CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Director

Mayor Timothy M. Keller

December 21, 2020

David Soule, P.E.
Rio Grande Engineering
P.O. Box 93924
Albuquerque, NM 87199

RE: Quivira Subdivision
Grading & Drainage Plan and Drainage Report
Engineer's Stamp Date: 12/02/20
Hydrology File: D09D006

Dear Mr. Soule:

Based upon the information provided in your submittal received 12/04/2020, the Grading & Drainage Plan and Drainage Report **are not** approved for Grading Permit, Work Order, or for action by the DRB on Preliminary Plat. The following comments need to be addressed for approval of the above referenced project:

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Grading & Drainage Plan

1. Please provide a swale that collects the off-site drainage and directs it to the proposed 10' concrete rundown. (please see image below)

2. Since you will need to do grading on the adjacent property with the swale from Comment #1, please provide a notarized agreement with the adjacent property owner stating that you can perform construction activities related to what is outlined on the Grading & Drainage Plan.

3. Please provide a cross-section detail for the 10' concrete rundown. (please see image below)

4. Is the 10' concrete rundown on its own tract like the detention pond? If not, I would highly recommend that it be put in one. The maintenance and liability of this will need to be the HOA and not a homeowner.

5. Please provide a typical roadway section and a roadway section for where the drainage goes from the west side to the east side of the roadway.

6. Please remove the 10 – 2' sidewalk culverts. This is very unstable and the City only allows 4 – 2' sidewalk culverts max in an area. I would recommend that you provide inlets and then pipe it into the detention / stormwater quality pond.

7. Please provide a cross-section for the proposed detention pond showing all distances from the property lines, the 100-year 6 hr volume elevation, top of pond elevation, and bottom of pond elevation. (please see image below)

8. As for the drainage work on the east adjacent property, again, I think providing a manhole and storm pipe for the outfall from the detention pond to be a better long term solution. If this is done, then just provide a standpipe with an orifice (along with calculations) for the allowable discharge rate into the 24" pipe.

9. Again, since you will need to do grading and work on the east adjacent property. Please provide a notarized agreement with the adjacent property owner (HOA for that subdivision) stating that you can perform construction activities related to what is outlined on the Grading & Drainage Plan.

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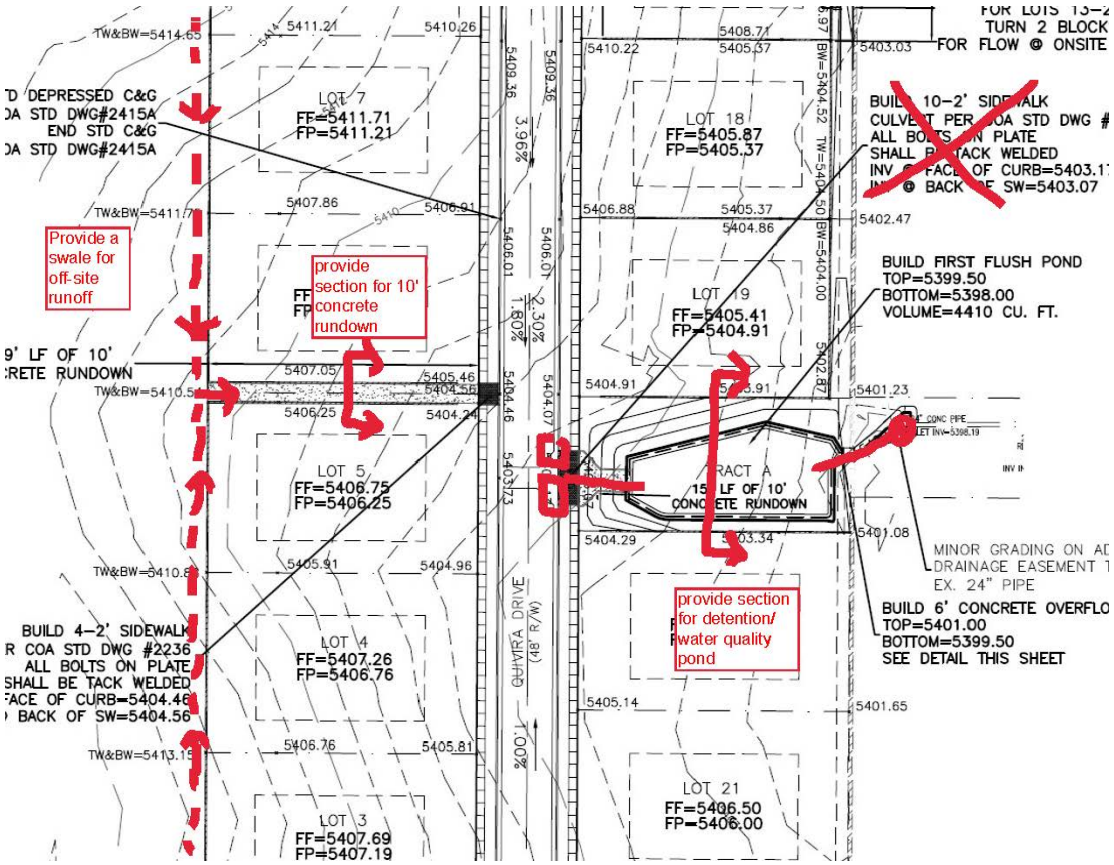
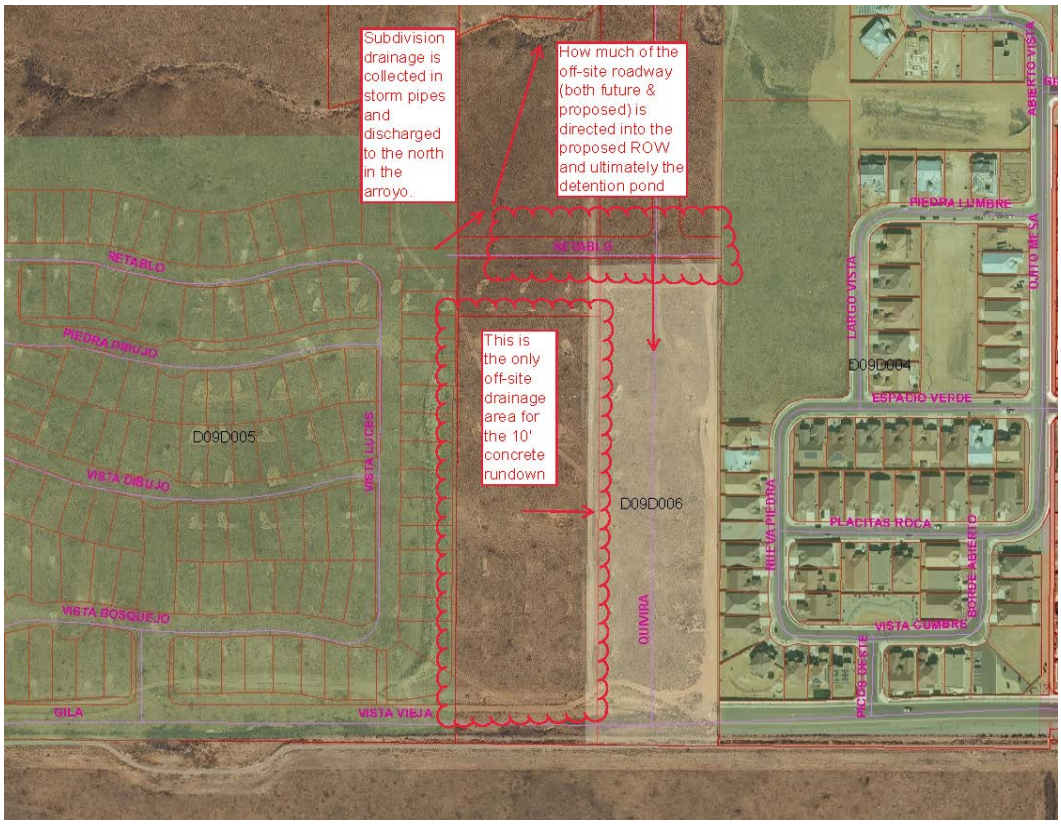


Drainage Report

1. Please provide a better off-site drainage area exhibit. This should better show the adjacent west property which should be the only area included in the flow calculations

that goes down the 10' concrete rundown. Also, please show the area of the northern proposed R.O.W. which will discharge into the Quivira R.O.W. which then ultimately gets discharged into the detention pond. Please note that the existing western subdivision drainage is being collected in a storm pipe system and then discharged to the north into the existing arroyo.



2. Then please revise any calculation that are need and make any changes to the overall design.

Standard review fee of $325 (for DRB Site) will be required at the time of resubmittal.

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

Sincerely,

Renée C. Brissette

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

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: QUIVIRA SUBDIVISION Building Permit #:_____ Hydrology File #: _____

DRB#: _____ EPC#: _____ Work Order#: _____

Legal Description: TRACT 6 VOLCANO CLIFFS UNIT 6

City Address: UNADDRESSED LOT ON QUIVIRA BETWEEN CIEJA VIST AND RETABLO

Applicant: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: RIO GRANDE ENGINEERING Contact: DAVID SOULE

Address: PO BOX 93924 ALB NM 87199

Phone#: 505.321.9099 Fax#: 505.872.0999 E-mail: david@riograndeengineering.com

TYPE OF DEVELOPMENT: ___ PLAT ___ RESIDENCE X DRB SITE ___ ADMIN SITE

Check all that Apply:

DEPARTMENT:

X HYDROLOGY/ DRAINAGE

___ TRAFFIC/ TRANSPORTATION

TYPE OF SUBMITTAL:

___ ENGINEER/ARCHITECT CERTIFICATION

___ PAD CERTIFICATION

___ CONCEPTUAL G & D PLAN

XX GRADING PLAN

XX 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?

IS THIS A RESUBMITTAL?: ___ Yes XX No

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

X BUILDING PERMIT APPROVAL

___ CERTIFICATE OF OCCUPANCY

X 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

X OTHER (SPECIFY) VACATION OF ROW

DATE SUBMITTED: _____ By: _____

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED:_____

FEE PAID:_____

DRAINAGE REPORT

For

QUIVIRA SUBDIVISION

Albuquerque, New Mexico

Prepared by

Rio Grande Engineering
PO Box 93924
Albuquerque, New Mexico 87199

DECEMBER 2020

12/2/20

David Soule P.E. No. 14522

TABLE OF CONTENTS

Appendix

Map

PURPOSE

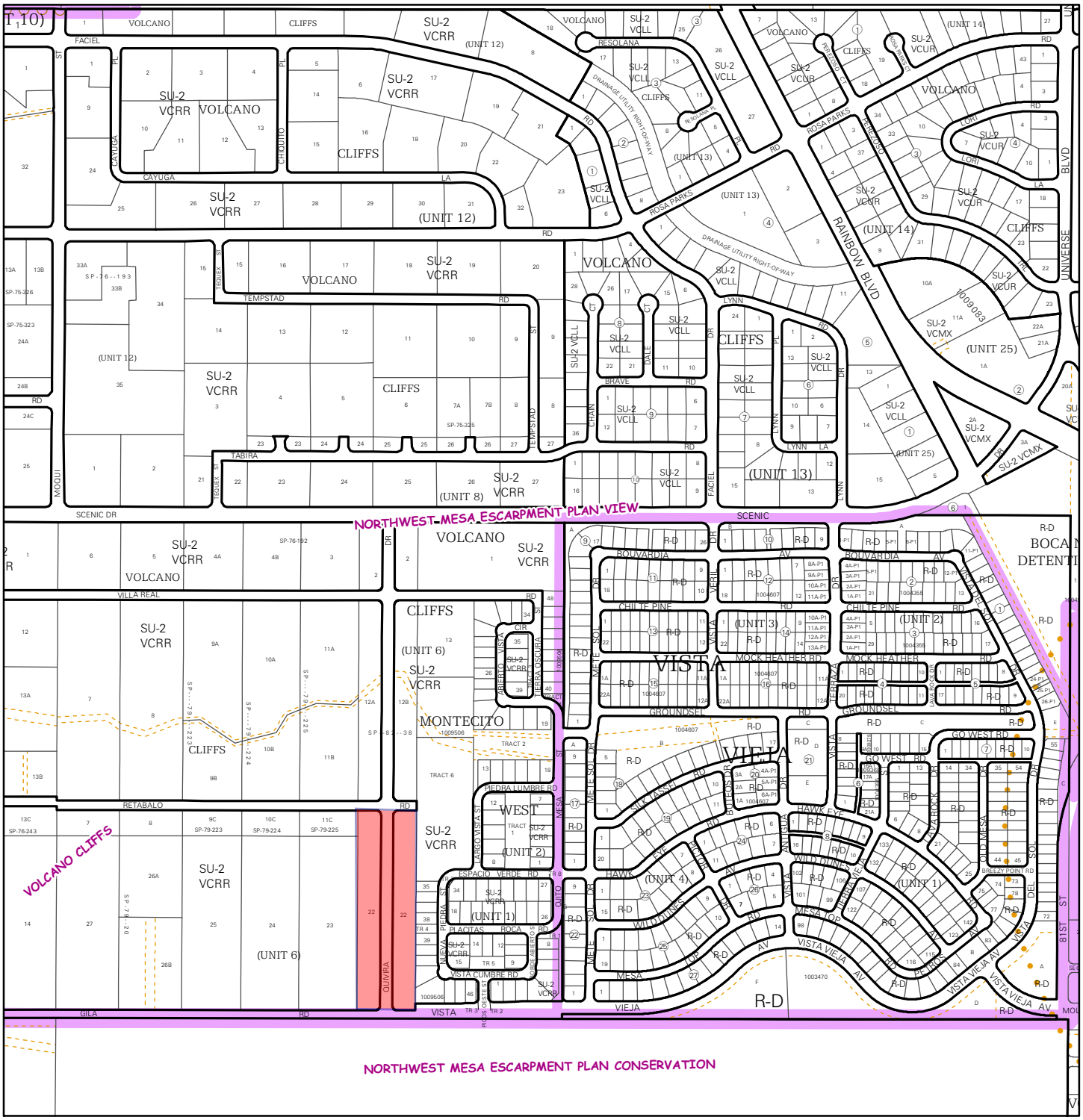
The purpose of this report is to provide the Drainage Management Plan for the subdivision and development of 23 single family lots located on Quivira Dr NW This plan was prepared in accordance with the City of Albuquerque design regulations, utilizing the City of Albuquerque's Development Process Manual drainage guidelines. This report will demonstrate that the grading does not adversely affect the surrounding properties, nor the upstream or downstream facilities.

