

CITY OF ALBUQUERQUE

Planning Department
Alan Varela, Interim Director



Mayor Timothy M. Keller

October 18, 2021

Jeremy Shell, P.E.
Respec
5971 Jefferson St. NE
Albuquerque, NM 8710

**RE: Volcano Mesa at The Trails
Conceptual Grading Plan & Drainage Report
Engineer's Stamp Date: No Date
Hydrology File: C18D088**

Dear Mr. Shell:

Based upon the information provided in your submittal received 04/27/2021, the Conceptual Grading Plan and Drainage Report are approved for action by the DRB on Preliminary Platting action.

Prior to Grading Permit and Work Order approval, please ensure that the Grading Plan reflects all drainage items need for the Work Order. The Grading Plan for this submittal will be added to the Work Order set of construction drawings. Also make sure that both the Grading Plan and the Drainage Report is sealed, signed and dated.

As a reminder, if the project total area of disturbance (including the staging area and any work within the adjacent Right-of-Way) is 1 acre or more, then an Erosion and Sediment Control (ESC) Plan and Owner's certified Notice of Intent (NOI) is required to be submitted to the Stormwater Quality Engineer (Doug Hughes, PE, jhughes@cabq.gov, 924-3420) 14 days prior to any earth disturbance.

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov.

Sincerely,

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department



City of Albuquerque

Planning Department
Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: Volcano Mesa at The Trails **Building Permit #:** _____ **Hydrology File #:** _____
DRB#: _____ **EPC#:** _____ **Work Order#:** _____
Legal Description: Tract 2, Unit 2, The Trails
City Address: _____

Applicant: DR Horton **Contact:** _____
Address: _____
Phone#: _____ **Fax#:** _____ **E-mail:** _____

Other Contact: RESPEC **Contact:** Jeremy Shell
Address: 5971 Jefferson Street NE, Suite 101, Albuquerque NM 87109
Phone#: 505.918.1053 **Fax#:** _____ **E-mail:** jeremy.shell@respec.com

TYPE OF DEVELOPMENT: ☒ (72) PLAT (# of lots) _____ RESIDENCE _____ DRB SITE _____ ADMIN SITE _____

IS THIS A RESUBMITTAL? _____ Yes ☒ No

DEPARTMENT _____ TRANSPORTATION ☒ HYDROLOGY/DRAINAGE

Check all that Apply:

TYPE OF SUBMITTAL:

- ☐ ENGINEER/ARCHITECT CERTIFICATION
- ☐ PAD CERTIFICATION
- ☒ CONCEPTUAL G & D PLAN
- ☐ GRADING PLAN
- ☐ DRAINAGE REPORT
- ☐ DRAINAGE MASTER PLAN
- ☐ FLOODPLAIN DEVELOPMENT PERMIT APPLIC
- ☐ ELEVATION CERTIFICATE
- ☐ CLOMR/LOMR
- ☐ TRAFFIC CIRCULATION LAYOUT (TCL)
- ☐ TRAFFIC IMPACT STUDY (TIS)
- ☐ STREET LIGHT LAYOUT
- ☐ OTHER (SPECIFY) _____
- ☐ PRE-DESIGN MEETING?

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

- ☐ BUILDING PERMIT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY
- ☒ PRELIMINARY PLAT APPROVAL
- ☐ SITE PLAN FOR SUB'D APPROVAL
- ☐ SITE PLAN FOR BLDG. PERMIT APPROVAL
- ☒ FINAL PLAT APPROVAL
- ☐ SIA/ RELEASE OF FINANCIAL GUARANTEE
- ☐ FOUNDATION PERMIT APPROVAL
- ☒ GRADING PERMIT APPROVAL
- ☐ SO-19 APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ GRADING/ PAD CERTIFICATION
- ☐ WORK ORDER APPROVAL
- ☐ CLOMR/LOMR
- ☐ FLOODPLAIN DEVELOPMENT PERMIT
- ☐ OTHER (SPECIFY) _____

DATE SUBMITTED: 7/29/21 **By:** Jeremy Shell

COA STAFF:

ELECTRONIC SUBMITTAL RECEIVED: _____

FEE PAID: _____

TRACT 2 AT THE TRAILS

DRAINAGE REPORT

PREPARED FOR

DR Horton, Inc.
4400 Alameda Blvd. Suite B
Albuquerque, NM 87113

PREPARED BY

RESPEC, Inc.
5971 Jefferson St. NE,
Suite 101
Albuquerque, NM 87109

SEPTEMBER 2021

Project Number W0021.01

City of Albuquerque
Planning Department
Development Review Services
HYDROLOGY SECTION
PRELIMINARY APPROVED
DATE: 10/18/21
BY: *Renée C. Brissette*
HydroTrans # C09D001H

THESE PLANS AND/OR REPORT ARE
CONCEPTUAL ONLY. MORE INFORMATION MAY
BE NEEDED IN THEM AND SUBMITTED TO
HYDROLOGY FOR BUILDING PERMIT APPROVAL.





I, Jeremy Shell, do hereby certify that this report was duly prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

Jeremy Shell P.E.
NMPE No. 26341

Date

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1.0 INTRODUCTION

1.1 PURPOSE

This drainage report provides the rationale and calculations to effectively manage storm water runoff for the 100-year 24-hour storm event for the proposed tract 2 at the trials Development using a system of street and storm drainage improvements.

1.2 LOCATION AND DESCRIPTION

The proposed Tract 2 Subdivision is approximately 10.39 acres. The tract 2 development is located south of Paseo Del Norte Blvd and west of Universe Blvd. The proposed development will be comprised of single-family housing with the appropriate infrastructure constituents.



FIGURE 1.2.1— PROJECT LOCATION

2.0 DESIGN CRITERIA / ASSUMPTIONS

- On site storm drain systems are designed using the 100-year 24-hour design storm.
- Storm runoff conveyed in residential streets shall not exceed a depth of 0.2 feet above the top of curb in the 100-year storm event.
- Flow depths in the event of the 10-year design storm will not exceed 0.5 feet in any collector or arterial street. One lane free of flowing or standing water in each traffic direction will be preserved on arterial streets.
- The product of depth times velocity will not exceed 6.5 in any street conveyance location in the event of a 10-year design storm.

3.0 HYDROLOGY

Hydrologic modeling was performed using the Arid Lands Hydrologic Model, (AHYMO S-4) released in April 2018. The results for the proposed models along with sub-basin maps can be found in **Appendix A**. Hydrologic analysis conforms to Albuquerque Development Process Manual (DPM) Volume II Chapter 22 Section 3, October 2008 Revision.

3.1 EXISTING CONDITIONS

The site is predominantly undisturbed sandy soils with slopes ranging from 0% to 10%. The site is moderately vegetated with various native shrubs and grasses. The site drains to the southwest corner of tract 2 including Basin F7 from tract 3 per revised hydraulic addendum to the amendment to the trails DMP trails units 1,2, and 3. The table below shows the existing sub-basins analysis results.

TABLE 3.1.1 – PROPOSED SUB-BASINS RESULTS

Subbasin	A (ac)	Q (cfs)	V (ac ft)	Q/A (cfs/ac)
EXISTING	10.40	12.14	0.336	1.17

3.2 PROPOSED CONDITIONS

Upon development, the site is to be divided into three sub-basins as depicted in Exhibit A under **Appendix A**. A high point generally divides stormwater runoff towards the southwest and southeast area of the site. The sub-basins are Subbasin A, Subbasin B, and Subbasin C. Subbasin A and Subbasin B will surface drain to a low point in subbasin C which is at the southwest corner of the property. The flows will be picked up via inlets and conveyed to the existing Pond F5 via a 42" CMP storm drain. Pond F5 is located at the southwest corner of Oak Ridge St and Hearthstone Rd per revised hydraulic addendum to the amendment to the trails DMP trails units 1,2, and 3. There will be 30" storm drain connection for the future development to the adjacent property tract 3 located east of tract 2.

The table below shows the proposed sub-basins analysis results. The full analysis and results can be found in **Appendix A**.

