

**DRAINAGE REPORT**  
**FOR**  
**PARK HILL SUBDIVISION**

*Prepared for*

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## **PURPOSE**

*The purpose of this report is to demonstrate the adequacy of the proposed drainage to allow this site to be subdivided into about 245 single family detached residential lots (Zoned R-T) in 3 units and so associated public drainage infrastructure can be constructed and turned over to the City of Albuquerque for maintenance.*

## **EXISTING CONDITIONS**

*The project comprises an onsite area of 41.138 ac within the city of Albuquerque that slopes from west to east at about 6%. The site is bounded on the West by undeveloped land and on the east by Los Suenos subdivision which has been rough graded for development. Drainage enters this site only from the west and not from Black Arroyo Blvd on the north or from McMahon Blvd on the South. Existing undeveloped storm water runoff is to enter Los Suenos in the middle of its west edge at a temporary detention pond which slowly discharges via surface drainage to the temporary retention pond in the Northeast corner of that development. That development is also planning to extend storm sewer to its North West corner in Black Arroyo Blvd to receive the 190 cfs  $\pm$  developed 100 yr peak flow from this development and the property to the West. A separate drainage report which is in the process of being revised deals with the drainage in Wests Blvd east of Los Suenos Subdivision.*

## **PREVIOUS REPORTS INCLUDE:**

1. *Rio Rancho/ Unser Blvd Gateway Master Drainage plan and Interim recommendations March 5, 2001 by Community Sciences Corp.*
2. *Drainage Report for Los Suenos Subdivision Jan 15, 2001 by Tierra West, LLC.*

## **PROPOSED MANAGEMENT PLAN**

*This subdivision will free discharge fully developed flows through an on-site storm sewer system into Black Arroyo Blvd. The on-site storm sewer and surface drainage system is sized to convey developed flows from the upstream off-site area through this site.*

*Black Arroyo Blvd. will be capable of conveying all of the 100 year flow ( $Q_{100} = 180 \text{ cfs} \pm$ ) from the downstreams northeast corner of this development to Unser Blvd. where several alternatives including ponding at that point are being considered. The Black Arroyo Blvd. storm sewer is sized in a separate report, first in the Los Suenos Subdivision Drainage Report dated 1-15-01 and again later in the "Rio Rancho/Unser Blvd. Gateway Master Drainage Plan dated March 5, 2001. Capacity analysis for downstream portions of Black Arroyo Blvd. is not included herein (see separated documents).*

*A small area of drainage Basin K is too low to drain north to Black Arroyo Blvd., so it will drain east into Los Suenos Subdivision (Basin #K, Area = 2.7 acre,  $Q_{100} = 8.65 \text{ cfs}$ ).*

*Every effort has been made to minimize drainage to McMahon Blvd. but it is in a deep cut next to this project so some rear yards will drain to McMahon.*

*Downstream off-site facilities may not be constructed or they may be incomplete at the time of this development, so this development will provide temporary on-site retention of 100 year, 10 day volume to serve both this development and the upstream off-site undeveloped area. The pond will be constructed with Unit 1 and then reclaimed as lots with unit 3 when the downstream infrastructure is complete.*

**Table 1 - Summary of Hydrology**

Description	Basin ID	Area Acres	Area Sq. Mi.	Land Treatment				Q <sub>100</sub> cfs	V <sub>100</sub> ac•ft	
				A	B	C	D		6 hr	10 day
Off-Site Upstream	101	26.8	0.0367	0	25	25	50	79.94	2.722	4.364
On-Site & Black Arroyo Blvd.	102	37.3	0.0583	0	29	14	57	118.29	4.501	7.105
McMahon Blvd.	103	9.5	0.0148	0	33	22 <sup>(1)</sup>	45	28.06	1.039	1.563
Off-Site Upstream	101 Existing	26.8	0.0367	90	0	0	10	37.26	1.158	1.486

<sup>(1)</sup> McMahon includes steep slopes in adjacent back yards because it is in deep cut.

**100 YEAR PRECIPITATION** (From Figures D, E and F, and Eq. 28 of DPM 22.2)  
 $P_{60} = 1.87"$ ,  $P_{360} = 2.20"$ ,  $P_{1440} = 2.66"$ ,  $P_{10 \text{ days}} = 10.0 \cdot [24.9 / (2.66")^{1.4}] = 3.67"$

The 100 yr volume for existing conditions offsite and developed conditions onsite is 1.48 ac.ft., respectively, plus 93% of 7.1 ac.ft. which equals 8.1 ac.ft. Basin K is 7% of area #102 and does not drain to the pond.