INTRODUCTION

The subject of this report, as shown on the Exhibit A, is a 7.3 acre parcel of land located on the Quivira Drive between Vista Vieja Road and Retablo Road. The current legal is tract 22, unit 6 Volcano Cliffs. As shown on FIRM map35013C0111G, the entire site is located within Flood Zone X. The site is directly west and adjacent to Montecito subdivision unit 2 and east of Montecito west subdivision (D009-D005). The site has been identified as upstream basin 6-D.3 with and dedicated discharge point and allowable rate of 29.6 cfs, a copy of map has been included in appendix A. The development of Montecito west subdivision diverted the majority of the upland flows.

EXISTING CONDITIONS

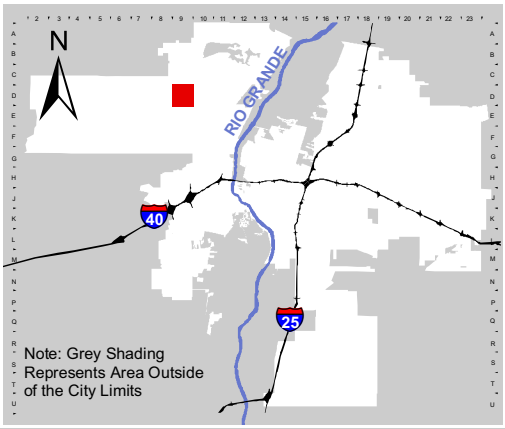
The site currently is undeveloped and drains to an existing 24" public storm drain in the Montecito unit 2 subdivision. Minor flows enter the site from an adjacent Tract 23 of Volcano Cliffs unit 6.



For more current information and details visit: http://www.cabq.gov/gis

Albuquerque Geographic Information System

Map amended through: 1/28/2016



Zone Atlas Page:

D-09-Z

Selected Symbols

- SECTOR PLANS
- Design Overlay Zones
- City Historic Zones
- H-1 Buffer Zone
- Petroglyph Mon.
- Escarpment
- 2 Mile Airport Zone
- Airport Noise Contours
- Wall Overlay Zone

0 750 1,500 Feet

PROPOSED CONDITIONS

The proposed improvements consist of grading the lots to construct Quivira road and 23 homes. As shown on the drainage basin map located in appendix B, the site will be graded to consist of 6 sub basins. Basins A, F and D drain directly to Quivira. Basins B and C are the rear portions of the lots that will drain to the rear and travel along a private drainage easement within the rear yard. All basins excluding Basin E which contains the water block portion of Quivira that will discharge 0.25 cfs to Vista Vieja will drain to a water quality/detention pond. Upland flow of will be accepted by a 10' channel and will flow into the onsite pond. The pond will retain the required first flush volume of 4264 cf, and discharge to the existing 24" storm drain located east of the property. Due to the developed condition assumptions with in the surrounding drainage plans, the pond will limit its discharge by introducing a weir overflow to meter the flow to 29.01cfs.

The pond, overflow and rear yard easements will be privately maintained by the Home owners association that will be created with the development. The improvements and adjacent roadway and sidewalks will be constructed by city work order.

SUMMARY AND RECOMMENDATIONS

This project is a new residential development located between two fully developed subdivisions. The regional storm drain system has been designed to accept 29.6 cfs from this lot. The proposed development will discharge 29.01 cfs which is less than allowed. The development will manage the required first flush and drain to the required outfall. This drainage plan and report conforms to the governing drainage regulations of the City as well as the overall drainage concept approved with the Montecito and Montecito west subdivisions. AMAFCA was contacted about any fees associated with the development of this site an ultimate usage of their

down stream detention facilities, and were informed of no fees and acknowledgement that this site must match the developed conditions assumptions within the Montecito development plan. Since the effected area site encompasses more than 1 acre, a NPDES permit will be required prior to any construction activity.

APPENDIX A

Excerpts from D09D005 drainage plan

BASIN OS-D
AREA=152.2 AC
Q=174.2 CFS
A=95.0, B=5.0,
C=0.0, D=0.0

AP OS-D
Q=174.2 CFS

BASIN 15-D
AREA=96.4 AC
Q=177.2 CFS
A=68.0, B=8.0,
C=8.0, D=16.0

AP 15-D
Q=213.1 CFS

BASIN E-1.4
AREA=87.0 AC
Q=144.7 CFS
Q(allow)=58 CFS
A=60.0, B=13.0,
C=13.0, D=14.0

BASIN E-1.3
AREA=50.8 AC
Q=102.3 CFS
Q(allow)=35 CFS
A=52.0, B=16.0,
C=16.0, D=16.0

BASIN E-1.1
AREA=3.9 AC
Q=9.9 CFS
A=30.0, B=18.0,
C=18.0, D=34.0

AP E-1.3
Q=102.3 CFS

AP E-1.4
Q=247.0 CFS
EX SD CAPACITY =
94 CFS

BASIN E-1.2
AREA=0.8 AC
Q=2.3 CFS
A=0.0, B=29.0,
C=29.0, D=42.0

AP 9-D.1
Q=223.1 CFS

BASIN 9-D.1
AREA=38.6 AC
Q=68.5 CFS
A=40.0, B=21.0,
C=19.0, D=20.0

BASIN 6-D.1
AREA=28.9 AC
Q=39.2 CFS
A=85.0, B=8.0,
C=3.0, D=4.0

AP #2
Q=238.8 CFS
EX SD CAPACITY =
269 CFS

BASIN 9-D.2
AREA=6.2 AC
Q=15.6 CFS
A=30.0, B=18.0,
C=18.0, D=34.0

BASIN 6-D.2
SEE ONSITE
BASIN MAP

BASIN 6-D.3
AREA=11.7 AC
Q=29.6 CFS
A=30.0, B=18.0,
C=18.0, D=34.0

AP #1
Q=60.7 CFS
EX SD CAPACITY =
62 CFS

BASIN A-1.1
AREA=58.9 AC
Q=51.2 CFS
A=90.0/B=5.0,
C=5.0, D=0.0

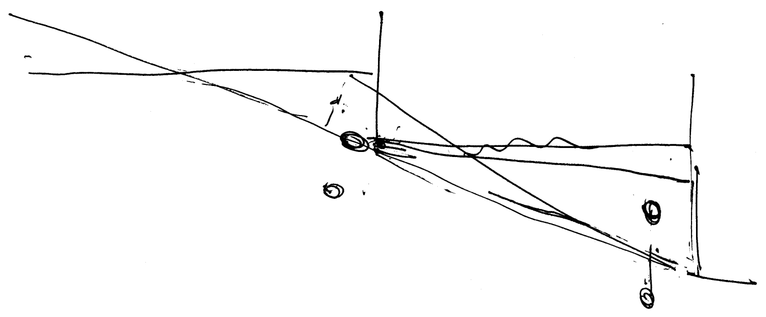
BASIN A-1.2
AREA=8.1 AC
Q=20.4 CFS
A=30.0, B=18.0,
C=18.0, D=34.0

Vista Viejo

Water pressure line

Development to the west will have restricted allowable surface discharge to Vista Viejo

For future developments, no further discharge onto Vista Viejo Ave should be allowed.



LEGEND

BASIN BOUNDARY	
FLOW ARROW	
OPEN SPACE	

SCOTT A. HUSTON
46644
REGISTERED PROFESSIONAL ENGINEER

N

Overall Basin Map

400 200 0 400
1" = 400'

DEVELOPED CONDITIONS
OVERALL BASIN MAP

Bohannan ▲ Huston

P:\20160398\CDP\Plans\General\Drainage\20170017 Overall Developed Basin Map.dwg
May 20, 2016 – 8:14am

APPENDIX B

SITE HYDROLOGY

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, USA*
Latitude: 35.1624°, Longitude: -106.739°
Elevation: 5419.05 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.161** (0.138-0.188)	**0.209** (0.178-0.244)	**0.281** (0.239-0.329)	**0.339** (0.289-0.395)	**0.417** (0.351-0.484)	**0.477** (0.402-0.553)	**0.541** (0.454-0.626)	**0.610** (0.507-0.705)	**0.702** (0.578-0.814)	**0.777** (0.634-0.901)
10-min	**0.245** (0.210-0.286)	**0.318** (0.271-0.371)	**0.428** (0.364-0.501)	**0.517** (0.439-0.601)	**0.635** (0.535-0.737)	**0.726** (0.612-0.841)	**0.824** (0.691-0.952)	**0.928** (0.771-1.07)	**1.07** (0.880-1.24)	**1.18** (0.966-1.37)
15-min	**0.303** (0.261-0.355)	**0.395** (0.336-0.461)	**0.531** (0.451-0.622)	**0.640** (0.545-0.745)	**0.787** (0.663-0.914)	**0.899** (0.759-1.04)	**1.02** (0.856-1.18)	**1.15** (0.956-1.33)	**1.33** (1.09-1.54)	**1.47** (1.20-1.70)
30-min	**0.409** (0.351-0.478)	**0.531** (0.453-0.620)	**0.715** (0.607-0.837)	**0.863** (0.733-1.00)	**1.06** (0.893-1.23)	**1.21** (1.02-1.41)	**1.38** (1.15-1.59)	**1.55** (1.29-1.79)	**1.79** (1.47-2.07)	**1.98** (1.61-2.29)
60-min	**0.506** (0.434-0.592)	**0.657** (0.561-0.767)	**0.884** (0.751-1.04)	**1.07** (0.908-1.24)	**1.31** (1.11-1.52)	**1.50** (1.26-1.74)	**1.70** (1.43-1.97)	**1.92** (1.59-2.22)	**2.21** (1.82-2.56)	**2.44** (2.00-2.83)
2-hr	**0.594** (0.515-0.682)	**0.759** (0.655-0.872)	**1.01** (0.866-1.16)	**1.21** (1.04-1.37)	**1.49** (1.27-1.69)	**1.71** (1.45-1.94)	**1.95** (1.64-2.21)	**2.20** (1.84-2.49)	**2.56** (2.12-2.89)	**2.85** (2.33-3.22)
3-hr	**0.637** (0.563-0.731)	**0.812** (0.715-0.932)	**1.07** (0.941-1.22)	**1.27** (1.12-1.45)	**1.55** (1.35-1.77)	**1.78** (1.55-2.02)	**2.03** (1.74-2.29)	**2.29** (1.95-2.59)	**2.64** (2.23-3.00)	**2.94** (2.44-3.34)
6-hr	**0.735** (0.651-0.832)	**0.931** (0.832-1.06)	**1.21** (1.07-1.36)	**1.42** (1.26-1.61)	**1.72** (1.52-1.94)	**1.95** (1.71-2.19)	**2.20** (1.91-2.47)	**2.45** (2.12-2.74)	**2.80** (2.40-3.15)	**3.10** (2.63-3.49)
12-hr	**0.818** (0.728-0.918)	**1.03** (0.920-1.16)	**1.32** (1.16-1.48)	**1.55** (1.37-1.73)	**1.84** (1.62-2.06)	**2.08** (1.82-2.32)	**2.32** (2.02-2.58)	**2.58** (2.22-2.87)	**2.92** (2.49-3.25)	**3.19** (2.71-3.58)
24-hr	**0.937** (0.828-1.07)	**1.18** (1.04-1.34)	**1.48** (1.31-1.68)	**1.72** (1.52-1.95)	**2.05** (1.80-2.32)	**2.31** (2.02-2.60)	**2.57** (2.24-2.90)	**2.84** (2.46-3.19)	**3.21** (2.76-3.60)	**3.49** (2.99-3.92)
2-day	**0.974** (0.870-1.09)	**1.22** (1.10-1.37)	**1.54** (1.38-1.72)	**1.79** (1.60-2.00)	**2.13** (1.90-2.37)	**2.39** (2.12-2.66)	**2.66** (2.35-2.96)	**2.94** (2.58-3.27)	**3.32** (2.89-3.70)	**3.62** (3.14-4.03)
3-day	**1.14** (1.03-1.26)	**1.43** (1.29-1.58)	**1.77** (1.60-1.96)	**2.05** (1.85-2.26)	**2.41** (2.17-2.66)	**2.69** (2.42-2.97)	**2.98** (2.67-3.29)	**3.28** (2.92-3.61)	**3.67** (3.25-4.05)	**3.97** (3.50-4.38)
4-day	**1.31** (1.20-1.44)	**1.63** (1.49-1.79)	**2.00** (1.83-2.19)	**2.30** (2.10-2.51)	**2.70** (2.45-2.95)	**3.00** (2.72-3.28)	**3.31** (2.99-3.61)	**3.61** (3.26-3.94)	**4.02** (3.61-4.39)	**4.33** (3.87-4.74)
7-day	**1.51** (1.38-1.64)	**1.87** (1.71-2.04)	**2.28** (2.09-2.49)	**2.60** (2.38-2.84)	**3.03** (2.76-3.29)	**3.34** (3.05-3.64)	**3.66** (3.33-3.98)	**3.97** (3.60-4.32)	**4.37** (3.95-4.76)	**4.66** (4.21-5.09)
10-day	**1.67** (1.54-1.82)	**2.08** (1.91-2.27)	**2.55** (2.34-2.77)	**2.92** (2.68-3.17)	**3.41** (3.12-3.70)	**3.78** (3.45-4.10)	**4.15** (3.78-4.50)	**4.52** (4.10-4.90)	**5.00** (4.52-5.42)	**5.36** (4.82-5.82)
20-day	**2.11** (1.94-2.31)	**2.62** (2.41-2.87)	**3.19** (2.93-3.48)	**3.62** (3.32-3.94)	**4.17** (3.81-4.53)	**4.57** (4.17-4.96)	**4.95** (4.51-5.37)	**5.32** (4.84-5.77)	**5.78** (5.25-6.28)	**6.11** (5.53-6.65)
30-day	**2.54** (2.33-2.75)	**3.15** (2.89-3.42)	**3.80** (3.48-4.12)	**4.28** (3.92-4.63)	**4.88** (4.47-5.27)	**5.31** (4.86-5.74)	**5.72** (5.23-6.18)	**6.11** (5.57-6.60)	**6.58** (5.98-7.11)	**6.91** (6.27-7.47)
45-day	**3.10** (2.86-3.36)	**3.84** (3.54-4.16)	**4.59** (4.22-4.96)	**5.12** (4.71-5.53)	**5.77** (5.31-6.23)	**6.22** (5.72-6.72)	**6.63** (6.09-7.16)	**7.00** (6.43-7.56)	**7.43** (6.81-8.02)	**7.70** (7.06-8.32)
60-day	**3.57** (3.29-3.87)	**4.42** (4.08-4.79)	**5.28** (4.87-5.71)	**5.89** (5.44-6.38)	**6.63** (6.12-7.17)	**7.14** (6.59-7.72)	**7.62** (7.02-8.24)	**8.04** (7.40-8.70)	**8.53** (7.85-9.23)	**8.85** (8.15-9.58)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at low er and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) w ill be greater than the upper bound (or less than the low er bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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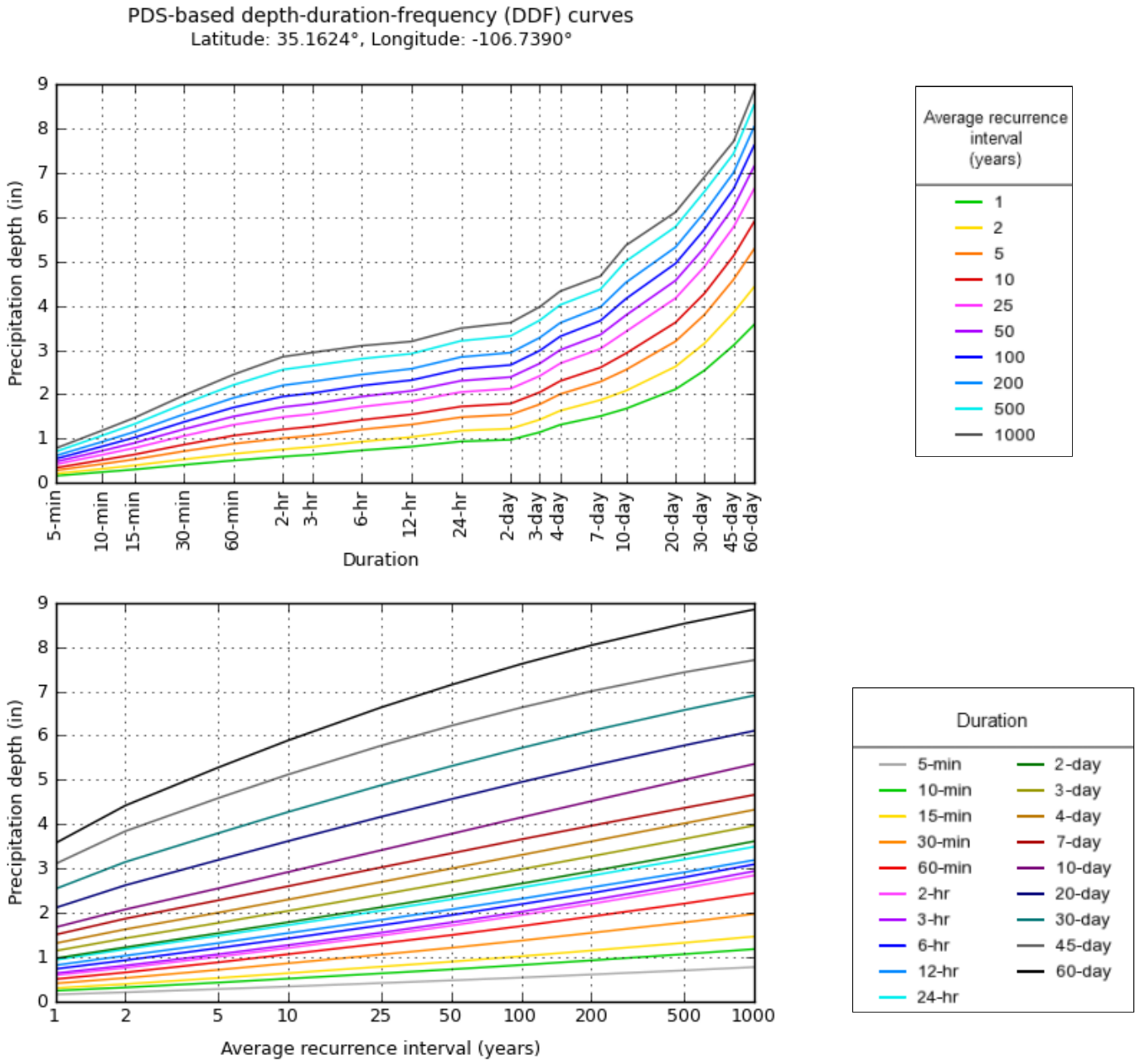
PF graphical



NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Fri Dec 4 00:18:21 2020

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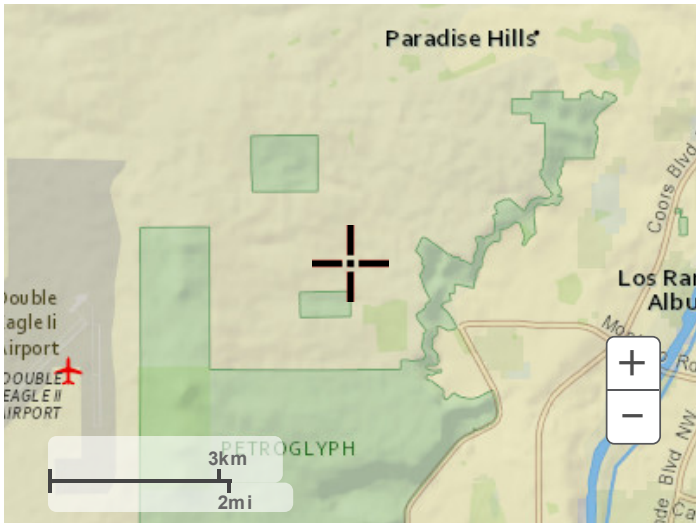
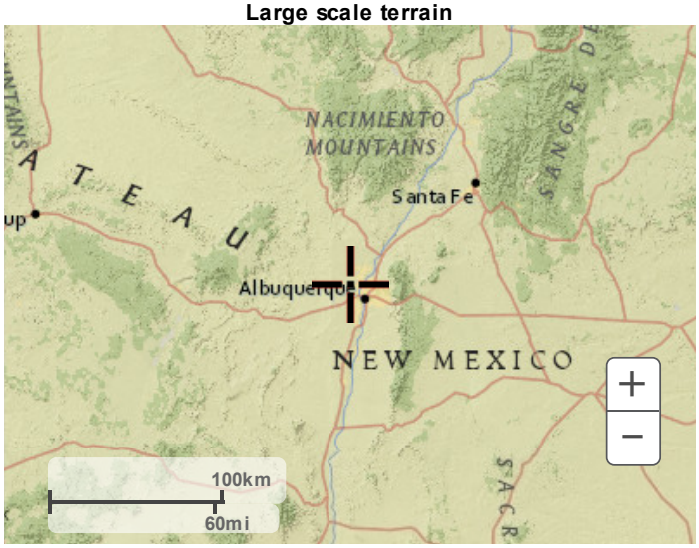
Maps & aerials

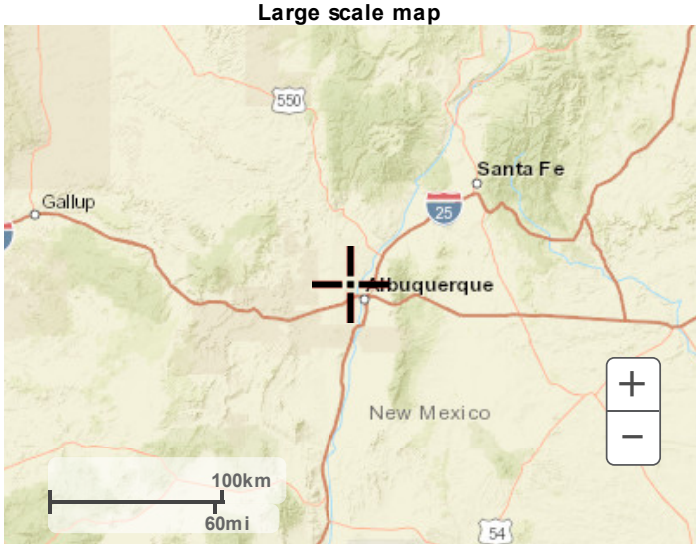
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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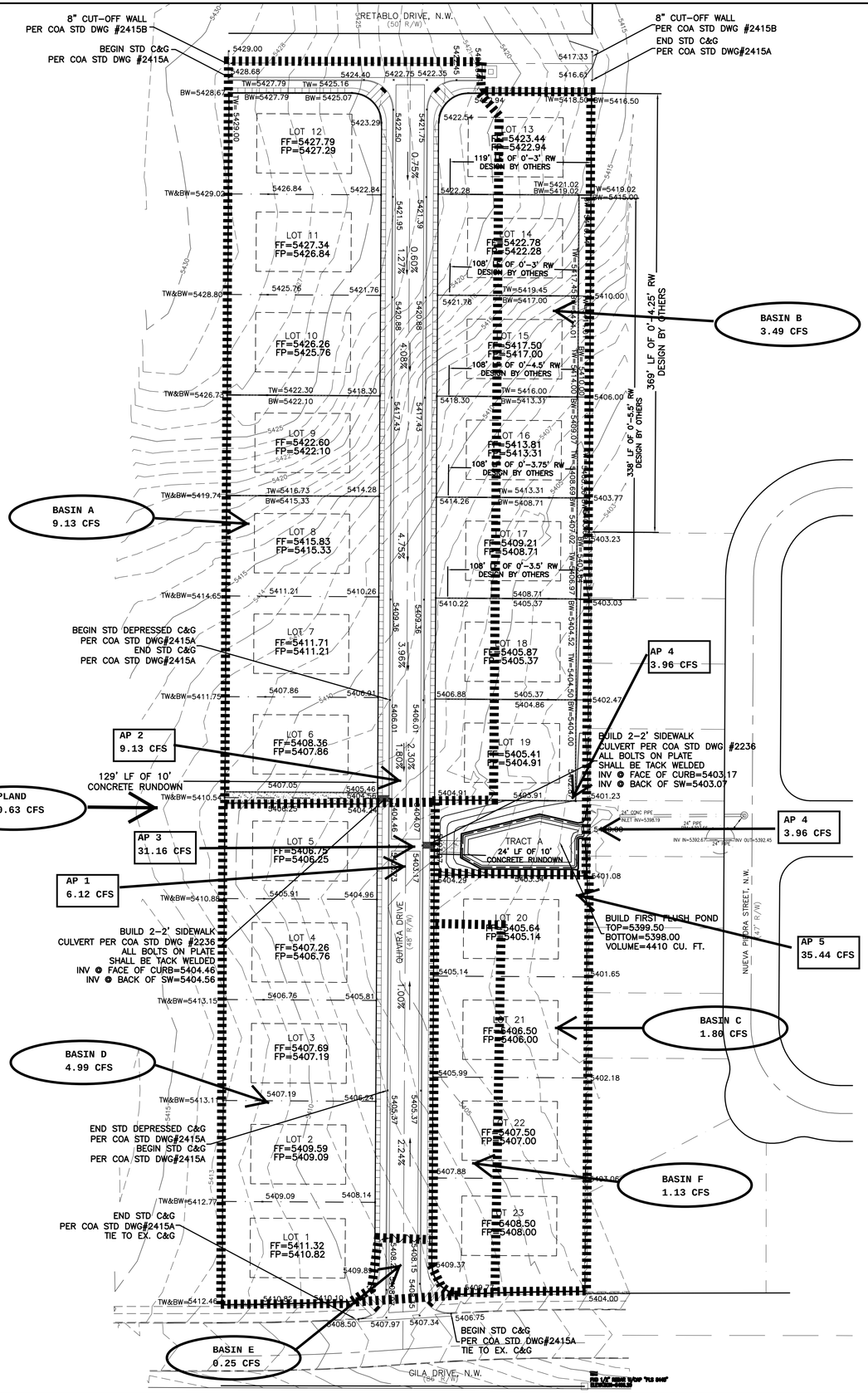
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov



CAUTION:

EXISTING UTILITIES ARE NOT SHOWN. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO ANY EXCAVATION TO DETERMINE THE ACTUAL LOCATION OF UTILITIES & OTHER IMPROVEMENTS.

EROSION CONTROL NOTES:

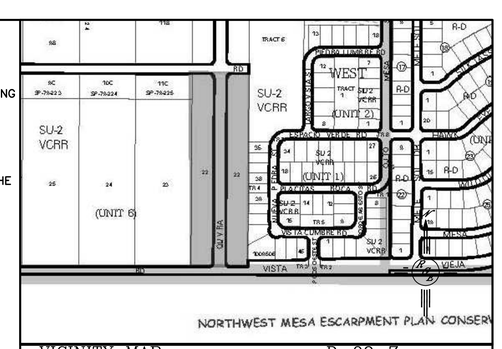
1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.

2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.

