CITY OF ALBUQUERQUE

PLANNING DEPARTMENT – Development Review Services

Richard J. Berry, Mayor

October 17, 2016

Robert J. Fierro, P.E., P.S.
Fierro & Company
6300 Montano Rd. Suite F3
Albuquerque, NM, 87120

RE: **Beehive Homes**
        Grading & Drainage Plan/Report
        Engineer's Stamp Date 9-8-2016 (File: E10D027)

Dear Mr. Fierro:

Based upon the information provided in your submittal received 9-15-2016, the above referenced Grading and Drainage Plan and Report is approved for Building Permit with the following condition:

PO Box 1293

- Provide a desiltation pond, or other method to decrease sediment transport onto the adjacent property, since much of the existing on-site vegetation will be cleared with Phase I.

Albuquerque

Please attach a copy of this approved plan in the construction sets when submitting for a building permit. Prior to Certificate of Occupancy release, Engineer Certification per the DPM checklist and completion of the item above will be required.

If you have any questions you can contact me at 924-3986.

New Mexico 87103

Sincerely,

www.cabq.gov

Abiel Carrillo, P.E.
Principal Engineer, Planning Dept.
Development Review Services

Orig: Drainage file

Albuquerque - Making History 1706-2006

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: _____ Building Permit #: _____ City Drainage #: _____

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

Legal Description: _____

City Address: _____

Engineering Firm: _____ Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Owner: _____ Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Architect: _____ Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: _____ Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

DEPARTMENT:
_____ HYDROLOGY/ DRAINAGE
_____ TRAFFIC/ TRANSPORTATION
_____ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:
_____ ENGINEER/ ARCHITECT CERTIFICATION

_____ CONCEPTUAL G & D PLAN
_____ GRADING PLAN
_____ DRAINAGE MASTER PLAN
_____ DRAINAGE REPORT
_____ CLOMR/LOMR

_____ TRAFFIC CIRCULATION LAYOUT (TCL)
_____ TRAFFIC IMPACT STUDY (TIS)
_____ EROSION & SEDIMENT CONTROL PLAN (ESC)

_____ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:
_____ BUILDING PERMIT APPROVAL
_____ CERTIFICATE OF OCCUPANCY

_____ PRELIMINARY PLAT APPROVAL
_____ SITE PLAN FOR SUB'D APPROVAL
_____ SITE PLAN FOR BLDG. PERMIT APPROVAL
_____ FINAL PLAT APPROVAL
_____ SIA/ RELEASE OF FINANCIAL GUARANTEE
_____ FOUNDATION PERMIT APPROVAL
_____ GRADING PERMIT APPROVAL
_____ SO-19 APPROVAL
_____ PAVING PERMIT APPROVAL
_____ GRADING/ PAD CERTIFICATION
_____ WORK ORDER APPROVAL
_____ CLOMR/LOMR

_____ PRE-DESIGN MEETING
_____ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: _____ Yes _____ No

DATE SUBMITTED: _____ By: _____

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: ____

DRAINAGE REPORT
FOR
BEEHIVE HOMES
AT VOLCANO CLIFFS,
LOTS 0-26 through 0-31

VOLCANO CLIFFS, UNIT 1

Prepared For:

RBA Architects
1104 Park Ave SW
Albuquerque, NM 87102

Prepared by:

Fierro&Company
ENGINEERING | SURVEYING

September 2016

BEEHIVE HOMES
AT VOLCANO CLIFFS
DRAINAGE REPORT

September 2016

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

_____
Robert J. Fierro, P.E.
NMPE No. 20585

_____9-9-16_____
Date

TABLE OF CONTENTS

APPENDIX INDEX

INTRODUCTION

Authorization

RBA Architecture authorized Fierro & Company, LLC to prepare a Grading & Drainage Plan for the Beehive Homes Inc. at Volcano Cliffs project.

Study Area Location

The project is located within Zone Atlas Map: E-10-Z. See Sheet C-3.0.

Purpose

The purpose of this drainage report is to 1) determine the pre-develop and proposed runoff conditions for the 100-year, 6-hour storm event, 2) outline the criteria for development of the site, and 3) demonstrate that the downstream basins will not be inversely impacted by this development.

HYDROLOGY

Methodology

Drainage Basin Delineation

A topographic survey with 1-foot contour intervals was obtained by Harris Surveying, Inc. in October 2015. Spot checks were performed by Fierro & Company, LLC in June 2016. This data was used to delineate the existing basins.

Hydrological Method

Hydrologic procedures presented in the Hydrology Section of the City of Albuquerque's DMP, Section 22.2, revised April 7, 1993 were followed. AHYMO-S4 program was used to produce the peak flow and runoff volume values for the 100-year, 6-hour storm event.

Hydrological Characteristics

Precipitation

Rainfall depths for a range of durations were acquired from National Oceanographic and Atmospheric Administration's (NOAA) Precipitation Frequency Data Server (PFDS), Atlas 14, as shown on Table 1. The PFDS requires a location to be entered and Google Earth was used to obtain the site location in latitude and longitude. The location entered into the PFDS is latitude 35.1525º N, longitude 106.7117º W.

