CITY OF ALBUQUERQUE

December 3, 2019

Raquel Michel, P.E.
Bohannan Huston, Inc.
7500 Jefferson St NE Courtyard 1
Albuquerque, NM 87114

Re: Amendment to Montecito Vista Drainage Report (D09-005) for Mitigation of Erosion along Vista Vieja Rd
Engineer's Stamp Date 11-25-19 (CPN 763984, D09D005)

Dear Mr. Mulberry,

Based upon the information provided in the submittal received 11-25-19, the above referenced amendment is approved for Work Order with the following comment:

1. It was not clear that adequate freeboard was provided at Location 7. This comment can be addressed during the construction plan review process at DRC.

If you have any questions, please contact me.

Sincerely,

Shahab Biazar, P.E.
City Engineer
Planning Dept.

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Bohannan Huston

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MEMORANDUM

DATE: November 25, 2019

TO: Curtis Cherne, P.E.
Shahab Biazar, P.E.

FROM: Jeff Mulbery, P.E., Racquel M. Michel, P.E.

SUBJECT: **Amendment to Montecito Vistas Drainage Report (D09-005) for Mitigation of Erosion Along Vista Vieja Rd.**

RACQUEL M. MICHEL NEW MEXICO 19158 PROFESSIONAL ENGINEER 11/25/19

Observed Erosion Along Vista Vieja

The purpose of this memo is to address the erosion that occurred as a result of the storm on August 3, 2019. We have completed a physical review of the site as well as a review of the record documents for the roadway and adjacent subdivisions. It appears the flow has resulted in a deep head-cut along the south side of Vista Vieja Rd. See pictures below.

Looking North Just East of Via Montecito St.

Looking Northeast East of Via Montecito St.

Existing Conditions

To begin our analysis, we reviewed the following reports:

- Montecito Vistas Subdivision Units 1 through 4 Drainage Report (prepared by BHI, dated 8/16/16, COA D09-006)
- Montecito West Subdivision Phase II, III, and IV Drainage Report (prepared by BHI, dated 1/24/07, COA D09-004)
- Vista Vieja Subdivision Drainage Report (prepared by Wilson & Co., dated 10/04/04, COA D09-003)

These reports detail the existing and proposed hydrologic conditions both offsite and on. See Exhibit 1 – Existing Basin Map for basin names, drainage table, direction, and analysis point locations.

Storm water from basins A-1.1, OS-Y.1, and R-1 drains to the west end of Vista Vieja Rd. (currently a gravel access road). Drainage from basin OS-Y.2 is combined with this flow and runs along the south side of the road causing erosion near the trail entrance near Via Montecito. Runoff then flows east and ultimately drains into Vista Vieja just east of Montecito Vistas.

Updated Drainage Analysis

It appears there are three concerns which may have contributed to the erosion along the south side of Vista Vieja.

1. Interim Conditions: The extension of Vista Vieja from Via Montecito to the west of the property was not constructed per plan, and therefore could not convey storm water east and into the Vista Vieja street section. The plan called for this roadway section to be rough graded to the finished subgrade elevation, with a sedimentation pond just west of Via Montecito. This

significant flow was subsequently pushed south to the open space, and then impacted Vista Vieja further east.

2. Existing Drainage from the South: It appears the existing drainage basins as shown in Exhibit 1, did not include an area to the south of the future Vista Vieja which does drain to the future roadway. There are three additional off-site basin areas (OS-Y.1, OS-Y.2, and OS-Z) that were not included in the original study. After careful review of the existing contours and field observations, these areas do drain to the northeast, and contribute to the total flow in the Vista Vieja Right-of-Way.
3. Revision to Existing Conditions Analysis: The basin limits and land treatment percentages were revised to more accurately reflect actual conditions.

Drainage conditions were analyzed utilizing the 100-year, 6-hour storm event and an AHYMO model that was based on the methodology previously used for the Montecito West and Montecito Vistas subdivisions. The AHYMO input and output files are attached.

Proposed Mitigation

The proposed repair and mitigation are shown on Exhibit 2 – Interim Conditions Street Section Exhibit and described as follows:

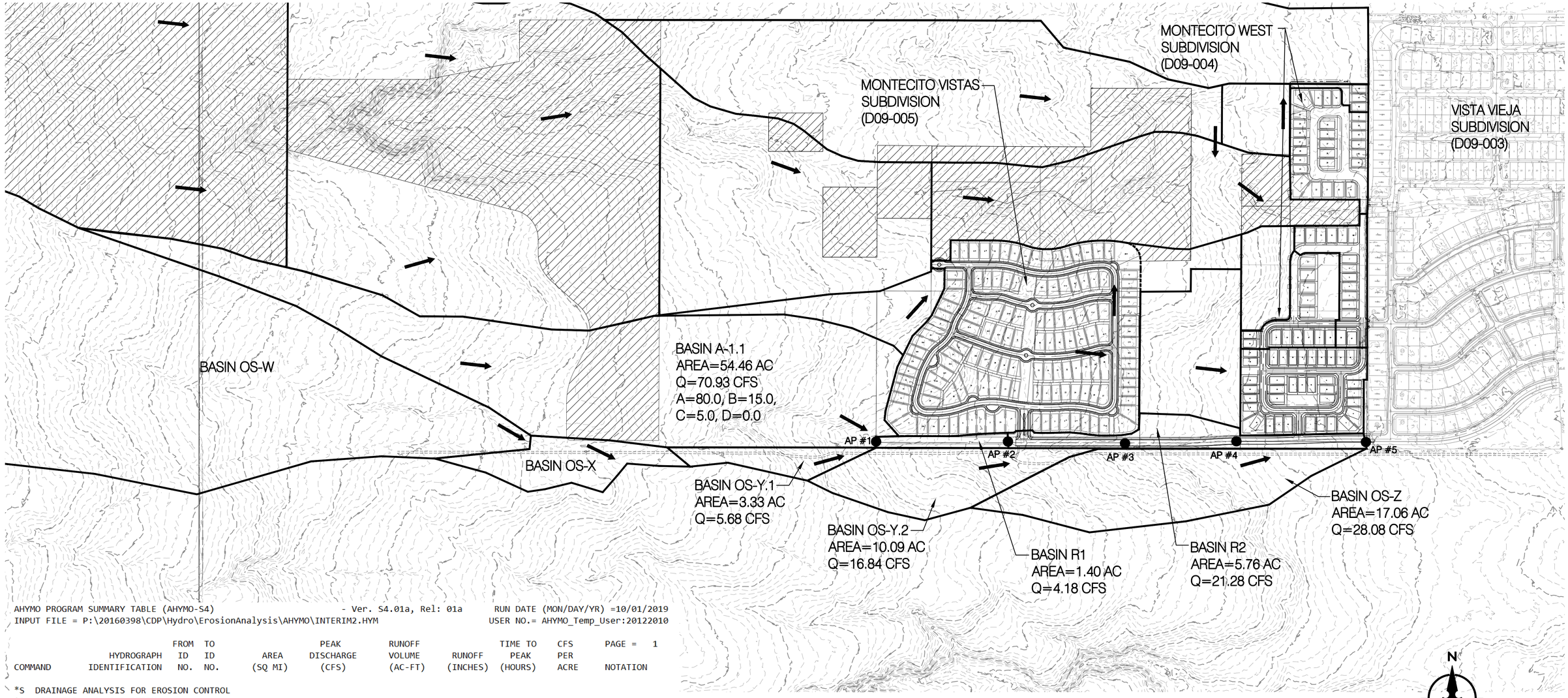
1. Construction of the proposed roadway section (graded to roadway subgrade) for the portion of Vista Vieja lying west of Via Montecito Street, per the approved plan. This will direct flow along the access road to the paved portion of Vista Vieja. This will then contain the flow from Basins A-1.1 and OS-Y.1 within the curbs of Vista Vieja.
2. Reconstruction of grade behind the curb where damage occurred and installation of a rip rap armoring or swale along the south side of the right of way to help direct flow from Basin OS-Y.2. This flow runs along Vista Vieja, then turns south into the open space, before sheet flowing back north and into Vista Vieja.