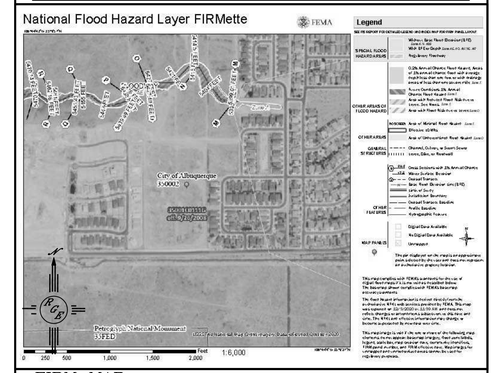
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.

4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.

5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL ACCEPTANCE OF ANY PROJECT.



VICINITY MAP: D-09-Z



FIRM MAP:

LEGAL DESCRIPTION:

LOTS 1-23, AND TRACT A, QUIVERA ESTATES

NOTES:

1. ALL SPOT ELEVATIONS REPRESENT FLOWLINE ELEVATION UNLESS OTHERWISE NOTED.

2. ALL CURB AND GUTTER TO 6" HEADER UNLESS OTHERWISE NOTED.

3. ALL RETAINING WALL DESIGN SHALL BE BY OTHERS.

4. ALL NEW PAVING SHALL BE 6" PCC OVER 8" SUBGRADE PREPARATION IN CONFORMANCE TO ACI 330R-08. UNLESS OTHERWISE NOTED.

5. ANY CURBS OR PAVEMENT NEGATIVELY IMPACTED BY CONSTRUCTION ACTIVITY SHALL BE REPLACED TO MATCH EXISTING CONDITIONS.

6. ALL SITE WORK SHALL CONFORM TO CITY OF ALBUQUERQUE STANDARDS FOR PUBLIC WORKS CONSTRUCTION EDITION 9

LEGEND

- EXISTING CONTOUR (5414)
- EXISTING INDEX CONTOUR (5415)
- PROPOSED CONTOUR (5414)
- PROPOSED INDEX CONTOUR (5415)
- SLOPE TIE
- EXISTING SPOT ELEVATION (× 4048.25)
- PROPOSED SPOT ELEVATION (× 4048.25)
- BOUNDARY
- CENTERLINE
- RIGHT-OF-WAY
- PROPOSED CURB
- EXISTING CURB AND GUTTER
- PROPOSED SIDEWALK
- EXISTING SIDEWALK
- 3' ADA PATH-2% MAX SLOPE

N

GRAPHIC SCALE

50 20 0 20 50

SCALE: 1"=50'

ENGINEER'S SEAL

DAVID SOULE NEW MEXICO 14522 REGISTERED PROFESSIONAL ENGINEER

12/2/20

DAVID SOULE
P.E. #14522

QUIVIRA ESTATES

GRADING AND DRAINAGE PLAN

Rio Grande Engineering
1606 CENTRAL AVENUE SE
SUITE 201
ALBUQUERQUE, NM 87106
(505) 872-0999

DRAWN BY WCWJ

DATE 12-02-20

2102059-LAYOUT-8-06-20

SHEET # —

JOB # 2102059

BASIN DATA

Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		Q100 GENERATED	Q100 DISCHARGED	FIRST FLUSH REQUIRED
			%	(acres)	%	(acres)	%	(acres)	%	(acres)			
UPLAND	192622.00	4.422	30%	1.3266	18%	0.796	18%	0.796	34%	1.503	10.63	10.63	0
BASIN A	141171.00	3.241	0%	0	20%	0.648	44%	1.426	36%	1.167	9.13	9.13	1775
BASIN B	55091.00	1.265	0%	0	20%	0.253	49%	0.6197	31%	0.392	3.49	3.49	596
BASIN C	27965.00	0.642	0%	0	20%	0.128	47%	0.3017	33%	0.212	1.8	1.8	322
BASIN D	72952.00	1.675	0%	0	20%	0.335	31%	0.5192	49%	0.821	4.99	4.99	1248
BASIN E	2963.00	0.068	0%	0	0%	0.000	16%	0.0109	84%	0.057	0.25	0.25	87
BASIN F	16886.00	0.388	0%	0	20%	0.078	40%	0.1551	40%	0.155	1.13	1.13	236
TOTAL SITE PROPOSE	317028.00	7.278									31.16	29.01	4264

STAGE/STORAGE VOLUME CALCULATIONS

WATER QUALITY POND

	ACTUAL ELEV.	DEPTH (FT)	AREA SF	VOLUME PER UNIT	VOLUME CUMULATIVE	VOLUME AC-FT	Q (CFS)
OUTFALL	5399.50	0.00	3600.00	4410	4410	0.1012	0.00
	5400.00	0.50	4115.00	1928.75	6338.75	0.1455	6.26
	5401.00	1.50	5337.00	4726.00	11064.75	0.2540	32.52

Orifice Equation

Q=CLH^3/2

C = 2.95

L 6

H= HEIGHT

Q (CFS)= Flow

```
        AHYMO PROGRAM (AHYMO-S4)                    - Version: S4.01a - Rel: 01a
             RUN DATE (MON/DAY/YR) = 12/03/2020
             START TIME (HR:MIN:SEC) = 17:31:58     USER NO.=
RioGrandeSingleA41963517
             INPUT FILE = ocuments and Settings\Owner\Desktop\2020 JOBS\MONTICITO
PLANS\pondrout120220.txt


    *S     AHYMO -  QUIVIRA-
    *S              POND ROUTING

    START               TIME=0.0  PUNCH CODE=0


    RAINFALL            TYPE=2
                        QUARTER=0.0    ONE= 1.70 IN
                        SIX=2.20 IN   DAY= 2.57 IN   DT = 0.05 HR



                    24-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE
AREAS (NM & AZ) - D1
                    DT =   0.050000 HOURS       END TIME =    24.000002 HOURS
                      0.0000  0.0033  0.0068  0.0104  0.0144  0.0185  0.0231
                      0.0297  0.0401  0.0513  0.0628  0.0754  0.0881  0.1012
                      0.1147  0.1285  0.1437  0.1595  0.1766  0.1987  0.2233
                      0.2562  0.2936  0.3397  0.4012  0.4704  0.5899  0.7756
                      1.0939  1.3176  1.4940  1.5827  1.6604  1.7162  1.7606
                      1.7994  1.8277  1.8537  1.8752  1.8931  1.9092  1.9236
                      1.9372  1.9493  1.9607  1.9718  1.9826  1.9914  1.9964
                      2.0013  2.0061  2.0106  2.0150  2.0194  2.0237  2.0279
                      2.0319  2.0358  2.0397  2.0435  2.0473  2.0508  2.0544
                      2.0579  2.0613  2.0647  2.0680  2.0712  2.0744  2.0775
                      2.0806  2.0837  2.0867  2.0897  2.0926  2.0955  2.0984
                      2.1012  2.1040  2.1068  2.1096  2.1123  2.1150  2.1176
                      2.1202  2.1228  2.1254  2.1280  2.1305  2.1330  2.1354
                      2.1379  2.1403  2.1427  2.1451  2.1474  2.1498  2.1521
                      2.1544  2.1566  2.1589  2.1611  2.1633  2.1655  2.1676
                      2.1698  2.1719  2.1740  2.1761  2.1782  2.1803  2.1823
                      2.1843  2.1863  2.1883  2.1903  2.1923  2.1942  2.1962
                      2.1981  2.2000  2.2019  2.2038  2.2057  2.2076  2.2095
                      2.2114  2.2132  2.2151  2.2170  2.2188  2.2207  2.2225
                      2.2244  2.2262  2.2281  2.2299  2.2317  2.2336  2.2354
                      2.2372  2.2390  2.2408  2.2426  2.2444  2.2462  2.2480
                      2.2498  2.2515  2.2533  2.2551  2.2568  2.2586  2.2603
                      2.2621  2.2638  2.2656  2.2673  2.2690  2.2708  2.2725
                      2.2742  2.2759  2.2776  2.2793  2.2810  2.2827  2.2844
                      2.2861  2.2877  2.2894  2.2911  2.2927  2.2944  2.2960
                      2.2977  2.2993  2.3010  2.3026  2.3042  2.3058  2.3074
                      2.3091  2.3107  2.3123  2.3139  2.3155  2.3170  2.3186
                      2.3202  2.3218  2.3233  2.3249  2.3265  2.3280  2.3296
                      2.3311  2.3327  2.3342  2.3357  2.3372  2.3388  2.3403
                      2.3418  2.3433  2.3448  2.3463  2.3478  2.3493  2.3507
                      2.3522  2.3537  2.3552  2.3566  2.3581  2.3595  2.3610
                      2.3624  2.3638  2.3653  2.3667  2.3681  2.3695  2.3710
                      2.3724  2.3738  2.3752  2.3765  2.3779  2.3793  2.3807
                      2.3821  2.3834  2.3848  2.3862  2.3875  2.3889  2.3902
                      2.3915  2.3929  2.3942  2.3955  2.3968  2.3982  2.3995
                      2.4008  2.4021  2.4034  2.4047  2.4059  2.4072  2.4085
                      2.4098  2.4110  2.4123  2.4135  2.4148  2.4160  2.4173
                      2.4185  2.4197  2.4210  2.4222  2.4234  2.4246  2.4258
                      2.4270  2.4282  2.4294  2.4306  2.4318  2.4329  2.4341
                      2.4353  2.4364  2.4376  2.4387  2.4399  2.4410  2.4422
                      2.4433  2.4444  2.4455  2.4467  2.4478  2.4489  2.4500
```

```
 2.4511  2.4522  2.4533  2.4543  2.4554  2.4565  2.4576
 2.4586  2.4597  2.4607  2.4618  2.4628  2.4639  2.4649
 2.4659  2.4669  2.4680  2.4690  2.4700  2.4710  2.4720
 2.4730  2.4740  2.4750  2.4759  2.4769  2.4779  2.4788
 2.4798  2.4807  2.4817  2.4826  2.4836  2.4845  2.4854
 2.4864  2.4873  2.4882  2.4891  2.4900  2.4909  2.4918
 2.4927  2.4936  2.4945  2.4953  2.4962  2.4971  2.4979
 2.4988  2.4996  2.5005  2.5013  2.5022  2.5030  2.5038
 2.5046  2.5054  2.5063  2.5071  2.5079  2.5087  2.5094
 2.5102  2.5110  2.5118  2.5126  2.5133  2.5141  2.5148
 2.5156  2.5163  2.5171  2.5178  2.5185  2.5193  2.5200
 2.5207  2.5214  2.5221  2.5228  2.5235  2.5242  2.5249
 2.5256  2.5263  2.5269  2.5276  2.5283  2.5289  2.5296
 2.5302  2.5308  2.5315  2.5321  2.5327  2.5334  2.5340
 2.5346  2.5352  2.5358  2.5364  2.5370  2.5376  2.5382
 2.5387  2.5393  2.5399  2.5404  2.5410  2.5415  2.5421
 2.5426  2.5432  2.5437  2.5442  2.5447  2.5453  2.5458
 2.5463  2.5468  2.5473  2.5478  2.5483  2.5487  2.5492
 2.5497  2.5502  2.5506  2.5511  2.5515  2.5520  2.5524
 2.5529  2.5533  2.5537  2.5541  2.5546  2.5550  2.5554
 2.5558  2.5562  2.5566  2.5570  2.5573  2.5577  2.5581
 2.5585  2.5588  2.5592  2.5595  2.5599  2.5602  2.5606
 2.5609  2.5612  2.5616  2.5619  2.5622  2.5625  2.5628
 2.5631  2.5634  2.5637  2.5640  2.5642  2.5645  2.5648
 2.5650  2.5653  2.5656  2.5658  2.5660  2.5663  2.5665
 2.5667  2.5670  2.5672  2.5674  2.5676  2.5678  2.5680
 2.5682  2.5684  2.5686  2.5687  2.5689  2.5691  2.5693
 2.5694  2.5696  2.5697  2.5699  2.5700

 *UPLAND
 COMPUTE NM HYD       ID=1  HYD NO=101  DA= .0069094 SQ MI
                      PER A=30 PER B=18 PER C=18  PER D=34
                      TP=-.170  MASSRAIN=-1


        K =  0.092650HR    TP =  0.170000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
        UNIT PEAK =   7.2725    CFS   UNIT VOLUME =   0.9982       B =   526.28
 P60 = 1.7000
        AREA =     0.002349 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000


        K =  0.180127HR    TP =  0.170000HR    K/TP RATIO =  1.059568     SHAPE
CONSTANT, N =  3.332443
        UNIT PEAK =   8.2593    CFS   UNIT VOLUME =   0.9984       B =   307.90
 P60 = 1.7000
        AREA =     0.004560 SQ MI    IA =   0.52727 INCHES    INF =   1.32636
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000

    PRINT HYD            ID=1  CODE=3

                                        PARTIAL HYDROGRAPH   101.00

        TIME      FLOW           TIME      FLOW           TIME      FLOW
TIME      FLOW           TIME      FLOW
         HRS       CFS            HRS       CFS            HRS       CFS
HRS       CFS            HRS       CFS
        0.000       0.0          4.950       0.0          9.900       0.0
14.850       0.0          19.800       0.0
        0.150       0.0          5.100       0.0         10.050       0.0
```

