HYDROLOGY G15/D3 THREE PLANS

G15-D3

3 PLANS

BOHANNAN-HUSTON INC.
4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

RECEIVED
MAR 23 1978
CITY ENGINEERS

March 21, 1978

Mr. Bruno Conegliano
Assistant City Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Dear Mr. Conegliano:

Enclosed for your review and comment are two copies of the drainage report for the Nobel, Inc., Food Distribution Center.

If you should have any questions regarding this report, please feel free to contact me or Ms. Powe-Pierson at this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

Enclosures

cc: Mr. V. M. Kimmick, City Engineer
Mr. C. Bart Nixon, Seminoff, Nixon, Dowman, and Bode

sh
Job No. 78-026

Cremons Inc

**City of Albuquerque**
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 11, 1978

Michael M. Emery
Bohannan-Huston Inc.
4125 Carlisle Blvd.,NE
Albuquerque, New Mexico

RE: Nobel, Inc., Food Distribution Center

Dear Mr. Emery:

I have reviewed the drainage report for the captioned development and find it unacceptable. The site is located on an alluvial terrace that has been and is presently extensively exploited to quarry sand and gravel. During an inspection of the site, I found no evidence of residual soils (decomposed granite), rather a clean sandy gravel ( 2-4 ft. ±) appears to overlay uniform clean river sand; also no indication was found of any runoff leaving the site. The arroyo mentioned in the report has been obliterated north west of Carmony Lane before reaching Edith Street and the only drainage facility in the area is the Alameda Lateral that, in the recent past, has overflown its banks to the south, in the vicinity of Menaul Street. Because of these conditions 100 percent retention of the rainfall reaching the site is required and the drainage report will have to supply a detailed site grading plan indicating the configuration of the land after developed.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gm

BOHANNAN-HUSTON INC.
4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

May 10, 1978

Mr. Bruno Conegliano
Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Drainage Report for Nobel, Inc., Food Distribution Center

Dear Mr. Conegliano:

In response to your letter of April 11, 1978, we are transmitting herewith a detailed grading plan for the referenced project site. The pond onsite is sized for 100 percent (100%) retention of rainfall, assuming a 3" rain falls on the fully developed site, with no upland contribution, and no infiltration within the pond.

We trust that these measures will make the Drainage Report acceptable for your approval. If you should have any further questions, please feel free to contact me at this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

Enclosure

cc: Mr. Bart Nixon, Seminoff, Nixon, and Bode

JPP/js
Job No. 78-026.1

Cremans Inc.

DRAINAGE REPORT

FOR

NOBEL, INC., FOOD DISTRIBUTION CENTER

MARCH, 1978

PREPARED FOR

SEMINOFF, NIXON, DOWMAN, AND BODE
Architects-Engineers
125 N.W. 15 Street
Oklahoma City, Oklahoma 73103

PREPARED BY

BOHANNAN-HUSTON, INC.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

Michial M. Emery

MICHIAL M. EMERY, P.E.
N.M.P.E. NO. 5194

## TABLE OF CONTENTS


| | PAGE |
|---|---|
| PURPOSE | 1 |
| PROJECT LOCATION AND DESCRIPTION | 1 |
| EXISTING HYDROLOGY | 1 |
| DEVELOPED DRAINAGE PLAN | 2 |
| RECOMMENDATIONS | 3 |


## APPENDIX


CALCULATIONS


## PLATES


PLATE 1 - LOCATION AND BASIN DEFINITION

PLATE 2 - UNDEVELOPED RUNOFF

PLATE 3 - DEVELOPED DRAINAGE

DRAINAGE REPORT

FOR

NOBEL, INC., FOOD DISTRIBUTION CENTER

## PURPOSE

It is the purpose of this report to examine the natural drainage of a parcel of land to be developed as the Nobel, Inc., Food Distribution Center and to recommend drainage improvements for development which will most effectively control runoff for a 100-year-frequency storm in accordance with the 1972-2 AMAFCA Drainage Resolution.

## PROJECT LOCATION AND DESCRIPTION

The study parcel consists of approximately 25 acres between Carmony Lane and Comanche Road west of Interstate 25 in Northeast Albuquerque. A location map is provided on Plate 1.