The capacity calculations for Section B-B, AP#4, and AP#5 are included as well.

Conclusion

The drainage concept outlined by this memo will mitigate the erosion concerns south of Vista Vieja and will allow for the safe management of storm runoff.

Another item of note is Exhibit 3 – Pre-Development Conditions shows that the conditions prior to the construction of Montecito West and Montecito Vistas allowed flow from basin EX1 to run to AP 5, entering Vista Vieja. With the construction of these two subdivisions, drainage from Montecito Vistas and a Montecito West has been directed north to the Middle Boca Negra arroyo, thus reducing the overall flow that is impacting Vista Vieja downstream of Montecito West.

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AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)                    - Ver. S4.01a, Rel: 01a      RUN DATE (MON/DAY/YR) =10/01/2019
INPUT FILE = P:\20160398\CDP\Hydro\ErosionAnalysis\AHYMO\INTERIM2.HYM                   USER NO.= AHYMO_Temp_User:20122010

                          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

*S  DRAINAGE ANALYSIS FOR EROSION CONTROL
*S  100 YEAR - 6 HOUR STORM
START                                                                                  TIME=      0.00
LOCATION                      DEFAULT
RAINFALL  TYPE= 1 NOAA 14                                                              RAIN6=     2.210
*S********************* COMPUTE EXISTING "EX1" BASINS ************************
COMPUTE NM HYD           EX1   -     1       0.18672      163.36      6.069      0.60949    1.600    1.367 PER IMP=   0.00
*S*********************  COMPUTE OFFSITE "A" BASINS  ************************
COMPUTE NM HYD         A_1.1   -     5       0.08510       70.93      2.766      0.60949    1.600    1.302 PER IMP=   0.00
*S*********************  COMPUTE OFFSITE "OS" BASINS ************************
COMPUTE NM HYD        OS_Y.1   -    10       0.00521        5.68      0.167      0.60149    1.533    1.704 PER IMP=   0.00
COMPUTE NM HYD        OS_Y.2   -    11       0.01577       16.84      0.498      0.59207    1.533    1.668 PER IMP=   0.00
COMPUTE NM HYD          OS_Z   -    12       0.02665       28.08      0.833      0.58590    1.533    1.646 PER IMP=   0.00
*S*********************  COMPUTE ROADWAY "R" BASINS  ************************
COMPUTE NM HYD            R1   -    15       0.00218        4.18      0.120      1.03024    1.533    2.994 PER IMP=   5.00
COMPUTE NM HYD            R2   -    16       0.00899       21.28      0.786      1.63880    1.533    3.698 PER IMP=  70.00
*S*****************************************************************************
ADD HYD                  AP1  5&10  20       0.09030       75.86      2.933      0.60902    1.567    1.313
ADD HYD                  AP2 20&15  21       0.09248       79.76      3.053      0.61896    1.567    1.348
ADD HYD                  AP3 21&11  22       0.10825       95.81      3.551      0.61504    1.567    1.383
ADD HYD                  AP4 22&16  23       0.11724      115.50      4.337      0.69357    1.567    1.539
ADD HYD                  AP5 23&12  24       0.14390      142.26      5.170      0.67363    1.567    1.545
FINISH
```

EXHIBIT 1
EXISTING CONDITIONS
OVERALL BASIN MAP

Montecito Vistas Erosion Control
Existing Conditions Basin Data Table
This table is based on the DPM Section 22.2, Zone: 1

Basin	Area	Area	Land Treatment Percentages				Q(100)	Q(100)	V(100)	V(100)
ID	(SQ. FT.)	(AC.)	A	B	C	D	(cfs/ac.)	(CFS)	(inches)	(CF)
A-1.1	2372346.63	54.46	80.0%	15.0%	5.0%	0.0%	1.30	*70.93*	*0.61*	*120493*
OS-Y.1	145123.85	3.33	85.0%	10.0%	5.0%	0.0%	1.70	*5.68*	*0.60*	*7274*