15.000	0.0	19.950	0.0				
0.300	0.0	5.250	0.0	10.200	0.0		
15.150	0.0	20.100	0.0				
0.450	0.0	5.400	0.1	10.350	0.0		
15.300	0.0	20.250	0.0				
0.600	0.0	5.550	0.1	10.500	0.0		
15.450	0.0	20.400	0.0				
0.750	0.1	5.700	0.1	10.650	0.0		
15.600	0.0	20.550	0.0				
0.900	0.3	5.850	0.1	10.800	0.0		
15.750	0.0	20.700	0.0				
1.050	0.5	6.000	0.1	10.950	0.0		
15.900	0.0	20.850	0.0				
1.200	0.8	6.150	0.1	11.100	0.0		
16.050	0.0	21.000	0.0				
1.350	2.2	6.300	0.1	11.250	0.0		
16.200	0.0	21.150	0.0				
1.500	9.6	6.450	0.1	11.400	0.0		
16.350	0.0	21.300	0.0				
1.650	8.4	6.600	0.1	11.550	0.0		
16.500	0.0	21.450	0.0				
1.800	4.1	6.750	0.1	11.700	0.0		
16.650	0.0	21.600	0.0				
1.950	2.1	6.900	0.1	11.850	0.0		
16.800	0.0	21.750	0.0				
2.100	1.3	7.050	0.1	12.000	0.0		
16.950	0.0	21.900	0.0				
2.250	0.9	7.200	0.1	12.150	0.0		
17.100	0.0	22.050	0.0				
2.400	0.7	7.350	0.1	12.300	0.0		
17.250	0.0	22.200	0.0				
2.550	0.4	7.500	0.1	12.450	0.0		
17.400	0.0	22.350	0.0				
2.700	0.3	7.650	0.1	12.600	0.0		
17.550	0.0	22.500	0.0				
2.850	0.2	7.800	0.1	12.750	0.0		
17.700	0.0	22.650	0.0				
3.000	0.2	7.950	0.1	12.900	0.0		
17.850	0.0	22.800	0.0				
3.150	0.1	8.100	0.1	13.050	0.0		
18.000	0.0	22.950	0.0				
3.300	0.1	8.250	0.1	13.200	0.0		
18.150	0.0	23.100	0.0				
3.450	0.1	8.400	0.1	13.350	0.0		
18.300	0.0	23.250	0.0				
3.600	0.1	8.550	0.1	13.500	0.0		
18.450	0.0	23.400	0.0				
3.750	0.1	8.700	0.1	13.650	0.0		
18.600	0.0	23.550	0.0				
3.900	0.1	8.850	0.1	13.800	0.0		
18.750	0.0	23.700	0.0				
4.050	0.1	9.000	0.0	13.950	0.0		
18.900	0.0	23.850	0.0				
4.200	0.1	9.150	0.0	14.100	0.0		
19.050	0.0	24.000	0.0				
4.350	0.1	9.300	0.0	14.250	0.0		
19.200	0.0	24.150	0.0				
4.500	0.0	9.450	0.0	14.400	0.0		
19.350	0.0						
4.650	0.0	9.600	0.0	14.550	0.0		
19.500	0.0						
4.800	0.0	9.750	0.0	14.700	0.0		
19.650	0.0						

RUNOFF VOLUME = 1.25058 INCHES = 0.4608 ACRE-FEET
PEAK DISCHARGE RATE = 10.63 CFS AT 1.550 HOURS BASIN AREA =

0.0069 SQ. MI.

*BASIN A
COMPUTE NM HYD ID=2 HYD NO=102 DA= .0050638 SQ MI
PER A=00 PER B=20 PER C=44 PER D=36
TP=-.170 MASSRAIN=-1

K = 0.092650HR TP = 0.170000HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 5.6434 CFS UNIT VOLUME = 0.9979 B = 526.28 P60 = 1.7000
AREA = 0.001823 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.050000

K = 0.144538HR TP = 0.170000HR K/TP RATIO = 0.850224 SHAPE CONSTANT, N = 4.186609
UNIT PEAK = 7.0045 CFS UNIT VOLUME = 0.9987 B = 367.43 P60 = 1.7000
AREA = 0.003241 SQ MI IA = 0.39687 INCHES INF = 0.96125 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.050000

PRINT HYD ID=2 CODE=3

PARTIAL HYDROGRAPH 102.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	4.950	0.0	9.900	0.0
14.850	0.0	19.800	0.0		
0.150	0.0	5.100	0.0	10.050	0.0
15.000	0.0	19.950	0.0		
0.300	0.0	5.250	0.0	10.200	0.0
15.150	0.0	20.100	0.0		
0.450	0.0	5.400	0.0	10.350	0.0
15.300	0.0	20.250	0.0		
0.600	0.0	5.550	0.0	10.500	0.0
15.450	0.0	20.400	0.0		
0.750	0.0	5.700	0.0	10.650	0.0
15.600	0.0	20.550	0.0		
0.900	0.2	5.850	0.0	10.800	0.0
15.750	0.0	20.700	0.0		
1.050	0.4	6.000	0.0	10.950	0.0
15.900	0.0	20.850	0.0		
1.200	0.6	6.150	0.0	11.100	0.0
16.050	0.0	21.000	0.0		
1.350	2.0	6.300	0.0	11.250	0.0
16.200	0.0	21.150	0.0		
1.500	8.2	6.450	0.0	11.400	0.0
16.350	0.0	21.300	0.0		
1.650	7.2	6.600	0.0	11.550	0.0
16.500	0.0	21.450	0.0		
1.800	3.3	6.750	0.0	11.700	0.0

```
16.650       0.0         21.600       0.0
        1.950       1.7          6.900       0.0         11.850       0.0
16.800       0.0         21.750       0.0
        2.100       1.0          7.050       0.0         12.000       0.0
16.950       0.0         21.900       0.0
        2.250       0.7          7.200       0.0         12.150       0.0
17.100       0.0         22.050       0.0
        2.400       0.5          7.350       0.0         12.300       0.0
17.250       0.0         22.200       0.0
        2.550       0.3          7.500       0.0         12.450       0.0
17.400       0.0         22.350       0.0
        2.700       0.2          7.650       0.0         12.600       0.0
17.550       0.0         22.500       0.0
        2.850       0.2          7.800       0.0         12.750       0.0
17.700       0.0         22.650       0.0
        3.000       0.1          7.950       0.0         12.900       0.0
17.850       0.0         22.800       0.0
        3.150       0.1          8.100       0.0         13.050       0.0
18.000       0.0         22.950       0.0
        3.300       0.1          8.250       0.0         13.200       0.0
18.150       0.0         23.100       0.0
        3.450       0.1          8.400       0.0         13.350       0.0
18.300       0.0         23.250       0.0
        3.600       0.0          8.550       0.0         13.500       0.0
18.450       0.0         23.400       0.0
        3.750       0.0          8.700       0.0         13.650       0.0
18.600       0.0         23.550       0.0
        3.900       0.0          8.850       0.0         13.800       0.0
18.750       0.0         23.700       0.0
        4.050       0.0          9.000       0.0         13.950       0.0
18.900       0.0         23.850       0.0
        4.200       0.0          9.150       0.0         14.100       0.0
19.050       0.0         24.000       0.0
        4.350       0.0          9.300       0.0         14.250       0.0
19.200       0.0         24.150       0.0
        4.500       0.0          9.450       0.0         14.400       0.0
19.350       0.0
        4.650       0.0          9.600       0.0         14.550       0.0
19.500       0.0
        4.800       0.0          9.750       0.0         14.700       0.0
19.650       0.0

        RUNOFF VOLUME =     1.40001 INCHES     =       0.3781 ACRE-FEET
        PEAK DISCHARGE RATE =      9.13 CFS  AT   1.550 HOURS   BASIN AREA =
0.0051 SQ. MI.



    *BASIN B
    COMPUTE NM HYD      ID=3  HYD NO=103  DA= .0019761 SQ MI
                        PER A=0  PER B=20 PER C=49  PER D=31
                        TP=-.170  MASSRAIN=-1


        K =  0.092650HR    TP =  0.170000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
        UNIT PEAK =   1.8964    CFS   UNIT VOLUME =   0.9941       B =   526.28
 P60 = 1.7000
        AREA =     0.000613 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000
```

K = 0.143671HR TP = 0.170000HR K/TP RATIO = 0.845122 SHAPE CONSTANT, N = 4.214212
UNIT PEAK = 2.9613 CFS UNIT VOLUME = 0.9960 B = 369.21 P60 = 1.7000
AREA = 0.001364 SQ MI IA = 0.39348 INCHES INF = 0.95174 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.050000

PRINT HYD ID=3 CODE=3

PARTIAL HYDROGRAPH 103.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	4.950	0.0	9.900	0.0
14.850	0.0	19.800	0.0		
0.150	0.0	5.100	0.0	10.050	0.0
15.000	0.0	19.950	0.0		
0.300	0.0	5.250	0.0	10.200	0.0
15.150	0.0	20.100	0.0		
0.450	0.0	5.400	0.0	10.350	0.0
15.300	0.0	20.250	0.0		
0.600	0.0	5.550	0.0	10.500	0.0
15.450	0.0	20.400	0.0		
0.750	0.0	5.700	0.0	10.650	0.0
15.600	0.0	20.550	0.0		
0.900	0.1	5.850	0.0	10.800	0.0
15.750	0.0	20.700	0.0		
1.050	0.1	6.000	0.0	10.950	0.0
15.900	0.0	20.850	0.0		
1.200	0.2	6.150	0.0	11.100	0.0
16.050	0.0	21.000	0.0		
1.350	0.7	6.300	0.0	11.250	0.0
16.200	0.0	21.150	0.0		
1.500	3.2	6.450	0.0	11.400	0.0
16.350	0.0	21.300	0.0		
1.650	2.7	6.600	0.0	11.550	0.0
16.500	0.0	21.450	0.0		
1.800	1.3	6.750	0.0	11.700	0.0
16.650	0.0	21.600	0.0		
1.950	0.6	6.900	0.0	11.850	0.0
16.800	0.0	21.750	0.0		
2.100	0.4	7.050	0.0	12.000	0.0
16.950	0.0	21.900	0.0		
2.250	0.3	7.200	0.0	12.150	0.0
17.100	0.0	22.050	0.0		
2.400	0.2	7.350	0.0	12.300	0.0
17.250	0.0	22.200	0.0		
2.550	0.1	7.500	0.0	12.450	0.0
17.400	0.0	22.350	0.0		
2.700	0.1	7.650	0.0	12.600	0.0
17.550	0.0	22.500	0.0		
2.850	0.1	7.800	0.0	12.750	0.0
17.700	0.0	22.650	0.0		
3.000	0.0	7.950	0.0	12.900	0.0
17.850	0.0	22.800	0.0		
3.150	0.0	8.100	0.0	13.050	0.0
18.000	0.0	22.950	0.0		
3.300	0.0	8.250	0.0	13.200	0.0
18.150	0.0	23.100	0.0		
3.450	0.0	8.400	0.0	13.350	0.0
18.300	0.0	23.250	0.0		

```
        3.600       0.0          8.550       0.0         13.500       0.0
18.450       0.0         23.400       0.0
        3.750       0.0          8.700       0.0         13.650       0.0
18.600       0.0         23.550       0.0
        3.900       0.0          8.850       0.0         13.800       0.0
18.750       0.0         23.700       0.0
        4.050       0.0          9.000       0.0         13.950       0.0
18.900       0.0         23.850       0.0
        4.200       0.0          9.150       0.0         14.100       0.0
19.050       0.0         24.000       0.0
        4.350       0.0          9.300       0.0         14.250       0.0
19.200       0.0
        4.500       0.0          9.450       0.0         14.400       0.0
19.350       0.0
        4.650       0.0          9.600       0.0         14.550       0.0
19.500       0.0
        4.800       0.0          9.750       0.0         14.700       0.0
19.650       0.0

        RUNOFF VOLUME =     1.33176 INCHES      =       0.1404 ACRE-FEET
        PEAK DISCHARGE RATE =       3.49 CFS  AT   1.550 HOURS   BASIN AREA =
0.0020 SQ. MI.



  *BASIN C
   COMPUTE NM HYD      ID=4  HYD NO=104  DA= .0010031 SQ MI
                       PER A=0 PER B=20 PER C=47  PER D=33
                       TP=-.170  MASSRAIN=-1


        K =  0.092650HR    TP =  0.170000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
        UNIT PEAK =   1.0248    CFS   UNIT VOLUME =   0.9881       B =   526.28
 P60 = 1.7000
        AREA =     0.000331 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000


        K =  0.144002HR    TP =  0.170000HR    K/TP RATIO =  0.847071     SHAPE
CONSTANT, N =  4.203617
        UNIT PEAK =   1.4569    CFS   UNIT VOLUME =   0.9914       B =   368.52
 P60 = 1.7000
        AREA =     0.000672 SQ MI    IA =   0.39478 INCHES    INF =   0.95537
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000

    PRINT HYD           ID=4  CODE=3

                                      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         4.800       0.0         9.600       0.0
14.400       0.0         19.200       0.0
        0.150       0.0         4.950       0.0         9.750       0.0
```