Development for the parcel is a proposed food warehouse with parking areas and a railroad spur. One acre is set aside for a ponding area.

## EXISTING HYDROLOGY

Plate 1 describes the study parcel and its upland area, a total of 70 acres beginning on the west right-of-way of Interstate 25. The north boundary of Basin I is formed by an arroyo running along the south edge of Carmony Lane. Approximately 170 cfs enters the arroyo through culverts under the interstate from the United Parcel Service and surrounding sites just east of the interstate. This runoff does not affect the site and is carried across

Carmony Lane by existing drainage improvements just east of the site.

The study parcel and its upland basins are on a 2 percent slope from east to west. Soils are decomposed granite, and vegetation is sparse native grasses. The two basins are approximately equal in size and runoff. Plate 2 describes the undeveloped conditions for the study parcel.

DEVELOPED DRAINAGE PLAN

The proposed development will pave more than 90 percent of the land in the study parcel. A 1-acre site has been set aside for ponding. The pond will supply permanent storage sufficient to contain the entire increase in runoff volume due to development of the parcel. This measure is in accordance with the 1972 Drainage Resolution and is necessary to insure that downstream conditions will not be aggravated. In addition, the pond will be sized to control the runoff rate from the parcel to the level experienced at Carmony Lane for undeveloped conditions. This measure decreases the runoff from the parcel by 14.2 cfs. The runoff that is presently experienced at Comanche Road will be diverted to the pond. The pond will release 14.2 cfs after permanent storage is satisfied through a conduit to a 20-foot drainage easement to the arroyo along Carmony Lane, where the existing conduits will conduct the flow across Carmony Lane and, should the conduits become clogged or have insufficient capacity, the flows will proceed across Carmony Lane in a dip section and downstream. The pond will have an overflow spillway that will

discharge the 100-year flow should the outflow conduit become clogged.

Upland flows will follow natural paths to the east boundary of the study parcel where a 2-foot-high berm will direct the flows north and south. Flows from Basin 1 will empty into the 20-foot drainage easement and to the arroyo. Flows from Basin 2 will empty onto Comanche Road.

By controlling both runoff volume and runoff rate from the parcel, and by directing upland flows to more adequate release points, the requirements of the 1972-2 Drainage Resolution have been met, and downstream conditions have not been aggravated. For storms smaller than the 100 year, conditions have been improved.

RECOMMENDATIONS

1. Construct a 2-foot-high berm with 2:1 maximum side slopes along the east property line within the parcel. This berm may be incorporated with the railroad spur. Refer to Plate 3 for location.

2. Construct ponding area as shown on Plate 3. Side slopes shall be 2:1, depth 6 feet, bottom dimensions 197x197 feet.

3. Install a vertical 18-inch RCP with top at 2'-3" above pond bottom as shown in the calculations.

4. Install an 18-inch RCP from vertical drop to 20-foot easement as shown on Plate 3; minimum slope 1.8 percent.

5. Construct earth channel in 20-foot easement to arroyo with 10-foot bottom, 2:1 side slopes, 2 feet deep, minimum slope .005.

6. Grade site to drain to ponding area.

7. Construct an overflow spillway on pond to discharge the 100-year flow when permanent storage and release storage depths have been reached.

# APPENDIX

UPLAND BREAK FOR THE NOBEL PROPERTY INCLUDE:

1. The United Parcel and surrounding upland area from North Diversion to I-25; 170 cfs passes under I-25 from this area (See Drainage Report [illegible]).

2. 45 acres between Nobel and I-25, defined on Plate 1. This area contributes as follows.