OS-Y.2	439555.94	10.09	90.0%	6.0%	4.0%	0.0%	1.67	*16.84*	*0.59*	*21687*
OS-Z	743002.68	17.06	93.0%	4.0%	3.0%	0.0%	1.65	*28.08*	*0.59*	*36277*
R1	60799.46	1.40	0.0%	0.0%	95.0%	5.0%	2.99	*4.18*	*1.03*	*5220*
R2	250744.23	5.76	0.0%	10.0%	20.0%	70.0%	3.70	*21.28*	*1.64*	*34243*

LEGEND
BASIN BOUNDARY
FLOW ARROW
OPEN SPACE

Bohannan Huston

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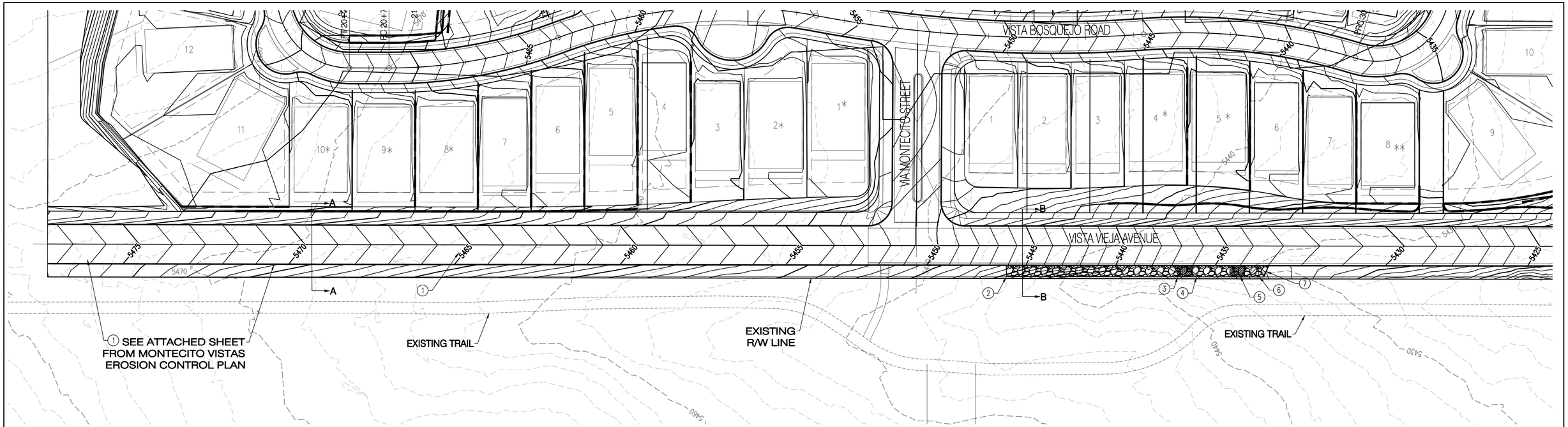
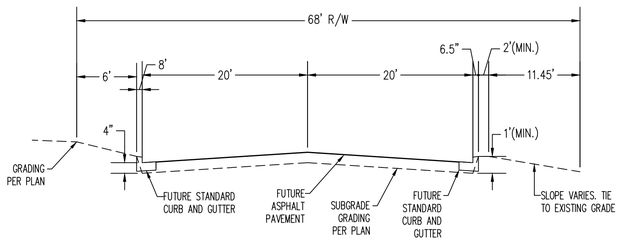
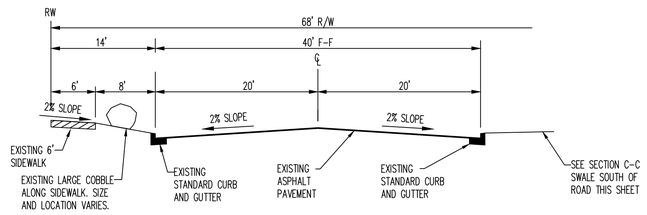




SECTION A-A
VISTA VIEJA AVENUE - 68' R/W
NOT TO SCALE

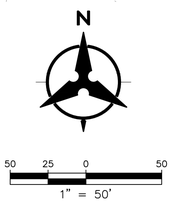


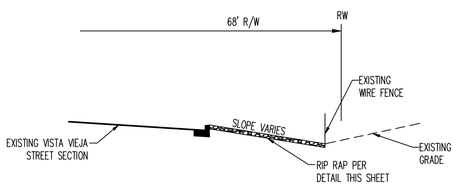
SECTION B-B STREET CAPACITY
VISTA VIEJA AVENUE - 68' R/W
NOT TO SCALE

FROM BASINS A-1.1, OS-Y.1, & R1
Q=79.76 CFS
DEPTH=0.45 FT
V=7.89 F/S

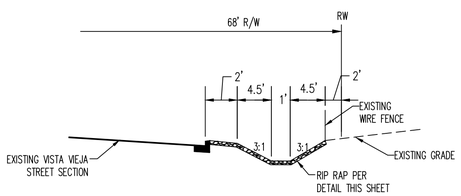
◯ KEYED NOTES

1. CONTRACTOR TO INSTALL ROADWAY GRADING (TO SUBGRADE) AND SEDIMENTATION POND PER PLAN. CONTRACTOR TO ENSURE THE TIE BACK TO PROPOSED GRADE ON THE SOUTH SIDE IS CONSTRUCTED WITH A 2' WIDE (MINIMUM) TOP OF BERM. CONTRACTOR SHALL ALSO REMOVE ANY BERMS OR OBSTRUCTIONS AND ENSURE THE EXISTING FLOW PATHS ENTER THE NEWLY CONSTRUCTED ROADWAY SECTION.
2. INSTALL RIP RAP SECTION B-B. CONTRACTOR SHALL FIELD FIT AND TIE TO EXISTING GRADE AT THE FENCE LINE.
3. TRANSITION FROM SECTION B-B TO SECTION C-C OVER 15 FEET. CONTRACTOR SHALL FIELD FIT AND TIE TO EXISTING GRADE AT THE FENCE LINE.
4. INSTALL RIP RAP SECTION C-C. CONTRACTOR SHALL FIELD FIT AND TIE TO EXISTING GRADE AT THE FENCE LINE.
5. TRANSITION FROM SECTION C-C TO SECTION D-D OVER 15 FEET. CONTRACTOR SHALL FIELD FIT AND TIE TO EXISTING GRADE AT THE FENCE LINE.
6. INSTALL RIP RAP SECTION D-D. CONTRACTOR SHALL FIELD FIT AND TIE TO EXISTING GRADE AT THE FENCE LINE.
7. INSTALL RIP RAP BERM FROM FENCE LINE TO BACK OF CURB TO DIRECT FLOWS INTO THE STREET. BERM SHALL BE 1 FT. TALL WITH A 1 FT. WIDE TOP.

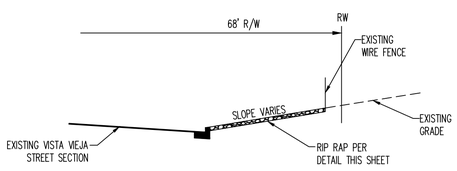




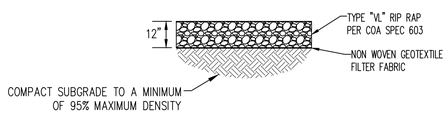
SECTION B-B - SWALE SOUTH OF ROAD
VISTA VIEJA AVENUE - 68' R/W
NOT TO SCALE



SECTION C-C - SWALE SOUTH OF ROAD
VISTA VIEJA AVENUE - 68' R/W
NOT TO SCALE



SECTION D-D - SWALE SOUTH OF ROAD
VISTA VIEJA AVENUE - 68' R/W
NOT TO SCALE



TYPICAL RIP RAP SECTION
NOT TO SCALE

EXHIBIT 2
INTERIM CONDITIONS
STREET SECTION EXHIBIT

Bohannan Huston

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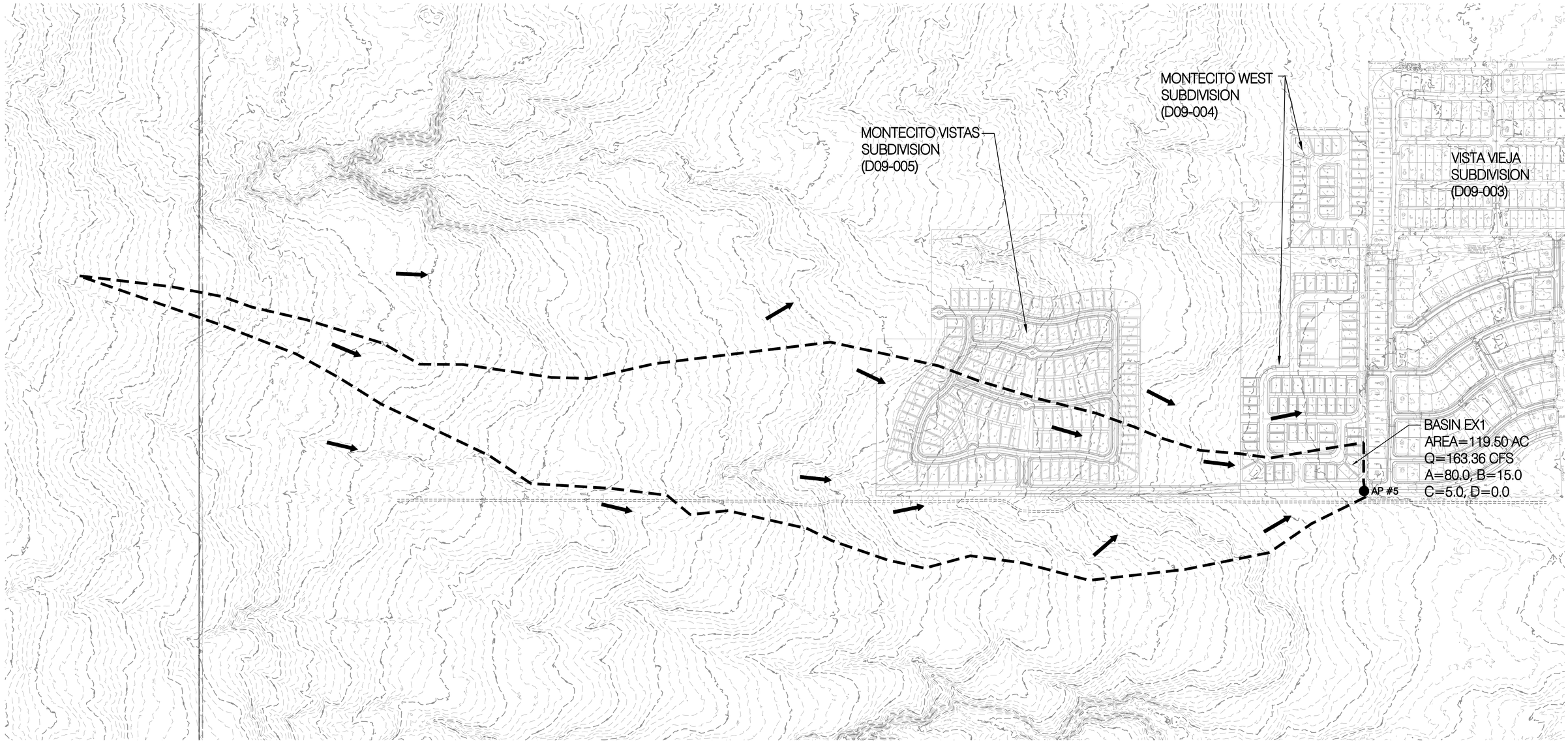
October 01, 2019 – 3:03pm



N

600 300 0 600

1" = 600'

Montecito Vistas Erosion Control
Pre-development* Conditions Basin Data Table

This table is based on the DPM Section 22.2, Zone: 1

Basin	Area	Area	Land Treatment Percentages				Q(100)	Q(100)	V(100)	V(100)
ID	(SQ. FT.)	(AC.)	A	B	C	D	(cfs/ac.)	(CFS)	(inches)	(CF)
EX1	5205317.12	119.50	80.0%	15.0%	5.0%	0.0%	1.41	*163.36*	*0.61*	*264382*

* Pre-development refers to the conditions after the Vista Vieja Subdivision was built, but before the Montecito West and Montecito Vistas Subdivisions were built.

EXHIBIT 3

PRE-DEVELOPMENT CONDITIONS

OVERALL BASIN MAP

LEGEND

BASIN BOUNDARY

FLOW ARROW

Bohannan Huston

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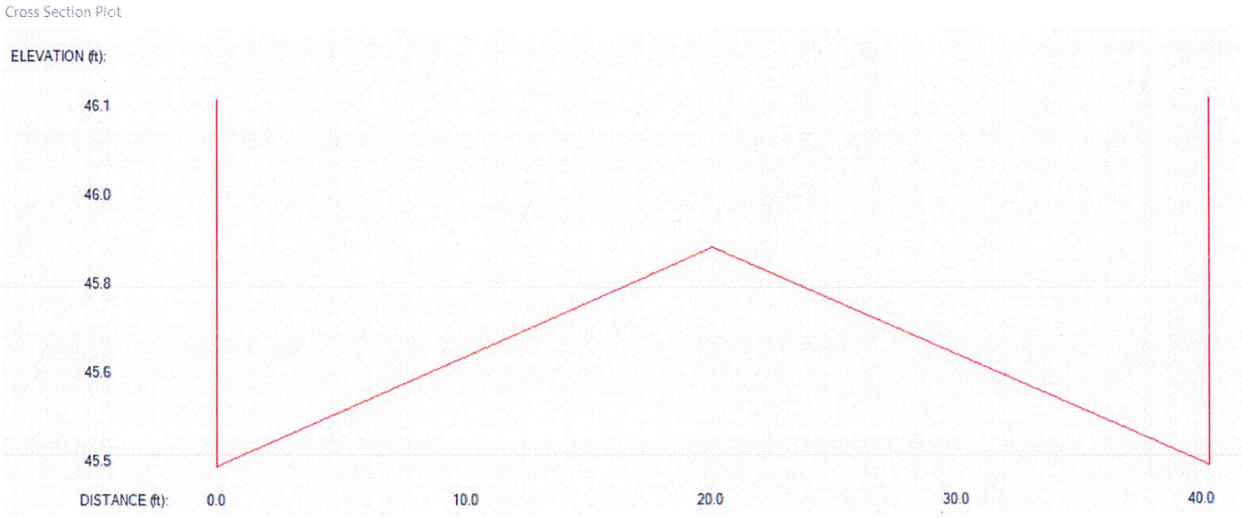
October 01, 2019 - 9:14am

Section B-B Street Only

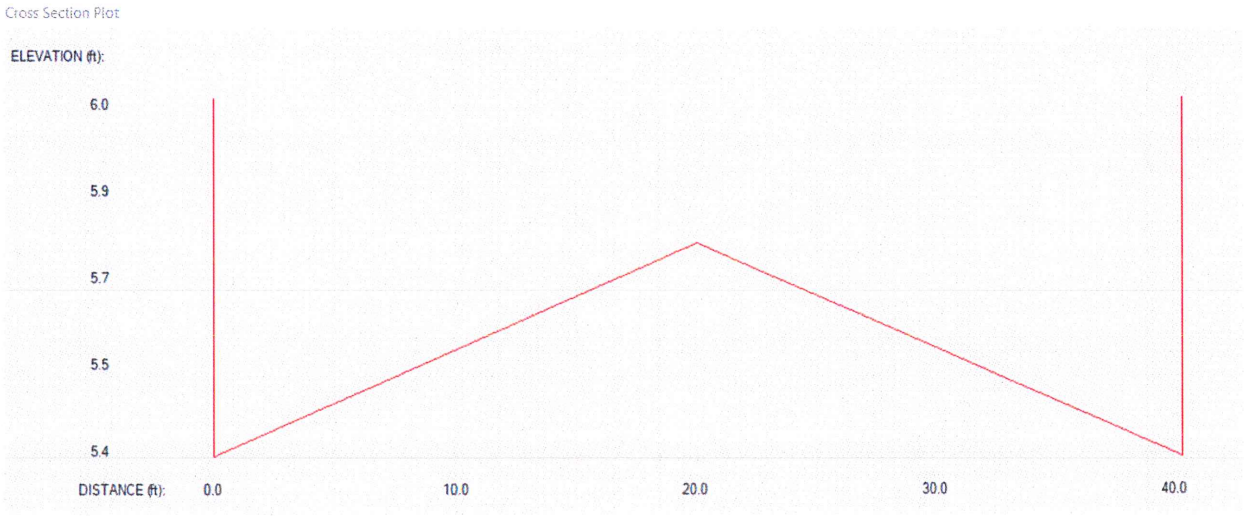


MANNING'S N = 0.017 SLOPE = 0.053

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	46.1	3.0	20.0	45.9	5.0	40.0	46.1
2.0	0.0	45.5	4.0	40.0	45.5			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
45.480	0.010	0.005	0.003	1.020	0.579	1.000	0.015
45.490	0.020	0.020	0.018	2.040	0.918	2.000	0.033
45.500	0.030	0.045	0.054	3.061	1.204	3.000	0.053
45.880	0.410	8.400	58.706	40.828	6.989	40.000	1.170
