



# ***City of Albuquerque***

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 5, 2004

Bruce Stidworthy, P.E.  
Bohannon Huston, Inc.  
7500 Jefferson NE – Courtyard 1  
Albuquerque, NM 87109

**Re: Cardinal Health (SP Pharmaceuticals) Building Addition, 4272 Balloon Park Rd NE, Certificate of Occupancy**

**Engineer's Stamp dated 8-28-02 (E17/D19<sup>E</sup>C)**

**Certification dated 3-03-04**

Dear Mr. Stidworthy,

Based upon the information provided in your submittal received 3-03-04, the above referenced certification is approved for release of permanent Certificate of Occupancy by Hydrology.

If you have any questions, you can contact me at 924-3981.

Sincerely,

Kristal D. Metro  
Engineering Associate, Planning Dept.  
Development and Building Services

C: Phyllis Villanueva  
file





# ***City of Albuquerque***

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 4, 2002

Kevin Murtagh  
Bohannon Huston, Inc.  
7500 Jefferson NE-Courtyard I  
Albuquerque New Mexico 87109

**RE: Grading and Drainage Plan for SP Pharmaceuticals Building Addition (E17-D19<sup>E</sup>C)  
Dated August 28, 2002**

Dear Mr. Murtagh:

The above referenced drainage plan is approved for Building Permit by Hydrology. Upon completion of the project please certify the project per the DPM for Certificate of Occupancy release.

If you have any questions please call me at 924-3982.

Sincerely,

Carlos A. Montoya  
City Floodplain Administrator





# ***City of Albuquerque***

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

February 20, 2003

Shahab Biazar, PE  
Advanced Engineering and Consulting, LLC  
10205 Snowflake Ct. NW  
Albuquerque, NM 87114

**RE: Cardinal Health Addition Grading and Drainage Plan (E-17/D19E)  
Engineer's Stamp Dated February 3, 2003**

Dear Mr. Biazar:

The above referenced grading and drainage plan received February 3, 2003 is approved for Building Permit and Grading Permit. The engineer will submit grading certification per the DPM to Hydrology upon completion of the project.

If you have any questions please call me at 924-3982

Sincerely,

Carlos A. Montoya, PE  
City Floodplain Administrator

C: File



DRAINAGE REPORT

FOR

DELUXE - ALBUQUERQUE

Printing Plant & Office Building  
Deluxe Check Printers, Inc.

OCCUPYING

LOT 3A, TRACT D-1, BALLOON FIELD INDUSTRIAL PARK

4240 BALLOON FIELD ROAD, N.E.

ALBUQUERQUE, NEW MEXICO

I. PURPOSE:

The purpose of this report is to present information, calculations, and recommendations relative to storm runoff for the site of a 14,738 sq. ft. combined printing plant and office building located at 4240 Balloon Park Road, N.E.

II. SCOPE:

This report is limited to an investigation of the existing and proposed conditions which affect storm flows on the study site. The proposed development is to be protected from flooding due to storm runoff, without increasing the threat of damage to downstream properties. Upstream areas which have been constructed since 1972 are presumed to meet the restrictions of applicable drainage ordinances and resolutions, beginning with AMAFCA Resolution 1972-2. Estimation of maximum runoff is based on the site being developed as proposed.



The report summarizes the drainage calculations for the specific site of Lot 3A and compares them to general calculations reported in the Master Drainage Plan for the entire 15-acre Tract D-1, approved on 6-11-81 as part of City Project No. 1112.

### III. LOCATION:

The study site is a 5.469-acre (238,246 sq. ft.) parcel located within a new industrial park area, two-thirds mile south of Osuna Road and one-half mile west of Interstate 25. Legally the parcel is defined as Lot 3A, Tract D-1, of the Balloon Field Industrial Park as shown on the Summary Plat, recorded on February 24, 1984, in Volume C23, Folio 67 of the records of the County Clerk of Bernalillo County. The site is zoned IP, Industrial Park.

