

NORTH DOMINGO BACA PARK

MASTER PLAN DRAINAGE REPORT

INTRODUCTION

The North Domingo Baca Park is located in the Northeast Heights of Albuquerque. It is bounded on the north by Corona Avenue, on the east by Wyoming Boulevard, on the south by Carmel Avenue and on the west by the Kinney Dam and Louisiana Boulevard. The total park area is approximately 38 acres. The Park location is indicated on **Figure 1, Location Map**.

According to the City of Albuquerque (COA) Development Process Manual (DPM), Section 22.2, Hydrology, Figure A-1, the project is located entirely within Precipitation Zone 3. The design storm is the 100-year, 6 hour storm event. The Peak Discharge per acre is found in Table A-9 of Section 22.2. The runoff volume is estimated using the excess precipitation found in Table A-8.

This drainage report investigates the design storm peak runoff rates and volumes for three conditions:

- the existing conditions
- Phase 1 development conditions
- full development conditions.

EXISTING CONDITIONS

The western 25 percent of the parcel is taken up by the Kinney Dam, which is owned by AMAFCA. This portion of the parcel is not included in the drainage analysis. The existing conditions drainage basins are shown on **Sheet 1 of 3**, which is included in the back pocket of this report.

The remaining 75 percent of the parcel is native soils and vegetation with some manmade disturbance. However, the observed existing manmade disturbances are not significant enough to affect the Land Treatment type. Therefore, the entire parcel under consideration is classified as Land Treatment A for the existing conditions computations.

The existing site is divided into three sub-basins. Basin X1 is the southern portion of the parcel and it drains directly into the dam's pool partially by sheet flow and partially by shallow concentrated flow. Basin X2 captures all runoff on the northern portion of the parcel and the existing dikes direct the flow to the existing soil cement rundown and into the dam's pool. Basin X3 is a portion of the parcel that is cut off from Basin X2 by the existing north dike. Runoff from Basin X3 flows directly into the dam's pool near the northeast corner of the pool.

The design storm runoff for the three existing conditions sub-basins is:

$$\text{For X1, } Q_{100} = (17.4098 \text{ AC}) \times (1.87 \text{ cfs/AC}) = 32.56 \text{ cfs}$$

$$\text{For X2, } Q_{100} = (20.1181 \text{ AC}) \times (1.87 \text{ cfs/AC}) = 37.62 \text{ cfs}$$

$$\text{For X3, } Q_{100} = (0.8055 \text{ AC}) \times (1.87 \text{ cfs/AC}) = 1.51 \text{ cfs.}$$

A spreadsheet summarizing the above calculations is included as **Table 1**. The total existing conditions runoff from the park site is 71.68 cfs. However, adding in the off-site flows, which include the Window 'G' channel (2250 cfs) and the 66" RCP (237 cfs), the total flow to the dam, including the park site, is about 2559 cfs.

RUNOFF FROM EXISTING CONDITIONS DRAINAGE BASINS

BASIN DESIGNATION	AREA (ACRES)	IMPERV. (ACRES)	LAND TREATMENT (ACRES)			PEAK DISCH. (CFS)
			A	B	C	
X1	17.4098	0	17.4098	0	0	32.56
X2	20.1181	0	20.1181	0	0	37.62
X3	0.8055	0	0.8055	0	0	1.51
TOTALS	38.3334	0	38.3334	0	0	71.68

TABLE 1

The runoff volume can be found using the excess precipitation in Table A-8 of Section 22.2 The estimated runoff volume is $[(38.3334 \text{ AC}) \times (0.66 \text{ IN.})] / 12 \text{ IN/FT} = 2.11 \text{ AC FT}$

PHASE 1 DEVELOPMENT

In Phase 1 of the Park's development, a concrete box culvert will be constructed to convey a major portion of the 100-year storm off-site flow through the park. The extent of Phase 1 development is shown on **Sheet 2 of 3**, which is included in the back pocket of this report. The box culvert will be constructed from the downstream end of the existing Window 'G' channel to the existing soil cement rundown in to the Kinney Dam pool. Ultimately, it will convey all the Window 'G' flow (2250 cfs), all flow from the 66" RCP (237 cfs) that drains the adjacent portion of Wyoming Blvd. and some additional flow from the park site by way of storm inlet connections into the box culvert. However, these storm inlet connections will be constructed later as the park develops but stub-outs will be provided in Phase 1 construction. The final design of the box culvert will be presented in a subsequent design analysis report that will be prepared by Smith Engineering Company for Phase 1 development. The culvert will be sized to convey the full development flows stated in the Full Development section of this report.