14.550	0.0	19.350	0.0				
0.300	0.0	5.100	0.0	9.900	0.0		
14.700	0.0	19.500	0.0				
0.450	0.0	5.250	0.0	10.050	0.0		
14.850	0.0	19.650	0.0				
0.600	0.0	5.400	0.0	10.200	0.0		
15.000	0.0	19.800	0.0				
0.750	0.0	5.550	0.0	10.350	0.0		
15.150	0.0	19.950	0.0				
0.900	0.0	5.700	0.0	10.500	0.0		
15.300	0.0	20.100	0.0				
1.050	0.1	5.850	0.0	10.650	0.0		
15.450	0.0	20.250	0.0				
1.200	0.1	6.000	0.0	10.800	0.0		
15.600	0.0	20.400	0.0				
1.350	0.4	6.150	0.0	10.950	0.0		
15.750	0.0	20.550	0.0				
1.500	1.6	6.300	0.0	11.100	0.0		
15.900	0.0	20.700	0.0				
1.650	1.4	6.450	0.0	11.250	0.0		
16.050	0.0	20.850	0.0				
1.800	0.6	6.600	0.0	11.400	0.0		
16.200	0.0	21.000	0.0				
1.950	0.3	6.750	0.0	11.550	0.0		
16.350	0.0	21.150	0.0				
2.100	0.2	6.900	0.0	11.700	0.0		
16.500	0.0	21.300	0.0				
2.250	0.1	7.050	0.0	11.850	0.0		
16.650	0.0	21.450	0.0				
2.400	0.1	7.200	0.0	12.000	0.0		
16.800	0.0	21.600	0.0				
2.550	0.1	7.350	0.0	12.150	0.0		
16.950	0.0	21.750	0.0				
2.700	0.0	7.500	0.0	12.300	0.0		
17.100	0.0	21.900	0.0				
2.850	0.0	7.650	0.0	12.450	0.0		
17.250	0.0	22.050	0.0				
3.000	0.0	7.800	0.0	12.600	0.0		
17.400	0.0	22.200	0.0				
3.150	0.0	7.950	0.0	12.750	0.0		
17.550	0.0	22.350	0.0				
3.300	0.0	8.100	0.0	12.900	0.0		
17.700	0.0	22.500	0.0				
3.450	0.0	8.250	0.0	13.050	0.0		
17.850	0.0	22.650	0.0				
3.600	0.0	8.400	0.0	13.200	0.0		
18.000	0.0	22.800	0.0				
3.750	0.0	8.550	0.0	13.350	0.0		
18.150	0.0	22.950	0.0				
3.900	0.0	8.700	0.0	13.500	0.0		
18.300	0.0	23.100	0.0				
4.050	0.0	8.850	0.0	13.650	0.0		
18.450	0.0	23.250	0.0				
4.200	0.0	9.000	0.0	13.800	0.0		
18.600	0.0						
4.350	0.0	9.150	0.0	13.950	0.0		
18.750	0.0						
4.500	0.0	9.300	0.0	14.100	0.0		
18.900	0.0						
4.650	0.0	9.450	0.0	14.250	0.0		
19.050	0.0						

RUNOFF VOLUME = 1.35906 INCHES = 0.0727 ACRE-FEET
PEAK DISCHARGE RATE = 1.80 CFS AT 1.550 HOURS BASIN AREA = 0.0010 SQ. MI.

```
 *BASIN D
  COMPUTE NM HYD       ID=5  HYD NO=105  DA= .0026168 SQ MI
                       PER A=0  PER B=20 PER C=31  PER D=49
                       TP=-.170  MASSRAIN=-1


         K =  0.092650HR    TP =  0.170000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
         UNIT PEAK =   3.9695    CFS   UNIT VOLUME =   0.9970       B =   526.28
 P60 = 1.7000
         AREA =     0.001282 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000


         K =  0.147589HR    TP =  0.170000HR    K/TP RATIO =  0.868171     SHAPE
CONSTANT, N =  4.092757
         UNIT PEAK =   2.8364    CFS   UNIT VOLUME =   0.9962       B =   361.31
 P60 = 1.7000
         AREA =     0.001335 SQ MI    IA =   0.40882 INCHES    INF =   0.99471
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000

     PRINT HYD           ID=5  CODE=7

                                        PARTIAL HYDROGRAPH   105.00

         TIME      FLOW           TIME      FLOW           TIME      FLOW
TIME      FLOW           TIME      FLOW
          HRS       CFS             HRS       CFS             HRS       CFS
HRS       CFS             HRS       CFS
         0.000       0.0          4.900       0.0          9.800       0.0
14.700       0.0          19.600       0.0
         0.350       0.0          5.250       0.0         10.150       0.0
15.050       0.0          19.950       0.0
         0.700       0.0          5.600       0.0         10.500       0.0
15.400       0.0          20.300       0.0
         1.050       0.2          5.950       0.0         10.850       0.0
15.750       0.0          20.650       0.0
         1.400       2.0          6.300       0.0         11.200       0.0
16.100       0.0          21.000       0.0
         1.750       2.4          6.650       0.0         11.550       0.0
16.450       0.0          21.350       0.0
         2.100       0.6          7.000       0.0         11.900       0.0
16.800       0.0          21.700       0.0
         2.450       0.3          7.350       0.0         12.250       0.0
17.150       0.0          22.050       0.0
         2.800       0.1          7.700       0.0         12.600       0.0
17.500       0.0          22.400       0.0
         3.150       0.0          8.050       0.0         12.950       0.0
17.850       0.0          22.750       0.0
         3.500       0.0          8.400       0.0         13.300       0.0
18.200       0.0          23.100       0.0
         3.850       0.0          8.750       0.0         13.650       0.0
18.550       0.0          23.450       0.0
         4.200       0.0          9.100       0.0         14.000       0.0
18.900       0.0          23.800       0.0
         4.550       0.0          9.450       0.0         14.350       0.0
19.250       0.0          24.150       0.0
```

RUNOFF VOLUME = 1.57731 INCHES = 0.2201 ACRE-FEET
PEAK DISCHARGE RATE = 4.99 CFS AT 1.550 HOURS BASIN AREA = 0.0026 SQ. MI.

*BASIN E
COMPUTE NM HYD ID=6 HYD NO=106 DA= .0001063 SQ MI
PER A=0 PER B=0 PER C=16 PER D=84
TP=-.170 MASSRAIN=-1

K = 0.092650HR TP = 0.170000HR K/TP RATIO = 0.545000 SHAPE CONSTANT, N = 7.106428
UNIT PEAK = 0.27642 CFS UNIT VOLUME = 0.9587 B = 526.28 P60 = 1.7000
AREA = 0.000089 SQ MI IA = 0.10000 INCHES INF = 0.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.050000

K = 0.132568HR TP = 0.170000HR K/TP RATIO = 0.779814 SHAPE CONSTANT, N = 4.608534
UNIT PEAK = 0.39407E-01CFS UNIT VOLUME = 0.8836 B = 393.89 P60 = 1.7000
AREA = 0.000017 SQ MI IA = 0.35000 INCHES INF = 0.83000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = 0.050000

PRINT HYD ID=6 CODE=3

PARTIAL HYDROGRAPH 106.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	3.450	0.0	6.900	0.0
0.150	0.0	3.600	0.0	7.050	0.0
0.300	0.0	3.750	0.0	7.200	0.0
0.450	0.0	3.900	0.0	7.350	0.0
0.600	0.0	4.050	0.0	7.500	0.0
0.750	0.0	4.200	0.0	7.650	0.0
0.900	0.0	4.350	0.0	7.800	0.0
1.050	0.0	4.500	0.0	7.950	0.0
1.200	0.0	4.650	0.0	8.100	0.0
1.350	0.1	4.800	0.0	8.250	0.0
1.500	0.2	4.950	0.0	8.400	0.0
1.650	0.2	5.100	0.0	8.550	0.0
10.350	0.0	13.800	0.0		
10.500	0.0	13.950	0.0		
10.650	0.0	14.100	0.0		
10.800	0.0	14.250	0.0		
10.950	0.0	14.400	0.0		
11.100	0.0	14.550	0.0		
11.250	0.0	14.700	0.0		
11.400	0.0	14.850	0.0		
11.550	0.0	15.000	0.0		
11.700	0.0	15.150	0.0		
11.850	0.0	15.300	0.0		
12.000	0.0	15.450	0.0		

```
        1.800       0.1          5.250       0.0          8.700       0.0
12.150       0.0          15.600       0.0
        1.950       0.1          5.400       0.0          8.850       0.0
12.300       0.0          15.750       0.0
        2.100       0.0          5.550       0.0          9.000       0.0
12.450       0.0          15.900       0.0
        2.250       0.0          5.700       0.0          9.150       0.0
12.600       0.0          16.050       0.0
        2.400       0.0          5.850       0.0          9.300       0.0
12.750       0.0          16.200       0.0
        2.550       0.0          6.000       0.0          9.450       0.0
12.900       0.0          16.350       0.0
        2.700       0.0          6.150       0.0          9.600       0.0
13.050       0.0          16.500       0.0
        2.850       0.0          6.300       0.0          9.750       0.0
13.200       0.0          16.650       0.0
        3.000       0.0          6.450       0.0          9.900       0.0
13.350       0.0          16.800       0.0
        3.150       0.0          6.600       0.0         10.050       0.0
13.500       0.0
        3.300       0.0          6.750       0.0         10.200       0.0
13.650       0.0

        RUNOFF VOLUME =     2.10127 INCHES      =       0.0119 ACRE-FEET
        PEAK DISCHARGE RATE =       0.25 CFS  AT   1.550 HOURS   BASIN AREA =
0.0001 SQ. MI.


    *BASIN F
    COMPUTE NM HYD      ID=7  HYD NO=107  DA= .0006057 SQ MI
                        PER A=0  PER B=20 PER C=40  PER D=40
                        TP=-.170  MASSRAIN=-1


        K =  0.092650HR    TP =  0.170000HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
        UNIT PEAK =  0.75004    CFS   UNIT VOLUME =   0.9858       B =   526.28
 P60 = 1.7000
        AREA =     0.000242 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000


        K =  0.145336HR    TP =  0.170000HR    K/TP RATIO =  0.854918     SHAPE
CONSTANT, N =  4.161582
        UNIT PEAK =  0.78200    CFS   UNIT VOLUME =   0.9840       B =   365.80
 P60 = 1.7000
        AREA =     0.000363 SQ MI    IA =   0.40000 INCHES    INF =   0.97000
INCHES PER HOUR
        RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000

    PRINT HYD           ID=7  CODE=7

                                    PARTIAL HYDROGRAPH   107.00

        TIME      FLOW          TIME      FLOW          TIME      FLOW
TIME      FLOW          TIME      FLOW
         HRS       CFS           HRS       CFS           HRS       CFS
HRS       CFS           HRS       CFS
        0.000       0.0         4.550       0.0         9.100       0.0
```

13.650	0.0	18.200	0.0				
	0.350	0.0	4.900	0.0	9.450	0.0	
14.000	0.0	18.550	0.0				
	0.700	0.0	5.250	0.0	9.800	0.0	
14.350	0.0	18.900	0.0				
	1.050	0.0	5.600	0.0	10.150	0.0	
14.700	0.0	19.250	0.0				
	1.400	0.4	5.950	0.0	10.500	0.0	
15.050	0.0	19.600	0.0				
	1.750	0.5	6.300	0.0	10.850	0.0	
15.400	0.0	19.950	0.0				
	2.100	0.1	6.650	0.0	11.200	0.0	
15.750	0.0	20.300	0.0				
	2.450	0.1	7.000	0.0	11.550	0.0	
16.100	0.0	20.650	0.0				
	2.800	0.0	7.350	0.0	11.900	0.0	
16.450	0.0	21.000	0.0				
	3.150	0.0	7.700	0.0	12.250	0.0	
16.800	0.0	21.350	0.0				
	3.500	0.0	8.050	0.0	12.600	0.0	
17.150	0.0	21.700	0.0				
	3.850	0.0	8.400	0.0	12.950	0.0	
17.500	0.0	22.050	0.0				
	4.200	0.0	8.750	0.0	13.300	0.0	
17.850	0.0						

RUNOFF VOLUME = 1.45463 INCHES = 0.0470 ACRE-FEET
PEAK DISCHARGE RATE = 1.13 CFS AT 1.550 HOURS BASIN AREA = 0.0006 SQ. MI.

```
*ADD UPLAND AND ONSITE TO DETERMINE FLOW INTO POND

ADD HYD             ID=8    HYD NO=108  ID I=1  ID II=2
ADD HYD             ID=9    HYD NO=109  ID I=3  ID II=4
ADD HYD             ID=10   HYD NO=110  ID I=5  ID II=7
ADD HYD             ID=11   HYD NO=111  ID I=8  ID II=9
ADD HYD             ID=12   HYD NO=112  ID I=10 ID II=11
PRINT HYD           ID=12  CODE=7
```

PARTIAL HYDROGRAPH 112.00

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
0.000	0.0	4.900	0.1	9.800	0.1
14.700	0.1	19.600	0.1		
0.350	0.0	5.250	0.1	10.150	0.1
15.050	0.1	19.950	0.0		
0.700	0.0	5.600	0.1	10.500	0.1
15.400	0.1	20.300	0.0		
1.050	1.3	5.950	0.2	10.850	0.1
15.750	0.1	20.650	0.0		
1.400	12.3	6.300	0.2	11.200	0.1
16.100	0.1	21.000	0.0		
1.750	15.0	6.650	0.2	11.550	0.1
16.450	0.1	21.350	0.0		
2.100	3.7	7.000	0.2	11.900	0.1
16.800	0.1	21.700	0.0		
2.450	1.6	7.350	0.2	12.250	0.1
17.150	0.1	22.050	0.0		

```
        2.800       0.6          7.700       0.2         12.600       0.1
17.500      0.1          22.400       0.0
        3.150       0.3          8.050       0.1         12.950       0.1
17.850      0.1          22.750       0.0
        3.500       0.2          8.400       0.1         13.300       0.1
18.200      0.1          23.100       0.0
        3.850       0.1          8.750       0.1         13.650       0.1
18.550      0.1          23.450       0.0
        4.200       0.1          9.100       0.1         14.000       0.1
18.900      0.1          23.800       0.0
        4.550       0.1          9.450       0.1         14.350       0.1
19.250      0.1          24.150       0.0

        RUNOFF VOLUME =     1.36063 INCHES     =       1.3189 ACRE-FEET
        PEAK DISCHARGE RATE =      31.16 CFS  AT   1.550 HOURS   BASIN AREA =
0.0182 SQ. MI.


  * ROUTE THE NORTH BASIN THRU THE PROPOSED RESERVOIR
  ROUTE RESERVOIR     ID=14  HYD NO=114   INFLOW=12   CODE=3
                      OUTFLOW(CFS)    STORAGE(AC-FT)    ELEV(FT)
                           0.00          0.1012         399.50
                           6.26          0.1455         400.00
                          32.56          0.2540         401.00


    *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *

      TIME       INFLOW     ELEV       VOLUME     OUTFLOW
      (HRS)      (CFS)      (FEET)     (AC-FT)    (CFS)

       0.00        0.00     399.50       0.101       0.00
       0.15        0.00     399.50       0.101       0.00
       0.30        0.00     399.50       0.101       0.00
       0.45        0.00     399.50       0.101       0.00
       0.60        0.00     399.50       0.101       0.00
       0.75        0.15     399.50       0.101       0.04
       0.90        0.78     399.54       0.105       0.48
       1.05        1.28     399.58       0.108       0.97
       1.20        2.35     399.64       0.114       1.75
       1.35        6.79     399.82       0.130       4.01
       1.50       28.16     400.55       0.205      20.67
       1.65       24.49     400.81       0.233      27.55
       1.80       11.60     400.34       0.183      15.33
       1.95        5.92     400.05       0.151       7.54
       2.10        3.68     399.88       0.135       4.78
       2.25        2.56     399.76       0.124       3.24
       2.40        1.86     399.68       0.117       2.29
       2.55        1.18     399.62       0.112       1.56
       2.70        0.79     399.58       0.108       1.02
       2.85        0.57     399.56       0.106       0.71
       3.00        0.41     399.54       0.105       0.51
       3.15        0.31     399.53       0.104       0.37
       3.30        0.25     399.52       0.103       0.29
       3.45        0.20     399.52       0.103       0.23
       3.60        0.17     399.52       0.103       0.19
       3.75        0.16     399.51       0.102       0.17
       3.90        0.14     399.51       0.102       0.15
       4.05        0.14     399.51       0.102       0.14
       4.20        0.13     399.51       0.102       0.14
       4.35        0.13     399.51       0.102       0.13
       4.50        0.13     399.51       0.102       0.13
```