TABLE 3.2.1 – PROPOSED SUB-BASINS RESULTS

Subbasin	A (ac)	Q (cfs)	V (ac ft)	Q/A (cfs/ac)
SUBBASIN A	4.04	13.8	0.6	3.42
SUBBASIN B	4.73	16.21	0.705	3.43
SUBBASIN C	1.63	5.48	0.238	3.36
TOTAL	10.4	35.49	1.543	3.41

4.0 HYDRAULICS

Hydraulic analysis to determine peak flow rates for street capacities and storm drain systems conforms to Albuquerque Development Process Manual (DPM) Volume II Chapter 22 Section 3, October 2008 Revision.

4.1 STREETS

Runoff quantities for the hydraulic design of Tract 2 are those calculated by the AHYMO hydrologic model. Street capacities were checked at certain locations throughout the roadways where flow runoff rates are critical.

The maximum street capacity was determined for a given street section using Manning Solver Version 0.497 ft to ensure the design criteria mentioned in Section 2 of this report were met. Calculations for street capacities are shown in **Appendix B**.

4.2 STORM INLETS AND STORM DRAINS

Flow quantities intercepted by curb inlets were determined using the Albuquerque DPM grating capacities rating curves for the appropriate inlets. The storm drains were sized using Manning Solver. Inlet and storm drain capacity calculations can be found in **Appendix E**.

5.0 CONCLUSION

The analysis performed for this drainage report demonstrates that the capacity of the proposed drainage system will match the requirements for a 100-year 24-hour storm event for the development of tract 2 at the trails using the requirements set forth by the Albuquerque DPM.

6.0 REFERENCES

- **City of Albuquerque** "Albuquerque DPM" *Drainage, Flood Control and Erosion, chapter 22.*
- **National Oceanic and Atmosphere Administration** "Point Precipitation Frequency Estimates" *NOAA Atlas 14, Volume 1, Version 5 Location name: Los Lunas, New Mexico, USA* Latitude: 34.8131°, Longitude: -106.7313°*
- **NRCS** – "National Engineering Handbook" Website Address –
<https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/hydrology/?cid=stelprdb1043063>



APPENDIX A

HYDROLOGY



AHYMO

INPUT

```

* 100 YEAR RAINFALL TABLE
RAINFALL          TYPE=13  RAIN QUARTER=0.0
                  RAIN ONE=1.69 IN  RAIN SIX=2.17 IN
                  RAIN DAY=2.49 IN  DT=0.05 HR
*****
*S EXISTING CONDITIONS

*S  COMPUTE HYD EXISTING
COMPUTE NM HYD    ID=1  HYDNO=101  DA=0.0163SQ MI
                  PER A=100  PER B=0    PER C=0    PER D=0
                  TP=-0.13  RAIN=-1
PRINT HYD         ID=1  CODE=10

*****

*S  PROPOSED CONDITIONS

*S  COMPUTE HYD PROPOSED SUBBASIN A
COMPUTE NM HYD    ID=2  HYDNO=102  DA=0.0063SQ MI
                  PER A=0    PER B=15   PER C=15   PER D=70
                  TP=-0.13  RAIN=-1
PRINT HYD         ID=2  CODE=10

*S  COMPUTE HYD PROPOSED SUBBASIN B
COMPUTE NM HYD    ID=3  HYDNO=103  DA=0.0074SQ MI
                  PER A=0    PER B=15   PER C=15   PER D=70
                  TP=-0.13  RAIN=-1
PRINT HYD         ID=3  CODE=10

*S  COMPUTE HYD PROPOSED SUBBASIN C
COMPUTE NM HYD    ID=4  HYDNO=104  DA=0.0025SQ MI
                  PER A=0    PER B=15   PER C=15   PER D=70
                  TP=-0.13  RAIN=-1
PRINT HYD         ID=4  CODE=10

*****

FINISH

```



AHYMO

OUTPUT

AHYMO PROGRAM (AHYMO-S4) - Version: S4.02a - Rel:
02a
RUN DATE (MON/DAY/YR) = 09/17/2021
START TIME (HR:MIN:SEC) = 10:41:14 USER NO.=
AHYMO-S4TempUser05901704
INPUT FILE = N:\CDS Library\Engineering Tools\AHYMO-S4\Input.HMI

* 100 YEAR RAINFALL TABLE

RAINFALL TYPE=13 RAIN QUARTER=0.0
RAIN ONE=1.69 IN RAIN SIX=2.17 IN
RAIN DAY=2.49 IN DT=0.05 HR

COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS
2 - PEAK AT 1.40 HR.

