E·R & Associates

CIVIL ENGINEERING • SURVEYING • LAND PLANNING
1330 SAN PEDRO, N.E. — SUITE 101
ALBUQUERQUE, NEW MEXICO 87110 (505) 266-8791

April 27, 1982

RECEIVED
APR 30 1982
ENGINEERING

Mr. Brian Burnett
Civil Engineer/Hydrology
CITY OF ALBUQUERQUE
P. O. Box 1293
Albuquerque, New Mexico 87103

RE:, Pond-Drain Pipes,
United Blood Services

Dear Mr. Burnett:

At the request of the contractor, Jaynes Corporation, and the architect, Antonio Predock & Associates, our survey crew performed an as-built survey on Friday, April 9, 1982. On this date we found that the drain pipes for the ponds were not set to the design grades. The survey crew, under the supervision of John F. Esquibel, set the required grades on the drain pipes. On Friday, April 9, 1982, again the survey crew went out and checked the elevations of the pipe as they were installed.

Our firm has submitted an as-built drawing revealing the final as-built conditions of the referenced subject.

If we can be of any further assistance, please do not hesitate to call.

Sincerely,

E·R & ASSOCIATES

T. M. Conrardy

T. M. Conrardy

John F. Esquibel

T. M. CONRARDY
NEW MEXICO
No. 2933
REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR

REG. LAND SURVEYOR
STATE OF
NO. 5949
NEW MEXICO
JOHN F. ESQUIBEL

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

July 22, 1981

City Engineer Office
Albuquerque, New Mexico

RECEIVED
JUL 24 1981
CITY ENGINEER

Attn: Bryan Burnett

Transmitted herewith is revised drainage report for United Blood Services. This revised report contains all of the changes that were discussed in the meeting of July 17, 1981 with Mr. Chuck Easterly. We have supplied the following additional information requested at said meeting, these being:

1. Computed ponds for a 10 year storm.
2. Submitted calculations for positive drainage of said ponds.
3. Called out detail K-15.
4. Roof drainage calculations.
5. Revised parking lot contours.
6. Increased size of ponds and reduced depth to 1 foot.

Please be aware that the owner and the contractor need this final approval so that they may commence construction immediately.

We will be available to respond immediately to any request or additional requirements that may occur.

Very truly yours,

A & E ENGINEERING, INC.

John F. Esquibel, President

JFE:mhe

1330 SAN PEDRO N.E.
SUITE 114 (505-266-8791)
ALBUQUERQUE, NEW MEXICO 87110

Latest Revision

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

RECEIVED
JUL 24 1981
CITY ENGINEER

April 15, 1981

Antoine Predock
300 12 NW
Albuquerque, New Mexico

RE: UNITED BLOOD SERVICES - DIVISION OF BLOOD SYSTEMS

Dear Sir:

We are transmitting this drainage report for Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc. in Albuquerque, New Mexico. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with the present City of Albuquerque drainage policies.

We do appreciate this opportunity to serve you and if any questions develop, we will be available to assist you in any responses regarding this report.

Very truly yours,

A & E ENGINEERING, INC.

JFE:mhe

John F. Esquibel, President

ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

DRAINAGE REPORT

FOR

UNITED BLOOD SERVICES

ALBUQUERQUE, NEW MEXICO

PREPARED FOR:

UNITED BLOOD SERVICES
DIVISION OF BLOOD SYSTEMS
1515 UNIVERSITY BOULEVARD
ALBUQUERQUE, NEW MEXICO

PREPARED BY:

A & E ENGINEERING, INC.
1330 SAN PEDRO NE - SUITE 114
ALBUQUERQUE, NEW MEXICO 87110

APRIL 15, 1981

REVISED July 20, 1981

Theodore M. Conrardy

THEODORE M. CONRARDY
REGISTERED PROFESSIONAL
ENGINEER NO. 2933

DRAINAGE REPORT

TABLE OF CONTENTS

GENERAL:

This drainage report consists of a hydrologic study of a probable 100-year storm affecting the proposed development on a portion of Lot 3 of the replat of a portion of Tract "A", Land of Fundamentals Inc.

LOCATION AND DESCRIPTION:

The property under study is a parcel of land zoned C-3 Fundamentals Inc., and contains approximately 1.306 acres. It is located on University Boulevard approximately 1200 feet north of the intersection of University Boulevard and Indian School Road. This property is more particularly described as Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc.

The existing terrain for the parcel slopes to the west at about 4.5% grade.

PROPOSED DEVELOPMENT:

This parcel of land is to be developed into The United Blood Services. It will be graded, paved and landscaped to shed storm water off the property, so that the runoff drains into proposed ponds and shall be controlled in a similar manner as existing conditions.

PROPOSED DRAINAGE PLAN:

In order to control offsite and onsite runoff of this development, the area has been designed with grades, landscaped area and ponds to collect the runoff.

The drainage has been divided into three (3) drainage areas to prevent concentration of runoff at only one point. (See plate 1 drainage plan).

Drainage area "A" (offsite drainage from undeveloped parcels directly north and east) affecting this project shall flow across the proposed parking lot by means of a swale and shall discharge in

similar manner to the existing conditions. Drainage area "B" the paved area west of the building and the building roof both drain into three (3) ponds located along the south side of the southwest corner of the parking lot. Excess runoff will discharge over the ponds and will be controlled in a similar manner to the existing conditions.

The drainage from Area "C", area in front of building, shall flow into Pond"D" located in center of circular donor's parking lot and any excess will flow into University Boulevard.

DISCUSSION OF METHOD:

The development of this area will be controlled by the guidelines set forth in the recent Resolution of the Albuquerque Metropolitan Arroyo Flood Control Autnority and the City of Albuquerque.

The amount of storm water is computed by using a 100-year storm, this being a storm consisting of 100-year 6 hours precipitation as shown by the rainfall frequency maps for New Mexico, June 1967, published by the Special Studies Branch, Office of Hydrology, United States Weather Bureau.

The pond area was calculated so that the volume of water ponded would equal the volume of runoff produced by the development.

OFFSITE DRAINAGE CALCULATIONS:

The quantity of offsite runoff that will flow into the west half of this property parking lot was determined by using the rational formula:

$$Q = C.I.A. \quad \text{(Rational formula method)}$$

$$t_c = \left(\frac{11.2\ (L)^3}{H}\right)^{0.385}$$

$$I = \frac{189}{t_c + 25} \quad \text{(100 yr. frequency)}$$

Undeveloped Area

A = 0.72 acres H = 7 ft. L = 0.663 mi.
t_c = 0.522 x 60 = 3.13 min. I = 5.40 C = 0.40

$\therefore t_c$ = 10 min.

Q = C.I.A. = 0.40 x 5.40 x 0.72 - 1.55 cfs

The offsite runoff shall flow across the proposed parking lot by means of a swale and shall discharge in the ponds. The ponds will allow for the runoff to flow in similar manner as its existing conditions.

AREA "A" OFFSITE UNDEVELOPED Q (runoff)

Q = C.I.A. (rational formula method)

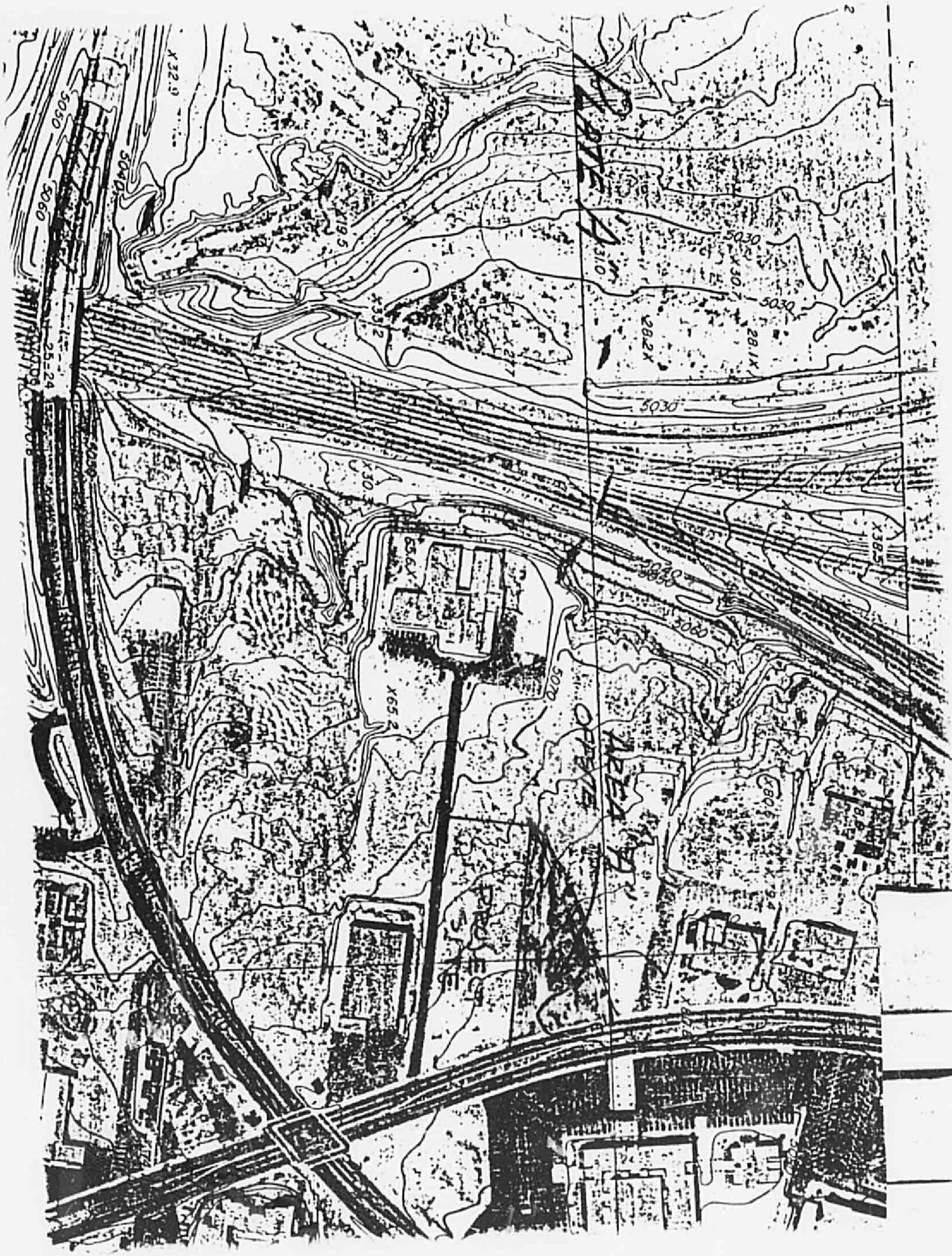
$t_c = \frac{(11.2\ (L)^3)}{(H)}$ $0.385 = \frac{(11.2\ (0.0663)^3}{(7)}$ $0.385 = .0522 \times 60$ min.

