	0.17	0.12	5,411	1,753	3,658
1,080	64,800	0.13	0.10	6,201	2,629	3,572
1,440	86,400	0.11	0.08	6,994	3,506	3,488

Maximum Storage Required by Bowstring = 3,717

PW: HMH

Basin C




PEAK DISCHARGE AND RUNOFF VOLUME BOWSTRING METHOD
Project Name: *Mara Meadows Basin C*

Designer: C Baker

Date: 1/20/2021

This calculation sheet estimates peak runoff and runoff volumes as described in the April 2008 *Spokane Regional Stormwater Manual*.

Zone C, 25-YR	
Area (ACRE):	0.5441
Time of Conc. (MIN):	5
Weighted "C":	0.47
Outflow (CFS):	0.0733
Detention (CU FT):	—

Time (MIN)	Time (SEC)	Intensity (IN/HR)	Q DEV. (CFS)	V In (CU FT)	V Out (CU FT)	Storage (CU FT)
5	300	2.90	0.74	299	22	277
5	300	2.90	0.74	299	22	277
10	600	2.05	0.53	370	44	326
15	900	1.70	0.44	438	66	372
20	1,200	1.50	0.39	502	88	414
25	1,500	1.35	0.35	556	110	446
30	1,800	1.20	0.31	586	132	454
35	2,100	1.05	0.27	594	154	440
40	2,400	0.96	0.25	617	176	441
45	2,700	0.93	0.24	669	198	471
50	3,000	0.87	0.22	693	220	473
55	3,300	0.82	0.21	717	242	475
60	3,600	0.77	0.20	732	264	468
70	4,200	0.70	0.18	773	308	466
80	4,800	0.65	0.17	818	352	467
90	5,400	0.61	0.16	862	396	466
100	6,000	0.57	0.15	893	440	454
120	7,200	0.51	0.13	957	528	429
180	10,800	0.4	0.10	1,120	792	329
240	14,400	0.34	0.09	1,266	1,055	211
300	18,000	0.29	0.07	1,348	1,319	29
360	21,600	0.27	0.07	1,505	1,583	-78
480	28,800	0.23	0.06	1,707	2,111	-403
600	36,000	0.19	0.05	1,762	2,639	-877
720	43,200	0.17	0.04	1,891	3,166	-1,276
1,080	64,800	0.13	0.03	2,167	4,750	-2,582
1,440	86,400	0.11	0.03	2,444	6,333	-3,889

Maximum Storage Required by Bowstring = 475

PW: HMH