Table 1: NOAA Precipitation Depths (in inches)	
Duration	100-year
15-min	1.01
1-hr	1.69
2-hr	1.93
3-hr	1.98
6-hr	2.15
12-hr	2.24
24-hr	2.49

Existing Condition

The site is vacant, approximately 1.51 acres, and slopes south . A public utility easement is located on the south 7-feet of the property. The site is bound by Montano Road to the north, vacant lots to the east, developed residential lots to the south, and a dental office to the west. An offsite basin with an area of 0.8576 acres drains into the site at the southeast corner. This runoff and the runoff from the site drain to two gate openings located on Lot 6 and Lot 8 of Volcano Cliffs Subdivision, Unit 1. Approximately 2.56 cfs flows through these gates. Refer to Sheet C-3.2 for the existing basins. Refer to the table below for the pre-developed hydrologic results.

Table 2: Pre-developed Hydrologic Data, Peak Discharge, and Volumetric Runoff							
Basin	Area	Land Treatment Percentage (%)				Q100-year, 6-hour (cfs)	V100-year, 6-hour (ac-ft)
	(acres)	A	B	C	D		
OS1	0.8576	0	100	0	0	1.85	0.052
101	1.515	0	100	0	0	3.27	0.092

Proposed Condition

The site will be developed into senior housing and will be constructed in two phases. This report only covers Phase I development. Phase I includes a 9,000 sq.ft. building, parking lot, water quality features, and a pond. Refer to sheets C-3.0 and C-3.2. Basin 201 will drain to the pond. Basin 202 under Phase I will remain 80% undeveloped and free discharge to the two gate openings.

There are no adverse implications to the two lots that receive runoff from Phase I development. The peak discharge through each gate opening is reduced from 2.56 to 2.18 CFS. The pond also retains the net volume from the existing to proposed condition. Refer to the table below for the post-developed hydrologic results.

Table 3: Proposed Hydrologic Data, Peak Discharge, and Volumetric Runoff						
Basin	Area	Land Treatment Percentage (%)				Q100-year, 6-hour (cfs)	V100-year, 6-hour (ac-ft)
	(acres)	A	B	C	D	
201	0.7185	0	11.5	8.5	80	2.72	0.100
202	0.7959	0	0	80	20	2.49	0.076

90th Percentile Storm

The City of Albuquerque's Drainage Ordinance 14-15-2-12 is met for this new development. The first flush will be routed through and retained in depressed landscaping. See Sheet C-3.3 for the depressed landscaping areas. Calculations below show compliance to Ordinance 14-15-2-12.

Basin 201
Land Treatment D Area = 25,014 sq.ft.

Water Quality Volume Needed = $25,014 \; sq.ft. (.34") * \frac{1ft}{12"} = 709 \; ft^3$ = 0.01627 ac-ft

Water Quality Volume provided in landscaping = $975 \; sq.ft. (3") * \frac{1ft}{12"} = 244 \; ft^3$ = 0.00560 ac-ft

Water Quality Volume provided in pond = 709 ft^3 – 244 ft^3 = 465 ft^3 = 0.01067 ac-ft

Therefore; Water Quality Volume Provided = Water Quality Volume Required

Basin 202
Land Treatment D Area = 6,465 sq.ft.

Water Quality Volume Needed = $6,465 \; sq.ft. (.34") * \frac{1ft}{12"} = 183 \; ft^3$ = 0.00421 ac-ft

Water Quality Volume provided = $613 \; sq.ft. (4") * \frac{1ft}{12"} = 204 \; ft^3$ = 0.00469 ac-ft

Therefore; Water Quality Volume Provided > Water Quality Volume Required

CONCLUSION

The proposed development meets the City's drainage requirements. Phase I does not increase the peak runoff volume nor peak discharge leaving the site. A grading & drainage plan will be submitted for Phase II. Phase II drainage will discharge approximately 2.56 cfs through each gate opening.

APPENDIX A

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, US*
Latitude: 35.1525°, Longitude: -106.7117°
Elevation: 5136 ft*
* source: Google Maps

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

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

Average recurrence interval (years)

