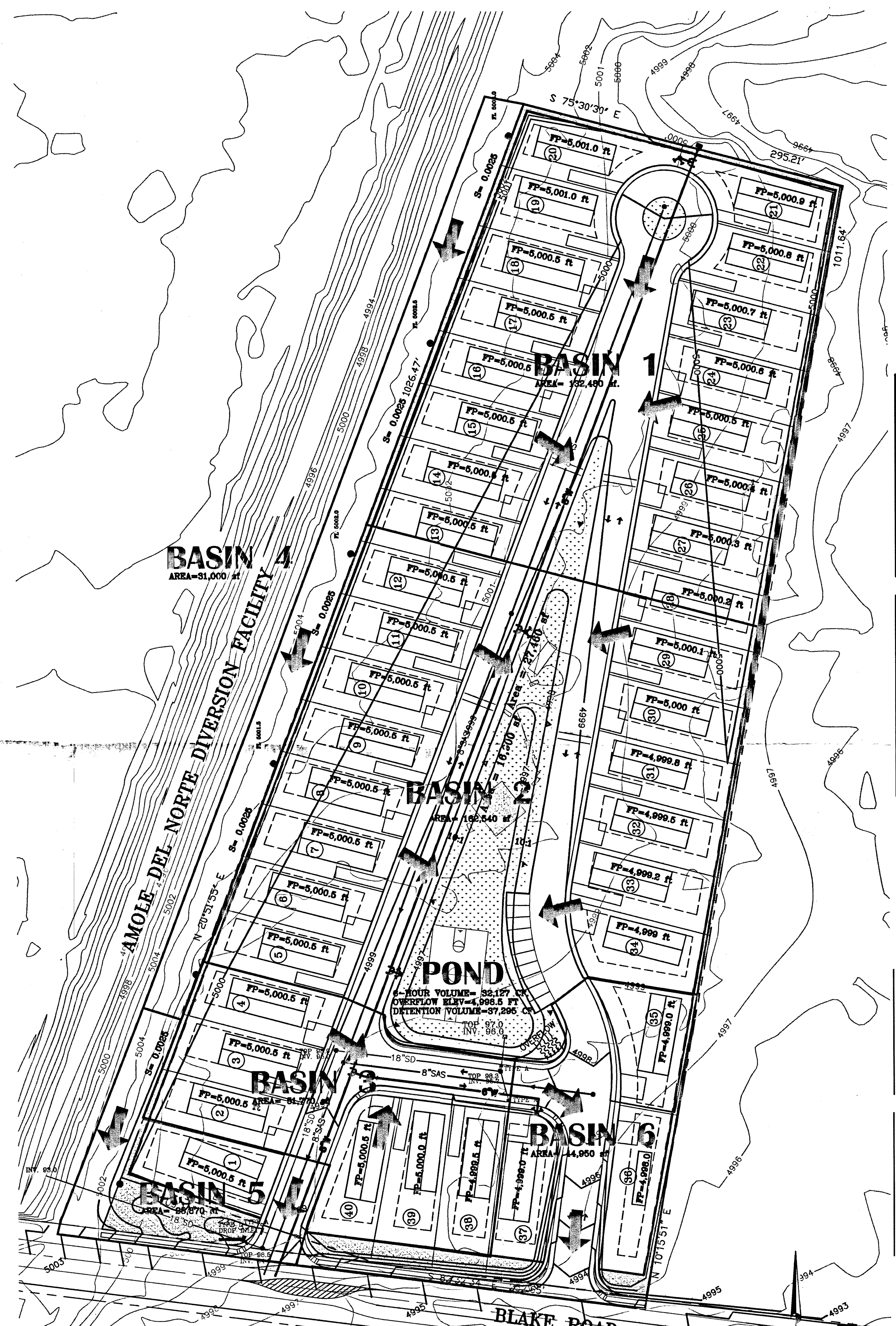


NOTE:

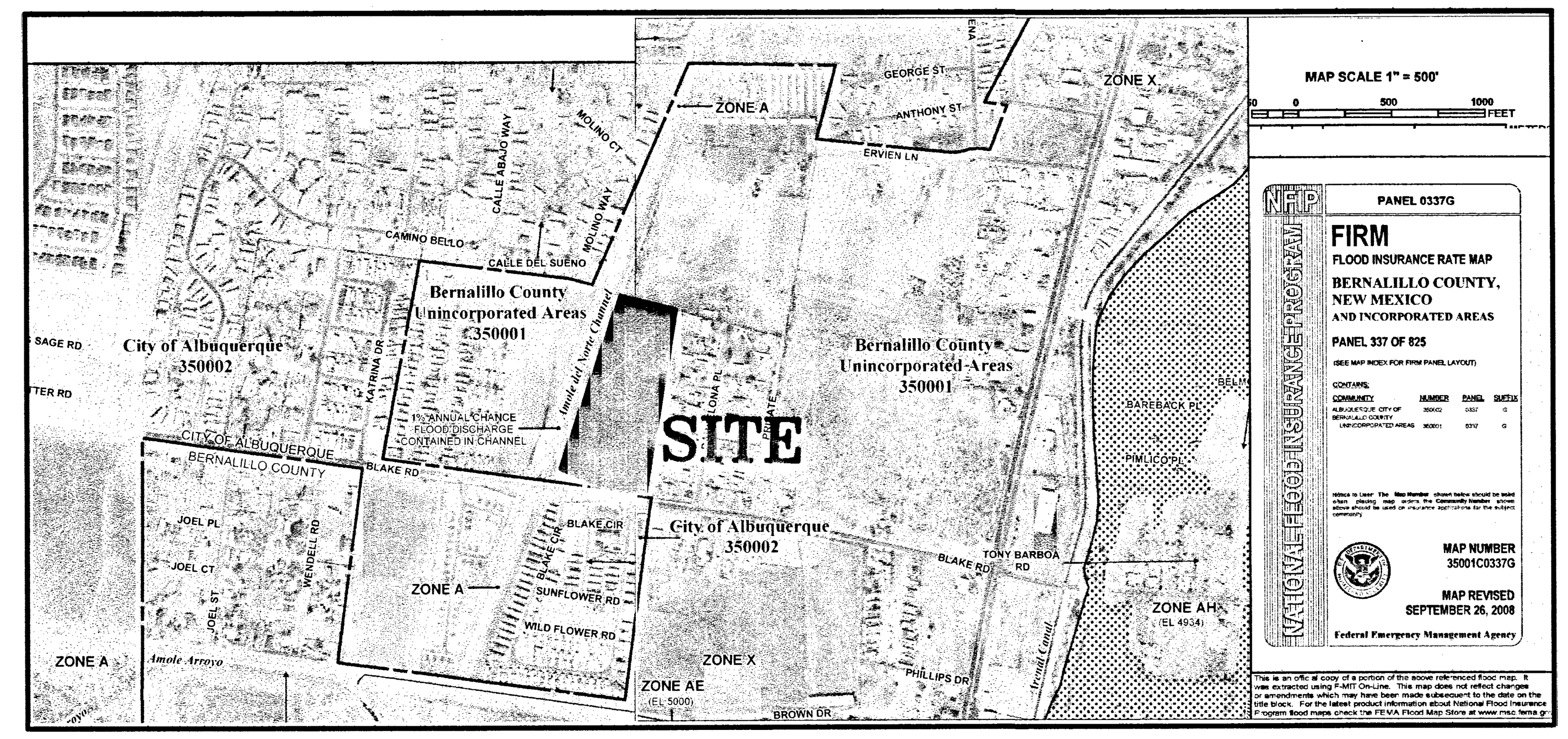
STORM DRAIN WITHIN CITY OF ALBUQUERQUE RIGHT-OF-WAY THAT PENETRATES THE AMOLE DEL NORTE CHANNEL TO BE BUILT BY SEPARATE CITY OF ALBUQUERQUE WORK ORDER.