TABLE 2 — STREET DRAINAGE CAPACITIES

Basin No.	Area Ac.	% of Total	100 Year Flow (cfs)		Contributing Basins	Street Width/ Curb Type/ Slope	Flow Depth ft <sup>(1)</sup>	Velocity fps	Energy Depth ft <sup>(2)</sup>	Location
			Increment ft	Cumm.						
101A	2.85	10.63%	8.50	—	—	24'/Std./0.50%	0.33'	1.8	0.38'	Black Arroyo Blvd
101B	16.31	60.86%	48.65	—	—	40'/Std./5.20%	0.46'	6.7	1.16' <sup>(4)</sup>	Park North St.
101C	7.64	28.51%	22.79			24'/Std./0.5%	0.51'	2.5	0.61'	Park North Stub.
Total 101 A - C	26.80		79.94							
102A	2.10	5.63%	6.66	55.25	101B	40' Std/5.84%	0.46	7.0	1.22 <sup>(4)</sup>	Black Arroyo Blvd Sta 109 + 50
102A				29.59	101&102 except 102K	40' Std/3.41%	0.42	5.0	0.81'	
102B	1.13	3.03%	3.58			26'/Std/1.0%	0.27 <sup>(3)</sup>	2.3	0.35'	Park North St.
102C	5.56	14.91%	17.63	20.20 <sup>(5)</sup>	101C & 102B	28'/Std/3.1%	0.38'	4.4	0.68'	Park South Ave
102L	0.40	1.07%	1.27	—	—					
102D	6.28	16.84%	19.92	—		28'/Std./8.0%	0.32'	6.0	0.87'	Parkhill Ave
102D		—	—	41.41	101C, 102B, 102C & 102L	28'/Std./0.5%	0.64'	3.2	0.79'	Milky Way St.
102E	3.10	8.81%	10.42	—	—	28'/Std./8.0%	0.26'	5.2	0.68'	Rose Park Ave
102F	2.90	8.24%	9.75	—	102E	28'/Roll/5.85%	0.22'	4.5	0.53'	Malpais Park Ave
102F		—	—	20.16		28'/Roll/5.85%	0.35'	5.5	0.82'	Malpais Park Ave
102G	3.10	8.81%	10.42	10.42	102E & 102F	28'/Std/2.0%	0.45'	4.2	0.72'	Malpais Park Ave
102G		—	—	45.07 <sup>(5)</sup>	101C, 102B-F & 102L	28'/Std./0.5%	0.67'	3.4	0.85'	Milky Way St.
102H	7.83	20.99%	24.83	20.53 <sup>(5)</sup>	101A	28'/Std./6.3%	0.35'	5.7	0.85'	Red Rock Park Ave
102J	2.20	6.25%	7.39	45.38 <sup>(5)</sup>	101B, 102C, 102B-H & 102L	28'/Std./0.5%	0.67'	3.3	0.84'	Milky Way St.

Basin No.	Area Ac.	% of Total	100 Year Flow (cfs)		Contributing Basins	Street Width/ Curb Type/ Slope	Flow Depth ft <sup>(1)</sup>	Velocity fps	Energy Depth ft <sup>(2)</sup>	Location
			Increment t	Cumm.						
102K	2.70	7.67%	9.07	—	—	26'/Roll/0.5%	0.32'	1.8	0.37'	Park Hill Ave
Total 102 A-L	35.20	100.00%	118.29							
103	3.03	100.00%	28.06							

\* 100 year surface flow after inlet interception is accounted for (see inlet calcs).

<sup>(1)</sup> Flow depths are taken from Plate 22.3 D-1 and 22.3 D-2 of the DPM and reduced by 3/4" for roll curb types to account for the difference in gutter depression. Allowable depths may not exceed curb heights which are 0.33' for roll curb and gutter and 0.67' for standard curb and gutter.

<sup>(2)</sup> Energy depth is calculated as flow depth plus energy head. Allowable depths are 0.20' above top of curb.

<sup>(3)</sup> Flow is contained in West half of Park North St. The Depth of 0.27' does not exceed crown at 0.29'.

<sup>(4)</sup> Black Arroyo Blvd has no driveways and the street will be about 3' below the adjacent private land and will be separated by a block wall on the Right of Way line, so the Right of Way will contain the energy grade line, and normal depth is contained below the top of curb. Existing undeveloped 100 yr flow to Westside is about half of fully developed flow so this project will build the South 1/2 section with a temporary 8" Asphalt curb on the North edge.

<sup>(5)</sup> The 100 yr flows have been reduced by the amount intercepted in upstream inlets for the purpose in calculating surface flow depths.