Duration	1	2	5	10	25	50	100	200	500	1000
5-min	0.159 (0.136-0.186)	0.206 (0.176-0.241)	0.278 (0.235-0.325)	0.335 (0.284-0.391)	0.411 (0.347-0.480)	0.472 (0.397-0.549)	0.536 (0.448-0.623)	0.605 (0.501-0.703)	0.698 (0.573-0.813)	0.773 (0.629-0.899)
10-min	0.242 (0.207-0.283)	0.314 (0.268-0.367)	0.423 (0.358-0.495)	0.509 (0.433-0.594)	0.626 (0.529-0.730)	0.718 (0.605-0.836)	0.817 (0.682-0.949)	0.921 (0.763-1.07)	1.06 (0.872-1.24)	1.18 (0.957-1.37)
15-min	0.299 (0.257-0.350)	0.389 (0.332-0.455)	0.524 (0.444-0.614)	0.631 (0.536-0.737)	0.776 (0.655-0.905)	0.890 (0.749-1.04)	1.01 (0.846-1.18)	1.14 (0.946-1.33)	1.32 (1.08-1.53)	1.46 (1.19-1.70)
30-min	0.403 (0.346-0.472)	0.524 (0.446-0.612)	0.705 (0.598-0.827)	0.850 (0.722-0.992)	1.05 (0.882-1.22)	1.20 (1.01-1.40)	1.36 (1.14-1.58)	1.54 (1.27-1.79)	1.77 (1.46-2.06)	1.96 (1.60-2.28)
60-min	0.499 (0.428-0.584)	0.648 (0.552-0.758)	0.873 (0.740-1.02)	1.05 (0.894-1.23)	1.29 (1.09-1.51)	1.48 (1.25-1.73)	1.69 (1.41-1.96)	1.90 (1.58-2.21)	2.19 (1.80-2.55)	2.43 (1.98-2.83)
2-hr	0.585 (0.503-0.680)	0.747 (0.641-0.870)	0.992 (0.848-1.15)	1.19 (1.01-1.37)	1.47 (1.24-1.68)	1.69 (1.42-1.94)	1.93 (1.61-2.21)	2.18 (1.80-2.49)	2.53 (2.08-2.90)	2.82 (2.29-3.23)
3-hr	0.620 (0.543-0.720)	0.790 (0.689-0.918)	1.04 (0.908-1.20)	1.24 (1.08-1.43)	1.51 (1.30-1.74)	1.74 (1.49-2.00)	1.98 (1.69-2.27)	2.24 (1.89-2.57)	2.59 (2.16-2.98)	2.88 (2.38-3.32)
6-hr	0.717 (0.630-0.823)	0.909 (0.802-1.04)	1.18 (1.04-1.35)	1.39 (1.22-1.59)	1.68 (1.47-1.92)	1.91 (1.66-2.17)	2.15 (1.85-2.44)	2.40 (2.05-2.72)	2.75 (2.33-3.13)	3.04 (2.55-3.47)
12-hr	0.793 (0.702-0.897)	1.00 (0.886-1.13)	1.28 (1.12-1.44)	1.50 (1.31-1.69)	1.78 (1.56-2.01)	2.01 (1.75-2.26)	2.24 (1.94-2.52)	2.49 (2.14-2.80)	2.82 (2.40-3.17)	3.09 (2.61-3.49)
24-hr	0.917 (0.810-1.04)	1.15 (1.02-1.31)	1.45 (1.28-1.64)	1.68 (1.48-1.90)	1.99 (1.75-2.26)	2.24 (1.96-2.52)	2.49 (2.17-2.81)	2.75 (2.38-3.09)	3.10 (2.67-3.48)	3.37 (2.89-3.79)
2-day	0.947 (0.845-1.06)	1.19 (1.06-1.33)	1.49 (1.33-1.66)	1.72 (1.53-1.92)	2.04 (1.81-2.27)	2.28 (2.02-2.54)	2.53 (2.23-2.82)	2.78 (2.44-3.10)	3.12 (2.73-3.51)	3.39 (2.94-3.82)
3-day	1.10 (0.993-1.21)	1.37 (1.24-1.51)	1.69 (1.53-1.87)	1.95 (1.76-2.15)	2.29 (2.06-2.52)	2.55 (2.29-2.81)	2.81 (2.52-3.10)	3.08 (2.75-3.39)	3.44 (3.05-3.80)	3.71 (3.28-4.11)
4-day	1.25 (1.14-1.36)	1.55 (1.42-1.69)	1.90 (1.73-2.07)	2.17 (1.98-2.37)	2.54 (2.31-2.77)	2.82 (2.56-3.08)	3.10 (2.81-3.38)	3.38 (3.06-3.68)	3.75 (3.38-4.09)	4.03 (3.61-4.40)
7-day	1.43 (1.30-1.55)	1.77 (1.62-1.92)	2.15 (1.97-2.33)	2.44 (2.24-2.65)	2.83 (2.59-3.07)	3.12 (2.85-3.38)	3.40 (3.11-3.69)	3.68 (3.35-3.98)	4.03 (3.67-4.37)	4.29 (3.89-4.66)
10-day	1.58 (1.45-1.72)	1.95 (1.80-2.13)	2.39 (2.20-2.59)	2.73 (2.51-2.96)	3.18 (2.92-3.43)	3.51 (3.22-3.79)	3.85 (3.52-4.16)	4.18 (3.81-4.51)	4.60 (4.18-4.97)	4.91 (4.45-5.32)
20-day	1.97 (1.80-2.15)	2.44 (2.24-2.66)	2.96 (2.72-3.22)	3.35 (3.08-3.64)	3.85 (3.53-4.17)	4.21 (3.85-4.56)	4.55 (4.16-4.92)	4.88 (4.45-5.27)	5.28 (4.81-5.71)	5.56 (5.06-6.02)
30-day	2.35 (2.15-2.54)	2.91 (2.67-3.15)	3.49 (3.21-3.78)	3.93 (3.60-4.24)	4.46 (4.10-4.81)	4.84 (4.44-5.21)	5.20 (4.77-5.60)	5.54 (5.07-5.95)	5.93 (5.42-6.38)	6.20 (5.67-6.68)
45-day	2.87 (2.65-3.10)	3.55 (3.28-3.84)	4.22 (3.90-4.56)	4.70 (4.34-5.07)	5.28 (4.87-5.69)	5.67 (5.23-6.11)	6.02 (5.56-6.47)	6.32 (5.84-6.80)	6.65 (6.15-7.15)	6.84 (6.35-7.35)
60-day	3.29 (3.04-3.57)	4.08 (3.76-4.41)	4.85 (4.48-5.24)	5.40 (4.99-5.83)	6.06 (5.61-6.53)	6.51 (6.02-7.01)	6.92 (6.40-7.45)	7.27 (6.73-7.84)	7.67 (7.11-8.27)	7.91 (7.35-8.52)