$I = \frac{189}{t_c + 25} = \frac{189}{10 + 25} = 5.40$

= 3.13 min (time of concentraction: Use 10 min.

A = 0.72 acres

Q = (0.4) (5.4) (0.72) = 1.55 cfs or pg. 1 for area "A" only.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OFFSITE - AREA "A"

By using Rational formula

$Q = ciA$

$c = 0.4$ $A = 0.72$ Acres

$i = 5.40$

$Q =$ 1.55 cfs, from page 3 of this report

The purpose of this calculation is to determine what the offsite runoff does to the retaining wall and the building

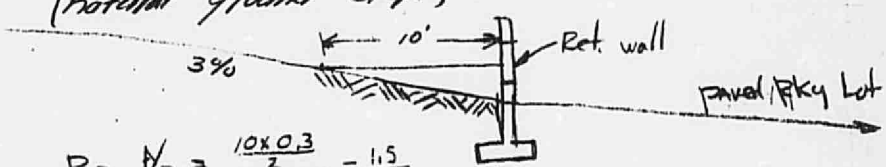
by the Manning's Equation

$V = 1.486\ R^{2/3}\ S^{1/2}$

$n = 0.03$

$S = \frac{79' - 74'}{300'} = 0.0167$

The cross slope from wall to the undeveloped area to the north is 3% (natural ground slope)



$R = A/P = \frac{\frac{10 \times 0.3}{2}}{10 + 0.3} = \frac{1.5}{10.3}$

$R = 0.146$

$V = \frac{1.486}{0.03}(0.146)^{2/3}(0.0167)^{1/2} = 1.80$ fps

a V = 1.80 will cause very little if any errosion.

USING $Q = 1.55$ cfs

$Q = A \cdot V \quad A = \frac{1.55}{1.80} = 0.86$ SF

Area of drainage section $A = \frac{10 \times d}{2} = 0.86$

10:1 = (0.86)(2),

OFFSITE- (Continued)

Therefore with a velocity of 1.80 and a depth of flow of 0.17 feet, this runoff will flow into the parking lot and into pond "A"

The flow will not be restricted to flow into the parking lot since we have two openings 2'-8" wide by 8" in height which are calculated to allow for slow velocity standing water condition

$$Q = 3.33 \, L \, H^{3/2}$$

$$H = 8" \text{ or } 0.67'$$

$$L = \frac{1.55}{3.33} (0.67)^{3/2} = \underline{0.25 \text{ ft}}$$

There the two openings as is shown on detail © will handle the runoff very adequatly.

Area "B" ONSITE (100 year storm)

Undeveloped runoff

$0.4 \times \frac{2.4}{12} \times 37,772.4\ SF = 3021.7\ cf.$

Developed runoff. - Impervious Area (roof & paving minus the ponds & landscaped areas)

$0.9 \times \frac{2.4}{12} \times 32,390\ SF = \underline{5830.2\ cf.}$

Pervious Area undeveloped (before development)

$0.4 \times \frac{2.4}{12} \times 32,390\ SF = \underline{2591.2\ c.f.}$

Volume required to be ponded for a 100 year storm

$5830.2 - 2591.2 = \underline{3229.0\ cf.}$

Ponding capacity

Ponds

"A"	15'x60'x1' =	900 cf.
"B"	24'x40'x1' =	960 cf.
"C"	24'x40'x1' =	960 cf.
	pond Cap. =	2820.0 cf.

Parking lot ponding:

The parking lot ponding is divided into two areas; ① 73.0 Contour to Front of ponds "A" & "B" 72.50. The area is equal to 5136 SF x 0.25' (Avg Depth) = 1284 Cu ft. ② This area is located east of pond "C" and is From contour 72.50 to 72.0; area is equal to 726 SF ∴ 726SF x 0.25 = 181.5 Cf. The total volume of ponding in the parking lot is 1284cf + 181.5 cf = 1465.5 cf

The total amount ponding; ponds & parking lot is equal to 2820cf + 1465.5 cf = 4285.5 cf

This is a total of (4285.5cf - 3290.0 cf) 995.5 cf in excess of the requiral amount.

AREA "C" (Pond "D")

Onsite Developed

Impervious Area: Paving

$0.9 \times \frac{2.4}{12} \times 7148 = 1286.64$ c.f.

Landscape Area

$0.4 \times \frac{2.4}{12} \times 10{,}703 = 856.24$ c.f.

Undeveloped ARea: (7148) c.f.

$0.4 \times \frac{2.4}{12} \times 7148\text{sf} = 571.8$ c.f.

V dev. = 1286.6

V underdev. = 571.8

V reqd. to be ponded = 714.8 c.f.

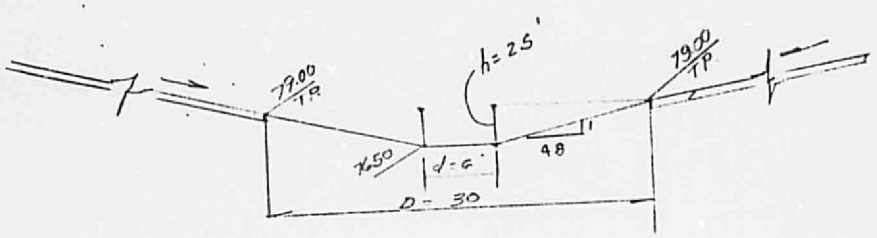
Pond "D" Volume

$V = 0.2618 \times h(D^2 + Dd + d^2)$

$h = 2.50$

$V = 0.2618 \times 2.50 \times 1116 = 730.4$ cu. ft.

Area "C" has ponding capacity of 730.4 cf. which has an excess of (730.4 cf. - 714.8 cf.) = 15.6 cf.



POND "D" Detail

Revised 6-30-81

Pond "D" drain pipe

Calculations

$L = 91.00'$

$H = (78.83 - 76.33) = 2.50\ ft$

Orfice opening 1/2 diameter hole

$d = 2"$ or $2/12 = 0.166\ ft$

Volume generated into the pond is equal to 1286.4 ft^3 by a 100 year storm

Orfice design

$$Q = C\,a\,\sqrt{2gh} \qquad a = \frac{\pi\left(\frac{0.5}{12}\right)^2}{4} = 0.0014\ ft^2$$

$C = 0.64$

$$Q = 0.64\,(0.0014)\,\sqrt{(64.4)(2.50)}$$

$Q = 0.011$ cfs

Volume per day = 0.011 cfs x 86400 sec/ = 982.3 cf/

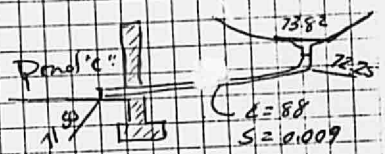
Based on this calculatims the pond will drain out into the street curb and gutter by using 2- 1/2 diamater orfico holes in 15.7 hours; but we recommend that three holes be constructed incase any hole gets plugged.

Note with 3- holes pond will drain in 1286.4 / 982.2 cf/day x 3 x 24 hrs = 10.2 hrs

less than 1/2 day.

Hydraulic Calculations

For 2" pvc drain pipe



$L = 88'$

$H_s = H_1 - H_2 = 72.25 - 71.50 = 0.75$

$S = \frac{0.75}{88'} = 0.0085$ use 0.009

Area = $16.7' \times 6.4' = 106.9\,SF / 43560\,SF = 0.002$ Acres

$Q = C\,i\,A$ $\quad t_c = 10$ min $\quad I = 5.4$

$Q = 0.9(5.4)(0.002) = 0.01$ cfs

$V = 1.318 \cdot C\, R^{0.63} S^{0.54}$ $\quad R = A/P = 0.04$

$V = 1.318(1.50)(0.04)^{0.63}(0.009)^{0.54}$

$V = 0.02$ fps

$Q = A \cdot V$

$0.001 = \frac{\pi D^2}{4}(0.02)$ $\quad D = 0.039'$

Therefore a 2" pvc will handle the flow created by this sump area.

The plans call for a 2" pvc to be installed.