DT =	0.050000 HOURS	END TIME =	24.000002 HOURS
0.0000	0.0056	0.0114	0.0173
0.0023	0.0079	0.0137	0.0196
0.0046	0.0102	0.0160	0.0219
0.0069	0.0125	0.0183	0.0242
0.0092	0.0148	0.0206	0.0265
0.0115	0.0171	0.0229	0.0288
0.0138	0.0194	0.0252	0.0311
0.0161	0.0217	0.0275	0.0334
0.0184	0.0240	0.0298	0.0357
0.0207	0.0263	0.0321	0.0380
0.0230	0.0286	0.0344	0.0403
0.0253	0.0309	0.0367	0.0426
0.0276	0.0332	0.0390	0.0449
0.0299	0.0355	0.0413	0.0472
0.0322	0.0378	0.0436	0.0495
0.0345	0.0401	0.0459	0.0518
0.0368	0.0424	0.0482	0.0541
0.0391	0.0447	0.0505	0.0564
0.0414	0.0470	0.0528	0.0587
0.0437	0.0493	0.0551	0.0610
0.0460	0.0516	0.0574	0.0633
0.0483	0.0539	0.0597	0.0656
0.0506	0.0562	0.0620	0.0679
0.0529	0.0585	0.0643	0.0702
0.0552	0.0608	0.0666	0.0725
0.0575	0.0631	0.0689	0.0748
0.0598	0.0654	0.0712	0.0771
0.0621	0.0677	0.0735	0.0794
0.0644	0.0700	0.0758	0.0817
0.0667	0.0723	0.0781	0.0840
0.0690	0.0746	0.0804	0.0863
0.0713	0.0769	0.0827	0.0886
0.0736	0.0792	0.0850	0.0909
0.0759	0.0815	0.0873	0.0932
0.0782	0.0838	0.0896	0.0955
0.0805	0.0861	0.0919	0.0978
0.0828	0.0884	0.0942	0.1001
0.0851	0.0907	0.0965	0.1024
0.0874	0.0930	0.0988	0.1047
0.0897	0.0953	0.1011	0.1070
0.0920	0.0976	0.1034	0.1093
0.0943	0.0999	0.1057	0.1116
0.0966	0.1022	0.1080	0.1139
0.0989	0.1045	0.1103	0.1162
0.1012	0.1068	0.1126	0.1185
0.1035	0.1091	0.1149	0.1208
0.1058	0.1114	0.1172	0.1231
0.1081	0.1137	0.1195	0.1254
0.1104	0.1160	0.1218	0.1277
0.1127	0.1183	0.1241	0.1300
0.1150	0.1206	0.1264	0.1323
0.1173	0.1229	0.1287	0.1346
0.1196	0.1252	0.1310	0.1369
0.1219	0.1275	0.1333	0.1392
0.1242	0.1298	0.1356	0.1415
0.1265	0.1321	0.1379	0.1438
0.1288	0.1344	0.1402	0.1461
0.1311	0.1367	0.1425	0.1484
0.1334	0.1390	0.1448	0.1507
0.1357	0.1413	0.1471	0.1530
0.1380	0.1436	0.1494	0.1553
0.1403	0.1459	0.1517	0.1576
0.1426	0.1482	0.1540	0.1599
0.1449	0.1505	0.1563	0.1622
0.1472	0.1528	0.1586	0.1645
0.1495	0.1551	0.1609	0.1668
0.1518	0.1574	0.1632	0.1691
0.1541	0.1597	0.1655	0.1714
0.1564	0.1620	0.1678	0.1737
0.1587	0.1643	0.1701	0.1760
0.1610	0.1666	0.1724	0.1783
0.1633	0.1689	0.1747	0.1806
0.1656	0.1712	0.1770	0.1829
0.1679	0.1735	0.1793	0.1852
0.1702	0.1758	0.1816	0.1875
0.1725	0.1781	0.1839	0.1898
0.1748	0.1804	0.1862	0.1921
0.1771	0.1827	0.1885	0.1944
0.1794	0.1850	0.1908	0.1967
0.1817	0.1873	0.1931	0.1990
0.1840	0.1896	0.1954	0.2013
0.1863	0.1919	0.1977	0.2036
0.1886	0.1942	0.2000	0.2059
0.1909	0.1965	0.2023	0.2082
0.1932	0.1988	0.2046	0.2105
0.1955	0.2011	0.2069	0.2128
0.1978	0.2034	0.2092	0.2151
0.2001	0.2057	0.2115	0.2174
0.2024	0.2080	0.2138	0.2197
0.2047	0.2103	0.2161	0.2220
0.2070	0.2126	0.2184	0.2243
0.2093	0.2149	0.2207	0.2266
0.2116	0.2172	0.2230	0.2289
0.2139	0.2195	0.2253	0.2312
0.2162	0.2218	0.2276	0.2335
0.2185	0.2241	0.2299	0.2358
0.2208	0.2264	0.2322	0.2381
0.2231	0.2287	0.2345	0.2404
0.2254	0.2310	0.2368	0.2427
0.2277	0.2333	0.2391	0.2450
0.2300	0.2356	0.2414	0.2473
0.2323	0.2379	0.2437	0.2496
0.2346	0.2402	0.2460	0.2519
0.2369	0.2425	0.2483	0.2542
0.2392	0.2448	0.2506	0.2565
0.2415	0.2471	0.2529	0.2588
0.2438	0.2494	0.2552	0.2611
0.2461	0.2517	0.2575	0.2634
0.2484	0.2540	0.2598	0.2657
0.2507	0.2563	0.2621	0.2680
0.2530	0.2586	0.2644	0.2703
0.2553	0.2609	0.2667	0.2726
0.2576	0.2632	0.2690	0.2749
0.2599	0.2655	0.2713	0.2772
0.2622	0.2678	0.2736	0.2795
0.2645	0.2701	0.2759	0.2818
0.2668	0.2724	0.2782	0.2841
0.2691	0.2747	0.2805	0.2864
0.2714	0.2770	0.2828	0.2887
0.2737	0.2793	0.2851	0.2910
0.2760	0.2816	0.2874	0.2933
0.2783	0.2839	0.2897	0.2956
0.2806	0.2862	0.2920	0.2979
0.2829	0.2885	0.2943	0.3002
0.2852	0.2908	0.2966	0.3025
0.2875	0.2931	0.2989	0.3048
0.2898	0.2954	0.3012	0.3071
0.2921	0.2977	0.3035	0.3094
0.2944	0.3000	0.3058	0.3117
0.2967	0.3023	0.3081	0.3140
0.2990	0.3046	0.3104	0.3163
0.3013	0.3069	0.3127	0.3186
0.3036	0.3092	0.3150	0.3209
0.3059	0.3115	0.3173	0.3232
0.3082	0.3138	0.3196	0.3255
0.3105	0.3161	0.3219	0.3278
0.3128	0.3184	0.3242	0.3301
0.3151	0.3207	0.3265	0.3324
0.3174	0.3230	0.3288	0.3347
0.3197	0.3253	0.3311	0.3370
0.3220	0.3276	0.3334	0.3393
0.3243	0.3299	0.3357	0.3416
0.3266	0.3322	0.3380	0.3439
0.3289	0.3345	0.3403	0.3462
0.3312	0.3368	0.3426	0.3485
0.3335	0.3391	0.3449	0.3508
0.3358	0.3414	0.3472	0.3531
0.3381	0.3437	0.3495	0.3554
0.3404	0.3460	0.3518	0.3577
0.3427	0.3483	0.3541	0.3600
0.3450	0.3506	0.3564	0.3623
0.3473	0.3529	0.3587	0.3646
0.3496	0.3552	0.3610	0.3669
0.3519	0.3575	0.3633	0.3692
0.3542	0.3598	0.3656	0.3715
0.3565	0.3621	0.3679	0.3738
0.3588	0.3644	0.3702	0.3761
0.3611	0.3667	0.3725	0.3784
0.3634	0.3690	0.3748	0.3807
0.3657	0.3713	0.3771	0.3830
0.3680	0.3736	0.3794	0.3853
0.3703	0.3759	0.3817	0.3876
0.3726	0.3782	0.3840	0.3899
0.3749	0.3805	0.3863	0.3922
0.3772	0.3828	0.3886	0.3945
0.3795	0.3851	0.3909	0.3968
0.3818	0.3874	0.3932	0.3991
0.3841	0.3897	0.3955	0.4014
0.3864	0.3920	0.3978	0.4037
0.3887	0.3943	0.4001	0.4060
0.3910	0.3966	0.4024	0.4083
0.3933	0.3989	0.4047	0.4106
0.3956	0.4012	0.4070	0.4129
0.3979	0.4035	0.4093	0.4152
0.4002	0.4058	0.4116	0.4175
0.4025	0.4081	0.4139	0.4198
0.4048	0.4104	0.4162	0.4221
0.4071	0.4127	0.4185	0.4244
0.4094	0.4150	0.4208	0.4267
0.4117	0.4173	0.4231	0.4290
0.4140	0.4196	0.4254	0.4313
0.4163	0.4219	0.4277	0.4336
0.4186	0.4242	0.4300	0.4359
0.4209	0.4265	0.4323	0.4382
0.4232	0.4288	0.4346	0.4405
0.4255	0.4311	0.4369	0.4428
0.4278	0.4334	0.4392	0.4451
0.4301	0.4357	0.4415	0.4474
0.4324	0.4380	0.4438	0.4497
0.4347	0.4403	0.4461	0.4520
0.4370	0.4426	0.4484	0.4543
0.4393	0.4449	0.4507	0.4566
0.4416	0.4472	0.4530	0.4589
0.4439	0.4495	0.4553	0.4612
0.4462	0.4518	0.4576	0.4635
0.4485	0.4541	0.4599	0.4658
0.4508	0.4564	0.4622	0.4681
0.4531	0.4587	0.4645	0.4704
0.4554	0.4610	0.4668	0.4727
0.4577	0.4633	0.4691	0.4750
0.4600	0.4656	0.4714	0.4773
0.4623	0.4679	0.4737	0.4796
0.4646	0.4702	0.4760	0.4819
0.4669	0.4725	0.4783	0.4842
0.4692	0.4748	0.4806	0.4865
0.4715	0.4771	0.4829	0.4888
0.4738	0.4794	0.4852	0.4911
0.4761	0.4817	0.4875	0.4934
0.4784	0.4840	0.4898	0.4957
0.4807	0.4863	0.4921	0.4980
0.4830	0.4886	0.4944	0.5003
0.4853	0.4909	0.4967	0.5026
0.4876	0.4932	0.4990	0.5049
0.4899	0.4955	0.5013	0.5072
0.4922	0.4978	0.5036	0.5095
0.4945	0.5001	0.5059	0.5118
0.4968	0.5024	0.5082	0.5141
0.4991	0.5047	0.5105	0.5164
0.5014	0.5070	0.5128	0.5187
0.5037	0.5093	0.5151	0.5210
0.5060	0.5116	0.5174	0.5233
0.5083	0.5139	0.5197	0.5256
0.5106	0.5162	0.5220	0.5279
0.5129	0.5185	0.5243	0.5302
0.5152	0.5208	0.5266	0.5325
0.5175	0.5231	0.5289	0.5348
0.5198	0.5254	0.5312	0.5371
0.5221	0.5277	0.5335	0.5394
0.5244	0.5300	0.5358	0.5417
0.5267	0.5323	0.5381	0.5440
0.5290	0.5346	0.5404	0.5463
0.5313	0.5369	0.5427	0.5486
0.5336	0.5392	0.5450	0.5509
0.5359	0.5415	0.5473	0.5532
0.5382	0.5438	0.5496	0.5555
0.5405	0.5461	0.5519	0.5578
0.5428	0.5484	0.5542	0.5601
0.5451	0.5507	0.5565	0.5624
0.5474	0.5530	0.5588	0.5647
0.5497	0.5553	0.5611	0.5670
0.5520	0.5576	0.5634	0.5693
0.5543	0.5599	0.5657	0.5716
0.5566	0.5622	0.5680	0.5739
0.5589			