4.65	0.13	399.51	0.102	0.13
4.80	0.13	399.51	0.102	0.13
4.95	0.13	399.51	0.102	0.13
5.10	0.14	399.51	0.102	0.13
5.25	0.14	399.51	0.102	0.14
5.40	0.14	399.51	0.102	0.14
5.55	0.15	399.51	0.102	0.14
5.70	0.15	399.51	0.102	0.15
5.85	0.16	399.51	0.102	0.15
6.00	0.16	399.51	0.102	0.16
6.15	0.16	399.51	0.102	0.16
6.30	0.16	399.51	0.102	0.16
6.45	0.16	399.51	0.102	0.16
6.60	0.16	399.51	0.102	0.16
6.75	0.16	399.51	0.102	0.16
6.90	0.16	399.51	0.102	0.16
7.05	0.16	399.51	0.102	0.16
7.20	0.16	399.51	0.102	0.16
7.35	0.15	399.51	0.102	0.15
7.50	0.15	399.51	0.102	0.15
7.65	0.15	399.51	0.102	0.15
7.80	0.15	399.51	0.102	0.15
7.95	0.15	399.51	0.102	0.15
8.10	0.15	399.51	0.102	0.15
8.25	0.15	399.51	0.102	0.15

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
8.40	0.15	399.51	0.102	0.15
8.55	0.14	399.51	0.102	0.15
8.70	0.14	399.51	0.102	0.14
8.85	0.14	399.51	0.102	0.14
9.00	0.14	399.51	0.102	0.14
9.15	0.14	399.51	0.102	0.14
9.30	0.14	399.51	0.102	0.14
9.45	0.14	399.51	0.102	0.14
9.60	0.14	399.51	0.102	0.14
9.75	0.13	399.51	0.102	0.14
9.90	0.13	399.51	0.102	0.13
10.05	0.13	399.51	0.102	0.13
10.20	0.13	399.51	0.102	0.13
10.35	0.13	399.51	0.102	0.13
10.50	0.13	399.51	0.102	0.13
10.65	0.13	399.51	0.102	0.13
10.80	0.13	399.51	0.102	0.13
10.95	0.12	399.51	0.102	0.12
11.10	0.12	399.51	0.102	0.12
11.25	0.12	399.51	0.102	0.12
11.40	0.12	399.51	0.102	0.12
11.55	0.12	399.51	0.102	0.12
11.70	0.12	399.51	0.102	0.12
11.85	0.12	399.51	0.102	0.12
12.00	0.12	399.51	0.102	0.12
12.15	0.11	399.51	0.102	0.11
12.30	0.11	399.51	0.102	0.11
12.45	0.11	399.51	0.102	0.11
12.60	0.11	399.51	0.102	0.11
12.75	0.11	399.51	0.102	0.11
12.90	0.11	399.51	0.102	0.11
13.05	0.11	399.51	0.102	0.11
13.20	0.11	399.51	0.102	0.11
13.35	0.10	399.51	0.102	0.10
13.50	0.10	399.51	0.102	0.10
13.65	0.10	399.51	0.102	0.10
13.80	0.10	399.51	0.102	0.10

13.95	0.10	399.51	0.102	0.10
14.10	0.10	399.51	0.102	0.10
14.25	0.10	399.51	0.102	0.10
14.40	0.10	399.51	0.102	0.10
14.55	0.09	399.51	0.102	0.09
14.70	0.09	399.51	0.102	0.09
14.85	0.09	399.51	0.102	0.09
15.00	0.09	399.51	0.102	0.09
15.15	0.09	399.51	0.102	0.09
15.30	0.09	399.51	0.102	0.09
15.45	0.09	399.51	0.102	0.09
15.60	0.09	399.51	0.102	0.09
15.75	0.08	399.51	0.102	0.08
15.90	0.08	399.51	0.102	0.08
16.05	0.08	399.51	0.102	0.08
16.20	0.08	399.51	0.102	0.08
16.35	0.08	399.51	0.102	0.08
16.50	0.08	399.51	0.102	0.08
16.65	0.08	399.51	0.102	0.08

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
16.80	0.07	399.51	0.102	0.08
16.95	0.07	399.51	0.102	0.07
17.10	0.07	399.51	0.102	0.07
17.25	0.07	399.51	0.102	0.07
17.40	0.07	399.51	0.102	0.07
17.55	0.07	399.51	0.102	0.07
17.70	0.07	399.51	0.102	0.07
17.85	0.07	399.51	0.102	0.07
18.00	0.06	399.51	0.102	0.07
18.15	0.06	399.51	0.102	0.06
18.30	0.06	399.51	0.102	0.06
18.45	0.06	399.50	0.102	0.06
18.60	0.06	399.50	0.102	0.06
18.75	0.06	399.50	0.102	0.06
18.90	0.06	399.50	0.102	0.06
19.05	0.06	399.50	0.102	0.06
19.20	0.05	399.50	0.102	0.06
19.35	0.05	399.50	0.102	0.05
19.50	0.05	399.50	0.102	0.05
19.65	0.05	399.50	0.102	0.05
19.80	0.05	399.50	0.102	0.05
19.95	0.05	399.50	0.102	0.05
20.10	0.05	399.50	0.102	0.05
20.25	0.05	399.50	0.102	0.05
20.40	0.04	399.50	0.102	0.05
20.55	0.04	399.50	0.102	0.04
20.70	0.04	399.50	0.101	0.04
20.85	0.04	399.50	0.101	0.04
21.00	0.04	399.50	0.101	0.04
21.15	0.04	399.50	0.101	0.04
21.30	0.04	399.50	0.101	0.04
21.45	0.04	399.50	0.101	0.04
21.60	0.03	399.50	0.101	0.03
21.75	0.03	399.50	0.101	0.03
21.90	0.03	399.50	0.101	0.03
22.05	0.03	399.50	0.101	0.03
22.20	0.03	399.50	0.101	0.03
22.35	0.03	399.50	0.101	0.03
22.50	0.03	399.50	0.101	0.03
22.65	0.02	399.50	0.101	0.03
22.80	0.02	399.50	0.101	0.02
22.95	0.02	399.50	0.101	0.02
23.10	0.02	399.50	0.101	0.02

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    23.25       0.02    399.50      0.101      0.02
    23.40       0.02    399.50      0.101      0.02
    23.55       0.02    399.50      0.101      0.02
    23.70       0.01    399.50      0.101      0.02
    23.85       0.01    399.50      0.101      0.01
    24.00       0.01    399.50      0.101      0.01
    24.15       0.01    399.50      0.101      0.01
    24.30       0.00    399.50      0.101      0.00
 PEAK DISCHARGE =       29.006 CFS - PEAK OCCURS AT HOUR    1.60
 MAXIMUM WATER SURFACE ELEVATION =      400.865
 MAXIMUM STORAGE =        0.2393 AC-FT      INCREMENTAL TIME=    0.050000HRS

FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 17:31:58
```

APPENDIX C

HYDRAULIC CALCULATIONS

Street Capacity Calculations

QUIVIRA AT AP1

28' F-F Street Section with 8" curb

Slope= **0.01**

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.25	0.00	0.43	0.0028952
0.02	0.00	0.34	0.01	0.00	0.00	0.39	0.01	0.48	0.00697505
0.04	0.01	0.68	0.02	0.01	0.02	0.62	0.02	0.54	0.01671823
0.06	0.03	1.02	0.03	0.02	0.05	0.81	0.05	0.58	0.02781231
0.08	0.05	1.36	0.04	0.05	0.10	0.98	0.08	0.61	0.03986721
0.1	0.08	1.70	0.05	0.09	0.18	1.14	0.11	0.63	0.05268105
0.12	0.12	2.04	0.06	0.15	0.30	1.29	0.15	0.65	0.06612785
0.125	0.13	2.13	0.06	0.17	0.33	1.32	0.17	0.66	0.06957767

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.18	0.35	1.29	0.17	0.63	0.0681329
0.16	0.23	3.91	0.06	0.29	0.59	1.30	0.21	0.57	0.07266866
0.2	0.42	5.95	0.07	0.62	1.23	1.48	0.30	0.58	0.09307377
0.24	0.69	8.00	0.09	1.17	2.33	1.70	0.41	0.61	0.11973675
0.2846	1.08	10.27	0.11	2.11	4.21	1.95	0.55	0.64	0.1532918
0.32	**1.47**	**12.08**	**0.12**	**3.14**	**6.28**	**2.14**	**0.69**	**0.67**	**0.1818449**
0.3551	1.91	13.87	0.14	4.45	8.90	2.33	0.83	0.69	0.21143825
0.365	2.05	14.37	0.14	4.87	9.74	2.38	0.87	0.69	0.21998447

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	5.15	10.30	2.44	0.90	0.71	0.22803693
0.4556	3.31	14.46	0.23	10.84	21.69	3.27	1.49	0.85	0.36803791
0.4848	3.72	14.49	0.26	13.15	26.29	3.53	1.71	0.89	0.41671203
0.5	3.94	14.51	0.27	14.41	28.83	3.66	1.83	0.91	0.44222732
0.54	4.50	14.55	0.31	17.96	35.92	4.00	2.16	0.96	0.5099349
0.5584	4.75	14.56	0.33	19.69	39.38	4.14	2.31	0.98	0.54134449
0.63	5.76	14.64	0.39	27.00	54.00	4.69	2.96	1.04	0.66504888
0.667	6.27	14.67	0.43	31.12	62.24	4.96	3.31	1.07	0.72983482

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	32.85	65.70	4.86	3.40	1.02	0.72163867
0.72	7.09	17.32	0.41	34.12	68.25	4.82	3.47	1.00	0.72025533
0.74	7.43	18.32	0.41	35.57	71.13	4.79	3.54	0.98	0.72112467
0.76	7.79	19.32	0.40	37.17	74.34	4.77	3.63	0.96	0.72395484
0.78	8.17	20.32	0.40	38.93	77.86	4.76	3.71	0.95	0.72850512
0.8	8.58	21.32	0.40	40.85	81.71	4.76	3.81	0.94	0.73457496

0.847	9.60	23.68	0.41	46.00	91.99	4.79	4.06	0.92	0.75390722

Street Capacity Calculations

QUIVIRA AT AP2

28' F-F Street Section with 8" curb

Slope= **0.018**

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.58	0.00460216
0.02	0.00	0.34	0.01	0.00	0.00	0.52	0.01	0.65	0.01094455
0.04	0.01	0.68	0.02	0.01	0.02	0.83	0.03	0.73	0.02590001
0.06	0.03	1.02	0.03	0.03	0.06	1.09	0.07	0.78	0.04277413
0.08	0.05	1.36	0.04	0.07	0.13	1.32	0.11	0.82	0.0610039
0.1	0.08	1.70	0.05	0.12	0.24	1.53	0.15	0.85	0.0803001
0.12	0.12	2.04	0.06	0.20	0.40	1.72	0.21	0.88	0.10048309
0.125	0.13	2.13	0.06	0.22	0.44	1.77	0.22	0.88	0.10565208

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.24	0.47	1.73	0.23	0.85	0.1038901
0.16	0.23	3.91	0.06	0.39	0.79	1.75	0.28	0.77	0.11192159
0.2	0.42	5.95	0.07	0.83	1.65	1.99	0.40	0.78	0.14310381
0.24	0.69	8.00	0.09	1.56	3.13	2.28	0.55	0.82	0.18320401
0.2846	1.08	10.27	0.11	2.83	5.65	2.61	0.74	0.86	0.23329911
0.32	1.47	12.08	0.12	4.21	8.43	2.87	0.92	0.90	0.27573419
0.3551	**1.91**	**13.87**	**0.14**	**5.97**	**11.94**	**3.13**	**1.11**	**0.92**	**0.31958393**
0.365	2.05	14.37	0.14	6.54	13.07	3.20	1.17	0.93	0.33222686

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.37	2.12	14.38	0.15	6.91	13.82	3.27	1.21	0.95	0.34386587
0.4556	3.31	14.46	0.23	14.55	29.10	4.39	2.00	1.15	0.54519857
0.4848	3.72	14.49	0.26	17.64	35.28	4.74	2.30	1.20	0.61490122
0.5	3.94	14.51	0.27	19.34	38.68	4.91	2.46	1.22	0.65139979
0.54	4.50	14.55	0.31	24.09	48.19	5.36	2.89	1.29	0.74814401
0.5584	4.75	14.56	0.33	26.42	52.83	5.56	3.10	1.31	0.79297804
0.63	5.76	14.64	0.39	36.22	72.45	6.29	3.97	1.40	0.96933347
0.667	6.27	14.67	0.43	41.75	83.50	6.66	4.44	1.44	1.06157989

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	44.07	88.14	6.52	4.56	1.37	1.05325942
0.72	7.09	17.32	0.41	45.78	91.57	6.46	4.65	1.34	1.05309335
0.74	7.43	18.32	0.41	47.72	95.43	6.42	4.75	1.32	1.05599982
0.76	7.79	19.32	0.40	49.87	99.73	6.40	4.86	1.29	1.0615857
0.78	8.17	20.32	0.40	52.23	104.46	6.39	4.98	1.28	1.06952617
0.8	8.58	21.32	0.40	54.81	109.62	6.39	5.11	1.26	1.07955014

0.847	9.60	23.68	0.41	61.71	123.42	6.43	5.44	1.23	1.11006975

Street Capacity Calculations

QUIVIRA AT AP3

28' F-F Street Section with 8" curb

Slope= **0.018**

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.01	0.00	0.17	0.00	0.00	0.00	0.33	0.00	0.58	0.00460216
0.02	0.00	0.34	0.01	0.00	0.00	0.52	0.01	0.65	0.01094455
0.04	0.01	0.68	0.02	0.01	0.02	0.83	0.03	0.73	0.02590001
0.06	0.03	1.02	0.03	0.03	0.06	1.09	0.07	0.78	0.04277413
0.08	0.05	1.36	0.04	0.07	0.13	1.32	0.11	0.82	0.0610039
0.1	0.08	1.70	0.05	0.12	0.24	1.53	0.15	0.85	0.0803001
0.12	0.12	2.04	0.06	0.20	0.40	1.72	0.21	0.88	0.10048309
0.125	0.13	2.13	0.06	0.22	0.44	1.77	0.22	0.88	0.10565208

For water depths greater than 0.125 ft but less than 0.365 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)+Y1

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.13	0.14	2.38	0.06	0.24	0.47	1.73	0.23	0.85	0.1038901
0.16	0.23	3.91	0.06	0.39	0.79	1.75	0.28	0.77	0.11192159
0.2	0.42	5.95	0.07	0.83	1.65	1.99	0.40	0.78	0.14310381
0.24	0.69	8.00	0.09	1.56	3.13	2.28	0.55	0.82	0.18320401
0.2846	1.08	10.27	0.11	2.83	5.65	2.61	0.74	0.86	0.23329911
0.32	1.47	12.08	0.12	4.21	8.43	2.87	0.92	0.90	0.27573419
0.3551	1.91	13.87	0.14	5.97	11.94	3.13	1.11	0.92	0.31958393
0.365	2.05	14.37	0.14	6.54	13.07	3.20	1.17	0.93	0.33222686

For water depths greater than 0.365 ft but less than 0.667 ft

Y2= Y - 0.365

A3= A2 + Y2*14

P3= P2 + Y2

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	
0.37	2.12	14.38	0.15	6.91	13.82	3.27	1.21	0.95	0.34386587	
0.4556	3.31	14.46	0.23	14.55	29.10	4.39	2.00	1.15	0.54519857	
0.4848	**3.72**	**14.49**	**0.26**	**17.64**	**35.28**	**4.74**	**2.30**	**1.20**	**0.61490122**	MAX Q
0.5	3.94	14.51	0.27	19.34	38.68	4.91	2.46	1.22	0.65139979	
0.54	4.50	14.55	0.31	24.09	48.19	5.36	2.89	1.29	0.74814401	
0.5584	4.75	14.56	0.33	26.42	52.83	5.56	3.10	1.31	0.79297804	
0.63	5.76	14.64	0.39	36.22	72.45	6.29	3.97	1.40	0.96933347	
0.667	6.27	14.67	0.43	41.75	83.50	6.66	4.44	1.44	1.06157989	

For water depths greater than 0.667 ft but less than 0.847 ft

Y3= Y - 0.667

A4= A3 + 14 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2)	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)
0.7	6.76	16.32	0.41	44.07	88.14	6.52	4.56	1.37	1.05325942
0.72	7.09	17.32	0.41	45.78	91.57	6.46	4.65	1.34	1.05309335
0.74	7.43	18.32	0.41	47.72	95.43	6.42	4.75	1.32	1.05599982
0.76	7.79	19.32	0.40	49.87	99.73	6.40	4.86	1.29	1.0615857
0.78	8.17	20.32	0.40	52.23	104.46	6.39	4.98	1.28	1.06952617
0.8	8.58	21.32	0.40	54.81	109.62	6.39	5.11	1.26	1.07955014

0.847	9.60	23.68	0.41	61.71	123.42	6.43	5.44	1.23	1.11006975

Ϙ=31.16

UPLAND CHANNEL ENTRANCE WEIR

Weir Equation:

$$Q = CLH^{3/2}$$

Q= 10.63 cfs
C = 2.95
H = 0.67 ft
L = Length of weir

$$L = \frac{31.16}{2.95(0.67)^{3/2}}$$

L = 6.57ft
Entrance is 10’ therefore accepable

UPLAND CHANNEL EXIT WEIR

Weir Equation:

$$Q = CLH^{3/2}$$

Q= 10.63 cfs
C = 2.95
H = 0.67 ft
L = Length of weir

$$L = \frac{31.16}{2.95(0.67)^{3/2}}$$

L = 6.57ft
4- SW CULVERTS IS ACCEPTABLE

Channel Capacity

	Top Width	Bottom Width	Depth	Area	WP	R	Slope	Q Provided	Q Required	Velocity
	(ft)	(ft)	(ft)	(ft^2)	(ft)		(%)	(cfs)	(cfs)	(ft/s)
Beginning	10	10	0.67	6.70	11.34	0.5908289	4.6	50.25	10.63	1.59

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.03

SIDEWALK CULVERT WEIR

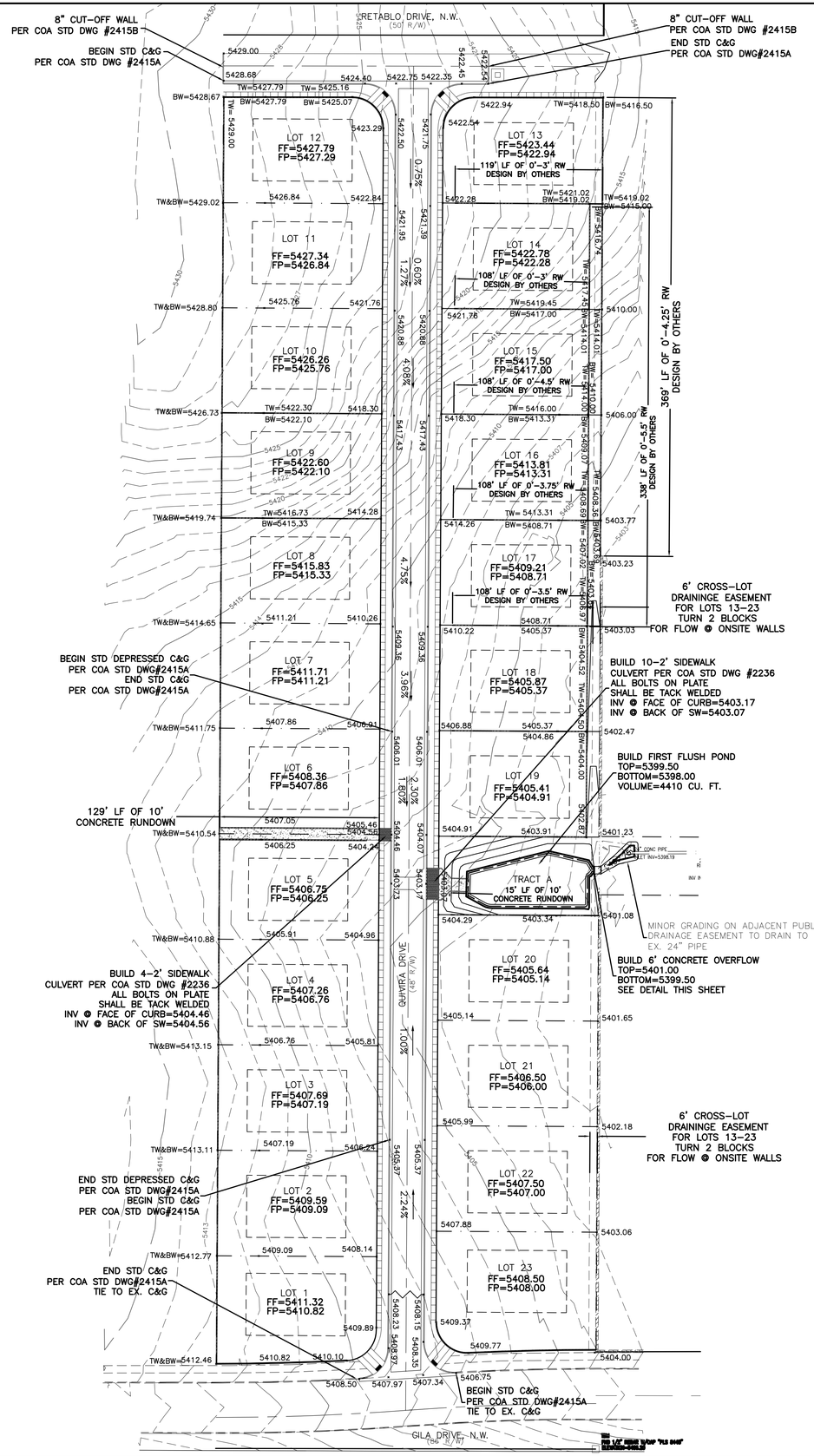
Weir Equation:

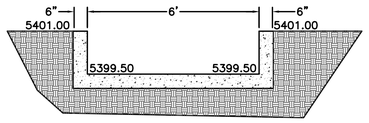
$$Q = CLH^{3/2}$$

Q= 31.16 cfs
C = 2.95
H = 0.67 ft
L = Length of weir

$$L = \frac{31.16}{2.95(0.67)^{3/2}}$$

L = 19.26ft
Use 20 feet for length of weir-10-2’ CULVERTS





CONCRETE OVERFLOW DETAIL

NTS

EROSION CONTROL NOTES:

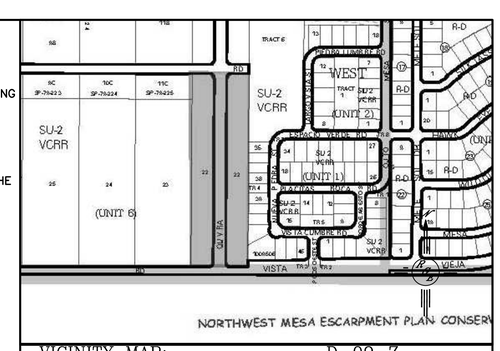
1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.

2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.

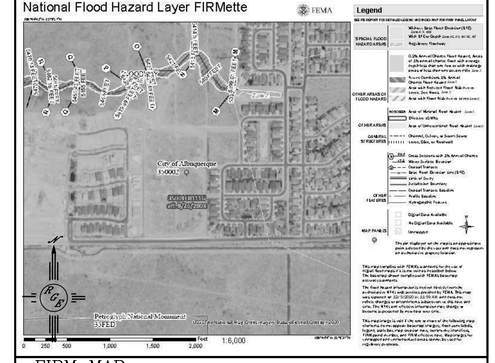
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.

4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.

5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL ACCEPTANCE OF ANY PROJECT.



VICINITY MAP: D-09-Z



FIRM MAP:

LEGAL DESCRIPTION:

LOTS 1-23, AND TRACT A, QUIVERA ESTATES

NOTES:

1. ALL SPOT ELEVATIONS REPRESENT FLOWLINE ELEVATION UNLESS OTHERWISE NOTED.

2. ALL CURB AND GUTTER TO 6" HEADER UNLESS OTHERWISE NOTED.

3. ALL RETAINING WALL DESIGN SHALL BE BY OTHERS.

4. ALL NEW PAVING SHALL BE 6" PCC OVER 8" SUBGRADE PREPARATION IN CONFORMANCE TO ACI 330R-08. UNLESS OTHERWISE NOTED.

5. ANY CURBS OR PAVEMENT NEGATIVELY IMPACTED BY CONSTRUCTION ACTIVITY SHALL BE REPLACED TO MATCH EXISTING CONDITIONS.

6. ALL SITE WORK SHALL CONFORM TO CITY OF ALBUQUERQUE STANDARDS FOR PUBLIC WORKS CONSTRUCTION EDITION 9

LEGEND

5414	EXISTING CONTOUR
5415	EXISTING INDEX CONTOUR
5414	PROPOSED CONTOUR
5415	PROPOSED INDEX CONTOUR
	SLOPE TIE
× 4048.25	EXISTING SPOT ELEVATION
1- × 4048.25	PROPOSED SPOT ELEVATION
	BOUNDARY
	CENTERLINE
	RIGHT-OF-WAY
	PROPOSED CURB
	EXISTING CURB AND GUTTER
	PROPOSED SIDEWALK
	EXISTING SIDEWALK
	3' ADA PATH-2% MAX SLOPE

N

GRAPHIC SCALE

50 20 0 20 50

SCALE: 1"=50'

CAUTION:

EXISTING UTILITIES ARE NOT SHOWN. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO ANY EXCAVATION TO DETERMINE THE ACTUAL LOCATION OF UTILITIES & OTHER IMPROVEMENTS.

ENGINEER'S SEAL

DAVID SOULE NEW MEXICO 14522 REGISTERED PROFESSIONAL ENGINEER

12/2/20

DAVID SOULE
P.E. #14522

QUIVIRA ESTATES

GRADING AND DRAINAGE PLAN

Rio Grande Engineering
1606 CENTRAL AVENUE SE
SUITE 201
ALBUQUERQUE, NM 87106
(505) 872-0999

DRAWN BY WCWJ

DATE 12-02-20

2102059-LAYOUT-8-06-20

SHEET # —

JOB # 2102059