[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 lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower 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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```
*S  BEEHIVE LOTS O-26 TO O-31
*S  Drainage Basin Analysis
*S "Existing" CONDITION MODEL
*S  COMBINED BASIN ANALYSIS
*
START                 TIME=0.0  PUNCH CODE=0 PRINT CODE=0
LOCATION              City of Albuquerque
*
* RAINFALL FROM NOAA COA DEVELOPMENT PROCESS MANUAL
*S      RAINFALL DATA FROM NOAA ATLAS 14
*S********************************************************************
*S  100 YEAR 6HR STORM EXISTING CONDITION
RAINFALL              TYPE=1
                      QUARTER=1.01 IN
                      HOUR=  1.69 IN
                      SIX HR= 2.15 IN
                      DAY=   2.49 IN   DT=0.01
*
****Adding Sediment Bulk Factor to all Basins
SEDIMENT BULK   CODE=1  BULK FACTOR=1.00
*
*S********************************************************************
*
*** BASIN OS1 ****
*
COMPUTE LT TP         LCODE=1   UPLAND/LAG TIME METHOD
                      NK=1   ISLOPE=1
                      LENGTH=315 FT   SLOPE=0.015  K=0.7
                      KN=0.05   CENTROID DIST=.5
COMPUTE NM HYD        ID=1   HYD NO=OS1   DA=0.00134 SQ MI
                      PER A=0 PER B=100  PER C=0  PER D=0
                      TP=0.0   MASSRAIN=-1
*
PRINT HYD             ID=1   CODE=1
*
*** BASIN 101 ****
*
COMPUTE LT TP         LCODE=1   UPLAND/LAG TIME METHOD
                      NK=1   ISLOPE=1
                      LENGTH=315 FT   SLOPE=0.01       K=0.7
                      KN=0.05   CENTROID DIST=.5
COMPUTE NM HYD        ID=2   HYD NO=101   DA=0.00237 SQ MI
                      PER A=0 PER B=100  PER C=0  PER D=0
                      TP=0.0   MASSRAIN=-1
*
PRINT HYD             ID=2   CODE=1
*
*
* Total Flow from Basin (OS1 + 101)
ADD HYD               ID=1  HYD NO=101SUM ID I=1   ID II=2
PRINT HYD             ID=1   CODE=1
*
*
FINISH
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AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)   - Ver. S4.01a, Rel: 01a   RUN DATE (MON/DAY/YR) =09/08/2016
INPUT FILE = \\Seagate-4004ED\Public\PROJECTS\SURVEYING\162020\AE DATA\AHYMO\16220E.txt   USER NO.= Fierro-NMSingleA32007641

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

*S BEEHIVE LOTS O-26 TO O-31
*S Drainage Basin Analysis
*S "Existing" CONDITION MODEL
*S COMBINED BASIN ANALYSIS
START   TIME=   0.00
LOCATION   DEFAULT
*S   RAINFALL DATA FROM NOAA ATLAS 14
*S**
*S 100 YEAR 6HR STORM EXISTING CONDITION
RAINFALL TYPE= 1 NOAA 14   RAIN6=   2.150
SEDIMENT BULK   PK BF =   1.00
*S**