2.2923	2.2933	2.2943	2.2953	2.2963	2.2973	2.2983
2.2992	2.3002	2.3012	2.3022	2.3032	2.3041	2.3051
2.3061	2.3071	2.3080	2.3090	2.3099	2.3109	2.3119
2.3128	2.3138	2.3147	2.3157	2.3166	2.3175	2.3185
2.3194	2.3204	2.3213	2.3222	2.3232	2.3241	2.3250
2.3259	2.3268	2.3278	2.3287	2.3296	2.3305	2.3314
2.3323	2.3332	2.3341	2.3350	2.3359	2.3368	2.3377
2.3386	2.3395	2.3404	2.3413	2.3422	2.3430	2.3439
2.3448	2.3457	2.3466	2.3474	2.3483	2.3492	2.3500
2.3509	2.3518	2.3526	2.3535	2.3543	2.3552	2.3560
2.3569	2.3577	2.3586	2.3594	2.3603	2.3611	2.3620
2.3628	2.3636	2.3645	2.3653	2.3661	2.3670	2.3678
2.3686	2.3695	2.3703	2.3711	2.3719	2.3727	2.3735
2.3744	2.3752	2.3760	2.3768	2.3776	2.3784	2.3792
2.3800	2.3808	2.3816	2.3824	2.3832	2.3840	2.3848
2.3856	2.3864	2.3872	2.3880	2.3887	2.3895	2.3903
2.3911	2.3919	2.3926	2.3934	2.3942	2.3950	2.3957
2.3965	2.3973	2.3980	2.3988	2.3996	2.4003	2.4011
2.4019	2.4026	2.4034	2.4041	2.4049	2.4056	2.4064
2.4071	2.4079	2.4086	2.4094	2.4101	2.4109	2.4116
2.4123	2.4131	2.4138	2.4145	2.4153	2.4160	2.4167
2.4175	2.4182	2.4189	2.4197	2.4204	2.4211	2.4218
2.4225	2.4233	2.4240	2.4247	2.4254	2.4261	2.4268
2.4276	2.4283	2.4290	2.4297	2.4304	2.4311	2.4318
2.4325	2.4332	2.4339	2.4346	2.4353	2.4360	2.4367
2.4374	2.4381	2.4388	2.4395	2.4402	2.4408	2.4415
2.4422	2.4429	2.4436	2.4443	2.4450	2.4456	2.4463
2.4470	2.4477	2.4483	2.4490	2.4497	2.4504	2.4510
2.4517	2.4524	2.4530	2.4537	2.4544	2.4550	2.4557
2.4564	2.4570	2.4577	2.4583	2.4590	2.4597	2.4603
2.4610	2.4616	2.4623	2.4629	2.4636	2.4642	2.4649
2.4655	2.4662	2.4668	2.4675	2.4681	2.4687	2.4694
2.4700	2.4707	2.4713	2.4719	2.4726	2.4732	2.4739
2.4745	2.4751	2.4757	2.4764	2.4770	2.4776	2.4783
2.4789	2.4795	2.4801	2.4808	2.4814	2.4820	2.4826
2.4832	2.4839	2.4845	2.4851	2.4857	2.4863	2.4869
2.4876	2.4882	2.4888	2.4894	2.4900		

*S EXISTING CONDITIONS

*S COMPUTE HYD EXISTING

COMPUTE NM HYD ID=1 HYDNO=101 DA=0.0163SQ MI

PER A=100 PER B=0 PER C=0 PER D=0

TP=-0.13 RAIN=-1

K = 0.164057HR TP = 0.130000HR K/TP RATIO = 1.261977
 SHAPE CONSTANT, N = 2.829292
 UNIT PEAK = 33.553 CFS UNIT VOLUME = 0.9973 B =
 267.60 P60 = 1.6900
 AREA = 0.016300 SQ MI IA = 0.65000 INCHES INF = 1.67000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=1 CODE=10

PARTIAL HYDROGRAPH 101.00

TIME	FLOW	TIME	FLOW	TIME	FLOW
TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS
HRS	CFS	HRS	CFS	HRS	CFS
0.000	0.0	1.000	0.0	2.000	1.1
3.000	0.1	4.000	0.0		
0.500	0.0	1.500	12.1	2.500	0.4
3.500	0.1	4.500	0.0		

RUNOFF VOLUME = 0.38662 INCHES = 0.3361 ACRE-FEET
 PEAK DISCHARGE RATE = 12.14 CFS AT 1.500 HOURS BASIN AREA =
 0.0163 SQ. MI.

*S PROPOSED CONDITIONS

*S COMPUTE HYD PROPOSED SUBBASIN A

COMPUTE NM HYD ID=2 HYDNO=102 DA=0.0063SQ MI

PER A=0 PER B=15 PER C=15 PER D=70

TP=-0.13 RAIN=-1

K = 0.070850HR TP = 0.130000HR K/TP RATIO = 0.545000
 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 17.853 CFS UNIT VOLUME = 0.9988 B =

526.28 P60 = 1.6900
 AREA = 0.004410 SQ MI IA = 0.10000 INCHES INF = 0.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

K = 0.116052HR TP = 0.130000HR K/TP RATIO = 0.892706
 SHAPE CONSTANT, N = 3.971978
 UNIT PEAK = 5.1365 CFS UNIT VOLUME = 0.9991 B =
 353.30 P60 = 1.6900
 AREA = 0.001890 SQ MI IA = 0.42500 INCHES INF = 1.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=2 CODE=10

PARTIAL HYDROGRAPH 102.00

TIME	FLOW	TIME	FLOW	TIME	FLOW
TIME	FLOW	TIME	FLOW		
HRS	CFS	HRS	CFS	HRS	CFS
HRS	CFS	HRS	CFS		
0.000	0.0	5.000	0.1	10.000	0.1
15.000	0.0	20.000	0.0		
0.500	0.0	5.500	0.1	10.500	0.1
15.500	0.0	20.500	0.0		
1.000	0.5	6.000	0.1	11.000	0.1
16.000	0.0	21.000	0.0		
1.500	13.8	6.500	0.1	11.500	0.1
16.500	0.0	21.500	0.0		
2.000	2.9	7.000	0.1	12.000	0.1
17.000	0.0	22.000	0.0		
2.500	0.4	7.500	0.1	12.500	0.1
17.500	0.0	22.500	0.0		
3.000	0.2	8.000	0.1	13.000	0.1
18.000	0.0	23.000	0.0		
3.500	0.1	8.500	0.1	13.500	0.1
18.500	0.0	23.500	0.0		
4.000	0.1	9.000	0.1	14.000	0.0
19.000	0.0	24.000	0.0		
4.500	0.1	9.500	0.1	14.500	0.0
19.500	0.0	24.500	0.0		

RUNOFF VOLUME = 1.78638 INCHES = 0.6002 ACRE-FEET
 PEAK DISCHARGE RATE = 13.80 CFS AT 1.500 HOURS BASIN AREA =
 0.0063 SQ. MI.