The south edge of the property is bounded by Tract D-2, the site of a fully-developed industrial park. To the west is lot B (undeveloped) of the Albuquerque Industrial Park Site. To the northwest is Lot 8 (undeveloped) of the Balloon Field Industrial Park. To the southeast are Lots 2 and 1, the developed site of Summa Medical research and development laboratories. The northeast edge of the property is bounded by Balloon Park Road, presently an unpaved City street having a 60-ft right-of-way. This street dead-ends approximately 1050 ft west of Kirchner Blvd. and 300 ft past the northwest corner of Lot 3A.



#### IV. EXISTING DRAINAGE CONDITIONS:

##### A. Topography and Soils

Slopes on the site are generally from east to west. The high point at the east property corner is at elevation 5150 and the low point at the west corner is 5137. The distance between these points is 635 feet, giving an average slope of 2.05%.

The natural soils at the site are described in the SCS Soil Survey of Bernalillo County as "EMB - Embudo: gravelly, fine sandy loam". The Hydrologic Soil Group is "D". (See Figure 3.)

##### B. On-Site and Off-Site Drainage Conditions

The undeveloped site is sparsely vegetated with native grasses. As shown on the DPM Plate 22.2 C-1, this condition results in a rational formula  $C$ -factor of 0.34 for 0% impervious.

There are no flows in Balloon Park Road from the east (Kirchner Blvd.). According to the Master Drainage Plan, flow on the adjacent lot to the east (Lot 2) is directed northward in an inverted-crown driveway, extending to Balloon Park Road. It appears, however, that runoff from approximately one-half acre of the parking lot on Lot 2 flows into Lot 3A instead of into the street. This appears to be at variance with the Master Drainage Plan.



A calculated flow of 36 cfs from Tract D-2 enters an existing temporary retention pond at the southwest corner of Lot 3A. There is presently no outfall for this pond. As shown in the Master Drainage Plan, this pond will be eliminated by the grading associated with Project 1112 and the construction of the proposed 12-ft wide concrete channel. As both the lots to the west and the Balloon Park Road on the north are lower than Lot 3A, there is no flow into the site from those directions.

There are no natural or artificial water courses crossing the site. Moreover, it does not lie in a 100-year flood hazard area as shown in Figure 2.

#### V. PROPOSED DRAINAGE CONDITIONS:

##### A. Criteria

The computations, conclusions and recommendations contained in this report are based on criteria found in the City of Albuquerque Development Process Manual, Volume 2, Design Criteria.

##### B. Off-Site Drainage

During the initial planning conference with the Hydrology section of the City Engineer's office on March 1, 1984, it was determined that free discharge would be allowed from the site once the downstream capacities were analyzed. As noted above, a Master Grading and Drainage Plan was



approved for the entire Balloon Field Industrial Park on 6-11-81. Under this plan all lots except Lots 3A, 8, 9, and 10 were to be graded to drain to Balloon Park Road. The runoff collected in the roadway will be discharged into a new rectangular concrete channel aligned along the west property line of Tract D-1. All flows not routed to the street will be routed directly into this channel. The channel discharges through a 60-inch CMP directly into the Bear Arroyo.

#### C. On-Site Drainage and Special Features

In order to comply with the Master Drainage Plan, the on-site flows for Lot 3A were calculated as shown in the Appendix. These values were compared to the limiting values used in sizing the drainage structures proposed in the approved Master Plan.

The detailed grading and the extent of impervious surfaces proposed for the Lot 3A development result in a discharge of 13.1 cfs, compared to 26.6 cfs calculated in the Master Drainage Plan. (This variance can be attributed in part to an average coefficient of runoff of  $C = 0.45$ , used in the present report, compared to a value  $C = 0.90$  used in the Master Plan.) Of this total amount, 1.9 cfs flows to the street rather than directly to the channel as assumed in the Master Plan. Although the net flow in the street was only increased from 46 to 46.3, the depth of flow in the outfall channel at the end of the street was checked.