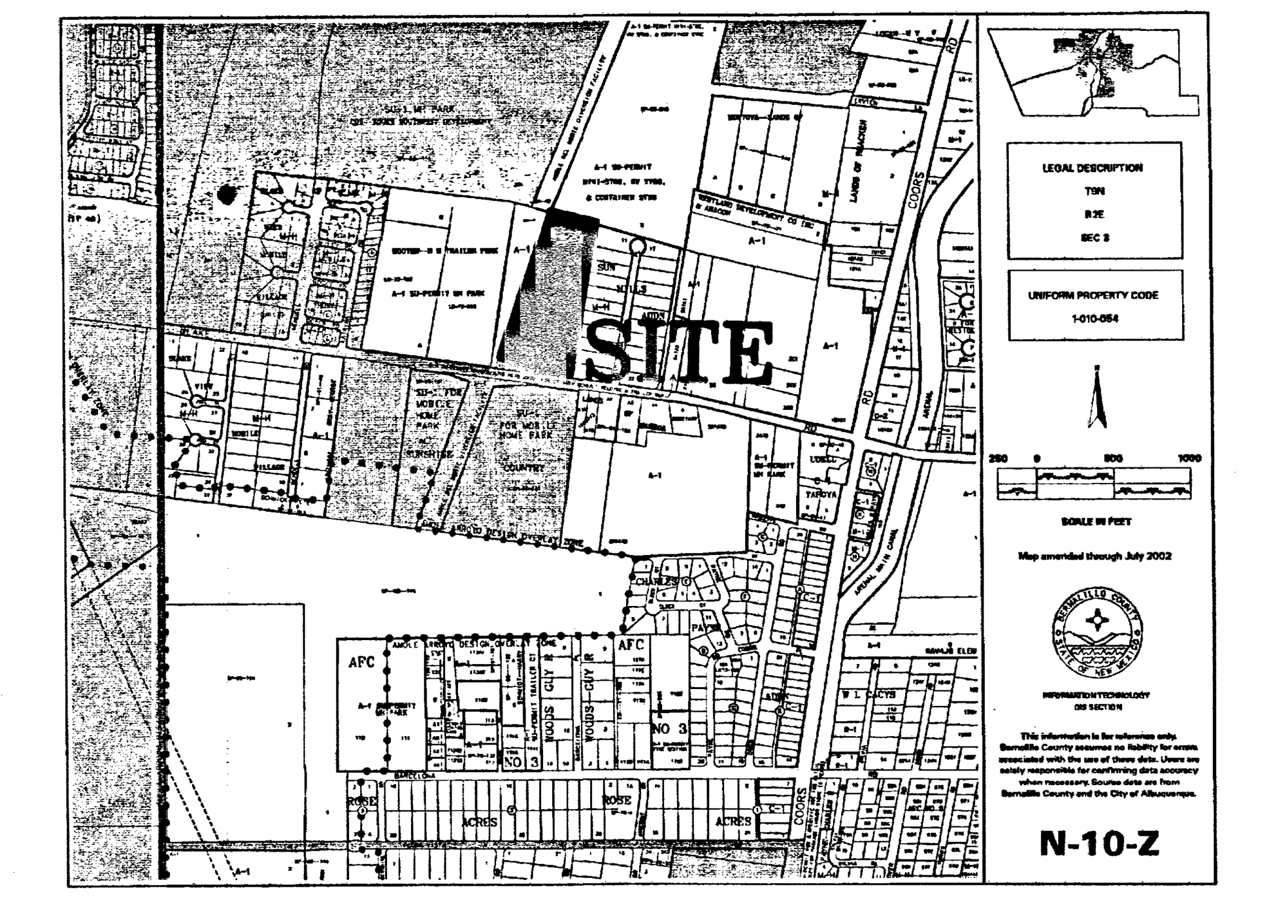
On December 8th 2010, Mark H. Burak, P.E. conducted an on-site inspection of this property. As of this date, no grading or excavation has occurred. Some fill stockpile has been placed on the property and is being used for offsite construction.