Area of 2" pipe = 0.02 SF

Volume per L.F. = 0.02 cuft/ft

Total Volume in pipe 88 LF x 0.02 = 1.76 cuft

6/30/81

Hydraulics Calculations Ponds

The ponds have been designed as a charging rate orifice retention basin for a 100 year frequency storm. The storm water will drain from the pond at a maximum rate equivalent to a 5-year (Q_5) storm calculated for the undeveloped condition.

Total Area that was undeveloped = 2.03 Acres
(Consists 1.306 A offsite & 0.72 Acres)

H = 79.0 − 71.0 = 8.0
L = 0.073 miles
C = 0.40

From: Noaa Hydrological curves - 2 Vol. 4

$i = 3.43$

$Q_{ALLOW} = Q_5 = CiA$

$Q_5 = 0.4\ (3.43)\ (2.03) = \underline{2.78 \text{ cfs}}$

Therefore the flow of $Q_5 = 2.78$ cfs will be used to design the outlet spillway openings for the ponds A, B & C

By Weir approach ($Q = 3.33\ L\ H^{3/2}$)

$L = Q / 3.33\ H^{3/2} = \frac{2.78}{3.33\ (0.5)^{1.5}}$

where H = 6" = 0.5'

$L = 2.78 / 1.18 = 2.36$ ft.

The plans call for the openings on the drainage plan, to be 2.50 feet by 6" min.

6/30/80

The design of the inlet orifices into pond "A" is calculated for the worst condition, this being for the maximum flow condition of the - $Q_{offsite} = 1.55$ cfs and onsite flow from the parking lot area B_{IP} equal to 0.95cfs for a maximum $Q_{IP} = 2.50$ cfs

Pond entrance (Submerged orifice)

$V = C_r \sqrt{2gh}$

$C_r = 0.82$

$g = 32.2$ fps

$\Delta h = h = 73.0 - 72.5 = 0.5'$

$V = 0.82 \sqrt{2(32.2)(0.5)}$

$V = 4.65$ fps

$Q = A \cdot V$

$A = Q/V = 2.50/4.65 = 0.54$ sf

Depth = 0.5'

Width (W) = $0.54/0.5 = \underline{1.08}$ min

Note: We have designed a total of 2 openings in pond "A" all four (40) wide by 0.5' deep. These openings will handle the flow that will flow into this pond.

Pond "B" and pond "C" also has 2 openings, which will eliminate excess ponding on the parking lot during smaller storms.

Roof Area

$a = 12,250.5$ S.F.

Volume $= 0.9 \times \frac{2.4}{12} \times 12,250.5 = 2205$ cuft

The volume of 2205 ft³ will be retained on the by means of control outlets – roof drains and roof drain pipes. The drain pipes will be 4" in diameter from the roof to the paved parking lot. The outlet of the parking lot will then be restricted to a 2" diameter office - by means of placing a 4"x2" reducer.

There are four roof drains collecting the water on the roof but only one 4" pipe for every two drains. The 4" diameter pipes transfer the water to the parking lot. There are overflow scuppers placed next to each roof drain to guarantee roof to drain incase drain pipes get clogged.

Scuppers are to be placed 3" above the roof level.

Calculation of roof drains

roof slopes $\frac{3}{16}$"/LF or $S = 0.0156$

$L = 124'$

$W = 48'$

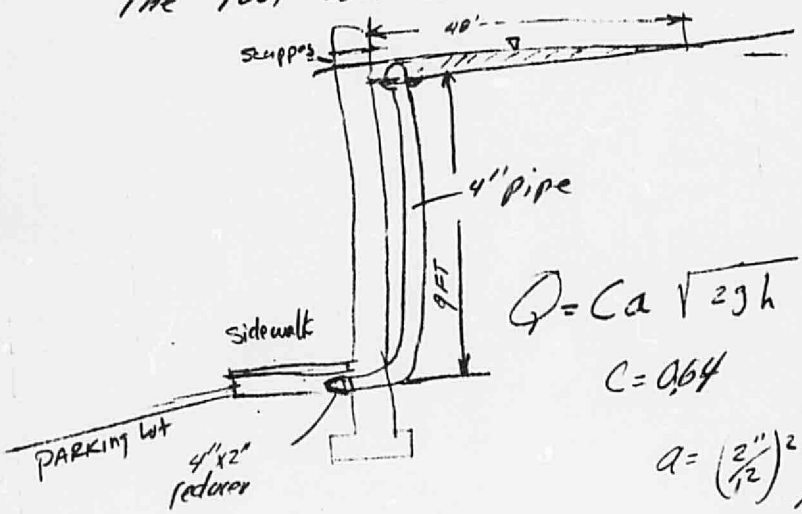
d = depth of water at west wall.

$48 \text{ LF} \times 0.0156 = 0.75'$

Volume $= \frac{0.75' \times 48'}{2} \times 124' = 2232$ cuft.

Roof Area Continued

This is the depth of water on the roof that could have occurred due to the slope on the roof. The roof drains allow for the roof to drain out by controlled outlets (orifices) these being 4 - roof drains connected to two-4" drain pipes, at a rate of 38.4 ft³/min. The roof will drain in 58.1 minutes.



$Q = Ca\sqrt{2gh}$

$C = 0.64$ $\quad H_L = 1$ $\quad H_T = 9+1 = 10'$

$a = \left(\frac{2''}{12}\right)^2 \pi / 4 = 0.02$

$Q = 0.64(0.02)\sqrt{2(32.2)\,10} = 0.32 c_i$

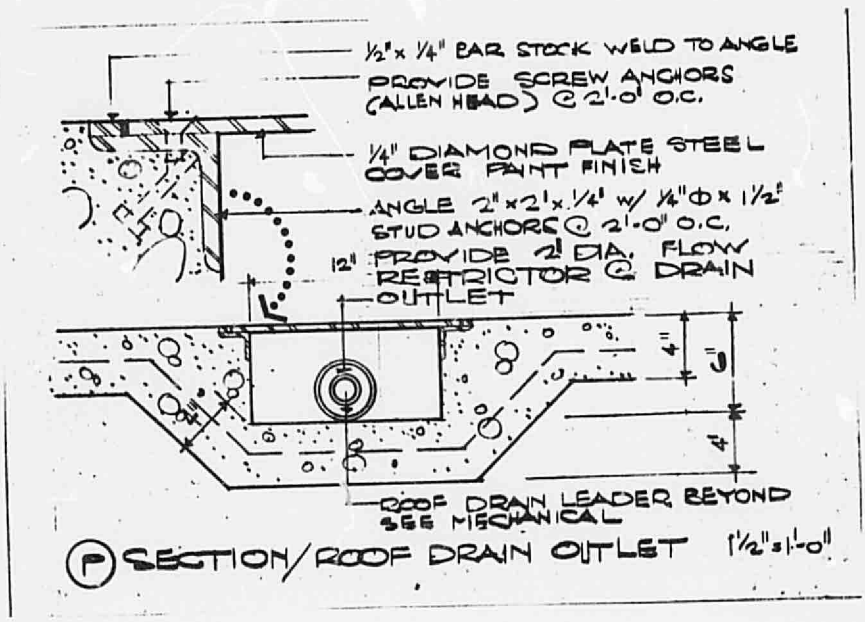
Volume for 1 minute = 19.20 ft³/min per pipe

2 pipes: Volume = 38.4 ft³

The total volume drained in one hour is

38.4 x 60 = 2304 ft³ therefore the roof will drain within a hour.

$\frac{2205\ ft^3}{\quad} =$ 58.1 minutes



(P) SECTION/ROOF DRAIN OUTLET 1½"=1'-0"

Ten Year storm Pond Calculations

From: Noaa. Atlas 2, Vol. III New Mexico

10 year
10 minute duration
i intensity = 3.94 in/Hr.

$Q = c\,i\,a$ $\quad c = 0.9 \quad a$ = area (acres)

AREA B1P

$a = .8512/43560 = 0.195$ ac.

$Q = 0.9(3.94)(0.195) = 0.69$ cfs

Vol. = 0.69 cfs x 10 min x 60 sec/min = 414.0

OFFSITE Area "A"

$a = 0.72$

$Q = 0.4(3.94)(0.72) = 1.13$ cfs

Volume = 1.13 x 600 sec = 680.8

Pond "A" has a Capacity of 900.0 cut and the parking lot has an additional ponding capacity of 1484. cfs

Therefore there is (2384 − 1094.8) = 1289.2 cfs of ponding in excess. for area B1P.

AREA B2P =

$a = 6500/43560 = 0.149$ ac

$Q = (0.9)(3.94)(0.149) = 0.53$ cfs

Volume. = 0.53 cfs x 600 sec = 317.0 ft³

Pond "3" has a capacity of 960.0 Cuft; ∴ an excess of 643.0 cfs

AREA B3P =

$a = 5699/43560 = 0.130$ AC.

$Q = (0.9)(3.94)(0.130) = 0.46$ cf

(Ten Year Storm Continued)

Area B_{3P}

roof area = 12,250.5 SF / 43560 = 0.28 Ac.

$Q = CiA$

$= (0.9)(3.94)(0.28) = 0.99$ cfs

Volume 0.99 cf/sec x 600 sec = 595.7

Pond "C" has a capacity of 960 cuft therefore this area has an excess ponding capacity (960 - 874.0) = 86 cf.

Please Note that the volume from the roof is controlled by 2" orfice and will not affect the pond in the possibility of being an immediate impact on Pond "C."

POND DRAINS

Pond drains will be installed to insure that water ponded will drain from the ponding areas within a period of 24 hours so that it will not allow for the breeding of mosquitoes or become a nuisance.