To prevent gutter flows in Balloon Park Road from entering the site, Albuquerque City standard drive pads will be constructed at the two new driveway entrances into the site. To prevent site flows from Area 3 from crossing the property line into Lot 8, it will be necessary to grade a berm along the west property line. The berm will direct flows to the proposed concrete channel at the southwest corner of the site.

Due to the non-compliance of Lot 2 drainage with the Master Plan, Lot 3A is presently forced to accept approximately 1.6 cfs sheet flow from Lot 2. This situation will have to be remedied so as to avoid potential damage to Lot 3A, especially when expanded development takes place on Lot 3A. As the west edge of the parking lot on Lot 2 has not been completed (the curb has not been built), this edge of Lot 2 could be regraded to direct the flow southward to the southeast corner of Lot 3A. A second alternative for the Lot 2 owner would be to acquire a drainage easement from the Lot 3A owner.

#### VI. EROSION CONTROL PLAN:

Damage due to soil erosion and deposition from the 10-year storm will be minimal and confined primarily to the site due to the slope of the land toward the rear of the property. Any sediment from these 4.5 acres will be deposited in the temporary pond at the rear. Less than 1.0 acre of land drains toward the street. This area will be landscaped with a 10-ft



sodded "green belt" to eliminate soil erosion to the street. In addition, as shown on the Site Development Plan approved on May 1, 1984, the front portion of the site will be sodded a distance of approximately 80 feet south of the property line.

The existing pavement of Balloon Park Road passes the front of Lot 3A to a point 40 ft west of the northeast corner of the property. Full paved access to the site will be provided by the Balloon Field Industrial Park developer, the CIRTEC Corporation.

#### VII. FINDINGS AND CONCLUSIONS:

- A. The 100-year developed discharge for Lot 3A is 13.1 cfs, which exceeds the undeveloped discharge by only 4.6 cfs.
- B. Free discharge to the Bear Arroyo is possible because of the planned drainage improvements approved in the Master Drainage Plan of 6-11-81.
- C. All proposed downstream hydraulic structures have sufficient capacity to pass the 100-year storm runoff from Lot 3A and still conform to the flows set forth in the Master Drainage Plan.
- D. Drainage from Lot 2 is at variance with the approved Master Plan and the Drainage Ordinance 63-1982 as a result of approximately 1.6 cfs crossing the property line into Lot 3A from a paved parking lot.