Area $A = 45$ acres

Length of watercourse $L = 1350$

Slope of watercourse $S = 1.8\%$

Ground factor (bare soil) $B = 1.5$

Time of concentration $T_c = \text{Log}^{-1}[.3641(B) + .2854\,\text{Log}(L) - .197\,\text{Log}(S) - .3615]$

$T_c = 22.0$ minutes

Intensity $I = \frac{189}{25 + T_c}$ for Albg. area

$I = 4.02$ inches/hour

Runoff Rate $Q = CIA$

Runoff factor $C = 0.35$ undeveloped

$Q = 63.3$ cu.ft./second Upland basin 1&2

Basin 1 = [illegible] Basin 2 = [illegible]

THE INTERIOR BASIN IN UNDEVELOPED CONDITION

20 acres $L = 620'$ $S \approx 1.5\%$

$T_c = 21.6$ min. $I = 4.06$ $C = .35$

$Q = (.35)(4.06)(20) = 28.4$ cfs Basin 3 = 14.2 cfs Basin 4 = 14.2 cfs
UNDEVELOPED

UNDEVELOPED VOLUME 100 year 6hr storm → 2.4"

area = 886 844 ft² $C = 0.35$

$$\text{Volume} = (0.35)\left(\frac{2.4''}{12''/ft}\right)(886\,844\ ft^2) = 62079.1\ ft^3$$

PROJECT NAME Nobel SHEET 1 OF 1

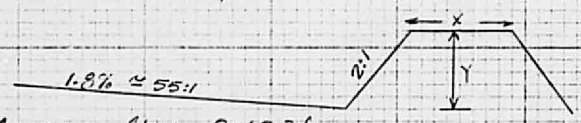
PROJECT NO. 79-[illegible] BY [illegible] DATE [illegible]

SUBJECT Upland & Interior Basins Undeveloped CH'D DATE

UPLAND RUNOFF -

1. Arroyo carrying 170 cfs from Unified Parcel site does not affect study parcel. It is carried across Carmony Dr east of the study parcel, and released in an arroyo 600' north of property line.

2. Adjacent basins will flow to east property line, stopped by a berm and carried to north property line, and drop into a storm conduit at the outlet of the pond. and to south property line of Commercial Park.




Manning flow Q=63.3cfs
$SS_1 = 55$ $SS_2 = 2$ $CHS = .005$ $n = .035$ BW=0 → flow depth = 1.19' ≈ 22" berm

INTERIOR DEVELOPED RUNOFF

Virtually all but the pond will be paved or hardened

C=0.90 $T_c$ will be minimum due to hardened surfaces

$T_c = 10$ min

$I = 5.4$ in/hr

$Q = CIA = (0.90)(5.4)(25) = 121.5$ cfs (developed)

DEVELOPED RUNOFF

$$\text{VOLUME} = (C)(R)(A) = (.90)\left(\frac{.4\text{ in}}{12\text{ in/ft}}\right)\left(836344\ \text{ft}^2\right) = 159{,}632\ \text{cu ft.}$$

R=2.4" rain

STORAGE REQUIREMENTS:

PERMANENT STORAGE

$$V_{DEVELOPED} - V_{UNDEVELOPED} = V_{STORED}$$

$$159{,}632 - 62{,}079 = \underline{\underline{77{,}553}}\ \text{cu ft}$$

| | | | |
|---|---|---|---|
| PROJECT NAME | [illegible] | SHEET 2 | OF 4 |
| PROJECT NO. | [illegible] | BY [illegible] | DATE [illegible] |
| SUBJECT | Development Runoff | CH'D | DATE |

STORAGE TO CONTROL RATE DISCHARGE

| 100 YR STORM DURATION $T_c$ | STORM INTENSITY $I = \frac{187}{25+T_c}$ | RUNOFF RATE $Q = CIA$ $C=.90$ $A=25$ | RUNOFF VOLUME $V = 60T_cQ_1$ | DISCHARGE RATE $Q_2$ $25.4 \div 2 = 14.2$ cfs | DISCHG VOLUME $V_2 = 60T_cQ_2$ | STORAGE VOLUME $V = V_1 - V_2$ |
|---|---|---|---|---|---|---|
| 10 | 5.4 | 121.50 | 72900 | 14.2 | 8520 | 64380 |
| 20 | 4.20 | 94.50 | 113400 | 14.2 | 17040 | 96360 |
| 30 | 3.44 | 77.32 | 139173 | 14.2 | 25560 | 113613 |
| 40 | 2.91 | 65.42 | 157015 | 14.2 | 34080 | 122935 |
| 50 | 2.52 | 56.70 | 170100 | 14.2 | 42600 | 127500 |
| 60 | 2.22 | 50.03 | 180106 | 14.2 | 51120 | 128986 |
| 62 | 2.17 | 48.88 | 181831 | 14.2 | 52824 | 129007 |
| 70 | 1.99 | 44.76 | 188055 | 14.2 | 59640 | 128415 |

Peak @ 62 min ; storage volume required 129007 cu.ft.
= 2.95 acre-feet

*NOTE* This assumes that permanent storage capacity is exceeded before high storm.