*S COMPUTE HYD PROPOSED SUBBASIN B

COMPUTE NM HYD ID=3 HYDNO=103 DA=0.0074SQ MI

PER A=0 PER B=15 PER C=15 PER D=70

TP=-0.13 RAIN=-1

K = 0.070850HR TP = 0.130000HR K/TP RATIO = 0.545000
SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 20.970 CFS UNIT VOLUME = 0.9988 B =
526.28 P60 = 1.6900
AREA = 0.005180 SQ MI IA = 0.10000 INCHES INF = 0.04000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

K = 0.116052HR TP = 0.130000HR K/TP RATIO = 0.892706
SHAPE CONSTANT, N = 3.971978
UNIT PEAK = 6.0333 CFS UNIT VOLUME = 0.9995 B =
353.30 P60 = 1.6900
AREA = 0.002220 SQ MI IA = 0.42500 INCHES INF = 1.04000
INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
DT = 0.050000

PRINT HYD ID=3 CODE=10

PARTIAL HYDROGRAPH 103.00

TIME	FLOW	TIME	FLOW	TIME	FLOW
TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS
HRS	CFS	HRS	CFS	HRS	CFS
0.000	0.0	5.000	0.1	10.000	0.1
15.000	0.1	20.000	0.0		
0.500	0.0	5.500	0.1	10.500	0.1
15.500	0.1	20.500	0.0		
1.000	0.6	6.000	0.2	11.000	0.1
16.000	0.1	21.000	0.0		
1.500	16.2	6.500	0.1	11.500	0.1
16.500	0.1	21.500	0.0		
2.000	3.4	7.000	0.1	12.000	0.1
17.000	0.1	22.000	0.0		
2.500	0.5	7.500	0.1	12.500	0.1
17.500	0.1	22.500	0.0		
3.000	0.2	8.000	0.1	13.000	0.1
18.000	0.1	23.000	0.0		
3.500	0.2	8.500	0.1	13.500	0.1

18.500	0.0	23.500	0.0		
4.000	0.1	9.000	0.1	14.000	0.1
19.000	0.0	24.000	0.0		
4.500	0.1	9.500	0.1	14.500	0.1
19.500	0.0	24.500	0.0		

RUNOFF VOLUME = 1.78638 INCHES = 0.7050 ACRE-Feet
 PEAK DISCHARGE RATE = 16.21 CFS AT 1.500 HOURS BASIN AREA = 0.0074 SQ. MI.

*S COMPUTE HYD PROPOSED SUBBASIN C

COMPUTE NM HYD ID=4 HYDNO=104 DA=0.0025SQ MI

PER A=0 PER B=15 PER C=15 PER D=70

TP=-0.13 RAIN=-1

K = 0.070850HR TP = 0.130000HR K/TP RATIO = 0.545000
 SHAPE CONSTANT, N = 7.106428
 UNIT PEAK = 7.0845 CFS UNIT VOLUME = 0.9980 B = 526.28
 P60 = 1.6900
 AREA = 0.001750 SQ MI IA = 0.10000 INCHES INF = 0.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

K = 0.116052HR TP = 0.130000HR K/TP RATIO = 0.892706
 SHAPE CONSTANT, N = 3.971978
 UNIT PEAK = 2.0383 CFS UNIT VOLUME = 0.9956 B = 353.30
 P60 = 1.6900
 AREA = 0.000750 SQ MI IA = 0.42500 INCHES INF = 1.04000
 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD -
 DT = 0.050000

PRINT HYD ID=4 CODE=10

PARTIAL HYDROGRAPH 104.00

TIME	FLOW	TIME	FLOW	TIME	FLOW
TIME	FLOW	TIME	FLOW		
HRS	CFS	HRS	CFS	HRS	CFS
HRS	CFS	HRS	CFS		
0.000	0.0	5.000	0.0	10.000	0.0
15.000	0.0	20.000	0.0		

0.500	0.0	5.500	0.0	10.500	0.0
15.500	0.0	20.500	0.0		
1.000	0.2	6.000	0.1	11.000	0.0
16.000	0.0	21.000	0.0		
1.500	5.5	6.500	0.0	11.500	0.0
16.500	0.0	21.500	0.0		
2.000	1.2	7.000	0.0	12.000	0.0
17.000	0.0	22.000	0.0		
2.500	0.2	7.500	0.0	12.500	0.0
17.500	0.0	22.500	0.0		
3.000	0.1	8.000	0.0	13.000	0.0
18.000	0.0	23.000	0.0		
3.500	0.1	8.500	0.0	13.500	0.0
18.500	0.0	23.500	0.0		
4.000	0.0	9.000	0.0	14.000	0.0
19.000	0.0	24.000	0.0		
4.500	0.0	9.500	0.0	14.500	0.0
19.500	0.0				

RUNOFF VOLUME = 1.78638 INCHES = 0.2382 ACRE-Feet
 PEAK DISCHARGE RATE = 5.48 CFS AT 1.500 HOURS BASIN AREA =
 0.0025 SQ. MI.

FINISH

NORMAL PROGRAM FINISH

END TIME (HR:MIN:SEC) = 10:41:15



AHYMO

SUMMARY

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver.
 S4.02a, Rel: 02a RUN DATE (MON/DAY/YR) =09/17/2021
 INPUT FILE = N:\CDS Library\Engineering Tools\AHYMO-S4\Input.HMI
 USER NO.= AHYMO-S4TempUser05901704

FROM		TO		PEAK	
RUNOFF	TIME TO	CFS	PAGE =	1	
	HYDROGRAPH	ID	ID	AREA	DISCHARGE
VOLUME	RUNOFF	PEAK	PER		
COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)
(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION	

RAINFALL TYPE=13

RAIN24= 2.490

*S EXISTING CONDITIONS

*S COMPUTE HYD EXISTING

COMPUTE NM HYD	101.00	-	1	0.01630	12.14
0.336	0.38662	1.500	1.164 PER IMP=	0.00	

*S PROPOSED CONDITIONS

*S COMPUTE HYD PROPOSED SUBBASIN A

COMPUTE NM HYD	102.00	-	2	0.00630	13.80
0.600	1.78638	1.500	3.423 PER IMP=	70.00	

*S COMPUTE HYD PROPOSED SUBBASIN B

COMPUTE NM HYD	103.00	-	3	0.00740	16.21
0.705	1.78638	1.500	3.422 PER IMP=	70.00	

*S COMPUTE HYD PROPOSED SUBBASIN C

COMPUTE NM HYD	104.00	-	4	0.00250	5.48
0.238	1.78638	1.500	3.427 PER IMP=	70.00	

FINISH

NAME: N:\Projects\W0021 DR Horton\W0021.01 DR Horton Tract 2 Trails\3. DWG\Sheets\W0021.01 Hydrology.dwg PLOT DATE: Sep 17, 2021 10:51am