45.890	0.420	8.800	63.418	40.848	7.207	40.000	1.228
45.900	0.430	9.200	68.272	40.868	7.421	40.000	1.287
45.910	0.440	9.600	73.267	40.888	7.632	40.000	1.346
45.920	0.450	10.000	78.400	40.908	7.840	40.000	1.406
45.930	0.460	10.400	83.668	40.928	8.045	40.000	1.467
45.940	0.470	10.800	89.071	40.948	8.247	40.000	1.528
45.950	0.480	11.200	94.606	40.968	8.447	40.000	1.590
45.960	0.490	11.600	100.272	40.988	8.644	40.000	1.652
45.970	0.500	12.000	106.066	41.008	8.839	40.000	1.715
46.090	0.620	16.800	185.112	41.248	11.019	40.000	2.508
46.100	0.630	17.200	192.453	41.268	11.189	40.000	2.577
46.110	0.640	17.600	199.906	41.288	11.358	40.000	2.647
46.120	0.650	18.000	207.468	41.308	11.526	40.000	2.716
46.130	0.660	18.400	215.139	41.328	11.692	40.000	2.786
46.140	0.670	18.800	222.919	41.348	11.857	40.000	2.857

Q=79.76



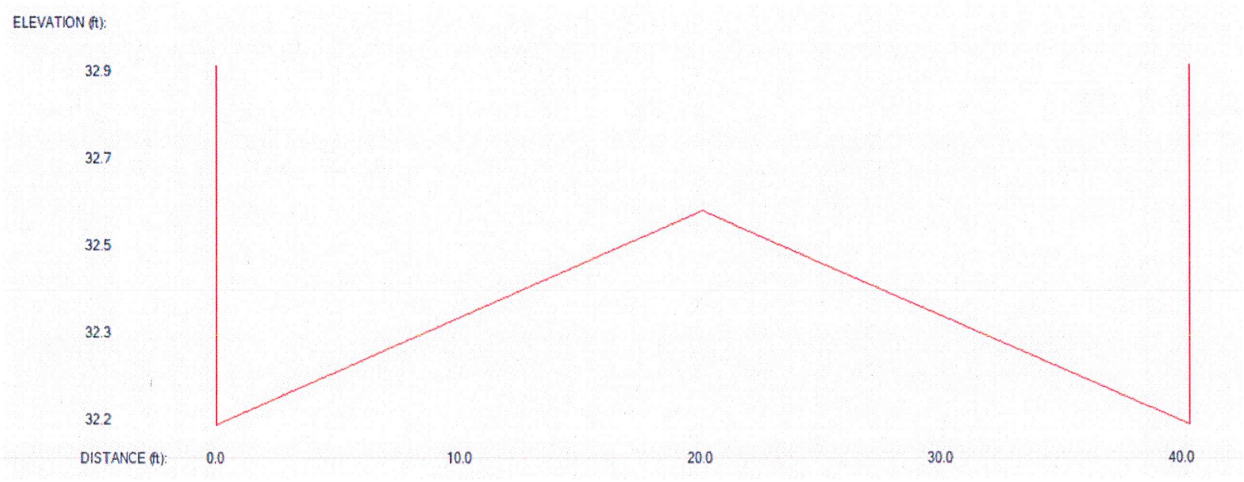
MANNING'S N = 0.017 SLOPE = 0.031

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	6.0	3.0	20.0	5.8	5.0	40.0	6.0
2.0	0.0	5.4	4.0	40.0	5.4			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
5.380	0.010	0.005	0.002	1.020	0.446	1.000	0.013
5.390	0.020	0.020	0.014	2.040	0.708	2.000	0.028
5.400	0.030	0.045	0.042	3.061	0.927	3.000	0.043
5.850	0.480	11.200	72.900	40.968	6.509	40.000	1.139
5.860	0.490	11.600	77.266	40.988	6.661	40.000	1.180
5.870	0.500	12.000	81.731	41.008	6.811	40.000	1.222
5.880	0.510	12.400	86.293	41.028	6.959	40.000	1.263
5.890	0.520	12.800	90.953	41.048	7.106	40.000	1.305
5.900	0.530	13.200	95.708	41.068	7.251	40.000	1.348
5.910	0.540	13.600	100.558	41.088	7.394	40.000	1.390
5.920	0.550	14.000	105.501	41.108	7.536	40.000	1.433
5.930	0.560	14.400	110.537	41.128	7.676	40.000	1.477
5.940	0.570	14.800	115.664	41.148	7.815	40.000	1.520
5.950	0.580	15.200	120.882	41.168	7.953	40.000	1.564
5.960	0.590	15.600	126.189	41.188	8.089	40.000	1.608
5.970	0.600	16.000	131.585	41.208	8.224	40.000	1.652
5.980	0.610	16.400	137.069	41.228	8.358	40.000	1.697
5.990	0.620	16.800	142.640	41.248	8.490	40.000	1.741
6.000	0.630	17.200	148.297	41.268	8.622	40.000	1.786
6.010	0.640	17.600	154.040	41.288	8.752	40.000	1.831
6.020	0.650	18.000	159.867	41.308	8.882	40.000	1.877
6.030	0.660	18.400	165.779	41.328	9.010	40.000	1.923

Q = 115.50

AP5 – Street Only



MANNING'S N = 0.017 SLOPE = 0.026

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	32.9	3.0	20.0	32.6	5.0	40.0	32.9
2.0	0.0	32.2	4.0	40.0	32.2			

WSEL FT.	DEPTH INC	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID PLUS OBSTRUCTIONS	TOTAL ENERGY (FT)
32.190	0.010	0.005	0.002	1.020	0.409	1.000	0.013
32.200	0.020	0.020	0.013	2.040	0.649	2.000	0.027
32.210	0.030	0.045	0.038	3.061	0.851	3.000	0.041
32.670	0.490	11.600	70.896	40.988	6.112	40.000	1.071
32.680	0.500	12.000	74.993	41.008	6.249	40.000	1.107
32.690	0.510	12.400	79.180	41.028	6.385	40.000	1.144
32.700	0.520	12.800	83.455	41.048	6.520	40.000	1.181
32.710	0.530	13.200	87.818	41.068	6.653	40.000	1.218
32.720	0.540	13.600	92.268	41.088	6.784	40.000	1.256
32.730	0.550	14.000	96.804	41.108	6.915	40.000	1.294
32.740	0.560	14.400	101.424	41.128	7.043	40.000	1.332
32.750	0.570	14.800	106.129	41.148	7.171	40.000	1.370
32.760	0.580	15.200	110.917	41.168	7.297	40.000	1.408
32.770	0.590	15.600	115.786	41.188	7.422	40.000	1.447
32.780	0.600	16.000	120.738	41.208	7.546	40.000	1.486
32.790	0.610	16.400	125.769	41.228	7.669	40.000	1.525
32.800	0.620	16.800	130.881	41.248	7.791	40.000	1.564
32.810	0.630	17.200	136.072	41.268	7.911	40.000	1.603
32.820	0.640	17.600	141.341	41.288	8.031	40.000	1.643
32.830	0.650	18.000	146.688	41.308	8.149	40.000	1.683
32.840	0.660	18.400	152.112	41.328	8.267	40.000	1.723
32.850	0.670	18.800	157.612	41.348	8.384	40.000	1.763

Q = 142.26