## **CAPACITIES OF INLETS**

### **PARK SOUTH STUB STREET**

INLETS # 5 & 6

*Park South Stub (24'FF) carries 22.79 cfs at 0.5% slope with a depth of 0.51'. The pair of type "A" inlets (# 5 & 6 ) will intercept 5.2 cfs each, per plate 22.3 D-5. This leaves 12.39 cfs by-pass flow which joins the 3.58cfs from Basin #102B and the 7.03 cfs from the upper 40% of Basin 102C for a total flow of 23.00cfs at 5.31% slope with a depth of 0.37', a velocity of 5.6fps, and an energy depth of 0.86' at station 13+00 on Park South Place.*

### **PARK SOUTH AVENUE EAST OF PARK NORTH STREET**

INLETS # 7, 8

*Park South Ave (26' FF) carries 23.00 cfs at 5.31% slope with a depth of 0.37' at Station 13+00. The pair of type A inlets*

*(# 7 & 8) will intercept 6.7 cfs each. This leaves 9.6 cfs by-pass flow which joins the 10.6 cfs from the lower 60% of Basin #102C for a total flow of 20.2 cfs at 8.0% slope with a depth of 0.33' a velocity of 6.2 fps and an energy depth of 0.92' near the East edge of Basin #102C.*

### **PARK SOUTH AVENUE WEST OF MILKY WAY STREET**

NO INLETS

*Park South Avenue (28' FF) carries 20.2 cfs at about 3.1% with a depth of 0.38'. The flow turns the corner and combines with the 1.27 cfs from Basin 102-L for a total of 21.47 cfs approaching Park Hill Ave in Milky Way St.*

### **MILKY WAY STREET AT PARK HILL AVE.**

NO INLETS

*Milky Way Street 28'FF carries 21.47 cfs at 0.5% slope with a depth of 0.50'. Park Hill Ave contributes another 19.92 cfs from Basin "D" for a total of 41.3 cfs approaching the intersection of Milky way and Malpais Park Ave.*

### **MILKY WAY STREET SOUTH OF MALPAIS PARK AVE**

INLETS # 13, 14, 15 & 16

*Milky Way Street carries 41.39 cfs at 0.5% slope with a depth of 0.64'. The first pair of type A inlets ( # 13 & 14) will intercept 7.1 cfs each. This leaves 27.19 cfs bypass flow with a depth of 0.54'. The second pair of type C inlets ( # 15 & 16) will intercept 5.5 cfs each. This leaves 16.19 cfs by-pass flow which joins the 28.86 cfs from Malpais Park Ave. (Basins 102 E, F & G) for a total of 45.05 cfs approaching the Red Rock Park Avenue intersection in Milky Way St.*



### **MILKY WAY STREET SOUTH OF RED ROCK PARK AVENUE**

INLETS ( # 17, 18, 19 & 20)

Milky Way Street carries 45.05 cfs at 0.50% slope with a depth of 0.67'. The first pair of type A inlets ( 17 & 18) will intercept 7.8 cfs each. This leaves 29.45 cfs by-pass flow with a depth of 0.55'. The second pair of type C inlets ( # 19 & 20 ) will intercept 5.8 cfs each. This leaves 17.85 cfs by-pass flow which joins the 20.53 cfs from Red Rock Park Ave for a total of 38.40 cfs. This joins with the 6.98 cfs from basin 102 J for a total of 45.36 cfs surface drainage in Milky Way Street approaching the intersection of Black Arroyo Blvd.

### **RED ROCK PARK AVENUE EAST OF MALPAIS PARK AVE.**

INLETS # 1 & 2

Red Rock Park Blvd. Carries 8.5 cfs from Basin #101A and 12.42 cfs from the upper half of Basin #102H for a total of 20.92 cfs at station 16+00 at 6.3% slope with a depth of 0.35', a velocity of 5.7 fps, and an energy depth of 0.85'. A pair of type A inlets (#172) will intercept 6.4cfs each leaving 8.12cfs by pass flow which joins the 12.41cfs from the lower half of Basin #102H for a total of 20.53cfs approaching the intersection of Milky Way.

### **MILKY WAY STREET SOUTH OF BLACK ARROYO BLVD**

INLETS # 21, 22, 23 & 24

Milky Way Street carries 45.36 cfs at 0.5% slope with a depth of 0.67'. The first pair of type A inlets ( # 21 & 22) will intercept 7.8 cfs each. This leaves 29.76 cfs by-pass flow to the second pair of inlets, with a depth of 0.57'. The second pair of type C inlets ( # 23 & 24 ) will intercept 6.2 cfs each. This leaves 17.36 cfs by-pass flow which combines with the by-pass flow from Inlets ( # 29 & 30) in Black Arroyo Blvd. West of Milky Way St.