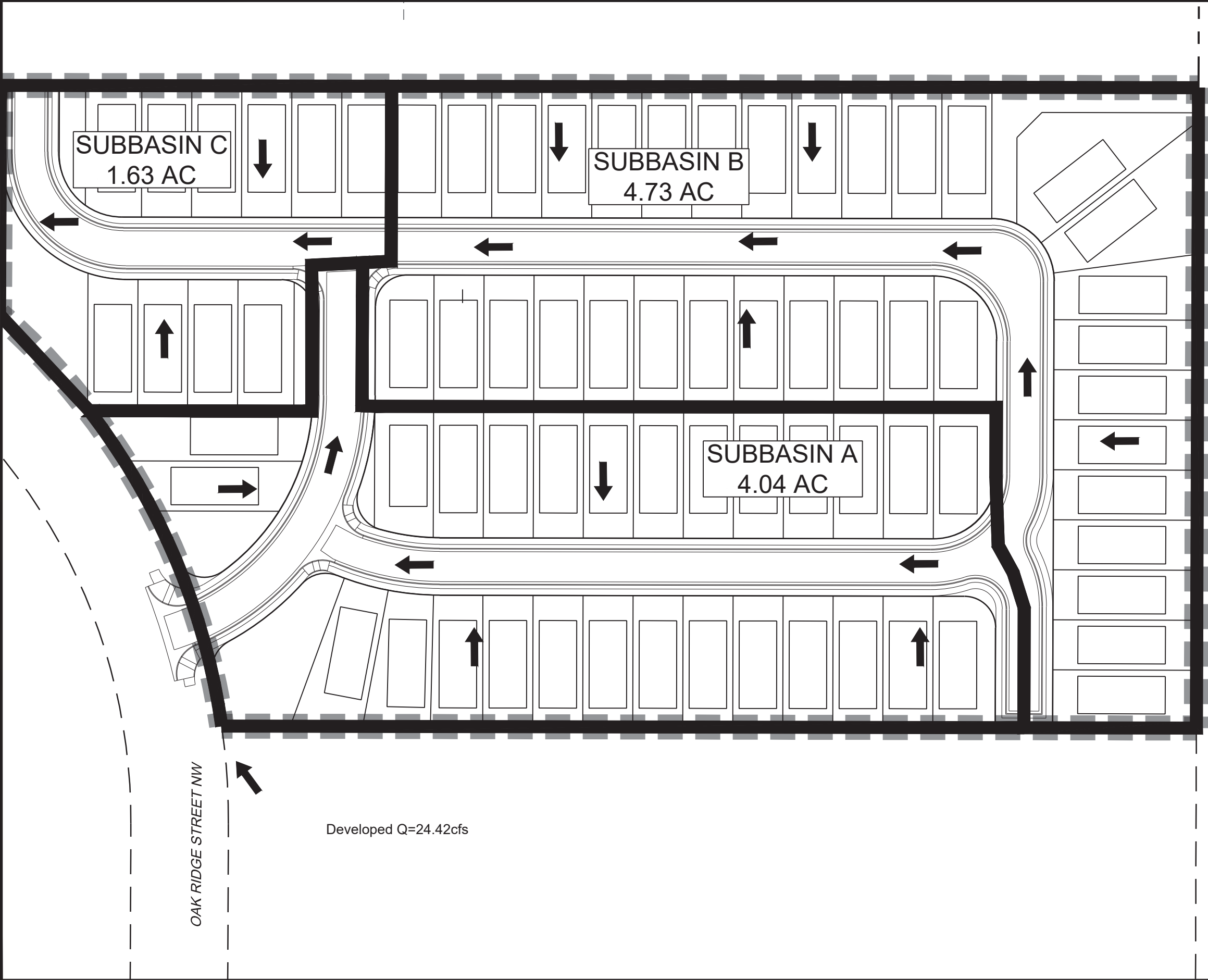


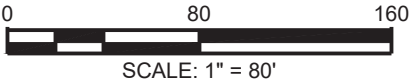
EXHIBIT A
PROPOSED SUBBASINS
JUNE, 2021

AHYMO OUTPUT: HISTORIC CONDITIONS				
Subbasin	A (ac)	Q (cfs)	V (ac ft)	Q/A (cfs/ac)
EXISTING	10.40	12.14	0.336	1.17

AHYMO OUTPUT: PROPOSED CONDITIONS				
Subbasin	A (ac)	Q (cfs)	V (ac ft)	Q/A (cfs/ac)
SUBBASIN A	4.04	13.8	0.6	3.42
SUBBASIN B	4.73	16.21	0.705	3.43
SUBBASIN C	1.63	5.48	0.238	3.36
TOTAL	10.4	35.49	1.543	3.41

LEGEND

- EXISTING SUBBBASIN BOUNDARY
- FLOW DIRECTION
- PROPOSED SUBBASIN BOUNDARY



RESPEC
COMMUNITY DESIGN SOLUTIONS
5971 JEFFERSON STREET SUITE 101
ALBUQUERQUE, NEW MEXICO 87109
WWW.RESPEC.COM PHONE: (505)253-9718



APPENDIX B

STREET DESIGN



Manning Formula: Capacity of Max Flow Rate for Sub-basin A,B & C (Standard C &G)

Irregular Section

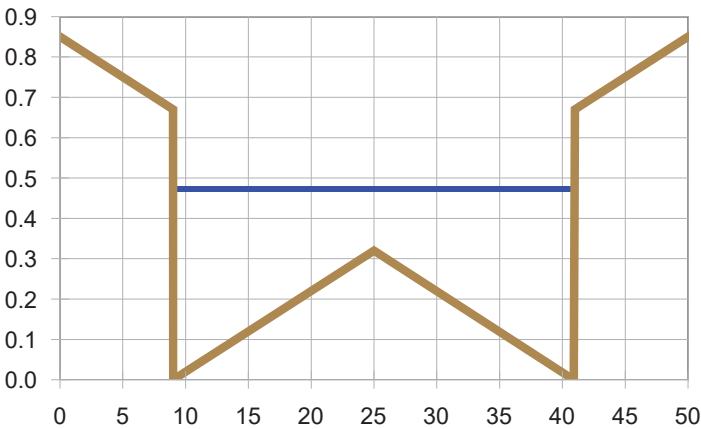
Input

Flow 35.49 cfs
Slope 0.0069 ft/ft

Sta	Elev	n	Sta	Elev	n	Sta	Elev	n	Sta	Elev	n
0	0.85	0.016	9	0.67	0.016	9.01	0	0.016	25	0.32	0.016
40.90	0	0.016	41	0.67	0.016	50	0.85	0.016			

Output

WSElev 0.473 ft
Flow Area 10.00 sf
Velocity 3.55 fps
Velocity Head 0.196 ft
Top Width 32.0 ft
Froude Number 1.12
Critical WSElev 0.497 ft
Critical Slope ft/ft





APPENDIX C

INLET & STORM DRAIN DESIGN

FIGURE 6.10.9 Grating Capacities for Type Double "C", "D", and "A"