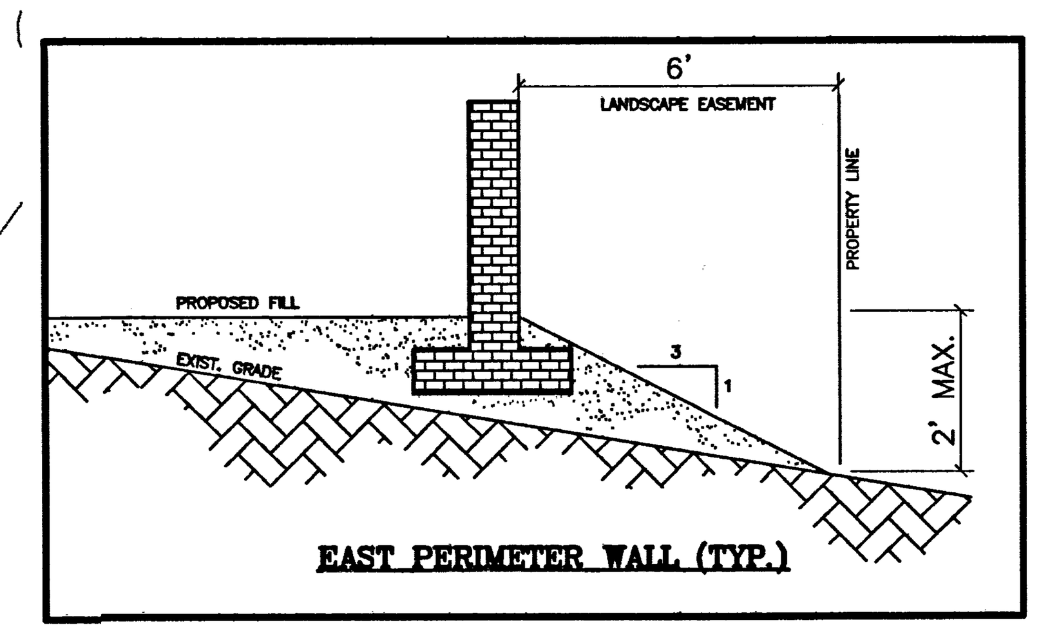
Signed Mark Burak
Burak Consulting

SCALE: 1" = 60'

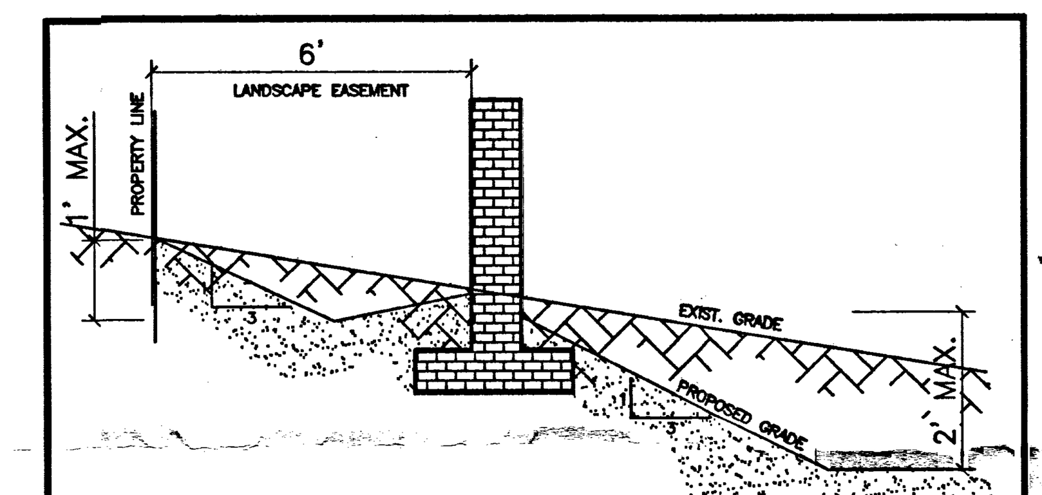
0 30 60 120







EAST PERIMETER WALL (TYP.)



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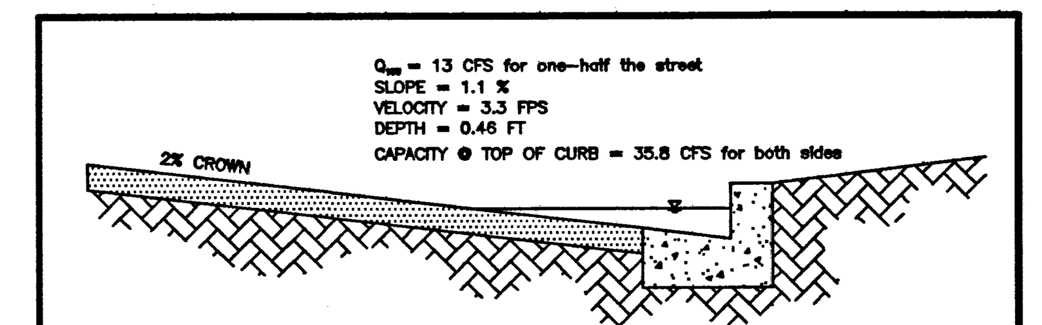


STREET CAPACITY – BLAKE NORTH SIDE

(FULLY DEVELOPED 100-YEAR STORM)