### **BLACK ARROYO BLVD. WEST OF MILKY WAY ST.**

INLETS # 25,26,27,28,29 & 30

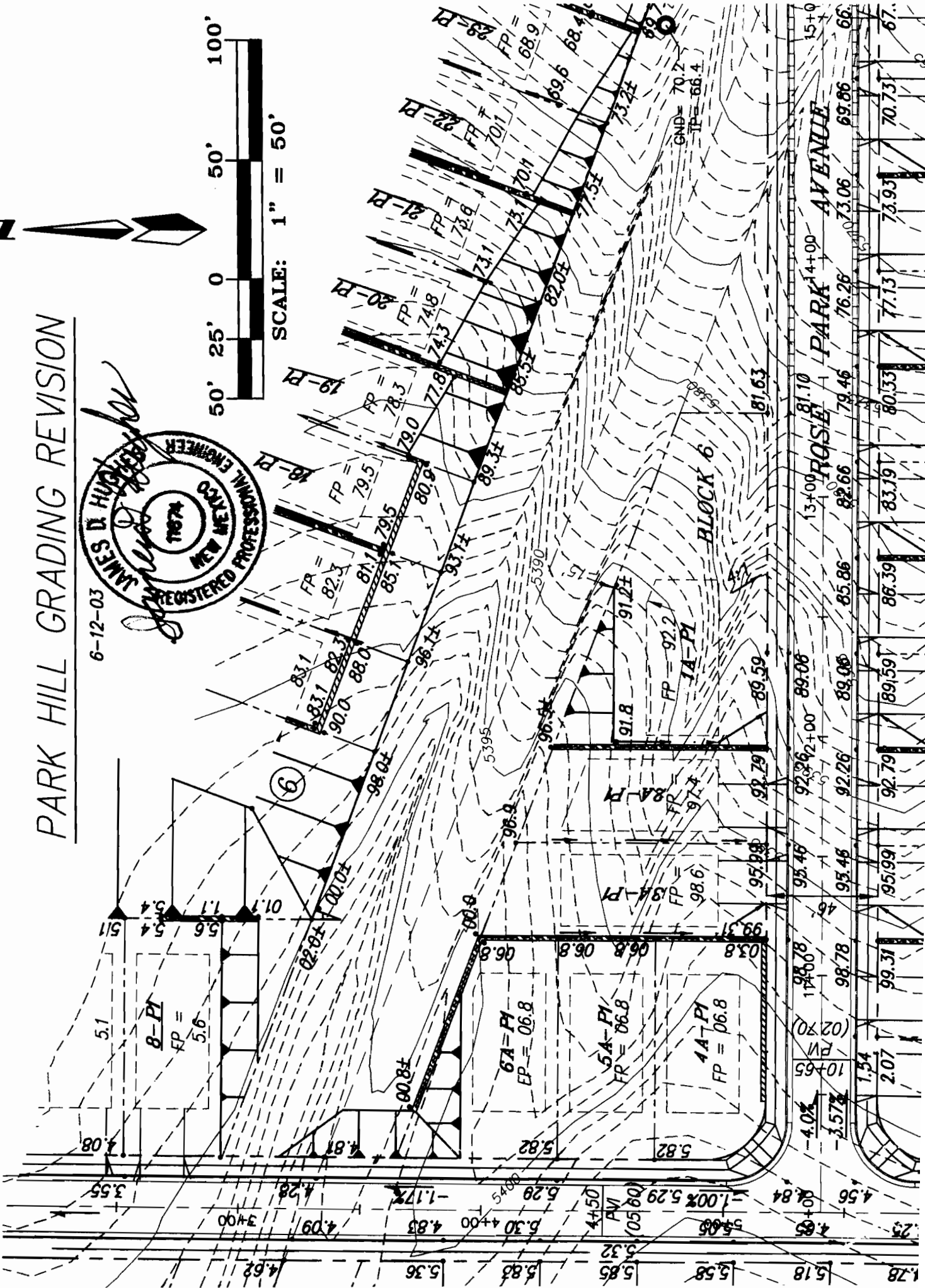
Black Arroyo Blvd carries 5.25 cfs at 5.84% with a depth of 0.46'. The first pair of Type "A" inlets ( # 25 & 26) will intercept. 9.0 cfs each leaving 37.25 cfs in the street flooring at a depth of 0.41'. The second pair type C inlets ( # 27 & 28) will intercept 7.8 cfs. This leaves 21.65 cfs bypass flow at a depth of 0.36'. The third pair of type C inlets (#29 & 30) will intercept 6.4cfs each. This leaves 8.85 cfs by pass flow which joins the 17.36cfs bypass flow from inlets #23 and 24 in Milky Way St. for a total of 26.21cfs East of Milky Way St.