VIII. RECOMMENDATIONS:

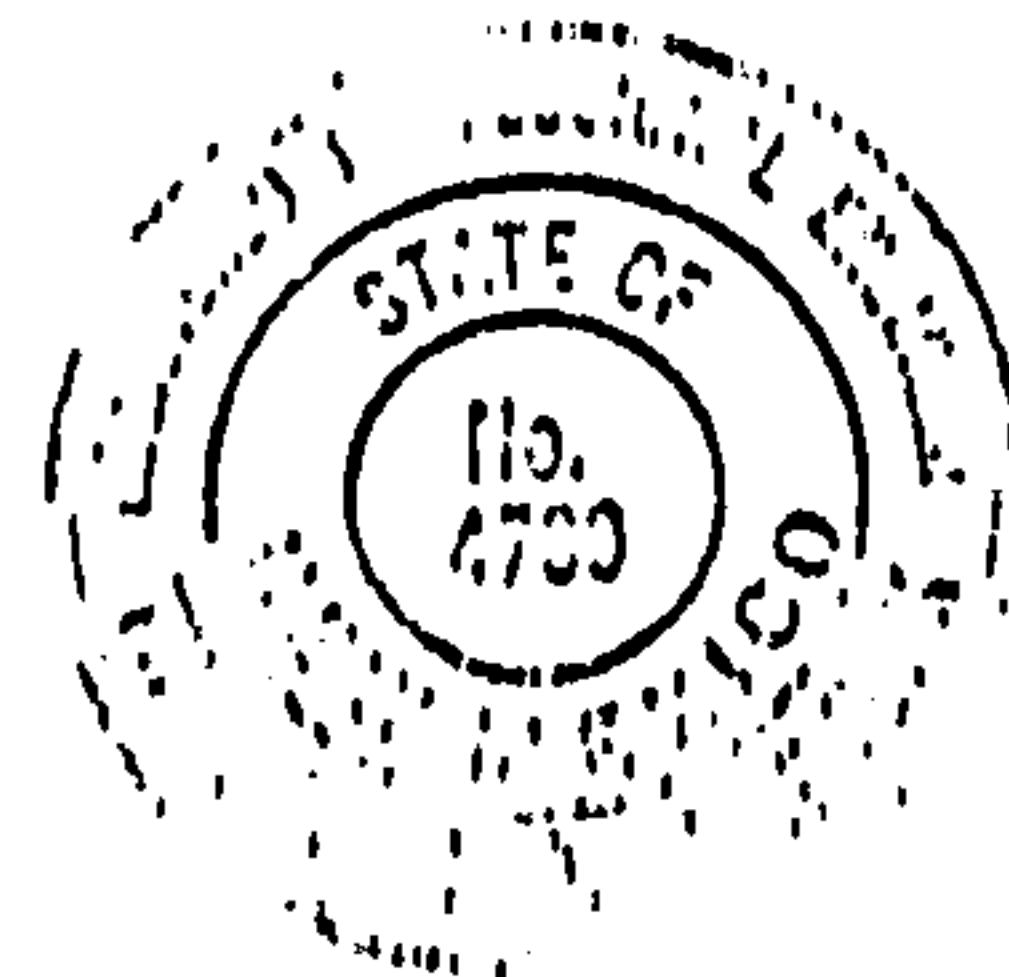
- A. Coordinate with the Balloon Park developer for the rough grading to be done at the rear of the property and during the construction of the 12-ft concrete channel on the west property line.
- B. Confine street flows within the gutter of Balloon Park Road using standard City drive pads at new driveway entrances.
- C. Confine flows to the site by grading an earthen berm at the west property line and by directing site flows toward the rear of the lot where they can enter the proposed concrete channel.
- D. Require the Lot 2 owner to comply with the Master Plan and with applicable City ordinances and to remedy the problem of free discharge across the property line.

Respectfully submitted,

BOYLE ENGINEERING CORPORATION

*Thornton D. Schwank*

Thornton D. Schwank, P.E.  
Senior Civil Engineer



Re-submitted  
5-2-84



DRAINAGE CALCULATIONS

DELUXE - ALBUQUERQUE

Printing Plant & Office Building  
Deluxe Check Printers, Inc.

occupying

Lot 3A, Balloon Field Industrial Park

4240 Balloon Park Road, N.E.

Albuquerque, New Mexico

E-17-Z

April 9, 1984

(Revision No. 1, May 2, 1984)

I. TIME OF CONCENTRATION:

Basin length,  $L = 635$  ft

Elev. difference  $= 5150.0 - 5137.0 = 13.0$  ft

Slope,  $S = 13.0/635 = 0.0205 = 2.05\%$

$T_c = 0.0078 (L^{0.77}/S^{0.385})$  (P. 22.2-3, DPM)

$= 0.0078 (635^{0.77}/0.0205^{0.385})$

$= 5.01$  min. Use minimum  $T_c = 10$  min.

II. RAINFALL INTENSITY: (Ref. Plate 22.2 D-1, DPM)

$i_{100} = 2.20$  inches (100-year, 6-hour rainfall volume)

$I_{100} = i_{100} (6.84) T_c^{-0.51}$  (Plate 22.2 D-2, DPM)

$= 2.20 (6.84) 10^{-0.51}$

$= 4.65$  inches/hr

$I_g = 0.541 I_{100}$  (Plate 22.2 D-1, DPM)