STREET FLOWS

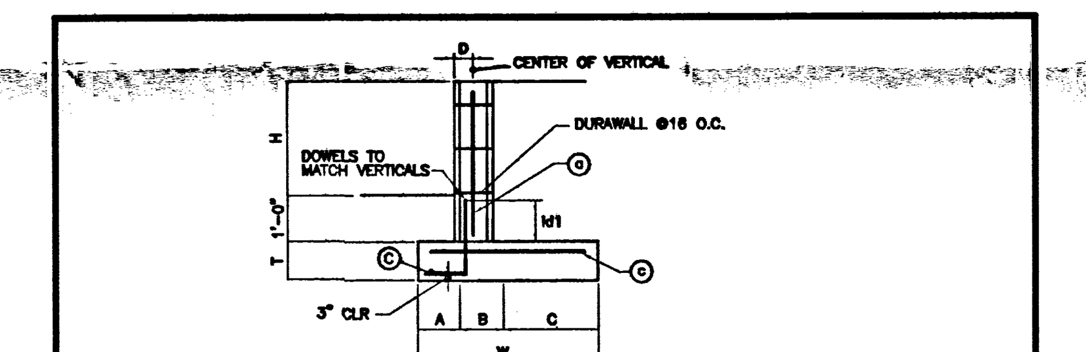
Manning's Equation for flow capacity in a street section.

Blake Road Capacity at Sunshine II

Input variables:		*Output Parameters:*	
Depth of flow	0.46 ft	Capacity at d	27.0 cfs
Width (back of curb)	39.0 ft	@ top of curb	35.8 cfs
Crown height	0.39 ft	@ back of walk	50.1 cfs
Street slope	1.10 %	Velocity at d	3.3 fps
Sidewalk width	4.0 ft	Hydraulic Jump	0.63 ft
Curb height	6.00 in	Gutter width	1.5 ft
Median width	0.0 ft	Gutter depression	1.5 in
Rt back of walk	100.0 %	Asphalt lip	0 in
Lt back of walk	100.0 %	Manning's n	0.017

Note: To maintain two 12-ft dry lanes, depth cannot exceed 0.245 feet

Note: Input 100% slope at back of walk for vertical walls. BURAK



RETAINING WALL DIMENSIONS & REINFORCEMENT

MIN. DIMENSIONS							STEEL REINFORCEMENT			
H	T	A	B	C	D	W	a	b	c	kd1
2'	1'-0"	0'-6"	0'-8"	0'-10"	5 1/4"	2'-0"	#5@24" o.c.	#5@16"	#4@16"	1'-6"
3'	1'-0"	0'-6"	0'-8"	1'-3"	5 1/4"	2'-5"	#5@16" o.c.	#5@16"	#4@16"	1'-6"
4'	1'-0"	1'-0"	0'-8"	1'-2"	6 1/4"	2'-10"	#5@18" o.c.	#5@16"	#4@16"	1'-6"
5'	1'-0"	1'-0"	0'-8"	1'-9"	6 1/4"	3'-5"	#5@8" o.c.	#5@16"	#4@16"	1'-6"
6'	1'-0"	1'-0"	0'-8"	2'-6"	6 1/4"	4'-2"	#5@8" o.c.	#5@16"	#4@16"	1'-6"

TYPICAL RETAINING WALL OVER 18"

N.T.S. (OPTION TO REPLACE/REDUCE CUT/FILL SLOPES)

CURB OPENING DROP INLET

SUMP CONDITION

Type "A" Curb Opening

Flow depth, y.........	0.26 feet	(y/h) percentage	52 %
Inlet length, L......	3.5 feet		
Lateral Width, W.....	2.00 feet	Weir flow............	2.16 cfs
Orifice height, h....	0.50 feet	Orifice flow.......	0.94 cfs

1. Orifice condition if depth is 40% greater than orifice height
2. Equations from FHWA HEC-12 dated March, 1984.

BURAK

RECTANGULAR GRATE DROP INLET

SUMP CONDITION

Type "D" - Basins 4&5

Flow depth, y.........	0.42 feet		
Grate open area, A......	7.32 sq.ft.		
Grate Perimeter, P...	10.00 feet	Weir flow......	4.08 cfs
Clogging percentage...	50 %	Orifice flow....	12.75 cfs

1. Orifice condition depends on bar config., grate size, depth.
2. Equations from FHWA HEC-12 dated March, 1984.

BURAK

RECTANGULAR GRATE DROP INLET

ON GRADE

Type "D"

