DRAINAGE REPORT

for

Seven Bar Phase 2&3
Entry Driveway
Cibola Loop N.E.
Albuquerque, New Mexico

Prepared by:

Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, New Mexico 87109

November 20, 2009

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.

Joel D. Hernandez
PE NO. 17893

Job No 29066

TABLE OF CONTENTS

Map Pockets

Appendices

PURPOSE

The purpose of this report is to provide a drainage management plan for the construction of a dedicated driveway to serve Phase 2 and Phase 3 (Tract B-9J-1A-1) of the Seven Bar Apartments. The proposed driveway will traverse Tract B-9H-1B-1 which was dedicated to the City of Albuquerque for pond/drainage purposes by the Vista Del Parque Subdivision plat. The grading configuration proposes to maintain the historical drainage patterns and detention pond volume in a manner which does not increase the existing maximum discharge. This design and analysis is in accordance with the DPM, Chapter 22, Hydrology Section. The purpose of this report is to provide the drainage analysis and management plan for approval of the new driveway alignment.

pm2 24 hr 100 yr
1.43 ac-ft

INTRODUCTION

The subject of this report is for the construction of an entry driveway to be located on a 0.78- acre tract (pond/drainage lot) located on Cibola Loop Road, between Luna Park Street and the Seven Bar Apartments entry driveway. The site appears on zone atlas page A-13-Z. As shown of FIRM map 35001C0108E, the subject property lies outside mapped flood zones. A previous drainage report by which the pond was designed was completed in April 1997 by Bohannan Huston and titled *Drainage Report for Tract B-9H-1*. This report limits the discharge from the pond to 11.6 cfs to be in conformance with the requirements of SAD No. 223. The proposed driveway was designed to maintain historic drainage patterns by not redirecting flows across property lines and by maintaining the pond volume such that discharge characteristics remain unchanged

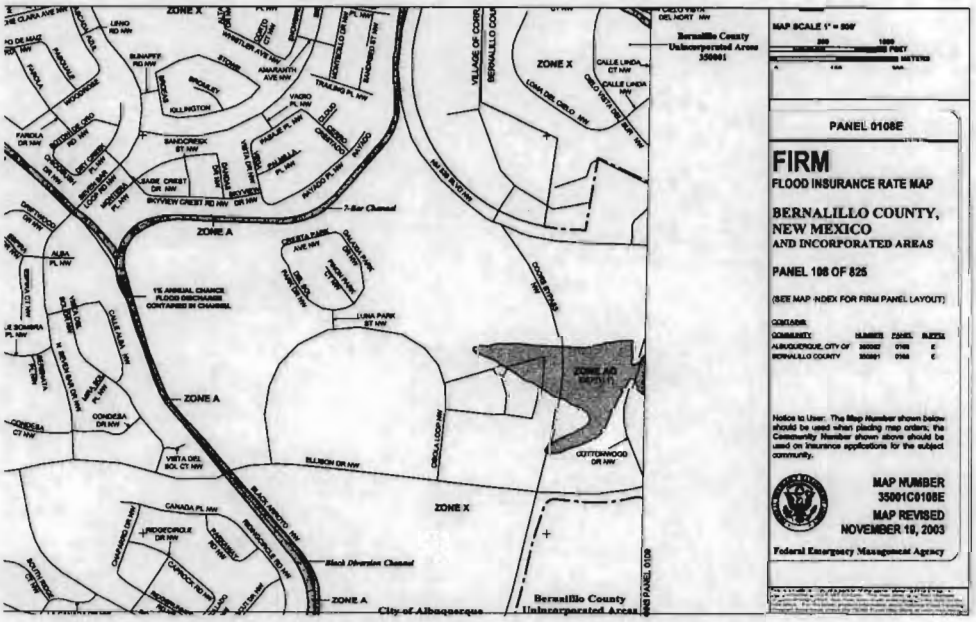
11.65 cfs at depth of 9.5'

12"
3 where is orifice

why not use 12" p/p rather than orifice

Exhibit A- Vicinity Map

Exhibit B- FIRM Map



EXISTING CONDITIONS

The property (Tract B-9J-1A-1) over which Phase 2 and Phase 3 of the Seven Bar Apartments will be constructed is currently undeveloped, however, this site was mass graded along with the construction of the existing apartments in Phase 1. The majority of this site currently drains to a detention pond located at the east side of the property, and a smaller area on the west side of the property drains south onto Phase 1. These flows are conveyed via an existing driveway into an onsite storm drain system.