POND DRAIN PIPE CALCULATIONS

Reference: Civil Engineering Handbook
4th Edition by Urquhart
Pages 4-32, 4-33

Orifice opening = ½" diameter
Average head $(\frac{2.5 - 0}{2})$ = 1.25' per pond
Assume water temperature = 60° F

Formula $d = \frac{\sqrt{gh}\ p}{\mu}$

where:
- d = orifice diameter in feet
- g = gravitational acceleration = 32.2 ft/sec
- h = average head in feet
- p = density in slugs/cu.ft. $= \frac{62.4}{32.2}$
- μ = viscosity = 0.00002359 slugs/ft sec

Computation to determine coefficient of discharge "C"

$$\frac{0.5/12\ \sqrt{32.2\ (1.25)}\ \ (\frac{62.4}{32.2})}{0.00002359} = 21{,}680$$

From Fig. 35, Page 4-32, C = 0.64

$Q_{orifice} = C\ a\ \sqrt{2gh}$
a = $\pi d^2/4$ = 0.0014 ft^2
d = diameter of orifice = 0.0416 ft.
h = 1.25
g = 32.2
C = 0.64 (from above computation)

$Q = (0.64)\ (0.0014\ ft.^2)\ \sqrt{2(32.2)\ (1.25)}$ = 0.0080 cfs

0.0080 cfs (86,400 sec/day) = 691 ft^3/day

SUMMARY:

It is recommended that this development be approved since the computations show that the proposed design is adequate to satisfactorily handle a 100-year storm.

(Pond Drains Continued)

Pond "A" 900 cuft will require 2 - ½" diameter orifice holes, but we have designed the 2" pvc to have 4 holes so that it drain the pond and that volume in the parking lot for a 100year storm.

Pond 'B' has a capacity of 960 c.f. and also parking lot ponding of 990 ct for which will be required to be drained therefore 3 - ½ diameter holes will be required.

Pond "C" has a ponding capacity of 960 cf. and 181 cf in the parking lot. Therefore 3 - ½" diameter holes will be required.

ANTOINE PREDOCK ARCHITECT
3001 2 STREET N.W.
ALBUQUERQUE NEW MEXICO 87102
TELEPHONE: 505 843 7390

November 12, 1981

City of Albuquerque
City Engineer's Office
400 Marquette Avenue N.W.
Albuquerque, New Mexico 87102

Attention: Brian Burnett

RE: Drainage Study for United Blood Services

Dear Brian:

Per your request please find the enclosed drawings depicting a slight modification in the drainage plan on the above referenced project.

Because of a misinterpretation of existing grade conditions, to maintain the correct elevations on the outflow from pond "C" we need to get under the sidewalk. The drawings detail where and how this will occur.

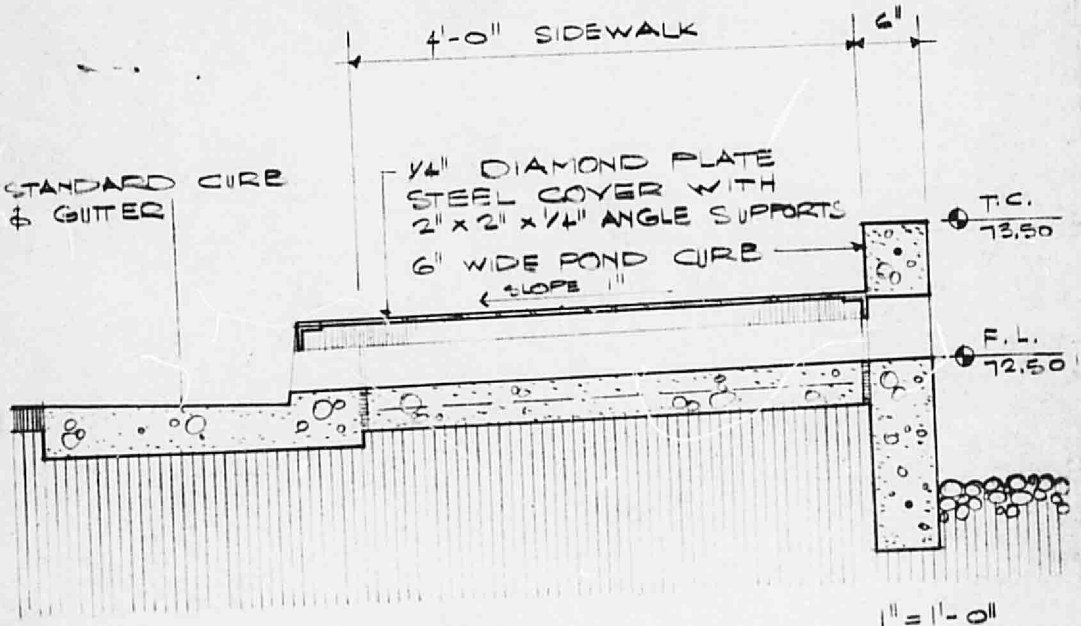
If you have any questions, please contact our office.

Thank you,

Jon Anderson
Project Architect

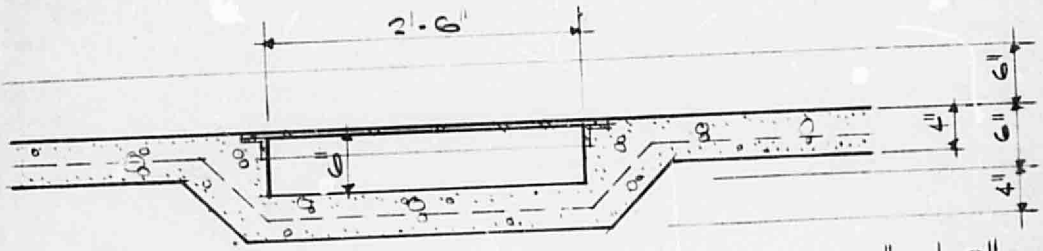
JA/sv

Enclosures



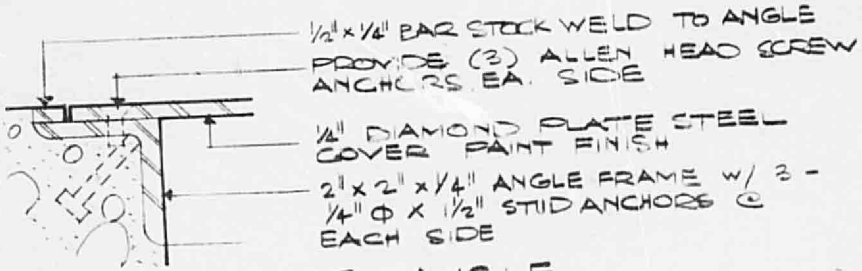
LONGITUDINAL SECTION

1" = 1'-0"



CROSS SECTION

1" = 1'-0"



DETAIL @ EDGE ANGLE

DRAINAGE OUTFLOW TRENCH DETAILS

UNITED BLOOD SERVICES 11/10/8

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

July 24, 1981

J15-D9

Mr. John Esquibel
A & E Engineering, Inc.
1330 San Pedro N.E.-Suite 114
Albuquerque, N.M. 87110

RE: UNITED BLOOD SERVICES

Dear Mr. Esquibel·

The drainage report for the United Blood Services is hereby approved. Approval is granted based on the additional information supplied in the drainage report and grading plan details dated July 24, 1981.

Be aware that construction in City right-of-way must conform to the procedures outlined in Special Order No. 19.

Very truly yours,

Brian G. Burnett
Civil Engineer/Hydrology

BHB/tsl

cc: John Anderson, Antoine Predock - Architects

MUNICIPAL DEVELOPMENT DEPARTMENT
Richard S. Heller, P.E., City Engineer ENGINEERING DIVISION Telephone (505) 766-7467

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

July 9, 1981

City Engineer Office
Albuquerque, New Mexico

Attn: Bryan Burnett

Transmitted herewith is revised drainage report for United Blood Services. Please be aware that the owner and the contractor need this final approval so that they may commence construction immediately.

We will be available to respond immediately to any request or additional requirements that may occur.

Very truly yours,

A & E ENGINEERING, INC.

John F. Esquibel, President

JFE:mhe

1330 SAN PEDRO N.E.
SUITE 114 (505-266-8791)
ALBUQUERQUE, NEW MEXICO 87110

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

July 13, 1981

Mr. John Esquibel
President, A&E Engineering
1330 San Pedro N.E., Suite 114
Albuquerque, New Mexico 87110

RE: UNITED BLOOD SERVICES DRAINAGE REPORT

Dear Mr. Esquibel:

This letter is a follow-up to our conversation of July 10, 1981, concerning approval of the referenced report. As I indicated to you, our major concern is the proposed means of concurrerce of off-site flows to the parking area.

Mr. Charles Easterling, Principal Assistant City Engineer/Hydrology, has set up a meeting on Friday, July 17, 1981, at 1:00 to discuss the situation. We request that you and Mr. Theodore Conrardy be present. Mr. John Anderson, of Antoine Predock Architects, will also be asked to attend.

If I can be of further help, please call.

Very truly yours,

Brian G. Burnett

Brian G. Burnett
Civil Engineer/Hydrology

BGB/fs

cc: Mr. John Anderson

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. J15-D9 DATE: 6-25-81

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: United Blood Services

ATTENDANCE:	WHO	REPRESENTING
	Brian Burnett	City
	Jeff Esquibel	A & E Engr. Inc.