$= 0.541 (4.65) = 2.52$  inches/hr



### III. UNDEVELOPED FLOWS AND VOLUMES:

$$A = 5.469 \text{ acres} = 238,246 \text{ sq ft}$$

$$C = 0.34 \quad (\text{Soil Group B})$$

$$V_{100} = (2.20/12)(238,246)(0.34) = 14,900 \text{ cu ft}$$

$$Q_{100} = 0.34(4.65)(5.469) = 8.48 \text{ cfs}$$

### IV. DRAINAGE AREAS AND "C" FACTORS: (Plate 22.2 C-1, DPM)

SCS Soil Group: B

AREA NO.	AREA (acres)	UNDEVL.	PLANTED	IMPERVIOUS	PERCENT IMPERVIOUS	"C" FACTOR
1	2.734	2.734	0.	0.	0.	0.34
2	0.967	0.602	0.468	0.176	18.2	0.42
3	1.768	0.602	0.052	1.114	63.0	0.65
	-----			-----		
	5.469			1.290		

$$\text{Percent Impervious} = 1.290/5.469 \times 100 = 23.6$$

$$\text{Average "C" Factor} = 0.45$$

### V. DEVELOPED FLOWS AND VOLUMES:

If only on-site runoff is considered (Areas 1, 2, and 3):

$$V_{100} = (2.2/12)(238,246)(0.45) = 19,700 \text{ cu ft}$$

$$Q_{100} = 0.45(4.65)(5.469) = 11.44 \text{ cfs}$$

The additional sheet flow entering from off-site (lot 2 to the east) is computed as follows:

$$\text{Area} = 19,000 \text{ sq ft} = 0.436 \text{ acres}$$

Percent impervious for asphalt parking lot and landscaped (dirt) medians = 85% (estimated)

$$\text{Average "C" Factor} = 0.81$$

$$V_{100} = (2.2/12)(19,000)(0.81) = 2,800 \text{ cu ft}$$

$$Q_{100} = 0.81(4.65)(0.436) = 1.64 \text{ cfs}$$

The total developed flow discharged from the site is:

$$V_{100} = 19,700 + 2,800 = 22,500 \text{ cu ft}$$

$$Q_{100} = 1.44 + 1.64 = 3.08 \text{ cfs}$$



# VI. NET DISCHARGES:

Developed  $V_{100}$  - Undeveloped  $V_{100}$

$$22,500 - 14,900 = 7,600 \text{ cu ft}$$

AREA NO.	AREA (acres)	"C" FACTOR	$Q_{100}$ (cfs)	$V_{100}$ (cu ft)	
1	2.734	0.34	4.3	7,400	To channel
2	0.967	0.42	1.9	3,100	To street
3	1.768	0.65	3.3	9,200	To channel
Off-site	0.436	0.81	1.6	2,800	
			-----	-----	
			13.1	22,500	

# VII. CAPACITY OF 12-FT WIDE CHANNEL ALONG W. PROPERTY LINE:

(Ref. Master Drainage Plan, Balloon Field Industrial Park,  
City Project No. 1112, approved 6-11-81.)

Manning's  $n = 0.014$  (rough concrete)  
Slope,  $S = 0.005$  ft/ft  
Bottom width,  $B = 10.67$  ft  
Flow depth,  $D = 1.0$  ft

$$A = (1.0)(10.67) = 10.67 \text{ sq ft}$$

$$P = 1.0 + 10.67 + 1.0 = 12.67 \text{ ft}$$

$$R = 10.67/12.67 = 0.842$$

$$R^{(2/3)} = 0.892$$

$$S^{(1/2)} = 0.071$$

$$V = (1.486/0.014) (0.892)(0.071) = 6.69 \text{ fps}$$

$$Q = (6.69) (10.67) = 71.4 \text{ cfs}$$

From the Master Plan, the calculated flow at the southwest corner of Lot 3A (Reach point I) was  $Q_{100} = 36$  cfs. Using the  $I_{100} = 5.4$  in/hr intensity from the Master Plan, the calculated flow from Lot 3A is

$$Q_{100} = 0.9 (5.4)(5.469) = 26.6 \text{ cfs}$$

and the flow from Lots 8 and 9 is

$$Q_{100} = 0.9 (5.4)(2.0012) = 9.7 \text{ cfs}$$

The total flow between reach points I and III in the 12-ft channel is:



$$Q_{100} = 36 + 26.6 + 9.7 = 72.3 \text{ (cf. 71 cfs stated in the Master Plan)}$$