COMMAND	HYDROGRAPH ID	FROM ID	TO ID	AREA	PEAK DISCHARGE	RUNOFF VOLUME	RUNOFF	TIME TO PEAK	CFS PER ACRE	NOTATION
COMPUTE NM HYD	OS1	-	1	0.00134	1.85	0.052	0.72521	1.540	2.157	PER IMP= 0.00
COMPUTE NM HYD	101.00	-	2	0.00237	3.27	0.092	0.72521	1.540	2.153	PER IMP= 0.00
ADD HYD	101SUM	1& 2	1	0.00371	5.12	0.143	0.72518	1.540	2.154	
FINISH										

```
*S  BEEHIVE LOTS O-26 TO O-31
*S  Drainage Basin Analysis
*S "Proposed" CONDITION MODEL
*S  COMBINED BASIN ANALYSIS
*
START                   TIME=0.0  PUNCH CODE=0 PRINT CODE=0
LOCATION                City of Albuquerque
*
* RAINFALL FROM NOAA COA DEVELOPMENT PROCESS MANUAL
*S       RAINFALL DATA FROM NOAA ATLAS 14
*S***********************************************************************
*S  100 YEAR 6HR STORM PROPOSED CONDITION
RAINFALL                TYPE=1
                        QUARTER=1.01 IN
                        HOUR=   1.69 IN
                        SIX HR= 2.15 IN
                        DAY=    2.49 IN   DT=0.01
*
****Adding Sediment Bulk Factor to all Basins
SEDIMENT BULK   CODE=1  BULK FACTOR=1.00
*
*S***********************************************************************
*S***********************************************************************
*
*
*** BASIN OS1 ****
*
COMPUTE LT TP           LCODE=1   UPLAND/LAG TIME METHOD
                        NK=1   ISLOPE=1
                        LENGTH=315 FT    SLOPE=0.015  K=0.7
                        KN=0.05   CENTROID DIST=.5
COMPUTE NM HYD          ID=1   HYD NO=OS1   DA=0.00134 SQ MI
                        PER A=0 PER B=100  PER C=0  PER D=0
                        TP=0.0   MASSRAIN=-1
*
PRINT HYD               ID=1   CODE=1
*
*** BASIN 201 ****
*
COMPUTE LT TP           LCODE=1   UPLAND/LAG TIME METHOD
                        NK=2   ISLOPE=1
                        LENGTH=100 FT    SLOPE=0.06       K=0.7
                        LENGTH=240 FT    SLOPE=0.005      K=2.0
                        KN=0.05   CENTROID DIST=.5
COMPUTE NM HYD          ID=2   HYD NO=201   DA=0.00112 SQ MI
                        PER A=0 PER B=11.5  PER C=8.5  PER D=80
                        TP=0.0   MASSRAIN=-1
*
PRINT HYD               ID=2   CODE=1
*
*
*
*
*
```

```
*S  Route through Pond. WQ Volume from 5135.3 to 5135.60 =0.011 ac-ft
*
ROUTE RESERVOIR          ID=30  HYD NO=Pond  INFLOW ID=2  CODE=1
                         OUTFLOW (CFS)      STORAGE (AC FT)      ELEV
                         0.0                     0.00           5135.60
                         0.01                    0.039          5136.60
                         0.02                    0.077          5137.60
                         0.15                    0.093          5138.00
                         0.25                    0.097          5138.10
                         0.40                    0.104          5138.30


*
*
* Total Flow from Basin (OS1 + 201)
ADD HYD                  ID=1  HYD NO=201SUM ID I=1    ID II=30
PRINT HYD                ID=1   CODE=1
*
*
*** BASIN 202 ****
*
COMPUTE LT TP            LCODE=1   UPLAND/LAG TIME METHOD
                         NK=1   ISLOPE=1
                         LENGTH=250 FT   SLOPE=0.01       K=0.7
                         KN=0.05   CENTROID DIST=.5
COMPUTE NM HYD           ID=2   HYD NO=202   DA=0.001244 SQ MI
                         PER A=0 PER B=0  PER C=80  PER D=20
                         TP=0.0   MASSRAIN=-1
*
PRINT HYD                ID=2   CODE=1
*
* Total Flow from Basin (201SUM + 202)
ADD HYD                  ID=1  HYD NO=202SUM ID I=1    ID II=2
PRINT HYD                ID=1   CODE=1
*
*
*
*
FINISH
```

```
AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)              - Ver. S4.01a, Rel: 01a    RUN DATE (MON/DAY/YR) =09/09/2016
INPUT FILE = \\Seagate-4004ED\Public\PROJECTS\SURVEYING\162020\AE DATA\AHYMO\16220P.txt   USER NO.= Fierro-NMSingleA32007641


                          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  BEEHIVE LOTS O-26 TO O-31
*S  Drainage Basin Analysis
*S "Proposed" CONDITION MODEL
*S  COMBINED BASIN ANALYSIS
START                                                                                           TIME=    0.00
LOCATION                       DEFAULT
*S              RAINFALL DATA FROM NOAA ATLAS 14
*S****************************************************************************
*S  100 YEAR 6HR STORM PROPOSED CONDITION
RAINFALL  TYPE= 1 NOAA 14                                                                        RAIN6=   2.150
SEDIMENT BULK                                                                                    PK BF =   1.00
*S****************************************************************************
*S****************************************************************************
COMPUTE NM HYD         OS1   -    1    0.00134      1.85      0.052     0.72521    1.540    2.157 PER IMP=  0.00
COMPUTE NM HYD       201.00  -    2    0.00112      2.72      0.100     1.68104    1.530    3.799 PER IMP= 80.00
*S  Route through Pond. WQ Volume from 5135.3 to 5135.60 =0.011 ac-ft
ROUTE RESERVOIR       Pond   2   30    0.00112      0.12      0.063     1.04912    2.430    0.164 AC-FT=   0.089
ADD HYD             201SUM 1&30  1    0.00246      1.86      0.114     0.87266    1.540    1.182
COMPUTE NM HYD       202.00  -    2    0.00124      2.49      0.076     1.14143    1.530    3.134 PER IMP= 20.00
ADD HYD             202SUM 1& 2  1    0.00370      4.35      0.190     0.96286    1.540    1.834
FINISH
```
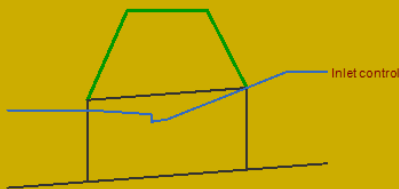
APPENDIX B

Culvert Report

4in PVC Pond Outlet

Invert Elev Dn (ft)	= 5137.60	
Pipe Length (ft)	= 2.00	
Slope (%)	= 2.49	
Invert Elev Up (ft)	= 5137.65	
Rise (in)	= 4.0	
Shape	= Circular	
Span (in)	= 4.0	
No. Barrels	= 1	
n-Value	= 0.012	
Culvert Type	= Circular Culvert	
Culvert Entrance	= Smooth tapered inlet throat	
Coeff. K,M,c,Y,k	= 0.534, 0.555, 0.0196, 0.9, 0.2	

Embankment

Top Elevation (ft)	= 5138.30
Top Width (ft)	= 1.00
Crest Width (ft)	= 3.00

Calculations

Qmin (cfs)	= 0.00
Qmax (cfs)	= 0.50
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 0.20
Qpipe (cfs)	= 0.20
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 2.46
Veloc Up (ft/s)	= 2.79
HGL Dn (ft)	= 5137.89
HGL Up (ft)	= 5137.91
Hw Elev (ft)	= 5138.05
Hw/D (ft)	= 1.20
Flow Regime	= Inlet Control

APPENDIX C

MONTANO ROAD N.W.