Gutter flow, Q.........	2.0 cfs	Efficiency:	
Flow velocity, V.......	2.0 fps	Frontal:total..	27 %
Flow depth, Y......	0.36 feet	Side flow, Rs...	32 %
Grate length, L......	3.0 feet	Grate, E........	51 %
Gutter width, W.........	2.0 feet	Top width, T.......	18.0 feet
Cross slope, Sx.......	2.00 %		
		Intercepted flow...	1.0 cfs

1. Ratio of frontal flow intercepted to total frontal flow, Rf=1.0
2. Frontal to total gutter flow ratio is for straight cross slope.
3. Equations from FHWA HEC-12 dated March, 1984.

BURAK

PARTIALLY FULL PIPE

Manning's Equation for flow capacity in a circular pipe.

18-Inch Pipe

Input variables:		*Output variables:*	
Normal depth, d	15 in	Capacity at d	6.53 cfs
Pipe slope	0.0050 ft/ft	Normal velocity	4.15 fps
Pipe diameter	18 in	Critical depth	12.89 in
Manning's n	0.015	Critical velocity	4.10 fps
		Critical slope	0.005 ft/ft

BURAK

Hydrologic Calculations - COA DPM 22.2

Sunshine West II

Blake and Coors March 10, 2011

Precipitation Zone 1	(inches)	P60	P360	P1440	P4days	P10days
		1.87	2.2	2.66	3.12	3.67

	A	B	C	D		A	B	C	D
Precipitation (inches)	0.44	0.67	0.99	1.97		0.44	0.67	0.99	1.97
Peak Discharge (cfs/acre)	1.29	2.03	2.87	4.37		1.29	2.03	2.87	4.37

Drainage Areas — *Land Treatments - Existing Conditions* / *Land Treatments - Developed Conditions*

Drainage Areas	A	B	C	D	Area (sf)	A	B	%	C	%	D	%	Area (sf)
Basin C1	19,872	0	112608	0	132,480		52,992	40%			79,488	60%	132,480
Basin C2	24,381	0	138159	0	162,540		97,524	60%			65,016	40%	162,540
Basin C3	7,766	0	44005	0	51,770		20,708	40%			31,062	60%	51,770
Basin C4		0	31000	0	31,000				31,000	100%			31,000
Basin C5	2,587	0	21990	1293.5	25,870		10,348	40%			15,522	60%	25,870
Basin C6	35,960	0	4495	4495	44,950		17,980	40%			26,970	60%	44,950
					448610								448610
					10.3	Acres							

Discharge — *Peak Flow Rate - Existing Conditions* / *Peak Flow Rate - Developed Conditions*

Discharge	A	B	C	D	100 yr Q (cfs)	A	B	C	D	100 yr Q (cfs)
Basin C1	0.59	0.00	7.42	0.00	8.01	0.00	2.47	0.00	7.97	10.4
Basin C2	0.72	0.00	9.10	0.00	9.82	0.00	4.54	0.00	6.52	11.1
Basin C3	0.23	0.00	2.90	0.00	3.13	0.00	0.97	0.00	3.12	4.1
Basin C4	0.00	0.00	2.04	0.00	2.04	0.00	0.00	2.04	0.00	2.0
Basin C5	0.08	0.00	1.45	0.13	1.66	0.00	0.48	0.00	1.56	2.0
Basin C6	1.06	0.00	0.30	0.45	1.81	0.00	0.84	0.00	2.71	3.5
									Into the Pond	21.5
			To the East Overland		26.5				Into the Pipe	8.2
									Down the Street	3.5

Volume Six Hour — *Runoff Volume - Existing Conditions*, Six Hour Storm / *Runoff Volume - Developed Conditions*, Six Hour Storm

Volume Six Hour	A	B	C	D	100 yr V (cu-ft)	A	B	C	D	100 yr V (cu-ft)
Basin C1	729	0	9,290	0	10,019	0	2,959	0	13,049	16,008
Basin C2	894	0	11,398	0	12,292	0	5,445	0	10,673	16,119
Basin C3	285	0	3,630	0	3,915	0	1,156	0	5,099	6,256
Basin C4	0	0	2,558	0	2,558	0	0	2,558	0	2,558
Basin C5	95	0	1,814	212	2,121	0	578	0	2,548	3,126
Basin C6	1,319	0	371	738	2,427	0	1,004	0	4,428	5,431
									Into the Pond	32,127
					33,332					17,370