# PARK HILL GRADING REVISION

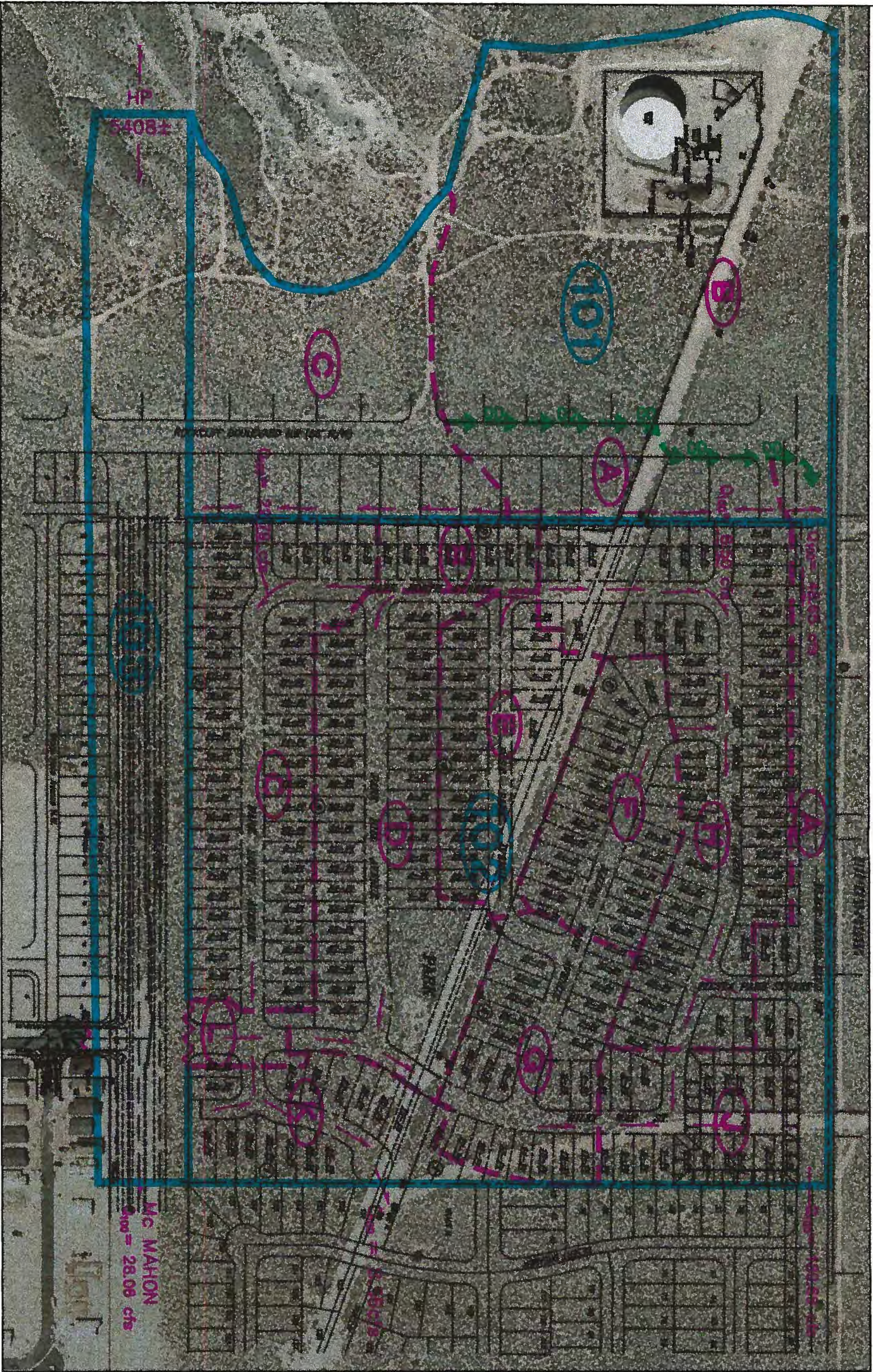
6-12-03



SCALE: 1" = 50'







**LEGEND**

 SUB-BASIN ID

 BASIN ID

 WATERBLOCK

 BASIN DIVIDE

 SUB-BASIN DIVIDE

 DIVERSION DIKE

**PARK HILL SUBDIVISION  
BASIN MAP**