GENERAL GRADING NOTES:
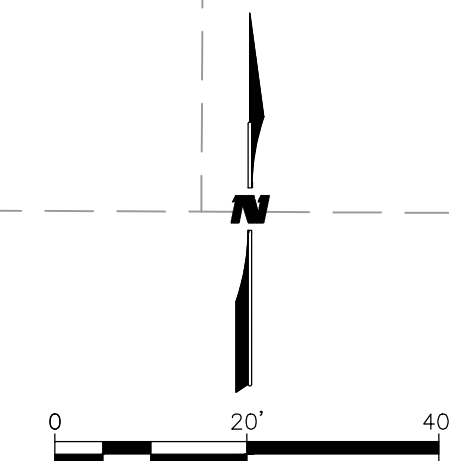
1. THE CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES SHOWN AND COORDINATE WITH ALL UTILITY OWNERS PRIOR TO ANY EXCAVATION.

2. THE CONTRACTOR SHALL LIMIT DISTURBANCE OF NATIVE VEGETATION TO A MINIMUM.

3. THIS PLAN RECOMMENDS POSITIVE DRAINAGE AWAY FROM ALL STRUCTURES TO PROHIBIT PONDING OF RUNOFF WHICH MAY CAUSE STRUCTURAL SETTLEMENT. FUTURE ALTERATION OF GRADES ADJACENT TO THE PROPOSED STRUCTURES IS NOT RECOMMENDED.

4. PERFORM GRADING AND EXCAVATION WORK IN COMPLIANCE WITH APPLICABLE SPECIFICATIONS, REQUIREMENTS, CODES AND ORDINANCES OF BERNALILLO COUNTY, NEW MEXICO.

5. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF OR OBTAINING EXCESS CUT OR FILL MATERIAL REQUIRED FOR FINAL GRADE.

6. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING AND COORDINATING WITH NEW MEXICO ONE CALL PRIOR EXCAVATION.

7. CLEAR AND GRUBBING PER NM APWA SECTION 201 SPECIFICATION.

8. PROPOSED POND VOLUME MEASURED FROM BOTTOM OF POND TO SPILLWAY INVERT.

9. SPOT ELEVATIONS ARE TO FINISH GRADE UNLESS NOTED OTHERWISE.

KEYED NOTES:

1. CONSTRUCT DRIVEPAD PER COA STD. DWG. 2425.
2. CONSTRUCT HEADER CURB PER DETAIL G1/C-3.1.
3. CONSTRUCT CURB & GUTTER PER DETAIL E1/C-3.1.
4. CONSTRUCT SIDEWALK PER DETAIL A7/C-3.1.
5. CONSTRUCT TURNDOWN SIDEWALK PER DETAIL E7/C-3.1.
6. CONSTRUCT TURNDOWN SIDEWALK AT ACCESSIBLE ZONES PER DETAIL C7/C-3.1.
7. CONSTRUCT ASPHALT PAVEMENT PER DETAIL C1/C-3.1.
8. CONSTRUCT CONCRETE PER DETAIL G7/C-3.1.
9. CONSTRUCT 3' MAX RETAINING WALL BY OTHERS.
10. CONSTRUCT DEPRESSED LANDSCAPING AS NOTED.
11. CONSTRUCT SIDEWALK CULVERT.
12. CONSTRUCT 2' WIDE GUTTER PER DETAIL A2/C-3.1.
13. CORE DRILL AND INSTALL 4" PVC PIPE. INVERT = 5137.70'
14. BUILD RETENTION POND TOP = 5138.30' BOTTOM = 5135.30'

PHASE I BUILDING FF = 5138.90'

OFFICE BUILDING

LOT C-25, VOLCANO CLIFFS SUBDIVISION, UNIT 1 FILED JULY 3, 1989 BLOCK D4, PAGE 36

ASPHALT

DUMPSTER AREA

GATE OPENING CONCRETE APRON TOC=5135.88'

GATE OPENING CONCRETE APRON TOC=5135.79'

N 89°44'00" W, 299.88'

S 89°44'00" E, 299.89'

BLOCK WALL

TW=38.30

LEGEND

	PROPERTY BOUNDARY
• • • →	FLOW PATH
	PROPOSED RETAINING WALL
	FLOWLINE
—3905—	EXISTING MAJOR CONTOUR
—05—	EXISTING MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
FG26.29	FINISHED GRADE
FL	FLOW LINE
TA	TOP OF ASPHALT
TBC	TOP BACK OF CURB
TC	TOP OF CURB
TOC	TOP OF CONCRETE
TS	TOP OF SIDEWALK
TW	TOP OF WALL
BW	BOTTOM OF WALL
⟋	SURFACE FLOW

0   20'   40'

N

ENGINEER'S SEAL

ROBERT J. FIERRO
NEW MEXICO
20585
PROFESSIONAL ENGINEER

PROJECT NAME

BEEHIVE HOMES INC.
AT VOLCANO CLIFFS
ALBUQUERQUE, NEW MEXICO

PROJECT NO:	162-20
DESIGNED BY:	RJF
DRAWN BY:	STAFF
CHECKED BY:	RJF
DATE:	SEPT 2016

SHEET TITLE

PHASE I
GRADING
PLAN

SHEET NO:

C-3.0

EXISTING BASIN MAP (E1)

BASIN 101
AREA = 1.5145 AC
Q100YR-6HR = 3.27 CFS
V100YR-6HR = 0.092 AC-FT

BASIN OS1
AREA = 0.8576 AC
Q100YR-6HR = 1.85 CFS
V100YR-6HR = 0.052 AC-FT

DIRT RD.