```
*S  DRAINAGE ANALYSIS FOR EROSION CONTROL
*
*S  100 YEAR - 6 HOUR STORM
*
*
START                 TIME=0.0 HR  PUNCH CODE=0
*
LOCATION              NM
*
*******************************************************************************
*
RAINFALL              TYPE=1  RAIN QUARTER=0
                      RAIN ONE=1.72 IN  RAIN SIX=2.21 IN
                      RAIN DAY=2.58 IN  DT=0.033333 HRS
*
*                     ********************************
*S******************** COMPUTE EXISTING "EX1" BASINS ************************
*                     ********************************
*
*  COMPUTE BASIN EX1 ************************************************************
*
*
COMPUTE LT TP         LCODE=1  UPLAND/LAG TIME TRANSITION METHOD
                      NK=3  ISLOPE=-1
                      LENGTH=400 FT  SLOPE=0.033  K=0.7
                      LENGTH=1600 FT  SLOPE=0.036  K=2
                      LENGTH=6000 FT  SLOPE=0.035 K=3

*
COMPUTE NM HYD        ID=1 HYD=EX1  AREA=0.18671506 SQ MI
                      PER A=80.0  PER B=15.0  PER C=5.0  PER D=0.0
                      TP=0.0 HR  MASS RAIN=-1
PRINT HYD             ID=1     CODE=20
*
*
*
*                     ********************************
*S********************  COMPUTE OFFSITE "A" BASINS  ************************
*                     ********************************
*
*  COMPUTE BASIN A-1.1 ***********************************************************
*
*
COMPUTE LT TP         LCODE=1  UPLAND/LAG TIME TRANSITION METHOD
                      NK=3  ISLOPE=-1
                      LENGTH=400 FT  SLOPE=0.033 K=0.7
                      LENGTH=1600 FT  SLOPE=0.036 K=2
                      LENGTH=3000 FT  SLOPE=0.035 K=3
```