Volume Ten Day — *Runoff Volume - Existing Conditions*, Ten Day Storm Event / *Runoff Volume - Developed Conditions*, Ten Day Storm Event

Volume Ten Day	100 yr V (cu-ft) existing	100 yr V (cu-ft) developed
Basin C1	10,019	25,745
Basin C2	12,292	24,083
Basin C3	3,915	10,061
Basin C4	2,558	2,558
Basin C5	2,280	5,027
Basin C6	2,978	8,735
Into the Pond		49,828
	34.041	26.381

Site Location - As shown by the Vicinity Map (Zone Atlas Map N-10), the 40-lot project site is located on the north side of Blake Road SW approximately 1,200 feet west of Coors Boulevard on the west side of the Albuquerque South Valley area. The project is bounded on the south by Blake Road, on the East by a 22-lot subdivision and undeveloped property, on the west by the Amole del Norte Drainage Facility, and on the north by a mobile home park. At present, the site is undeveloped and drains roughly from west to east then south to the existing Blake Road right-of-way. No offsite runoff impacts this site due to the proximity of the adjacent Amole Channel drainage facility.

Project Scope - The purpose of this project is to estimate the impact of development of the existing parcel into 40 residential mobile home lots with buildings, parking, utilities, storm drainage and landscaping. To control rainfall runoff throughout the project site, the volumetric capacity of the site including the proposed roadways, driveways, and building pads will need to be assessed. It is the intent of this analysis to illustrate that the entire 100-year runoff peak volume will be entirely controlled within the property limits of the subdivision except Basin 6. Calculations show that the compensatory ponding for the site will hold the six-hour runoff volume at a depth of only about two feet within the centralized park area. The pond will drain though a 18-inch diameter storm drainage system that will discharge into the Amole Channel. The storm drainage system will intercept all runoff generated on the majority of the property. The portion of Blake Road adjacent to the subject property is located within the City of Albuquerque right-of-way. Approximately 100-feet east of the property, Blake Road is within the right-of-way of Bernalillo County. Part of this project is to construct the full section of Blake Road within the City of Albuquerque right-of-way to the center of the existing bridge to the west.

Legal Description - Sunshine Acres Subdivision, within Town of Atrisco Grant, project section 3, Township 9 north range 2 east NMPM, MRGCD Map 47 Lots 1B, 1C1, 2B, 2C1, 2C3 containing approximately 10 acres, Albuquerque, New Mexico

Benchmark - Basis of elevation is from 2006 Bernalillo County aerial topography and mapping. Basis of Bearing is NM State Plane Coordinates, Central Zone 1927.

Hydrologic Methods - The process outlined in the City of Albuquerque Development Process Manual (DPM), Section 22.2 was used to quantify the peak flow rates and volumes throughout the project site. Due to the upstream residential development, no offsite runoff will impact the project site. The calculation spreadsheet analyzes the fully developed conditions for the 100-year, 6-hour rainfall event, precipitation zone 1. This spreadsheet outlines the peak runoff and volume for each subbasin for existing and fully developed conditions. For existing conditions, the property was assumed to consist of 15% Treatment A typically comprised of blow sand and 85% Treatment C since this property has been graded in the past. Fully developed conditions assumed typically 40-percent Treatment B for the landscaped areas and up to 60-percent treatment D for the impervious paved areas. The percentages are illustrated on the spreadsheet calculations.

The drainage basin map shows six separate subbasins 1 through 6 to assess peak flow rates at various points impacting the project site. The peak rate of runoff for the project under existing conditions was calculated as 27-cfs. Fully developed, the total runoff impacting downstream properties would be decreased to only 3.5-cfs.

Flood Zone - As shown by the FIRM, Panel 337G of 825 of the National Flood Insurance Program Flood Insurance Rate Maps (FIRM) for the City of Albuquerque, New Mexico, dated September 26, 2008, this site does not lie within a designated Flood Hazard Zone.

Existing Conditions – Currently, the site is undeveloped. Very little vegetation is apparent and the site is comprised of mostly blow sand with sparse vegetation. Drainage appears to run generally from west to east, then south to Blake Road, but no erosion is evidenced within the property or near the roadway areas. Runoff is not concentrated at any specific point along the roadways and the sheet flow has not generated excessive velocities and/or erosion as of this date. The proximity of the Amole channel to the west blocks any offsite runoff from impacting the site from upstream.