The majority of the Park will remain undisturbed during Phase 1 construction and after Phase 1 construction is complete. Therefore the majority of the Land Treatment will remain as type A. However, disturbance and subsequent compaction of the soil above and adjacent to the box culvert will change a portion of the site into Land Treatment C. The amount of change is indicated in the spreadsheet in **Table 2**.

The drainage basins resulting from the Phase 1 construction are shown on **Sheet 2 of 3**. The "mound" of dirt that will cover the box culvert upon completion of Phase 1 (P1) construction will create a new drainage divide between the north and south portions of the Park site. The new drainage basins are designated P1-1 and P1-2. The peak runoff from the 100-year storm is 56.10 cfs and 21.33 cfs,

respectively. Sub-basin P1-3 is the same as sub-basin X1 in the existing conditions. A spreadsheet summarizing the computation of the runoff is included as **Table 2**.

RUNOFF FROM PHASE 1 CONDITIONS DRAINAGE BASINS

BASIN DESIGNATION	AREA (ACRES)	IMPERV. (ACRES)	LAND TREATMENT (ACRES)			PEAK DISCH. (CFS)
			A	B	C	
P1-1	28.1013	0	25.8532	0	2.2481	56.10
			92%		8%	
P1-2	9.4266	0	7.0600	0	2.3566	21.33
			75%		25%	
P1-3	0.8055	0	0.8055	0	0	1.51
TOTALS	38.3334	0	33.7187	0	4.6047	78.94

TABLE 2

Phase 1 construction will increase the Park site peak rate of runoff by approximately 7 cfs. The total peak flow rate to the dam will increase by approximately 0.3 %.

Runoff volume = [(33.7187 AC) x (0.66 IN) + (4.6047 AC) x (1.29 IN)] / 12 IN/FT = 2.35 AC FT. The Phase 1 runoff volume will increase by 0.24 AC FT. The computed developed condition runoff volume to the Kinney Dam is 394 AC FT. Phase 1 will increase the runoff volume by 0.06%. The Lower North Domingo Baca Detention Dam Properties (Kinney Dam) is included as **Appendix A**.

FULL DEVELOPMENT

The North Domingo Baca Park Master Plan is shown on **Sheet 3 of 3**, which is included in the back pocket of this report. This shows the currently proposed, fully developed site conditions. The fully developed site will include buildings, hard surfaced playing courts and parking lots and turf grass fields. The land treatment types will change from nearly all A to nearly all B, C and D as indicated in **Table 3**. The exception is Basin B12, which includes the X1 and P1-3 basin and will remain undisturbed after full development.

The designated basins are established to coincide with proposed parcel development. For example, Basin B-1 and B-2 are the proposed Multi-Generation Center and its parking lot respectively.

A storm drain system will convey some of the Park runoff to the proposed box culvert and some directly to the dam's pool. The turf grass playing fields will sheet flow directly to the dam's pool as well.

A summary of the full development drainage calculations is included as **Table 3**. The full development runoff is approximately 134 cfs. This is an increase from the existing conditions runoff (72 cfs) of approximately 62 cfs.

As stated in the Existing Conditions section, the total flow to the dam is estimated to be 2559 cfs. The full development conditions runoff will increase this number to approximately 2621 cfs, which is an increase in peak discharge of approximately 1.02%.

The proposed, full development storm drain system is also shown on **Sheet 3 of 3**. A summary of this system is shown in Table 4 and Table 5, for the South and North sides of the Park, respectively. Phase 1 construction of the box culvert will include pipe stub-outs to accommodate the full development storm drain system.