```
*
COMPUTE NM HYD        ID=5 HYD=A_1.1  AREA=0.0850962 SQ MI
                      PER A=80.0  PER B=15.0  PER C=5.0  PER D=0.0
                      TP=0.0 HR  MASS RAIN=-1
PRINT HYD             ID=5     CODE=20
*
*
*
*                     ******************************
*S*******************  COMPUTE OFFSITE "OS" BASINS **************************
*                     ******************************
*
*  COMPUTE BASIN OS-Y.1*****************************************************
*
COMPUTE NM HYD        ID=10 HYD=OS_Y.1  AREA=0.005205602 SQ MI
                      PER A=85.0  PER B=10.0  PER C=5.0  PER D=0.0
                      TP=0.1333 HR  MASS RAIN=-1
PRINT HYD             ID=10     CODE=20
*
*
*  COMPUTE BASIN OS-Y.2*****************************************************
*
COMPUTE NM HYD        ID=11 HYD=OS_Y.2  AREA=0.0157669 SQ MI
                      PER A=90.0  PER B=6.0  PER C=4.0  PER D=0.0
                      TP=0.1333 HR  MASS RAIN=-1
PRINT HYD             ID=11     CODE=20
*
*
*  COMPUTE BASIN OS-Z*******************************************************
*
COMPUTE NM HYD        ID=12 HYD=OS_Z  AREA=0.026651554 SQ MI
                      PER A=93.0  PER B=4.0  PER C=3.0  PER D=0.0
                      TP=0.1333 HR  MASS RAIN=-1
PRINT HYD             ID=12     CODE=20
*
*
*                     ******************************
*S*******************  COMPUTE ROADWAY "R" BASINS  **************************
*                     ******************************
*
*  COMPUTE BASIN R1*********************************************************
*
COMPUTE NM HYD        ID=15 HYD=R1  AREA=0.002180881 SQ MI
                      PER A=0.0  PER B=0.0  PER C=95.0  PER D=5.0
                      TP=0.1333 HR  MASS RAIN=-1
PRINT HYD             ID=15     CODE=20
*
```

```
*
*  COMPUTE BASIN R2************************************************************
*
COMPUTE NM HYD        ID=16 HYD=R2  AREA=0.0089942 SQ MI
                      PER A=0.0  PER B=10.0  PER C=20.0  PER D=70.0
                      TP=0.1333 HR  MASS RAIN=-1
PRINT HYD             ID=16     CODE=20
*
*
*S***************************************************************************
*
* ADD A-1.1 TO OS-Y.1 TO GET FLOW AT WEST END OF GRAVEL ROAD ******************
*
ADD HYD               ID=20  HYD NO=AP1  ID I=5 TO ID II=10
PRINT HYD             ID=20  CODE=1
*
*
* ADD AP1 TO R1 TO GET FLOW AT EAST END OF GRAVEL ROAD ************************
*
ADD HYD               ID=21  HYD NO=AP2  ID I=20 TO ID II=15
PRINT HYD             ID=21  CODE=1
*
*
* ADD AP2 TO OS-Y.2 TO GET FLOW IN VISTA VIEJA ********************************
*
ADD HYD               ID=22  HYD NO=AP3  ID I=21 TO ID II=11
PRINT HYD             ID=22  CODE=1
*
*
* ADD AP3 TO R2 TO GET FLOW IN VISTA VIEJA ************************************
*
ADD HYD               ID=23  HYD NO=AP4  ID I=22 TO ID II=16
PRINT HYD             ID=23  CODE=1
*
*
* ADD AP4 TO OS-Z TO GET FLOW IN VISTA VIEJA **********************************
*
ADD HYD               ID=24  HYD NO=AP5  ID I=23 TO ID II=12
PRINT HYD             ID=24  CODE=1
*
*
FINISH
```

```
        AHYMO PROGRAM (AHYMO-S4)                    - Version: S4.01a - Rel: 01a
             RUN DATE (MON/DAY/YR) = 10/01/2019
             START TIME (HR:MIN:SEC) = 08:58:29     USER NO.=
AHYMO_Temp_User:20122010
             INPUT FILE = P:\20160398\CDP\Hydro\ErosionAnalysis\AHYMO\INTERIM2.HYM


    *S  DRAINAGE ANALYSIS FOR EROSION CONTROL
    *
    *S  100 YEAR - 6 HOUR STORM
    *
    *
    START                 TIME=0.0 HR  PUNCH CODE=0
    *
    LOCATION              NM
         Soil infiltration values (LAND FACTORS) for this location are not
available.
         The following default values were used.
         Land Treatment     Initial Abstr.(in)    Unif. Infilt.(in/hour)
              A             0.65                  1.67
              B             0.50                  1.25
              C             0.35                  0.83
              D             0.10                  0.04

    *
    ********************************************************************************
    *
    RAINFALL              TYPE=1  RAIN QUARTER=0
                                  RAIN ONE=1.72 IN  RAIN SIX=2.21 IN

                                  RAIN DAY=2.58 IN  DT=0.033333 HRS


                  6-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE
AREAS (NM & AZ) - D1
                  DT =   0.033333 HOURS       END TIME =     5.999941 HOURS
                    0.0000  0.0022  0.0043  0.0066  0.0090  0.0114  0.0141
                    0.0168  0.0197  0.0227  0.0257  0.0325  0.0393  0.0464
                    0.0540  0.0615  0.0697  0.0779  0.0863  0.0948  0.1034
                    0.1124  0.1214  0.1308  0.1408  0.1507  0.1619  0.1731
                    0.1870  0.2036  0.2202  0.2424  0.2646  0.2913  0.3224
                    0.3534  0.4001  0.4468  0.5104  0.5910  0.6716  0.8862
                    1.1009  1.2678  1.3868  1.5058  1.5656  1.6254  1.6741
                    1.7118  1.7495  1.7756  1.8017  1.8243  1.8434  1.8625
                    1.8770  1.8915  1.9040  1.9145  1.9251  1.9345  1.9439
                    1.9526  1.9604  1.9683  1.9756  1.9828  1.9900  1.9970
                    2.0040  2.0072  2.0105  2.0137  2.0169  2.0200  2.0229
```

2.0259	2.0288	2.0316	2.0345	2.0372	2.0400	2.0427
2.0453	2.0479	2.0504	2.0530	2.0555	2.0579	2.0604
2.0627	2.0651	2.0674	2.0696	2.0719	2.0742	2.0764
2.0786	2.0807	2.0828	2.0849	2.0870	2.0890	2.0910
2.0931	2.0951	2.0971	2.0990	2.1010	2.1029	2.1048
2.1067	2.1086	2.1105	2.1124	2.1142	2.1160	2.1179
2.1197	2.1215	2.1232	2.1250	2.1267	2.1285	2.1302
2.1319	2.1336	2.1353	2.1370	2.1386	2.1403	2.1419
2.1436	2.1452	2.1468	2.1484	2.1500	2.1516	2.1531
2.1547	2.1562	2.1578	2.1593	2.1608	2.1623	2.1638
2.1653	2.1668	2.1683	2.1697	2.1712	2.1726	2.1741
2.1755	2.1769	2.1783	2.1797	2.1811	2.1825	2.1839
2.1853	2.1866	2.1880	2.1893	2.1907	2.1920	2.1933
2.1947	2.1960	2.1973	2.1986	2.1999	2.2012	2.2024
2.2037	2.2050	2.2063	2.2075	2.2088	2.2100	

```
*
*                      ******************************
*S******************** COMPUTE EXISTING "EX1" BASINS ************************
*                      ******************************
*
*  COMPUTE BASIN EX1 ********************************************************
*
*
COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME TRANSITION METHOD
                       NK=3  ISLOPE=-1
                       LENGTH=400 FT  SLOPE=0.033  K=0.7
                       LENGTH=1600 FT  SLOPE=0.036  K=2
                       LENGTH=6000 FT  SLOPE=0.035 K=3


     BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
     USE Kn=  0.0160 AND Lca/L= 0.50000


     Tc AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

     SCS UPLAND METHOD FACTORS
                                LENGTH (FT)      SLOPE (FT/FT)       COMPOSITE K
     SHEET FLOW PORTION            400.0           0.033000            0.7000
     SHALLOW FLOW PORTION         1600.0           0.036000            2.0000
     CHANNEL FLOW PORTION         6000.0           0.035000            3.0000
     TOTAL BASIN                  8000.0           0.035100            2.3654


     LAG EQUATION FACTORS:     Kn=  0.0160     TOTAL BASIN LENGTH (FT)=
8000.0
     TOTAL BASIN SLOPE (FT/FT)=   0.035100     CENTROUD LENGTH (FT)=
```

4000.0

TIME OF CONCENTRATION (HRS)= 0.2856 TIME TO PEAK (HRS)= 0.1904
LAG TIME (HRS)= 0.2142

*

COMPUTE NM HYD ID=1 HYD=EX1 AREA=0.18671506 SQ MI
PER A=80.0 PER B=15.0 PER C=5.0 PER D=0.0
TP=0.0 HR MASS RAIN=-1
TIME TO PEAK (hrs)= 0.1904

K = 0.210335HR TP = 0.190402HR K/TP RATIO = 1.104691 SHAPE CONSTANT, N = 3.200232
UNIT PEAK = 292.00 CFS UNIT VOLUME = 1.000 B = 297.77
P60 = 1.7200
AREA = 0.186715 SQ MI IA = 0.61250 INCHES INF = 1.56500 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

PRINT HYD ID=1 CODE=20

HYDROGRAPH FROM AREA EX1

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	31.4	4.000	0.9	6.000	0.0
0.667	0.0	2.667	7.2	4.667	0.3	6.667	0.0
1.333	0.8	3.333	2.5	5.333	0.1		

RUNOFF VOLUME = 0.60949 INCHES = 6.0693 ACRE-FEET
PEAK DISCHARGE RATE = 163.36 CFS AT 1.600 HOURS BASIN AREA = 0.1867 SQ. MI.

*
*
*
* **********
*S********** COMPUTE OFFSITE "A" BASINS **********
* **********

```
    *
    *  COMPUTE BASIN A-1.1 ****************************************************
    *
    *
    COMPUTE LT TP          LCODE=1  UPLAND/LAG TIME TRANSITION METHOD
                           NK=3  ISLOPE=-1
                           LENGTH=400 FT  SLOPE=0.033 K=0.7
                           LENGTH=1600 FT  SLOPE=0.036 K=2
                           LENGTH=3000 FT  SLOPE=0.035 K=3


         BASIN LONGER THAN 4000.0 FT AND ALL BASIN LAG FACTORS NOT SPECIFIED
         USE Kn=  0.0160 AND Lca/L= 0.50000


         Tc AND Tp COMPUTED BY UPLAND/LAG TIME PROCEDURE

         SCS UPLAND METHOD FACTORS
                                    LENGTH (FT)      SLOPE (FT/FT)       COMPOSITE K
         SHEET FLOW PORTION            400.0          0.033000            0.7000
         SHALLOW FLOW PORTION         1600.0          0.036000            2.0000
         CHANNEL FLOW PORTION         3000.0          0.035000            3.0000
         TOTAL BASIN                  5000.0          0.035160            2.0984


         LAG EQUATION FACTORS:     Kn=  0.0160     TOTAL BASIN LENGTH (FT)=
5000.0
         TOTAL BASIN SLOPE (FT/FT)=   0.035160     CENTROUD LENGTH (FT)=
2500.0


         TIME OF CONCENTRATION (HRS)=  0.2871     TIME TO PEAK (HRS)=  0.1914
LAG TIME (HRS)=  0.2153

    *
    COMPUTE NM HYD         ID=5 HYD=A_1.1  AREA=0.0850962 SQ MI
                           PER A=80.0  PER B=15.0  PER C=5.0  PER D=0.0
                           TP=0.0 HR  MASS RAIN=-1
         TIME TO PEAK (hrs)=  0.1914

         K =  0.225525HR    TP =  0.191422HR    K/TP RATIO =  1.178155     SHAPE
CONSTANT, N =  3.011643
         UNIT PEAK =   125.71    CFS   UNIT VOLUME =   0.9999       B =   282.78
 P60 = 1.7200
         AREA =     0.085096 SQ MI    IA =   0.61250 INCHES    INF =   1.56500
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033333
```

```
    PRINT HYD             ID=5     CODE=20

                                          HYDROGRAPH FROM AREA A_1.1

         TIME      FLOW           TIME      FLOW           TIME      FLOW
TIME      FLOW           TIME      FLOW
          HRS       CFS            HRS       CFS            HRS       CFS
HRS       CFS            HRS       CFS
         0.000       0.0          2.000      15.4          4.000       0.5
6.000       0.0
         0.667       0.0          2.667       3.5          4.667       0.2
6.667       0.0
         1.333       0.4          3.333       1.3          5.333       0.1

        RUNOFF VOLUME =     0.60949 INCHES     =       2.7661 ACRE-FEET
        PEAK DISCHARGE RATE =      70.93 CFS  AT   1.600 HOURS   BASIN AREA =
0.0851 SQ. MI.


    *
    *
    *
    *                     *******************************
    *S********************  COMPUTE OFFSITE "OS" BASINS ************************
    *                     *******************************
    *
    *  COMPUTE BASIN OS-Y.1*****************************************************
    *
    COMPUTE NM HYD        ID=10 HYD=OS_Y.1  AREA=0.005205602 SQ MI
                          PER A=85.0  PER B=10.0  PER C=5.0  PER D=0.0
                          TP=0.1333 HR  MASS RAIN=-1

         K =  0.160917HR    TP =  0.133300HR    K/TP RATIO =  1.207182     SHAPE
CONSTANT, N =  2.944933
         UNIT PEAK =   10.829    CFS   UNIT VOLUME =   0.9984       B =   277.31
 P60 = 1.7200
         AREA =     0.005206 SQ MI    IA =   0.62000 INCHES    INF =   1.58600
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033333

    PRINT HYD             ID=10     CODE=20

                                          HYDROGRAPH FROM AREA OS_Y.1
```

INTERIM2.HYD

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.1	2.667	0.1	4.000	0.0
0.667	0.0	2.000	0.6	3.333	0.0		

RUNOFF VOLUME = 0.60149 INCHES = 0.1670 ACRE-FEET
PEAK DISCHARGE RATE = 5.68 CFS AT 1.533 HOURS BASIN AREA = 0.0052 SQ. MI.

```
*
*
*  COMPUTE BASIN OS-Y.2*****************************************************
*
COMPUTE NM HYD        ID=11 HYD=OS_Y.2  AREA=0.0157669 SQ MI
                      PER A=90.0  PER B=6.0  PER C=4.0  PER D=0.0
                      TP=0.1333 HR  MASS RAIN=-1
```

K = 0.162904HR TP = 0.133300HR K/TP RATIO = 1.222082 SHAPE CONSTANT, N = 2.912210
UNIT PEAK = 32.479 CFS UNIT VOLUME = 0.9992 B = 274.59
P60 = 1.7200
AREA = 0.015767 SQ MI IA = 0.62900 INCHES INF = 1.61120 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

```
PRINT HYD             ID=11     CODE=20
```

HYDROGRAPH FROM AREA OS_Y.2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	1.333	0.1	2.667	0.4	4.000	0.0
0.667	0.0	2.000	1.7	3.333	0.1	4.667	0.0

RUNOFF VOLUME = 0.59207 INCHES = 0.4979 ACRE-FEET
PEAK DISCHARGE RATE = 16.84 CFS AT 1.533 HOURS BASIN AREA =

0.0158 SQ. MI.