RUNOFF FLOWS
THROUGH THIS GATE.
Q100≈2.56 CFS

RUNOFF FLOWS
THROUGH THIS GATE.
Q100≈2.56 CFS

A.P. #1
Q100=1.85 CFS

PROPOSED BASIN MAP (A1)

MONTANO ROAD N.W.

BASIN 201
AREA = 0.7185 AC
Q100YR-6HR = 2.72 CFS
V100YR-6HR = 0.100 AC-FT

BASIN 202
AREA = 0.7959 AC
Q100YR-6HR = 2.49 CFS
V100YR-6HR = 0.076 AC-FT

BASIN OS1
AREA = 0.8576 AC
Q100YR-6HR = 1.85 CFS
V100YR-6HR = 0.052 AC-FT

POND
Q100,IN=2.72 CFS
Q100,OUT=0.12 CFS

PHASE I
BUILDING

RUNOFF CONTINUES TO FLOW
THROUGH THIS GATE.
PHASE I: Q100≈2.18 CFS
PHASE II: Q100≈2.56 CFS

RUNOFF CONTINUES TO FLOW
THROUGH THIS GATE.
PHASE I: Q100≈2.18 CFS
PHASE II: Q100≈2.56 CFS

A.P. #1
Q100=1.85 CFS

LEGEND

- SWALE
- EXISTING MAJOR CONTOUR — 5705
- EXISTING MINOR CONTOUR — 5704
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- SURFACE FLOW DIRECTION
- EXISTING BASIN MAP
- PROPOSED BASIN MAP
- DEPRESSED LANDSCAPING 3"-4"