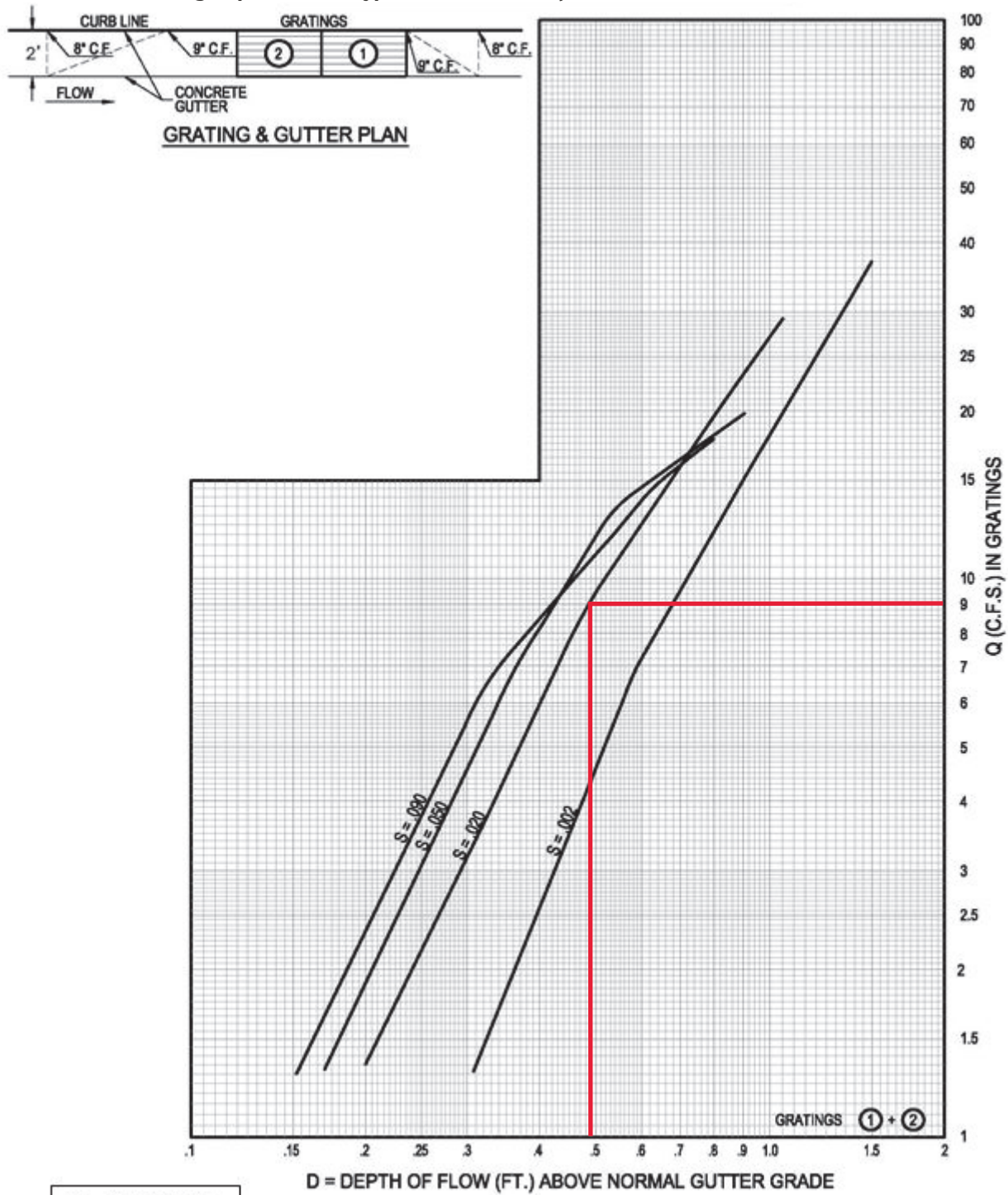
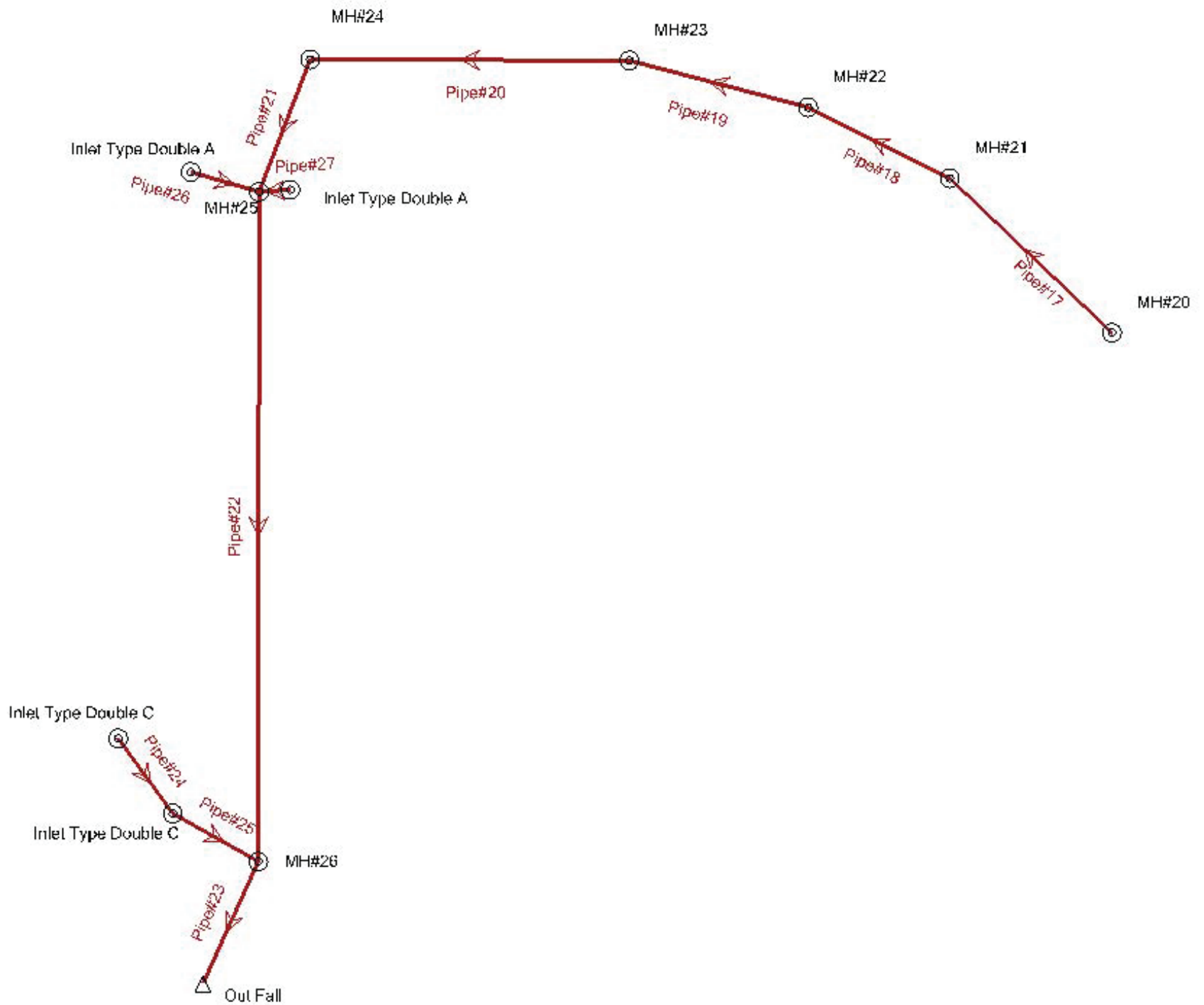
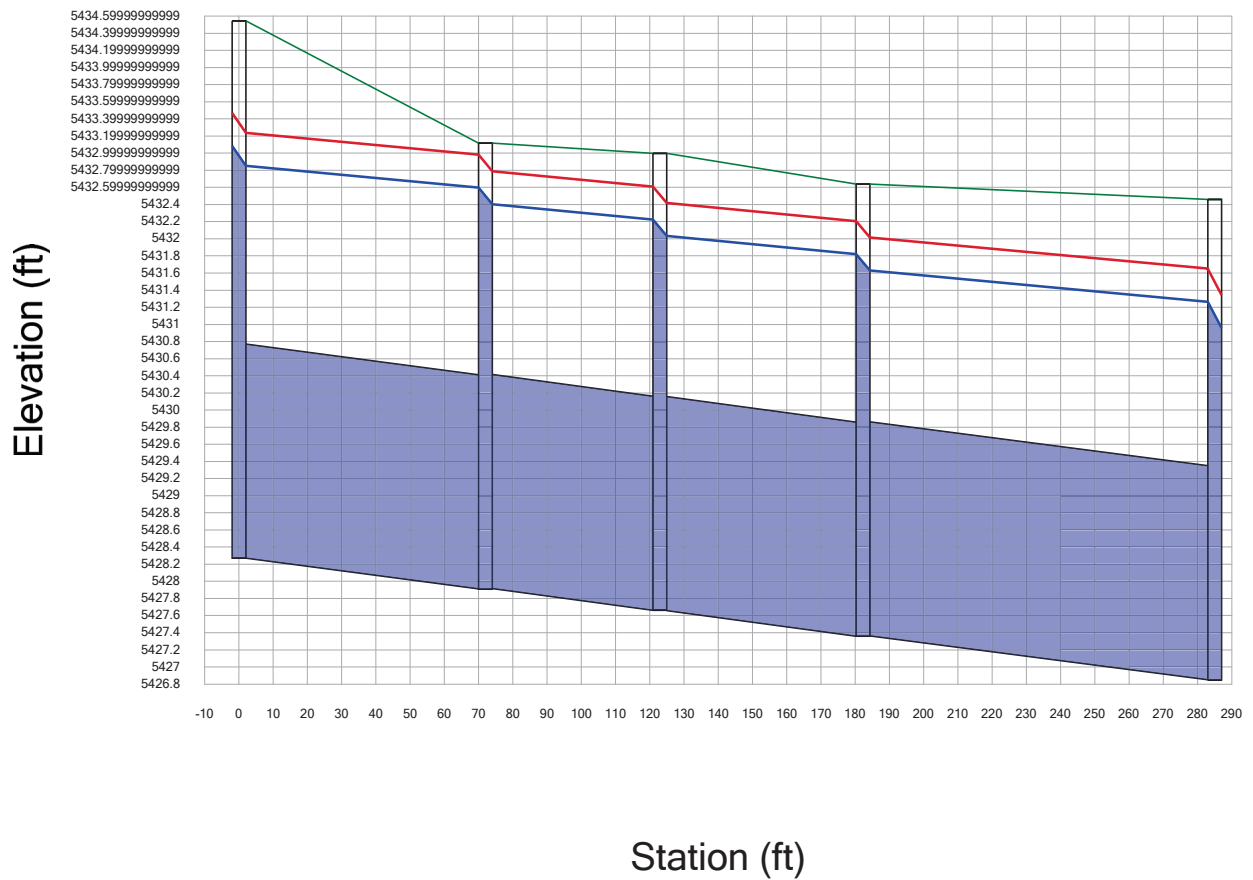