The pond tract is configured to accept flows from the Vista Del Parque Subdivision conveyed via a 30-inch RCP and to discharge flows through a 24-inch RCP at a maximum flow rate of 11.6 CFS. An excerpt from the report dated April 1997 by Bohannan Huston and titled *Drainage Report for Tract B-9H-1.*, is included for reference in Appendix B.

PROPOSED CONDITIONS

A new driveway to provide direct access to Tract B-9J-1A-1 is proposed over the drainage/pond tract. The roadway is designed with sidewalk culverts near the property boundary to maintain flows onsite, and thusly, not divert existing flows. Because a portion of the graded fill necessary to construct the road would have reduced the pond volume, the design proposes a series of culverts under the road section to serve as underground storage. The road profile is maintained at an elevation above the pond top to maintain volume and all-weather access.

The reconfigured pond was analyzed using AHYMO to ensure the original design discharge would be maintained. Our analysis assumed the same inflow characteristics as the above referenced report with a maximum flow of 67.4 cfs. The model results indicate the reconfigured pond would have a peak discharge of 11.66 cfs, a maximum storage volume of 1.47 acre-feet, and a maximum water surface elevation of 100.00 allowing for a one foot of freeboard. Calculations are found in Appendix A for the detention pond sizing and preliminary design.

SUMMARY AND RECOMMENDATIONS

The drainage management plan presented in this report demonstrates the proposed road alignment is hydraulically feasible as the proposed improvements will be configured to not adversely effect the operation of existing infrastructure. The development of this site is consistent with the DPM, Chapter 22, Hydrology section. It is recommended this road alignment be approved for rough grading.

agreement and covenant for pond

DRAFT

GRANT OF ACCESS EASEMENT AND ENCROACHMENT AGREEMENT

This Grant of Access Easement and Encroachment Agreement is made and executed this ___ day of December, 2009, by the City of Albuquerque (the "City") and Titan 528, LLC, a New Mexico limited liability company ("Titan").

WHEREAS, the City is the owner of that certain real property within Bernalillo County, New Mexico more particularly described as:

> Tract B-9H-1B-1, Seven Bar Ranch, as shown and designated on the plat entitled _____ recorded in the office of the Bernalillo County Clerk on _____ in Book ____, at Page ____(hereinafter the "City Property");

WHEREAS, Titan is the owner of that certain real property within Bernalillo County, New Mexico more particularly described as:

> Tract B-9J-1A-1, Seven Bar Ranch, as shown and designated on the plat entitled "Plat of Tracts B-9J-1A-1 and B-9J-1A-2" recorded in the office of the Bernalillo County Clerk on May 16, 2006 in Book 2006C, at Page 156 (hereinafter the "City Property");

WHEREAS, Titan desires, and the City is willing to grant, an easement over and across the City Property in accordance with the terms and conditions of Agreement;

NOW THEREFORE, in consideration of the covenants and conditions set forth herein and other good and valuable consideration, the receipt of which is hereby acknowledged, the City and Titan agree as follows:

1. The City hereby grants to Titan a perpetual, exclusive access easement over and across that portion of the City Property identified on Exhibit A (the "Easement") for the purpose of ingress and from the public right-of-way on Cibola Loop N.W. to the Titan Property. The City understands and agrees that the Titan property will be developed with multiple multi-family dwelling units and that the Easement will provide ingress and egress for the residents, guests, common carriers, and others accessing the Titan Property. Titan, at its sole cost and expense is permitted to construct road, landscaping, wall, signage, lighting, utilities and other improvements on the Easement. Titan, at its sole cost and expense, may modify and/or move the storm water drainage pond currently located on the Easement (the "Pond"); provided, however, any such modification of this tract and the Pond is subject to the reasonable design approval of the City per the approved Grading and Drainage Plan and Report engineer stamp dated _____, file # _____, approved by the City on _____.