FINDINGS:
1. Outside flows identified and swale indicated (hydraulics of inlets if used)
2. Drainage areas in parking lot identified.
3. Top of curb, flowline, and property line elevations shown (water blocks at entrances).
4. Offsite volume computed and incorporated into ponding scheme.
5. Recheck Pond D capacity
6. Hydraulics of outlet pipes for ponds A, B, ~~and~~, C, D examined (C's developed). Outfall for pond D needs to be shown.
7. Hydraulics of drain along South side of building examined (2" pvc).

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED:	J. Taylor	SIGNED:	Brian J. Burnett
TITLE:	Asst. Div. E.	TITLE:	Civil Engineer / Hydrology
DATE:	6/25/81	DATE:	6/25/81

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. _____ DATE: _____

PLANNING DIVISION NO. _____

CONFERENCE RECAP Page 2

SUBJECT: _____

ATTENDANCE:	WHO	REPRESENTING

FINDINGS:
8. Discharge scheme (flow path) at outlet Pipe for ponds A, B, and C.
9. Emergency spillway calculations for all ponds.
10. Entrance capacity of ponds computed.
11. Recede pond depth for (A) typical section at ponds
12. Protection for pond D required (6" curb minimum). Traffic pattern might need to be ~~reevaluated~~ examined
13. Top of curb, flowline, and driveway elevations for Aua Clat (University).
14. Vicinity map on plans
15. Bench mark description and location

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: _____ SIGNED: _____

TITLE: _____ TITLE: _____

DATE: _____ DATE: _____

United Blood Services
Comments
J15-DQ; B. Burnett

1. Page 1 - Proposed Drainage Plan (Last Paragraph)

"Drainage Area A (off-site drainage from undeveloped .... by means of a swale

- Swale is not shown on the plans
- 2 Inlets indicated on plans are inadequate
- Off-site drainage must be addressed along entire property line.

2. Page 2 - (First Paragraph)

"Drainage Area B, the paved area west of the building and the building roof both drain into three (3) ponds .....

- There is no indication from the proposed grading that flow from the parking lot will reach each pond in capacities that meet computed volumes

- Specific drainage areas must be shown and volumes computed to assure that ponds are adequately sized.
- A more obvious distinction should be made between existing and proposed contours.

3. Note that comments 1 and 2 must be incorporated together since offsite flows entering the lot combine with parking lot flow.

4. Page 3 - Computations

Area "A" is not accounted for in the ponding computations. "The offsite runoff shall flow across parking lot by means of swale and shall discharge into ponds."
Compute Composite "C":

A (effective): $1.68 \times 43560 \times .04 = 29,272$
B (effective): $33,270 \times .9 = 29,943$

$C = (29272 + 29943) / 73,180 + 33,270$

$C = .5563$

Ponding volume(∀)

$$(\forall) = \frac{2.4}{12} \times 106,450 \times .5563$$

$$\forall = 11,843 \text{ cuft.}$$

Or

$$\forall_A = 1.68 \times 43560 \times \frac{24}{12} \times 0.4 = 5854 \text{ cuft.}$$

$$\forall_B = 33270 \times \frac{24}{12} \times 0.9 = 5989 \text{ cuft}$$

$$11843 \text{ cuft.}$$

There is a descrepancy of 8000 cu ft of ponding

5. Page 3 - Computations

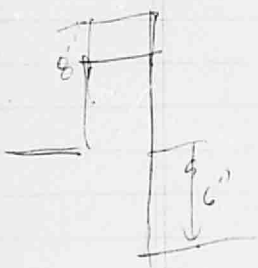
Required ponding ∀

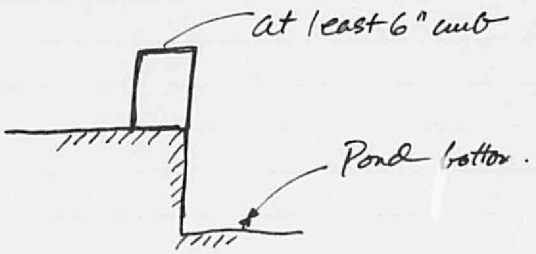
$$\forall = (1287 + 857) - 1428 = 716 \text{ cuft.}$$

Capacity is not meet.

6. Pond questions:

- The capacity of the outlet pipe must be examined (ie Manning's capacity equation and hydraulic grade line)
- How is discharge from ponds going to affect adjacent property?
- Pond emergency spillway calculations must be addressed (Areas B & C)
- Entrance capacities into the ponds must be addressed (weir calculations)
- Area C pond must have some sort of protection (to prevent cars from falling in).





Adding this curb may affect parking situation. Traffic has indicated that their approval is based on a "non-curb" situation.

1. Plan Drawings:

- Are there any existing curbs south of the project site? Spot elevations of existing F.L. of street should be indicated.
- There is not adequate grading for area C both paved and landscaped areas.
- Vicinity map with zone atlas page
- No bench mark description is indicated
- Exterior property line contours are indeed not adequate

DRAINAGE REPORT CHECKLIST

DATE 6.23.81 ZONE ATLAS PAGE NO. J15-D9

PROJECT TITLE (ADDRESS) United Blood Services

SUBDIVISION _____ LOT _____ BLOCK _____

ENGINEER A & E Engineering CONTACT Ted M Conrardy

ADDRESS 1330 San Pedro NE Suite 114 PHONE 266-8791
87110

OWNER _____ CONTACT _____

ADDRESS _____ PHONE _____

ARCHITECT/SURVEYOR _____ CONTACT _____

ADDRESS _____ PHONE _____

GENERAL:

YES	NO	NA	
✓			Professional Engineer's stamp signature and dated.
✓			North arrow and standard engineering scales used.
	✓		Planning and zoning action history.

OFF-SITE FLOWS:

YES	NO	NA	
	✓	✓?	Delineation of off-site contributing watersheds on SCS Bernalillo County Soil Survey Maps.
✓			Delineation of off-site contributing watersheds on City of Albuquerque Ortho-Topo Area Maps (Scale 1"=500' or 1"=200').
	✓		Quantification of off-site rates of flow caused by contributing watersheds for the 10 and 100 year storm frequency.
	✓		Off-site flow velocities and depths determined and locations indicated.
		✓	Discussion of any other local conditions that affect site drainage.
	✓		Delineation of site and contributing off-site watersheds on pertinent Flood Hazard Boundary Map.
	✓		Adequate treatment of offsite flows.

ON-SITE FLOWS:

YES	NO	NA	
✓			Calculations showing on-site developed and undeveloped flow volumes and rates.
	✓		On-site flow velocities and depths determined and locations indicated.
✓			Pond volume calculations.
	✓		Positive discharge of ponds with required rate and outlet calculations.
	✓		Pond emergency spillway calculations.
	✓		Pond safety protection (fencing for pond depths greater than 18".)
	✓		Pond landscaping provisions and commitments.
	✓		Pond maintenance provisions and commitments.
		✓	Soils investigation report for ponding within 15' of any structure.

PLAN DRAWINGS:

YES	NO	NA	
	✓		Adequate grading plan provided (See Grading Plan Checklist).
	✓		Vicinity map with Zone Atlas designation.
	✓		Indication of all easements and right-of-ways on, or adjacent to, the site with dimensions and purpose shown.

YES	NO	N/A	
	✓		Internal contributory drainage areas, including roof areas, outlined on the plan.
	✓		Direction and location of roof drainage including canales, gutters, and downspouts.
	✓		Flow lines defined by arrows and spot elevations.
✓			Details of ponds, swales, rundowns, curb cuts, water blocks, and all other significant drainage structures with contours, cross-sections and spot elevations when appropriate. ALL CROSS-SECTIONS MUST BE DRAWN TO STANDARD ENGINEERING SCALE. (Note: All proposed construction within the public way must be approved by the Assistant City Engineer/Design).
	✓		Standard City driveoad with elevation shown.
	✓	✓	Standard City curb cut.

COMMENTS _____

_____

_____

_____

_____

BY: _____

APPROVED BY: _____ DATE _____

GRADING PLAN CHECKLIST

DATE _____ ZONE ATLAS PAGE NO. J15-D9

PROJECT TITLE (ADDRESS) United Blood Services

SUBDIVISION _____ LOT _____ BLOCK _____

ENGINEER _____ CONTACT _____

ADDRESS _____ PHONE _____

ARCHITECT/SURVEYOR _____ CONTACT _____

ADDRESS _____ PHONE _____

YES	NO	NA	ITEM
	✓		Vicinity map with zone atlas page and legal description or plat.
	✓		Reference bench mark description.
✓			Drawn to standard engineering scale (1"=10' for sites less than one acre; 1" = 20' for sites less than five acres; 1" = 50' for sites greater than 5 acres).
	✓		Ground elevation on the site based on mean sea level datum as established by the U.S. Coast and Geodetic Survey (Vert. American Datum 1929).
	✓		Existing contours extending a minimum of 10 feet beyond the property line.
✓			Proposed contours at one foot intervals and proposed spot elevations at key points.
			Finish building floor elevation(s) with mean sea level designation.
✓			Notes defining property line, asphalt, sidewalks, planting areas, ponding areas, and all other areas whose delineation would increase clarity.
			Slopes (cut or fill) with height of less than 18", 2:1 minimum. Slopes with height greater than 18", 3:1 minimum.
	✓		Elevation of property line at least 0.33 ft. above top of curb.
		✓	Retaining wall required when a vertical grade change greater than 18" is anticipated.
		✓	Proposed street and alley grades if property abuts a dedicated unpaved street or alley. These grades are available, at no charge, from the City Engineer's Office. An advance request will expedite your project. (Note: At present there is a 3 month wait to have the City Engineer supply grades. However, to expedite the plans, the City Engineer may accept grades provided by an engineer).