ENGINEER'S SEAL

ROBERT J. FIERRO
NEW MEXICO
20585
PROFESSIONAL ENGINEER

FLOOD INSURANCE RATE MAP
MAP NO. 35001C0114H

SOIL MAP
MWA — MADUREZ-WINK ASSOCIATIN,
GENTLY SLOPING
HYDROLOGIC SOIL GROUP B

PROJECT NAME

BEEHIVE HOMES INC.
AT VOLCANO CLIFFS
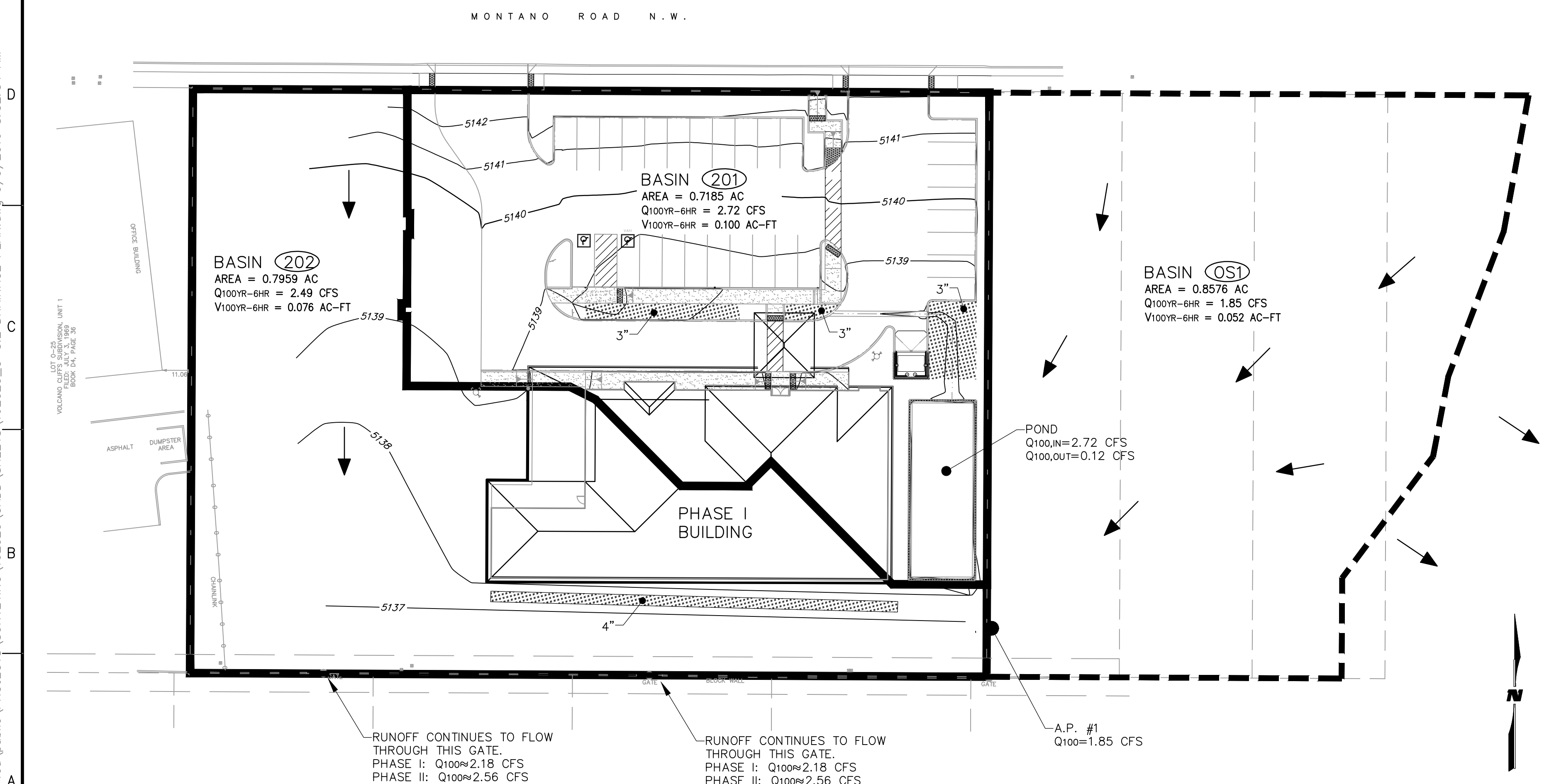ALBUQUERQUE, NEW MEXICO

BY	DESCRIPTION	DATE	REV.

PROJECT NO: 162-20
DESIGNED BY: RJF
DRAWN BY: STAFF
CHECKED BY: RJF
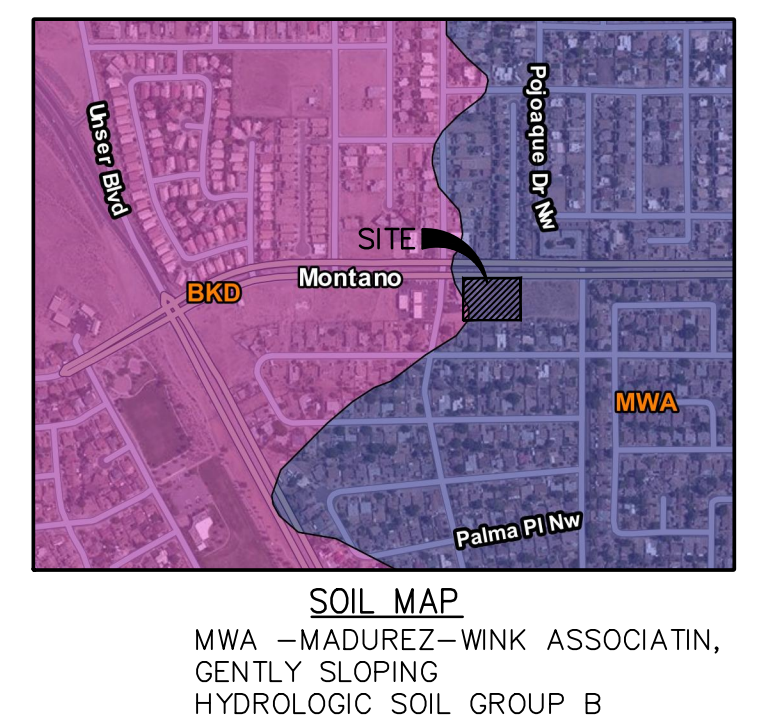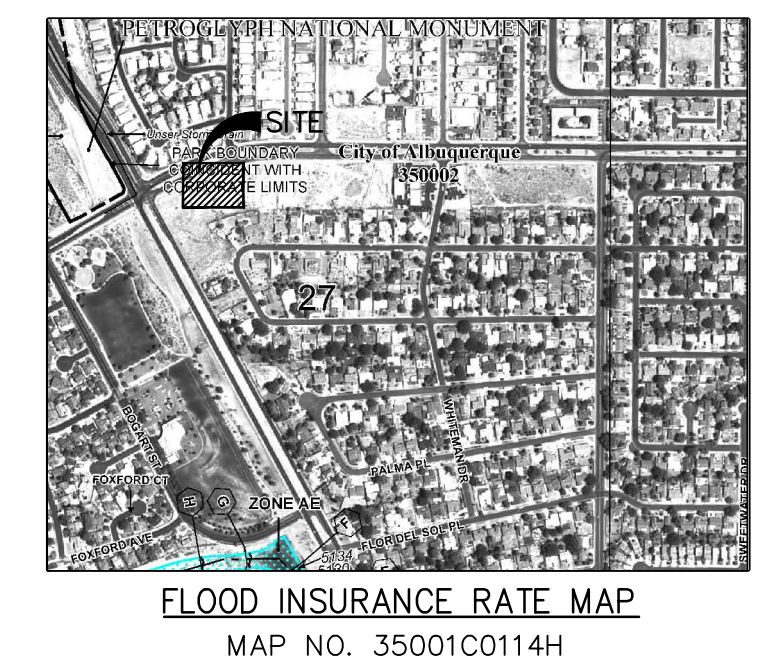DATE: SEPT 2016

SHEET TITLE

BASIN MAP

SHEET NO:

C-3.2