```
    *
    *
    *  COMPUTE BASIN OS-Z*****************************************************
    *
    COMPUTE NM HYD         ID=12 HYD=OS_Z  AREA=0.026651554 SQ MI
                           PER A=93.0  PER B=4.0  PER C=3.0  PER D=0.0
                           TP=0.1333 HR  MASS RAIN=-1

         K =  0.164213HR    TP =  0.133300HR    K/TP RATIO =  1.231907     SHAPE
CONSTANT, N =  2.891172
         UNIT PEAK =   54.549    CFS   UNIT VOLUME =   0.9994       B =   272.83
 P60 = 1.7200
         AREA =     0.026652 SQ MI    IA =   0.63500 INCHES    INF =   1.62800
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033333

    PRINT HYD              ID=12     CODE=20

                                                HYDROGRAPH FROM AREA OS_Z


         TIME      FLOW           TIME      FLOW           TIME      FLOW
TIME      FLOW           TIME      FLOW
          HRS       CFS             HRS       CFS            HRS       CFS
HRS       CFS            HRS       CFS
         0.000      0.0           1.333      0.2           2.667      0.7
4.000      0.0
         0.667      0.0           2.000      2.8           3.333      0.2
4.667      0.0

        RUNOFF VOLUME =     0.58590 INCHES     =       0.8328 ACRE-FEET
        PEAK DISCHARGE RATE =      28.08 CFS  AT   1.533 HOURS   BASIN AREA =
0.0267 SQ. MI.


    *
    *
    *                      *******************************
    *S*******************  COMPUTE ROADWAY "R" BASINS  *************************
    *                      *******************************
    *
    *  COMPUTE BASIN R1*******************************************************
```

```
    *
    COMPUTE NM HYD          ID=15 HYD=R1  AREA=0.002180881 SQ MI
                            PER A=0.0  PER B=0.0  PER C=95.0  PER D=5.0
                            TP=0.1333 HR  MASS RAIN=-1

         K =  0.072649HR    TP =  0.133300HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
         UNIT PEAK =  0.43051    CFS   UNIT VOLUME =   0.9711       B =   526.28
 P60 = 1.7200
         AREA =     0.000109 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033333


         K =  0.104175HR    TP =  0.133300HR    K/TP RATIO =  0.781506     SHAPE
CONSTANT, N =  4.597254
         UNIT PEAK =   6.1114    CFS   UNIT VOLUME =   0.9983       B =   393.20
 P60 = 1.7200
         AREA =     0.002072 SQ MI    IA =   0.35000 INCHES    INF =   0.83000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.033333

    PRINT HYD               ID=15     CODE=20

                                              HYDROGRAPH FROM AREA R1


         TIME      FLOW           TIME      FLOW           TIME      FLOW
TIME      FLOW           TIME      FLOW
          HRS       CFS             HRS       CFS            HRS       CFS
HRS       CFS             HRS       CFS
         0.000       0.0          1.333       0.7          2.667       0.0
4.000       0.0          5.333       0.0
         0.667       0.0          2.000       0.3          3.333       0.0
4.667       0.0          6.000       0.0

        RUNOFF VOLUME =     1.03024 INCHES     =       0.1198 ACRE-FEET
        PEAK DISCHARGE RATE =       4.18 CFS  AT   1.533 HOURS   BASIN AREA =
0.0022 SQ. MI.



    *
    *
    *  COMPUTE BASIN R2************************************************************
    *
```

INTERIM2.HYD

COMPUTE NM HYD ID=16 HYD=R2 AREA=0.0089942 SQ MI
PER A=0.0 PER B=10.0 PER C=20.0 PER D=70.0
TP=0.1333 HR MASS RAIN=-1

K = 0.072649HR TP = 0.133300HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 24.857 CFS UNIT VOLUME = 0.9989 B = 526.28 P60 = 1.7200
AREA = 0.006296 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

K = 0.113994HR TP = 0.133300HR K/TP RATIO = 0.855166 SHAPE CONSTANT, N = 4.160267
UNIT PEAK = 7.4029 CFS UNIT VOLUME = 0.9984 B = 365.72 P60 = 1.7200
AREA = 0.002698 SQ MI IA = 0.40000 INCHES INF = 0.97000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.033333

PRINT HYD ID=16 CODE=20

HYDROGRAPH FROM AREA R2

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	2.000	2.9	4.000	0.1	6.000	0.1
0.667	0.0	2.667	0.4	4.667	0.1	6.667	0.0
1.333	5.6	3.333	0.1	5.333	0.1		

RUNOFF VOLUME = 1.63880 INCHES = 0.7861 ACRE-FEET
PEAK DISCHARGE RATE = 21.28 CFS AT 1.533 HOURS BASIN AREA = 0.0090 SQ. MI.

*
*
*S**********
*

```
    * ADD A-1.1 TO OS-Y.1 TO GET FLOW AT WEST END OF GRAVEL ROAD *****************
    *
    ADD HYD              ID=20  HYD NO=AP1  ID I=5 TO ID II=10
    PRINT HYD            ID=20  CODE=1

                                          HYDROGRAPH FROM AREA AP1


        RUNOFF VOLUME =     0.60902 INCHES     =       2.9331 ACRE-FEET
        PEAK DISCHARGE RATE =      75.86 CFS  AT   1.567 HOURS   BASIN AREA =
0.0903 SQ. MI.



    *
    *
    * ADD AP1 TO R1 TO GET FLOW AT EAST END OF GRAVEL ROAD ***********************
    *
    ADD HYD              ID=21  HYD NO=AP2  ID I=20 TO ID II=15
    PRINT HYD            ID=21  CODE=1

                                          HYDROGRAPH FROM AREA AP2


        RUNOFF VOLUME =     0.61896 INCHES     =       3.0529 ACRE-FEET
        PEAK DISCHARGE RATE =      79.76 CFS  AT   1.567 HOURS   BASIN AREA =
0.0925 SQ. MI.



    *
    *
    * ADD AP2 TO OS-Y.2 TO GET FLOW IN VISTA VIEJA *******************************
    *
    ADD HYD              ID=22  HYD NO=AP3  ID I=21 TO ID II=11
    PRINT HYD            ID=22  CODE=1

                                          HYDROGRAPH FROM AREA AP3


        RUNOFF VOLUME =     0.61504 INCHES     =       3.5508 ACRE-FEET
        PEAK DISCHARGE RATE =      95.81 CFS  AT   1.567 HOURS   BASIN AREA =
0.1082 SQ. MI.
```

```
    *
    *
    * ADD AP3 TO R2 TO GET FLOW IN VISTA VIEJA ***********************************
    *
    ADD HYD              ID=23  HYD NO=AP4  ID I=22 TO ID II=16
    PRINT HYD            ID=23  CODE=1

                                          HYDROGRAPH FROM AREA AP4


        RUNOFF VOLUME =     0.69357 INCHES     =       4.3369 ACRE-FEET
        PEAK DISCHARGE RATE =     115.50 CFS  AT   1.567 HOURS   BASIN AREA =
0.1172 SQ. MI.



    *
    *
    * ADD AP4 TO OS-Z TO GET FLOW IN VISTA VIEJA **********************************
    *
    ADD HYD              ID=24  HYD NO=AP5  ID I=23 TO ID II=12
    PRINT HYD            ID=24  CODE=1

                                          HYDROGRAPH FROM AREA AP5


        RUNOFF VOLUME =     0.67363 INCHES     =       5.1697 ACRE-FEET
        PEAK DISCHARGE RATE =     142.26 CFS  AT   1.567 HOURS   BASIN AREA =
0.1439 SQ. MI.



    *
    *
    FINISH

        NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 08:58:29
```