2. From and after the date that Titan makes any improvements or commences construction on the Easement, Titan shall be responsible for all costs and expenses related to

the use or maintenance of the Easement and all improvements thereon including the maintenance of the City drainage pond located on the Easement. Prior to such date, the Easement and any improvements thereon shall be maintained by the City and any costs and expenses relating to or arising from the use or maintenance of the Easement shall be paid by the City.

3. Titan and its successors and assigns shall hold harmless and defend the City from any and all injuries, claims, damages, obligations and liability to the extent that such relate to or arise out of Titan's use of the Easement.

4. The rights and obligations of the parties set forth herein shall be binding upon the parties, their successors and assigns. The Easement and the parties' respective rights and obligations hereunder will run with and be appurtenant to the City Property and the Titan Property.

IN WITNESS WHEREOF, the parties forth their hands on the date first above written.

THE CITY OF ALBUQUERQUE

By:_____

Its:_____

Approved:

By:_____

Its:_____

STATE OF NEW MEXICO)
) **ss.**
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this __th day of December, 2009 by _____, _____of the City of Albuquerque on behalf of the City.

_____
Notary Public

My Commission Expires:

TITAN 528, LLC

By:_____
Ben F. Spencer, Manager

STATE OF NEW MEXICO)
) **ss.**
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this __th day of December, 2009 by Ben F. Spencer, Manager of Titan 528, LLC, a New Mexico limited liability company on behalf of said company.