COMMENTS _____

BY _____

GRADING PLAN CHECKLIST

DATE _____ ZONE ATLAS PAGE NO. J15-D9

PROJECT TITLE (ADDRESS) United Blood Services

SUBDIVISION _____ LOT _____ BLOCK _____

ENGINEER _____ CONTACT _____

ADDRESS _____ PHONE _____

ARCHITECT/SURVEYOR _____ CONTACT _____

ADDRESS _____ PHONE _____

YES	NO	NA	ITEM
	✓		Vicinity map with zone atlas page and legal description (or plat).
	✓		Reference bench mark description.
✓			Drawn to standard engineering scale (1"=40' for sites less than one acre; 1" = 50' for sites less than five acres; 1" = 50' for sites greater than 5 acres).
	✓		Ground elevation on the site based on mean sea level datum as established by the U.S. Coast and Geodetic Survey, North American Datum 1929).
	✓		Existing contours extending a minimum of 10 feet beyond the property line.
✓			Proposed contours at one foot intervals and proposed spot elevations at key points.
			Finish building floor elevation(s) with mean sea level designation.
✓			Notes defining property line, asphalt, sidewalks, planting areas, ponding areas, and all other areas whose definition would increase clarity.
			Slopes (cut or fill) with height of less than 18", 2:1 minimum. Slopes with height greater than 18", 3:1 minimum.
	✓		Elevation of property line at least 0.33 ft. above top of curb.
		✓	Retaining wall required when a vertical grade change greater than 18" is anticipated.
		✓	Proposed street and alley grades if property abuts a dedicated unpaved street or alley. These grades are available, at no charge, from the City Engineer's Office. An advance request will expedite your project. (Note: At present there is a 3 month wait to have the City Engineer supply grades. However, to expedite the plans, the City Engineer may accept grades provided by an engineer).

COMMENTS _____

BY _____

IN HOUSE STATUS OF
DRAINAGE REPORTS

ZONE ATLAS PAGE NO. _____

PROJECT TITLE (ADDRESS) _____

SUBDIVISION _____ LOT _____ BLOCK _____

ENGINEER _____ CONTACT _____

ADDRESS _____ PHONE _____

OWNER _____ CONTACT _____

ADDRESS _____ PHONE _____

ARCHITECT/SURVEYOR _____ CONTACT _____

ADDRESS _____ PHONE _____

ITEM	YES	NO	NA	BY	DATE	REMARKS
Zone Atlas page logged and map colored						
Pre-Design Conference						
Drainage Report:						
Review initiated						
Review completed						
Correspondence:						
Approval letter sent						

COMMENTS _____

_____

_____

_____

_____

BY _____

Justification for Items
Listed on Grading Plan And
Drainage Report Checklists

Drainage Report Checklist:

General:

	Document
Professional Stamp	80-15;Sec-4F or 6A
North arrows & scales	SO; Sec-A2
Planning - Zoning Action History	SO; Sec-21A5.i

Off-Site Flows:

Watershed boundaries on Bernalillo County Soil Survey Maps	SO; Sec-21B 80-15;Sec-7B
Quantification of off-site flow rates	80-15;Sec-4F
Determination of off-site depths and velocities	80-15;Sec-4F
Other local conditions affecting site drainage	80-15;Sec-7B SO;Sec-21A5.f
Pertinent FHB Map	SO;Sec-21B
Adequate treatment of off-site flows	80-15;Sec-4F

On-Site Flows:

Calculations for developed & undeveloped	80-15;Sec-4F
Determination of velocities	80-15;Sec-4F
Pond volume calculations	80-15;Sec-4B
Site discharge of ponds &Spillway calculations	80-15;Sec-4B
Safety protection for ponds	80-15;Sec-7B
Pond provisions & commitments	So;Sec-21B

Plan Drawings:

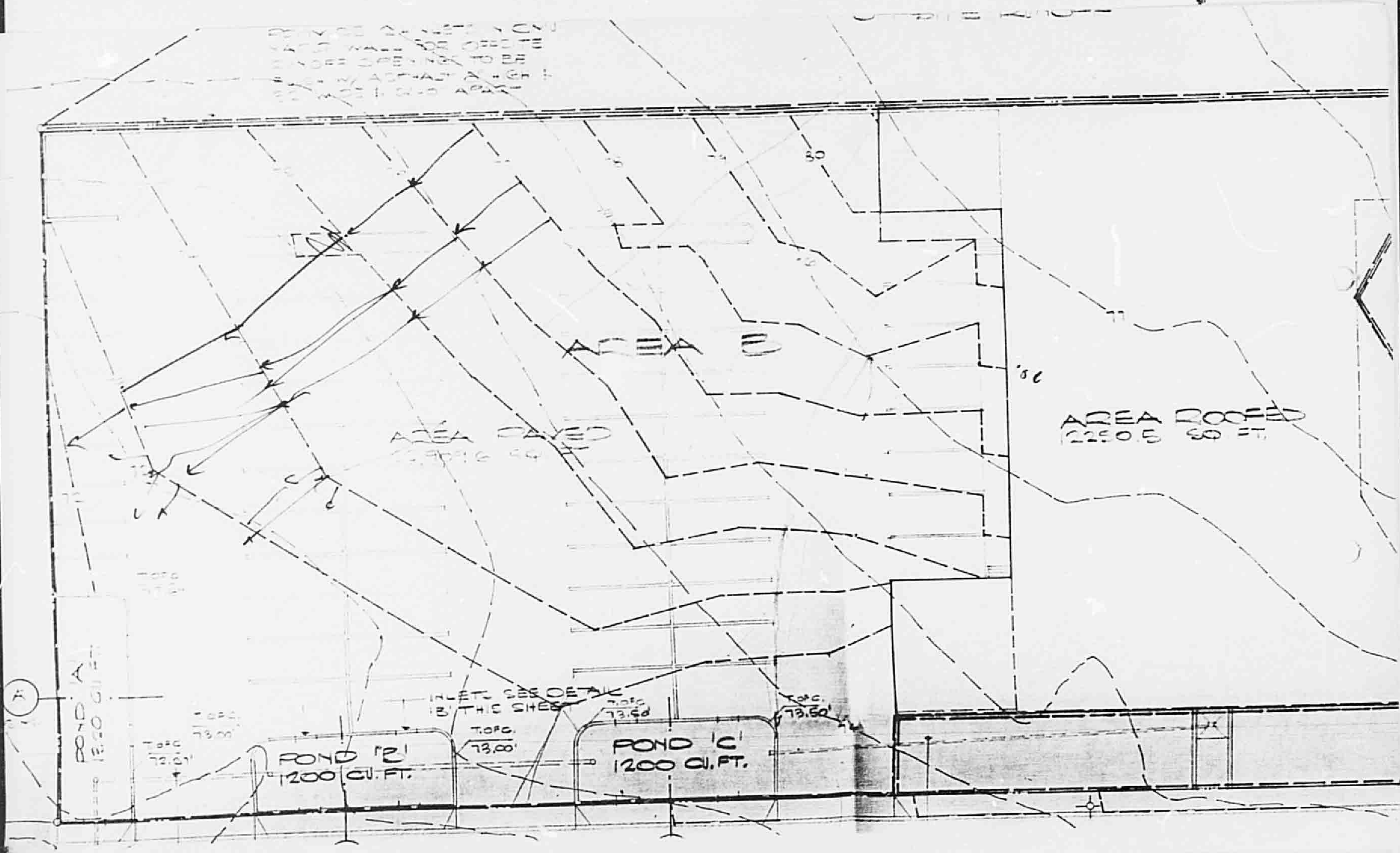
Vicinity Map	So;Sec-21A6
Grading Plan (See grading plan checklist)	
Indication of all easements and ROW	So;Sec-21A5,b&c
Outlined internal contributory drainage areas	So;Sec-21B 80-15;Sec-7B