RUNOFF FROM DEVELOPED CONDITIONS DRAINAGE BASINS

BASIN DESIGNATION	AREA (ACRES)	IMPERV. (ACRES)	LAND TREATMENT (ACRES)			PEAK DISCH. (CFS)
			A	B	C	
B1	2.4978	0.9016	0	0.7981	0.7981	9.35
		36%		32%	32%	
B2	0.9558	0.9080	0	0	0.0478	4.72
		95%			5%	
B3	5.0396	1.0079	0	3.2254	0.8063	16.23
		20%		64%	16%	
B4	1.3395	0.3493	0	0.4951	0.4951	4.75
		26%		37%	37%	
B5	1.7477	1.6603	0	0	0.0874	8.64
		95%			5%	
B6	1.2973	1.2324	0	0	0.0649	6.41
		95%			5%	
B7	2.7809	1.0451	0	0.8679	0.8679	10.50
		38%		31%	31%	
B8	1.4488	1.3764	0	0	0.0724	7.16
		95%			5%	
B9	2.0032	0.8906	0	0.8901	0.2225	7.55
		44%		44%	12%	
B10	2.8684	2.7250	0	0	0.1434	14.17
		95%			5%	
B11	13.2215	0.6611	0	12.5604	0	35.98
		5%		95%		
B12	3.1329	0.3133	0.4590	2.3606	0	8.57
		10%	15%	75%		
TOTALS	38.3334	13.0710	0.4590	21.1975	3.6059	134.03

TABLE 3

The estimated runoff volume for the proposed full development of the Park is as follows.

$[(0.46 \text{ AC}) \times (0.66 \text{ IN}) + (21.20 \text{ AC}) \times (0.92 \text{ IN}) + (3.61 \text{ AC}) \times (1.29 \text{ IN}) + (13.07 \text{ AC}) \times (2.36 \text{ IN})] / 12 \text{ IN/FT}$
 $= 4.61 \text{ AC FT}$ or an increase of 2.5 AC FT from the existing conditions runoff volume of 2.11 AC FT.

The volume runoff increase is $(2.5 \text{ AC FT} / 394 \text{ AC FT}) \times 100 = 0.6\%$.

FULL DEVELOPMENT DRAINAGE SYSTEM - SOUTH SIDE

DRAIN INLET (DI) DESIG.	Q100 TO DI	DOWNSTR'M DI	CUMULATIVE Q100 (cfs)	PIPE SIZE (IN)	PIPE SLOPE (FT/FT)	PIPE LENGTH (FEET)	PIPE CAPACITY (CFS)
B1-3	4.67	B4-2	4.67	18	0.0200	270	14.85
B4-1	2.37	B4-2	2.37	18	0.0075	100	9.10
B4-2	2.38	B6-2	7.04	18	0.0200	310	14.85
B6-1	3.20	B6-2	3.20	18	0.0075	100	9.10
B6-2	3.21	B9-2	10.24	18	0.0300	400	18.19
B9-1	3.77	B9-2	3.77	18	0.0075	170	9.10
B9-2	3.78	B10-2	14.01	18	0.0300	570	18.19
B10-2	7.08	B10-1	21.09	24	0.0100	100	22.62
B10-1	7.09	KINNEY DAM	28.18	24	0.0200	100	31.99

TABLE 4

FULL DEVELOPMENT DRAINAGE SYSTEM - NORTH SIDE

DRAIN INLET (DI) DESIG.	Q100 TO DI	DOWNSTR'M DI	CUMULATIVE Q100 (cfs)	PIPE SIZE (IN)	PIPE SLOPE (FT/FT)	PIPE LENGTH (FEET)	PIPE CAPACITY (CFS)
B1-1	2.34	B1-2	2.34	18	0.0075	100	9.10
B1-2	2.34	B2-1	4.68	18	0.0075	100	9.10
B2-1	4.72	BOX CULV	9.40	18	0.0100	20	10.50
B3-1	3.24	B3-2	3.24	18	0.0200	80	14.85
B3-2	3.25	B3-3	6.49	18	0.0200	100	14.85
B3-3	3.24	BOX CULV	9.73	18	0.0200	40	14.85
B3-4	3.25	B3-5	3.25	18	0.0075	200	9.10
B3-5	3.25	BOX CULV	6.50	18	0.0075	40	9.10
B5-1	4.32	B5-2	4.32	18	0.0075	110	9.10
B5-2	4.32	BOX CULV	8.64	18	0.0075	150	9.10
B7-1	5.25	B7-2	5.25	18	0.0075	190	9.10
B7-2	5.25	BOX CULV	10.50	18	0.0200	200	14.85
B8-1	3.58	B8-2	3.58	18	0.0075	100	9.10
B8-2	3.58	BOX CULV	7.16	18	0.0075	100	9.10
B12-1	8.57	KINNEY DAM	8.57	18	0.0250	120	16.61

TABLE 5