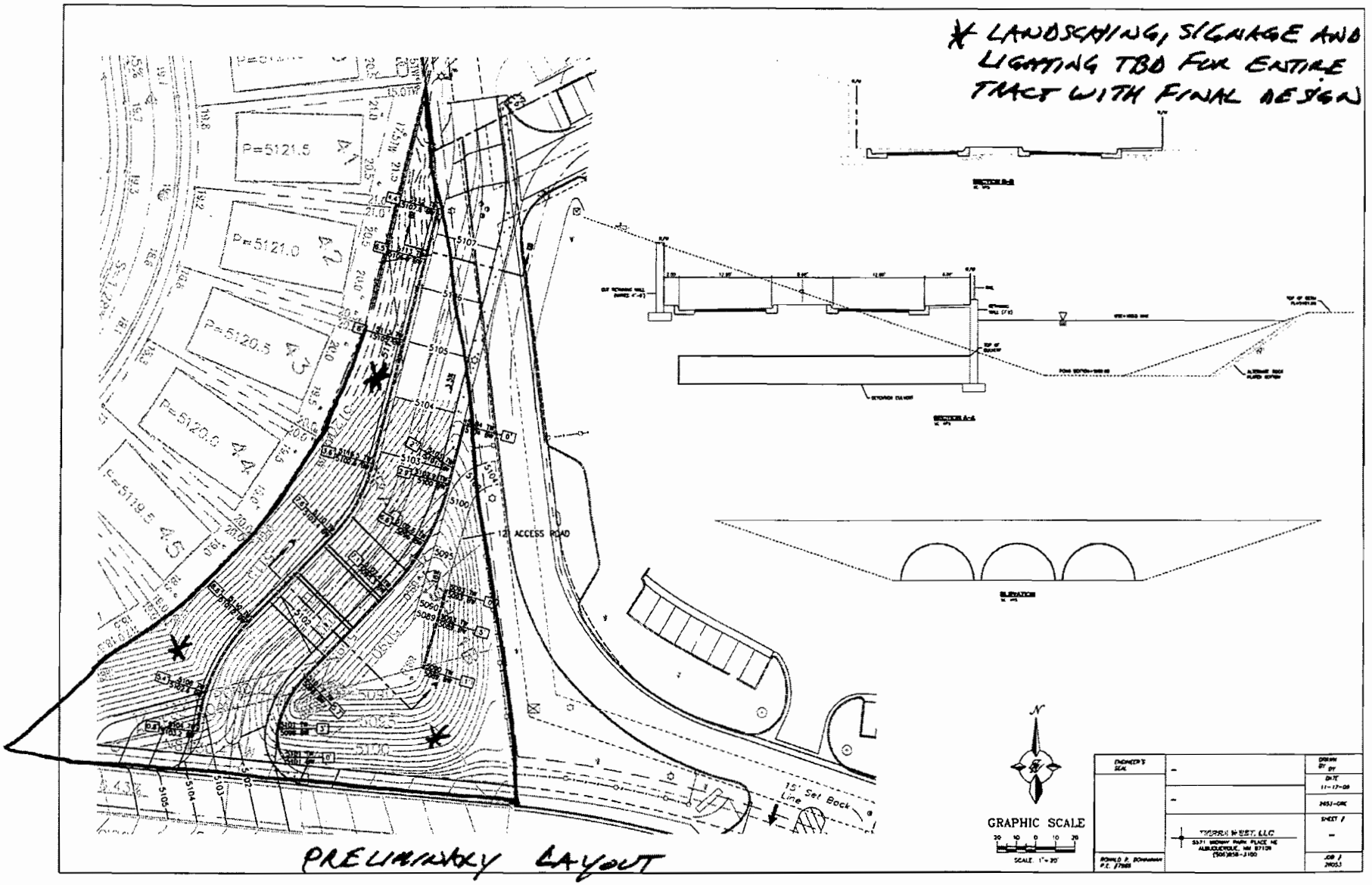
_____
Notary Public

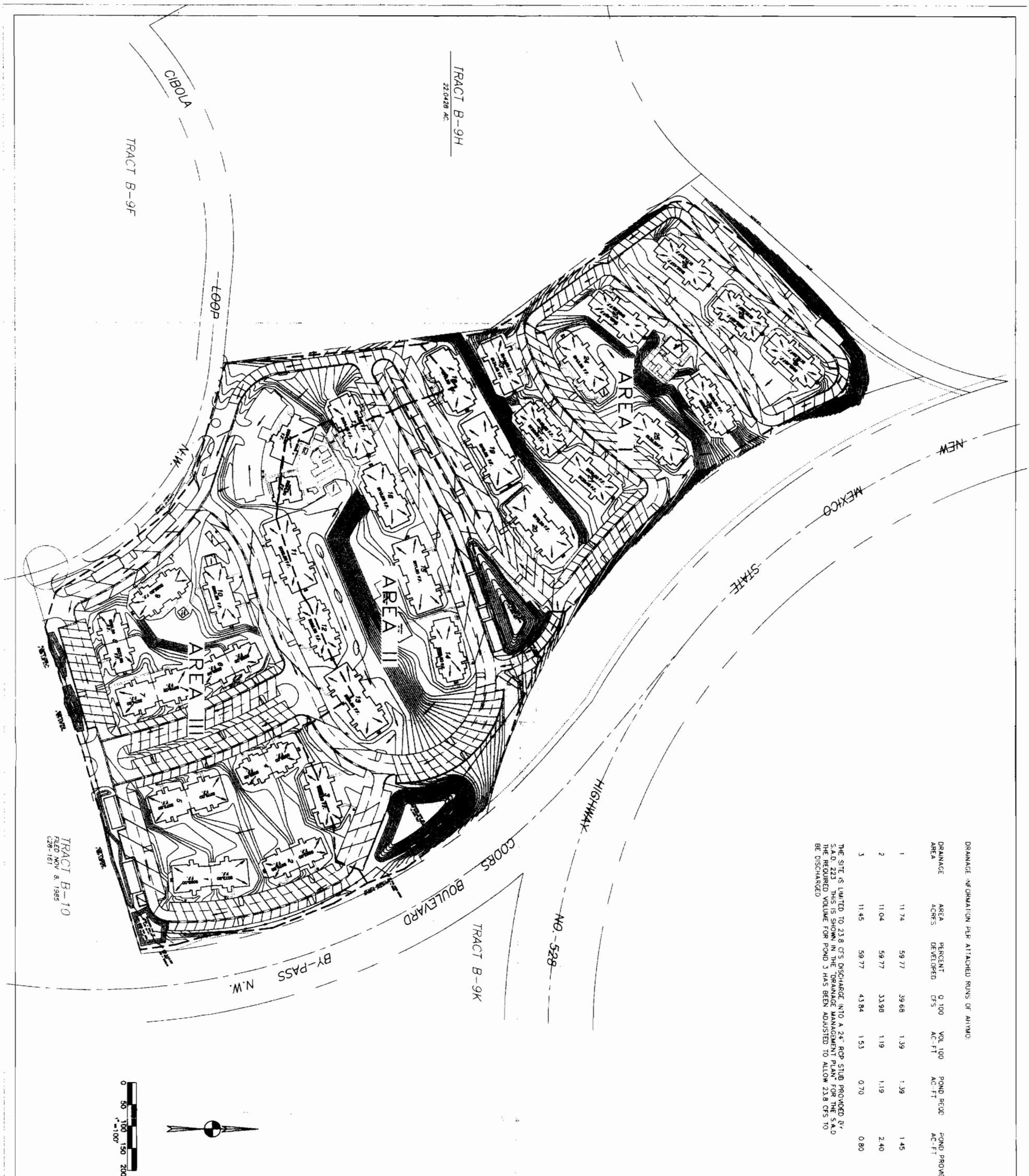
My Commission Expires:

_____

EXHIBIT "A" DRAFT

TRACT B-9H-18-1 (City)





DRAINAGE INFORMATION PER ATTACHED RUNS OF ARHYMO:

DRAINAGE AREA	AREA ACRES	PERCENT DEVELOPED	Q 100 CFS	VOL 100 AC-FT	POND REQD AC-FT	POND PROVIDED AC-FT
1	11.74	59.77	39.68	1.39	1.39	1.45
2	11.04	59.77	33.98	1.19	1.19	2.40
3	11.45	59.77	43.84	1.53	0.70	0.80

THE SITE IS LIMITED TO 23.8 CFS DISCHARGE INTO A 24" RCP STUB PROVIDED BY S.A.D. 223. THIS IS SHOWN IN THE "DRAINAGE MANAGEMENT PLAN" FOR THE S.A.D. THE REQUIRED VOLUME FOR POND 3 HAS BEEN ADJUSTED TO ALLOW 23.8 CFS TO BE DISCHARGED

Scale: 1" = 100' Date: 5-18-95	
TAPE: 022-A Drawn by: P.M.L.	
Xref: EBASE,PBASE	
File: 02201DMA	
Approved by: O.L.V.	
Project No.: 3022-01	

SHEET 11 OF 23

SEVEN BAR APARTMENTS
SECURITY CAPITAL
PACIFIC TRUST
ALBUQUERQUE, NM

DRAINAGE AREA MAP

Bury+Pittman, Inc.
Consulting Engineers and Surveyors
Dallas, Texas Tel 214/981-9011 Fax 214/991-0276

Pond Stage VS Volume

		POND VOLUME				CULVERT VOLUME			TOTAL VOLUME	
					19-FT SPAN, L=120' (TRIPLE 40-FT)				POND+CULVERT	
ELEVATION	AREA SF	INCREMENT VOL, CF	CUM VOL CF	CUM VOL AC-FT	AREA SF	INCREMENT VOL, CF	CUM VOL CF		CUM VOL CF	CUM VOL AC-FT
						120				
89	2120									
90	2434	2277	2277	0.052273	18.96	2275.79	2275.79		4552.788	0.104518
91	2771	2603	4880	0.112018	18.75	2250.30	4526.09		9405.588	0.215923
92	3136	2954	7833	0.179821	18.32	2198.46	6724.55		14557.548	0.334195
93	3519	3328	11161	0.25621	17.65	2118.31	8842.86		20003.360	0.459214
94	3925	3722	14883	0.341655	16.72	2006.44	10849.30		25731.796	0.590721
95	4351	4138	19021	0.436651	15.48	1857.08	12706.38		31726.880	0.728349
96	4838	4595	23615	0.542126	13.83	1660.04	14366.42		37981.424	0.871934
97	5345	5092	28707	0.659011	11.62	1394.83	15761.26		44467.756	1.020839
98	5870	5608	34314	0.787741	8.382	1005.84	16767.10		51081.096	1.172661
99	6400	6135	40449	0.928581	2.039	244.62	17011.72		57460.716	1.319117
100	7221	6811	47260	1.084929			17011.72		64271.216	1.475464
101	7751	7486	54746	1.256784			17011.72		71757.216	1.647319