Now the actual flow for the proposed development on Lot 3A is significantly less than that assumed in the Master Plan: 13.1 cfs < 26.6 cfs. Therefore the total flow in the channel has been reduced to:

$$Q_{100} = 36 + 13.1 + 9.7 = 58.8 < 71.4 \text{ cfs channel capacity}$$

#### VIII. CAPACITY OF STREET (40-FT FACE TO FACE):

5-in crown  
Manning's n = 0.017 (asphalt concrete)  
Slope S = 0.005 ft/ft  
Bottom width, B = 40.0 ft  
Flow depth, D = 0.67 ft (at top of 8-in curb)

$$A = 0.5 (2) (0.67 + 0.25)(20) = 18.40 \text{ sq ft}$$

$$P = 0.5 (40.0 + 0.67) = 41.34 \text{ ft}$$

$$R = 18.40/41.34 = 0.445$$

$$R^{(2/3)} = 0.583$$

$$S^{(1/2)} = 0.071$$

$$V = (1.486/0.017) (0.583)(0.071) = 3.62 \text{ cfs}$$

$$Q = 3.62 (18.40) = 66.6 \text{ cfs}$$

From the Master Plan, the calculated flow in the street from Lots 1, 2, 11-15 is 46 cfs. The proposed grading on Lot 3A introduces an additional 1.9 cfs into the street, instead of forcing all the flow to the channel, as assumed in the Master Plan.

On the other hand, Lot 2 was not graded at the time of its development to allow all its flow to enter the street. The street flow is reduced by the amount of flow entering Lot 3A instead of the street from Lot 2.

$$46.0 + 1.9 - 1.6 = 46.3 < 66.6 \text{ cfs (O.K. But check outfall at end of Balloon Park Road.)}$$

#### VII. CAPACITY OF 10-FT WIDE CHANNEL BETWEEN LOTS 9 & 10:

Although the calculated flow in the street has increased only slightly from 46 to 46.3 cfs, the capacity of the 10-ft wide rectangular channel outfall between Lots 9 and 10 will be checked to verify the Master Plan value.



$Q = 46.3$  cfs  
Manning's  $n = 0.014$   
Bottom width,  $B = 10.67$  ft

Reach I:

Slope,  $S = 0.0372$  ft/ft  
Calculated flow depth\*,  $D = 0.465$  ft < 1.5 ft channel depth  
(cf. depth stated in Master Plan = 0.5 ft)

Reach III:

Slope,  $S = 0.005$  ft/ft  
Calculated flow depth\*,  $D = 0.878$  ft < 1.5 ft channel depth  
(cf. depth stated in Master Plan = 0.9 ft)

\*See computer output



BOYLE ENGINEERING CORPORATION  
 3939-D SAN PEDRO DRIVE, N.E.  
 ALBUQUERQUE, NEW MEXICO 87110  
 505 / 883-7700

REACH I

INPUT DATA

n	Q (cfs)	S (ft/ft)	B (ft)	Z	D (ft)
.0140	46.3000	.00500	8.67	.000	Unknown

OUTPUT DATA

Q (cfs)	V (fps)	A (sq ft)	R (ft)	S (ft/ft)	n	B (ft)	Z	Depth (ft)	Crit Depth (ft)
46.3	6.08	7.6	.73	.00500	.0140	8.670	.000	.878	.961

REACH II

INPUT DATA

n	Q (cfs)	S (ft/ft)	B (ft)	Z	D (ft)
.0140	46.3000	.03720	8.67	.000	Unknown

OUTPUT DATA

Q (cfs)	V (fps)	A (sq ft)	R (ft)	S (ft/ft)	n	B (ft)	Z	Depth (ft)	Crit Depth (ft)
46.3	11.43	4.0	.42	.03720	.0140	8.670	.000	.465	.961