Plate 22.8 D-2



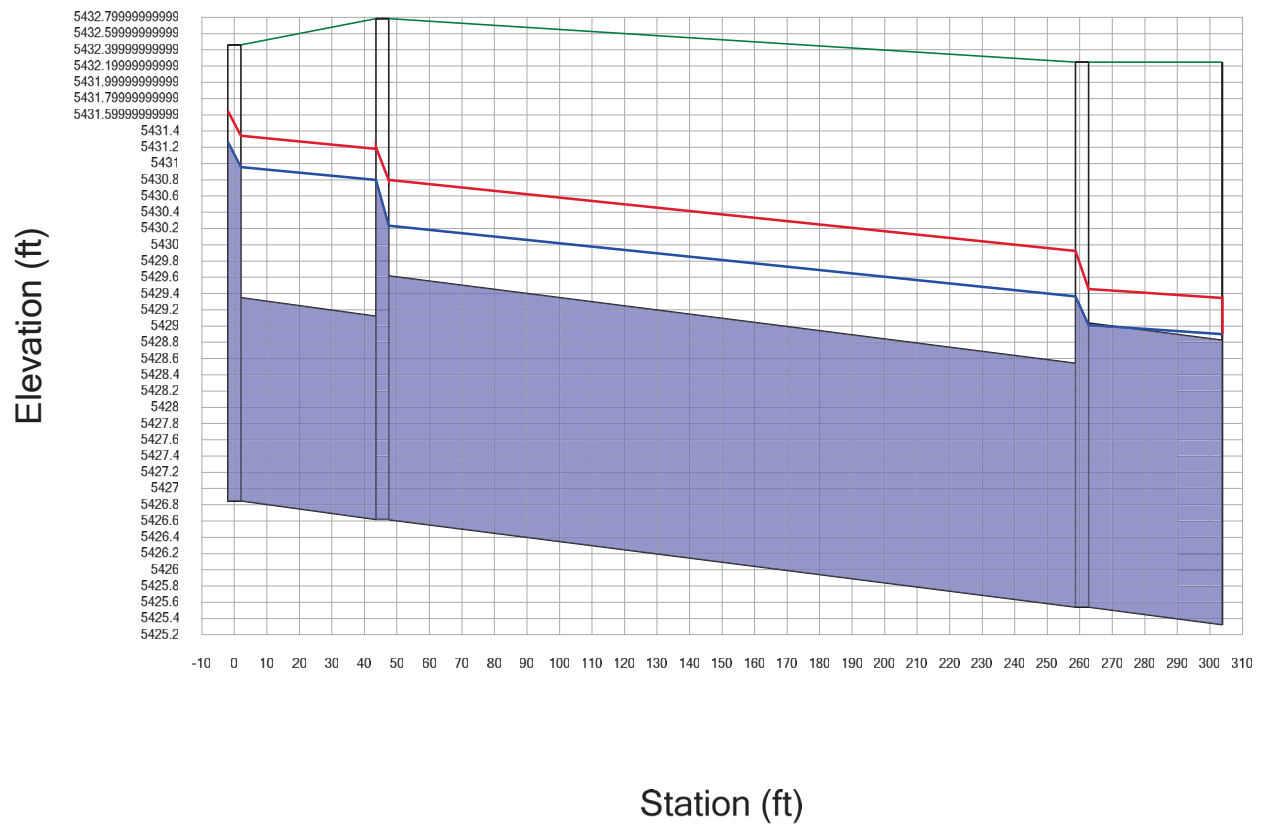
Profile Report **Profile: Manhoole #20 to Manhole #24**

Manhoole #20 to Manhole #24 - Base



Profile Report
Profile: MH#24 to Outfall

MH#24 to Outfall - Base



Manning Formula:

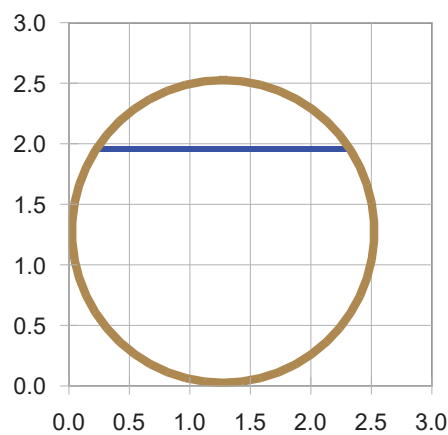
Circular Channel Pipe #21

Input

Flow	24.42 cfs
Slope	0.004 ft/ft
Manning's n	0.013
Diameter	30 in

Output

Depth	1.929 ft
Flow Area	4.06 sf
Velocity	6.01 fps
Velocity Head	0.561 ft
Top Width	2.10 ft
Froude Number	0.761
Critical Depth	1.683 ft
Critical Slope	0.00561 ft/ft



Manning Formula:

Circular Channel

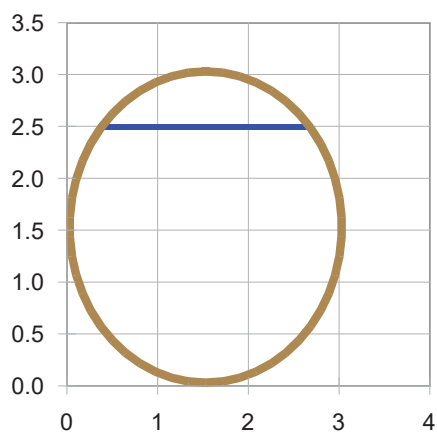
Pipe #22

Input

Flow	42.24 cfs
Slope	0.004 ft/ft
Manning's n	0.013
Diameter	36 in

Output

Depth	2.463 ft
Flow Area	6.21 sf
Velocity	6.80 fps
Velocity Head	0.719 ft
Top Width	2.30 ft
Froude Number	0.730
Critical Depth	2.117 ft
Critical Slope	0.00560 ft/ft



Manning Formula:

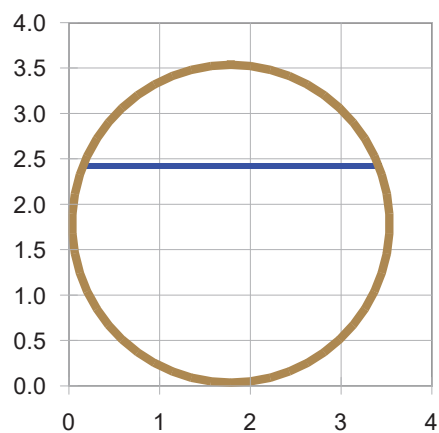
Circular Channel Pipe #23

Input

Flow	51.42 cfs
Slope	0.004 ft/ft
Manning's n	0.013
Diameter	42 in

Output

Depth	2.386 ft
Flow Area	6.99 sf
Velocity	7.36 fps
Velocity Head	0.842 ft
Top Width	3.26 ft
Froude Number	0.887
Critical Depth	2.242 ft
Critical Slope	0.00476 ft/ft



N:\Projects\W0021 DR Horton\W0021.01 DR Horton Tract 2 Trails\3 DWG\Sheets\W0021.01 Overall Grading Plan.dwg Frl 9.17.21 - 0944 - JAMIE VIGIL

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