VOLUME CALCULATIONS

POND 4

Volume = from irregular pond & pipe culvert

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
89	0	0	0.0000
90.00	1.00	0.1045	2.5736
91.00	2.00	0.2159	4.4212
92.00	3.00	0.3342	5.6983
93.00	4.00	0.4592	6.7375
94.00	5.00	0.5907	7.6366
95.00	6.00	0.7283	8.4405
96.00	7.00	0.8719	9.1742
97.00	8.00	1.0208	9.8534
98.00	9.00	1.1727	10.4887
99.00	10.00	1.3191	11.0877
100.00	11.00	1.4755	11.6559
101.00	12.00	1.6473	12.1977

Orifice Equation

Q = CA SQRT(2gH)

C =	0.6	
Diameter (in)	11.7	(RESTRICTOR PLATE
Area (ft^2)=	0.747	
g =	32.2	
H (Ft) =	Depth of water above center of orifice	
Q (CFS)=	Flow	

```
    20
    21              AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02d
    22                   RUN DATE (MON/DAY/YR) = 11/12/2009
    24                   START TIME (HR:MIN:SEC) = 16:20:50     USER NO.= AHYMO-S-9702d3TierraW-AH
    25                   INPUT FILE = C:\2653pnd1.txt
    26
* PEAK           ************************************************************
  MAXIM           *                       TRACT B-9H-1B
  MAXIM           *                       DETENTION POND                     *
                  ************************************************************
 PRINT            *          100-YEAR, 24-HR STORM  (PONDING CALCULATIONS)   *
                  ************************************************************
                  START               TIME=0.0
                  *
      T           *
                  SEDIMENT BULK       ID=1 BULK=1.05

      1           RAINFALL            TYPE=-2 RAIN QUARTER=0.0 IN
      2                               RAIN ONE=1.87 IN RAIN SIX=2.20 IN
      3                               RAIN DAY=2.66 IN DT=0.05 HR
      4
      5                        COMPUTED 24-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                               DT =    .050000 HOURS       END TIME =    24.000000 HOURS
     RU           *
     PE           * BASIN 9H
                  *
                  COMPUTE NM HYD      ID=2 HYD NO=BAS9H AREA=0.0293 SQ MI
                                      PER A=4.4 PER B=19.8 PER C=19.8 PER D=56.00
 *                                    TP=-0.1333 HR MASS RAINFALL=-1
 *
 FINISH                K =   .072649HR    TP =   .133300HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
                       UNIT PEAK =   64.780    CFS   UNIT VOLUME =    .9989       B =   526.28      P60 = 1.8700
     NO                AREA =      .016408 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
                       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


                       K =   .122955HR    TP =   .133300HR    K/TP RATIO =   .922392     SHAPE CONSTANT, N =  3.836889
                       UNIT PEAK =   33.284    CFS   UNIT VOLUME =    1.001       B =   344.14      P60 = 1.8700
                       AREA =      .012892 SQ MI    IA =    .44750 INCHES    INF =   1.10300 INCHES PER HOUR
                       RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

                    BULKING FACTOR APPLIED TO HYDROGRAPH.  FACTOR =  1.05000 AT PEAK FLOW.

                  PRINT HYD           ID=2 CODE=1

                                                HYDROGRAPH FROM AREA BAS9H
```