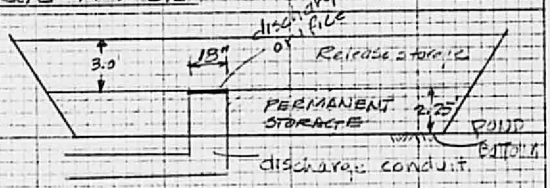
ORIFICE TO DISCHARGE 14.2 cfs

ORIFICE w/ 3' head

ORIFICE EQUATION:

$Q = Ca\sqrt{2gh}$ $C = 0.6$

$Q = 14.2$ $h = 3.0'$




$$a = \frac{Q}{C\sqrt{2gh}}$$

$$a = \frac{14.2}{0.6\sqrt{2(32.2)3}} = 1.70$$

$a = \pi r^2$ $r = \sqrt{\frac{1.70}{\pi}} = 0.74' = 8.84"$ $Dia = 2r = 17.67" \rightarrow$ USE 18"

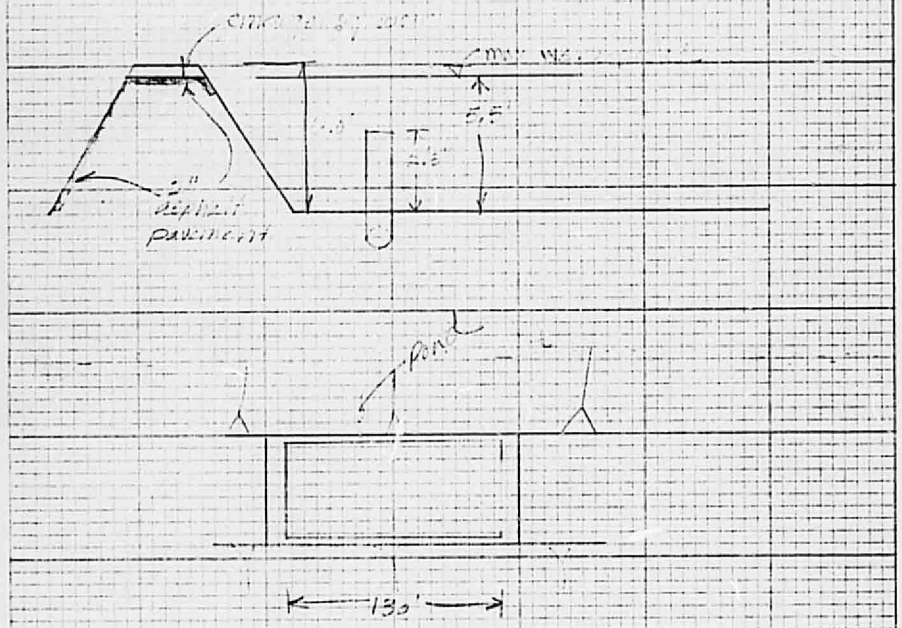
check Q $(0.6)(1.77)\sqrt{2gh} = 14.76$ cfs ✓ OK

PROJECT NAME Norfolk SHEET 3 OF 4
PROJECT NO. 7[illegible] BY [illegible] DATE [illegible]
SUBJECT [illegible] CH'D [illegible] DATE [illegible]

Weir to [illegible] 121 [illegible]

Q=121 [illegible] H=0.5

[illegible] L=130'

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|---|---|---|---|
| PROJECT NAME | [illegible] | SHEET 4 | OF 4 |
| PROJECT NO. | [illegible] | BY [illegible] | DATE [illegible] |
| SUBJECT | [illegible] | CH'D | DATE |