Proposed Grading & Storm Drainage-
The majority of the entire property will be graded to retain the six-hour runoff volume in the proposed depressed park area located near the center of the site. The maximum ponding depth in the park retention basin is two feet. The basin will be graded to overflow into the roadway to the east over the proposed parking area. From there, the overflow runoff would be confined to the internal roadway to discharge onto Blake Road. Basins 6 will not be able to be graded to drain into the proposed pond and will need to be discharged directly onto Blake Road. The peak rate generated by this area was calculated at about 3.5-cfs which is less than the existing rate of 27-cfs for the entire site. To ensure that the eastern portion of the property will drain west to the proposed ponding area, the majority of the eastern property will need to be raised about two feet above existing ground. A maximum two foot drop or fill will need to be placed within this six foot zone as shown on the details to the left. Either a 3:1 cut/fill slope will be constructed or a retaining wall footing provided depending on the contractor. The park will be lined with an estate curb to allow runoff to discharge to the ponding area in a sheet flow manner. This way, no concentrated runoff will impact the park from any single point. The park is to be landscaped with a large portion of xeriscaping and will be sloped at a 10:1 cross slope. This will allow for more diverse uses of the park such as picnic and playground areas. The proposed storm drainage system will drain the pond to the Amole Channel to the west.

The following table lists the generated volume, available capacity, and discharge rate for each subbasin.

	Discharge Rate	*100-Yr 6-Hr Vol*	*100-Yr 10-Day Vol.*	*Pond Storage Capacity*
Basin 1	8.0 exist -10.4 dev	10,019 – 16,008 cu.ft.	10,019–25,745 cu.ft.	
Basin 2	9.8 exist – 11.1 dev	12,292 - 16,119 cu.ft.	12,292–24,083 cu.ft.	
Basin 3	3.1 exist - 4.1 dev	3,915 – 6,256 cu.ft.	3,915 – 10,061 cu.ft.	
Basin 4	2.0 exist - 2.0 dev	2,558 – 2,558 cu.ft.	2,558 – 2,558 cu.ft.	
Basin 5	1.7 exist - 2.0 dev	2,121 – 3,126 cu.ft.	2,280 – 5,027 cu.ft.	
Basin 6	1.8 exist - 3.5 dev	2,427 – 5,431 cu.ft.	2,978 – 8,735 cu.ft.	
Basin 1-2 in Pond	21 cfs	32,127 cu.ft.	49,828 cu.ft.	37,295 cu.ft. @ 2.0 ft

Summary - The entire ten acre site may be developed according to the proposed development plan without adversely impacting downstream structures. The proposed retention basin will limit the outfall to the adjacent roadways. The retention basin will be utilized for water harvesting and will be constructed as a multi-use park/playground facility. Pond will be utilized for compliance with Bernalillo County Water Conservation Ordinance Section 30: 247-249.

A portion of the proposed subdivision will discharge directly onto Blake Road from the internal driveways. The outfall from the driveways will be intercepted in the improved roadway section and curb and gutter along the north side of Blake Road at a depth of 0.32-feet. The proposed discharge onto Blake Road is only a fraction of that under existing conditions.

When the anticipated storm drainage improvements are constructed within Coors Boulevard (140 inch diameter) and Blake Road (48 inch diameter), the outfall from the driveways will be able to be intercepted into the extended Blake storm drainage system and will eliminate essentially all of the runoff from Blake Road near Coors Boulevard.

MARK	DATE	BY	REVISION
	5/13	MHB	ADDED SD NOTE FOR COA WORK ORDER
	5/13	MHB	CHANGED 12" SD NOTATION TO 18" SD

DESIGNED BY: M.H.B.

DRAWN BY: T.D.S.

CHECKED BY:

MARK H. BURAK, NEW MEXICO, 10987, REGISTERED PROFESSIONAL ENGINEER

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BURAK Consulting, Civil Engineering, Development and Design Services

DRAINAGE PLAN

SUNSHINE WEST – SUBDIVISION II

4101 BLAKE ROAD SW

CSU – 60006 PWD – 200110002

RECEIVED MAY 2 4 2011 HYDROLOGY SECTION

DRAWING NUMBER