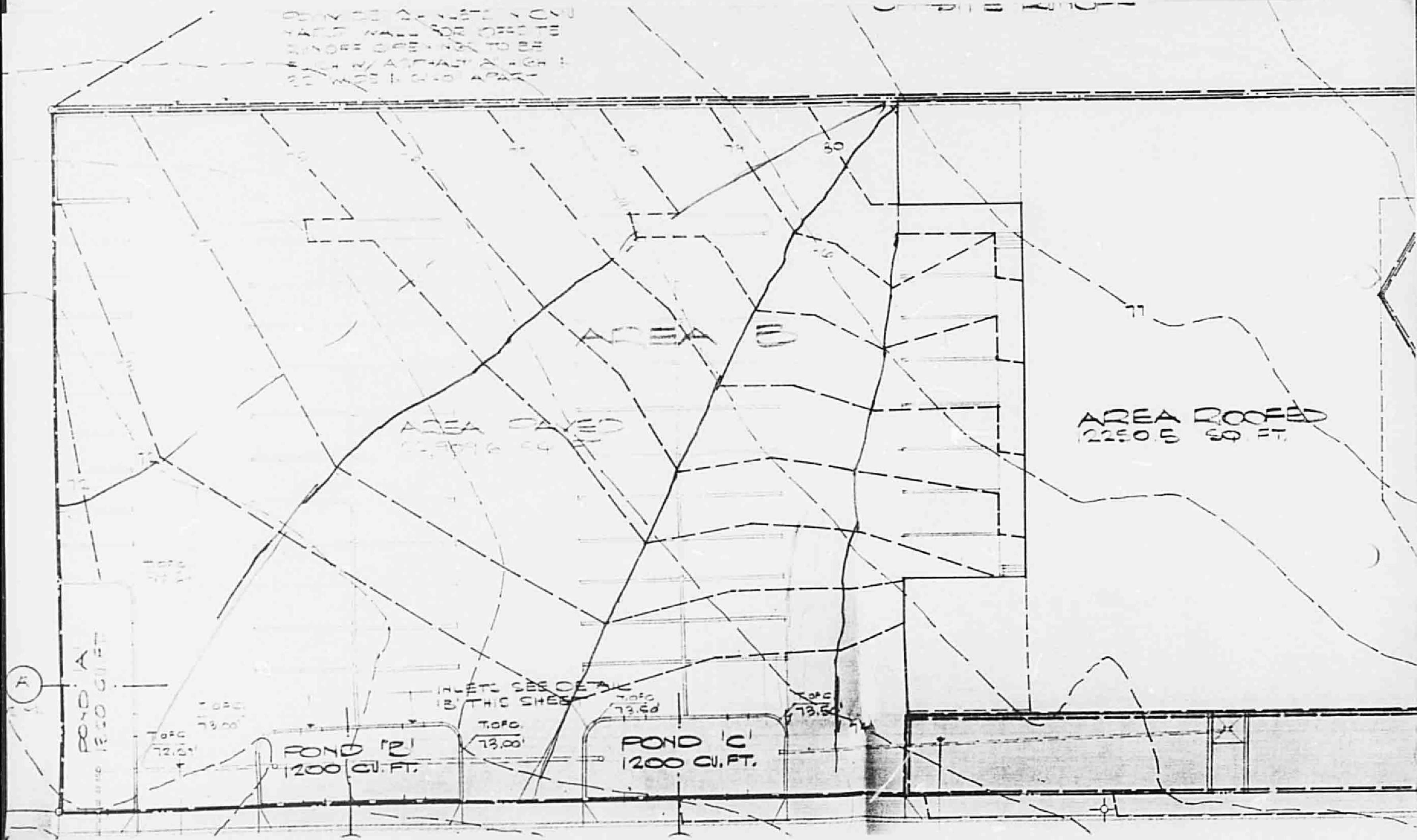
Roof drainage	SO;Sec-21B 80-15;Sec-7B
Flow lines defined by arrows	SO;Sec-21B 80-15;Sec-7B
Details of ponds, swales,etc.	SO;Sec-21B 80-15;Sec-7B
Standard City drivepad and curb cuts	SO;Sec-21B

Grading Plan Checklist

Vicinity Map & Legal Description	SO;Sec-21A6
Reference benchmark description	SO;Sec-21A3
Ground elevation etc.	SO;Sec-21A5,e 80-15;Sec-7A
Existing contours 10 feet beyond property line	SO;Sec-21A5,e-1 80-15;Sec-7A
Proposed elevations	SO;Sec-21A11 80-15;Sec-7A
Finish floor elevations	SO;Sec-21A11 80-15;Sec-7A
Notes defining asphalc,sidewalks,etc.	80-15;Sec-7A SO;Sec-21A5,d&g
Slopes(cut or fill) etc.	80-15;Sec-5
Retaining wall required when vertical grade change greater than 18" is anticipated	80-15;Sec-7A
Elevation of property line at least 0.33 feet above top of curb	SO;Sec-21B

SO - City of Albuquerque Subdivision Ordinance
80-15 - AMAFCA Resolution 80-15


AREA ROOFED
12250.5 SQ. FT.
AREA B
AREA PAVED
INLETS SEE DETAIL
'B' THIS SHEET
T.OF C.
73.50'
T.OF C.
73.50'
T.OF C.
73.00'
T.OF C.
73.00'
T.OF C.
73.01'
POND 'C'
1200 CU. FT.
POND 'B'
1200 CU. FT.
POND 'A'
1200 CU. FT.
A
80


AREA ROOFED
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POND 'B'
1200 CU. FT.
POND 'C'
1200 CU. FT.
T.OF.C.
73.00'
73.50'
A

0857

DRAINAGE REPORT

for

UNITED BLOOD SERVICES

in

ALBUQUERQUE, NEW MEXICO

Prepared by
A & E Engineering

Undeveloped Area

A = 0.72 acres h = 7 ft. L = 0.063 mi.
t_c = 0.522 x 60 = 3.13 min. I = 5.40 C = 0.40

$\therefore t_c$ = 10 min.

Q = C.I.A. = 0.40 x 5.40 x 0.72 = 1.55 cfs

The offsite runoff shall flow across the proposed parking lot by means of a swale and shall discharge in the ponds. The ponds will allow for the runoff to flow in similar manner as its existing conditions.

AREA "A" OFFSITE UNDEVELOPED Q (runoff)

Q = C.I.A. (rational formula method)

$t_c = \frac{(11.2\ (L)^3)}{(H)}^{0.385} = \frac{(11.2\ (0.0663)^3}{(7)}^{0.385}$ = .0522 x 60 min.

$I = \frac{189}{t_c + 25} = \frac{189}{10 + 25}$ = 5.40

A = 0.72 acres = 3.13 min (time of concentraction: Use 10 min.

Q = (0.4) (5.4) (0.72) = 1.55 cfs or pg. 1 for area "A" only.

AREA "B" ONSITE UNDEVELOPED Q

$0.4 \times \frac{2.4}{12} \times 37{,}772.37 = 3021.78$ cf

Onsite Developed

Impervious Area: (roof & paving)

$0.9 \times \frac{2.4}{12} \times 33{,}270 = 5988.60$ cf

Pervious Area (33,270 sf)

$0.4 \times \frac{2.4}{12} \times 33{,}270.0$ sf = 2661.6 cf.

Ponds "A""B" "C" Volume
"A" 15' x 44' x 2' = 1320 cf
"B" 15' x 40' x 2.5' = 1500 cf
"C" 15' x 40' x 2' = 1200 cf
4020 cf

Volume req.to be ponded
5988.6 - 2661.6 = 3327.0 cf.

Note: Area"B" has an excess of 393 cf.

AREA "C" ONSITE UNDEVELOPED Q (TOTAL AREA)

$0.4 \times \frac{2.4}{12} \times 17{,}851 = 1428.0$ c.f.

DRAINAGE REPORT

FOR

UNITED BLOOD SERVICES

ALBUQUERQUE, NEW MEXICO

RECEIVED
APR 20 1981
CITY ENGINEER

PREPARED FOR:

UNITED BLOOD SERVICES
DIVISION OF BLOOD SYSTEMS
1515 UNIVERSITY BOULEVARD
ALBUQUERQUE, NEW MEXICO

PREPARED BY:

A & E ENGINEERING, INC.
1330 SAN PEDRO NE - SUITE 114
ALBUQUERQUE, NEW MEXICO 87110

APRIL 15, 1981

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR No. 2933 NEW MEXICO T. M. CONRARDY

THEODORE M. CONRARDY
REGISTERED PROFESSIONAL
ENGINEER NO. 2933

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

April 15, 1981

Antoine Predock
300 12 NW
Albuquerque, New Mexico

RE: UNITED BLOOD SERVICES - DIVISION OF BLOOD SYSTEMS

Dear Sir:

We are transmitting this drainage report for Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc. in Albuquerque, New Mexico. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with the present City of Albuquerque drainage policies.

We do appreciate this opportunity to serve you and if any questions develop, we will be available to assist you in any responses regarding this report.

Very truly yours,

A & E ENGINEERING, INC.

JFE:mhe

John F. Esquibel, President

ALBUQUERQUE, NEW MEXICO 87110 505/266-0791

DRAINAGE REPORT

TABLE OF CONTENTS

GENERAL:

This drainage report consists of a hydrologic study of a probable 100-year storm affecting the proposed development on a portion of Lot 3 of the replat of a portion of Tract "A", Land of Fundamentals Inc.

LOCATION AND DESCRIPTION:

The property under study is a parcel of land zoned C-3 Fundamentals Inc., and contains approximately 2.98 acres. It is located on University Boulevard approximately 1200 feet north of the intersection of University Boulevard and Indian School Road. This property is more particularly described as Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc.

The existing terrain for the parcel slopes to the west at about 4.5% grade.

PROPOSED DEVELOPMENT:

This parcel of land is to be developed into The United Blood Services. It will be graded, paved and landscaped to shed storm water off the property, so that the runoff drains into proposed ponds and shall be controlled in a similar manner as existing conditions.

PROPOSED DRAINAGE PLAN:

In order to control offsite and onsite runoff of this development, the area has been designed with grades, landscaped area and ponds to collect the runoff.

The drainage has been divided into three (3) drainage areas to prevent concentration of runoff at only one point. (See plate 1 drainage plan).

Drainage area "A" (offsite drainage from undeveloped parcels directly north and east) affecting this project shall flow across the proposed parking lot by means of a swale and shall discharge in

similar manner to the existing conditions. Drainage area "B" the paved area west of the building and the building roof both drain into three (3) ponds located along the south side of the southwest corner of the parking lot. Excess runoff will discharge over the ponds and will be controlled in a similar manner to the existing conditions.

The drainage from Area "C", area in front of building, shall flow into Pond"D" located in center of circular donor's parking lot and any excess will flow into University Boulevard.

DISCUSSION OF METHOD:

The development of this area will be controlled by the guidelines set forth in the recent Resolution of the Albuquerque Metropolitan Arroyo Flood Control Authority and the City of Albuquerque.