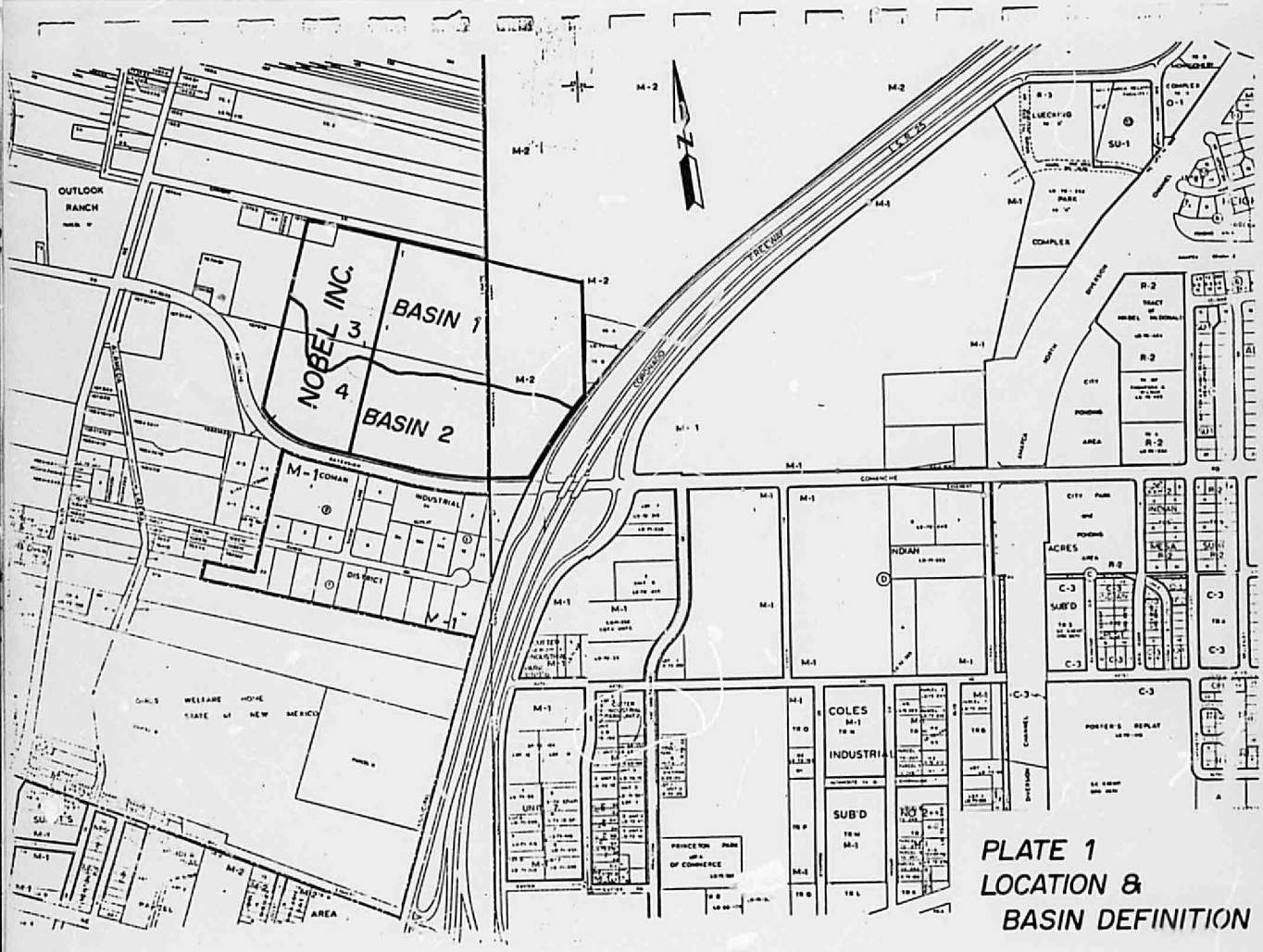


PLATE 1
LOCATION &
BASIN DEFINITION

2 0 7 2