The amount of storm water is computed by using a 100-year storm, this being a storm consisting of 100-year 6 hours precipitation as shown by the rainfall frequency maps for New Mexico, June 1967, published by the Special Studies Branch, Office of Hydrology, United States Weather Bureau.

The pond area was calculated so that the volume of water ponded would equal the volume of runoff produced by the development.

OFFSITE DRAINAGE CALCULATIONS:

The quantity of offsite runoff that will flow into the west half of this property parking lot was determined by using the rational formula:

$$Q = C.I.A. \quad \text{(Rational formula method)}$$

$$t_c = \frac{(11.2 \ (L)^3)^{0.385}}{H}$$

$$I = \frac{189}{t_c + 25} \quad \text{(100 yr. frequency)}$$

Undeveloped Area

A = 1.68 acres H = 7 ft. L = 0.0663 mi.
t_c = 0.0522 x 60 = 3.13 min. I= 7.55 C = 0.40

Q = C.I.A. = 0.40 x 7.55 x 1.68 = 4.50 c.f.s.

The offsite runoff shall flow across the proposed parking lot by means of a swale and shall discharge in the ponds. The ponds will allow for the runoff to flow in similar manner as its existing conditions.

AREA "A" OFFSITE UNDEVELOPED Q (runoff)

Q = C.I.A. (rational formula method)

$$I = \frac{189}{t_c + 25} = \frac{189}{3.13 + 25} = 6.7$$

$$t_c = \left(\frac{11.2\ (L)^3}{H}\right) .385 = \left(\frac{11.2\ (0.0663)^3}{7}\right) .385 = .0522 \times 60 \text{ min.}$$

A = 1.68 acres = 3.13 min (time of concentration)

Q = (0.4) (6.7) (1.68) = 4.50 c.f.s. or pg. 1 for area "A" only.

AREA "B" ONSITE UNDEVELOPED Q

$$0.4 \times \frac{2.4}{12} \times 37{,}772.37 = 3021.78 \text{ c.f.}$$

Onsite Developed

Impervious Area: (roof & paving)

$$0.9 \times \frac{2.4}{12} \times 33{,}270 = 5988.60 \text{ c.f.}$$

Ponds "A", "B", "C" Volume

"A" 15' x 44' x 2' = 1320 c.f.
"B" 15' x 40' x 2' = 1200 c.f.
"C" 15' x 40' x 2' = 1200 c.f.
3720 c.f.

AREA "C" ONSITE UNDEVELOPED Q

$$0.4 \times \frac{2.4}{12} \times 17{,}851 = 1428.0 \text{ c.f.}$$

Onsite Developed

Impervious Area: (paving)

$0.9 \times \frac{2.4}{12} \times 7148 = 1286.64$ c.f.

Landscape Area

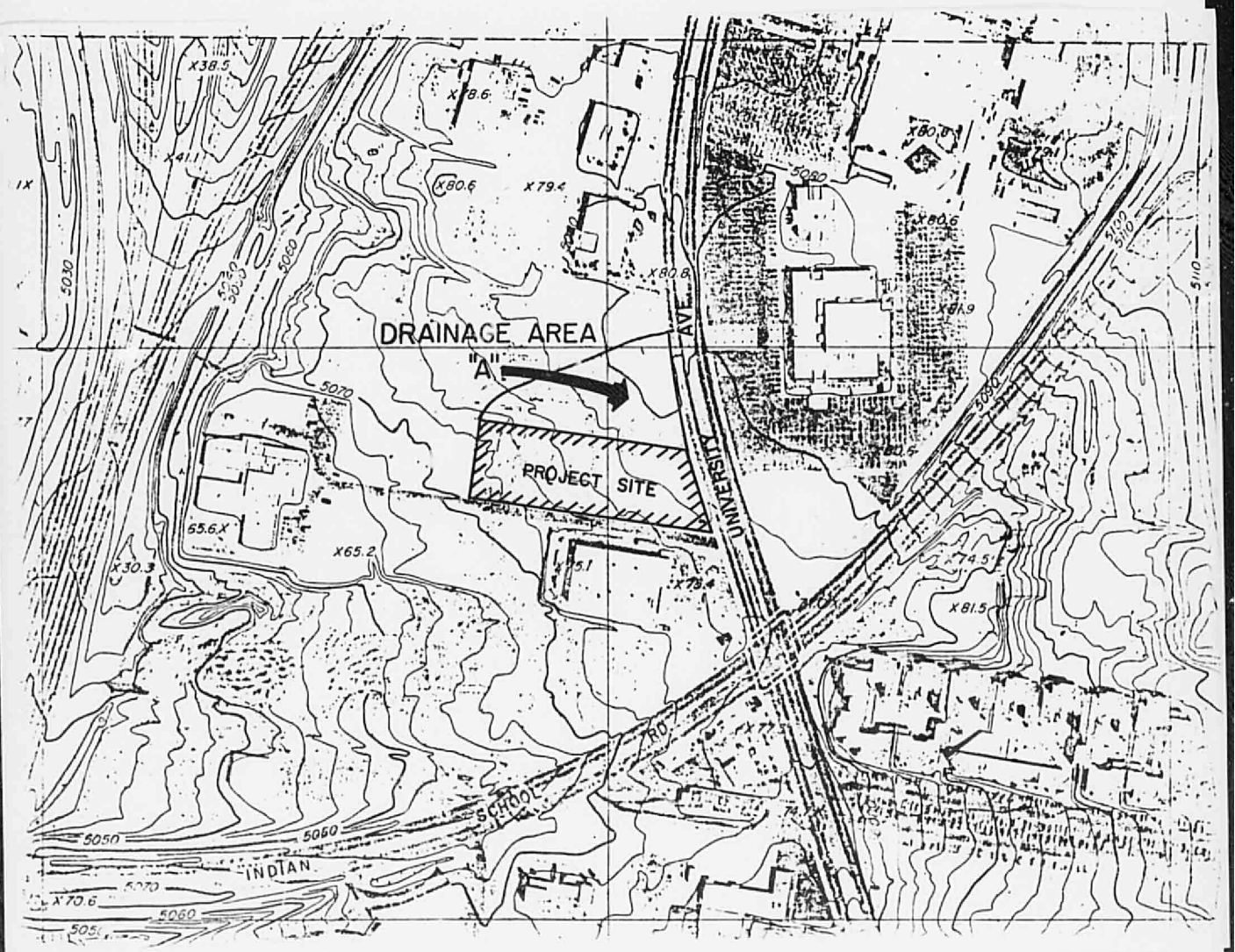
$0.4 \times \frac{2.4}{12} \times 10{,}703 = 856.24$ c.f.

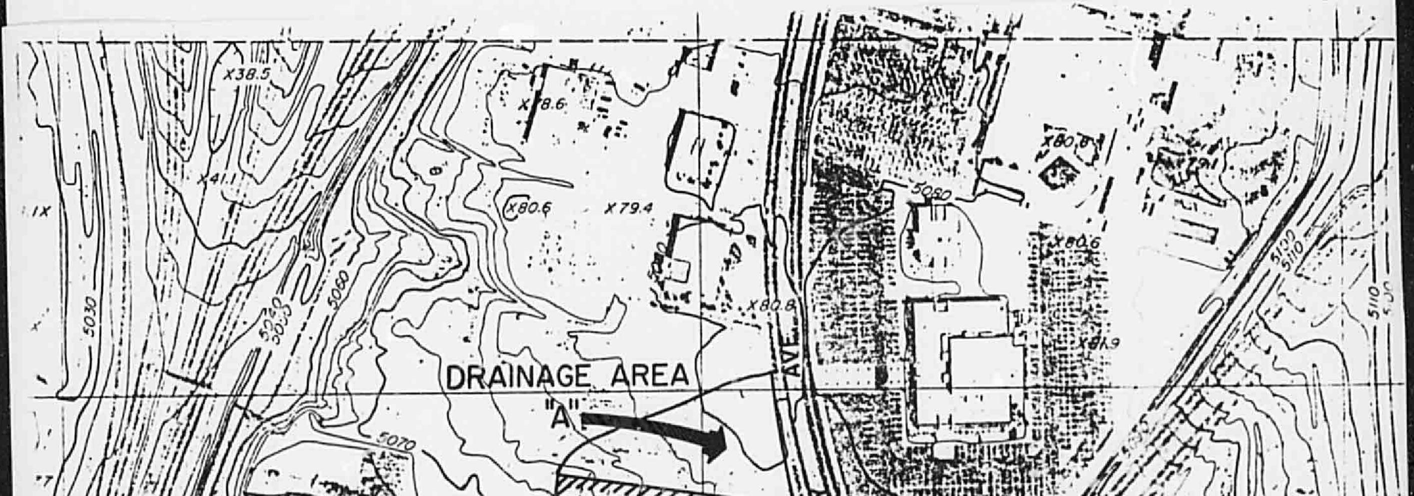
Pond "D" Volume

$15^2 \times \pi = 707$ c.f.

SUMMARY:

It is recommended that this development be approved since the computations show that the proposed design is adequate to satisfactorily handle a 100-year storm.


DRAINAGE AREA
"A"
PROJECT SITE
UNIVERSITY AVE
INDIAN SCHOOL RD
5030
5040
5050
5060
5070
5080
5090
5100
5110
X38.5
X41.1
X78.6
X80.6
X79.4
X80.8
X80.6
X81.9
X80.5
X74.5
X81.5
X65.2
X30.3
X70.6


DRAINAGE AREA
"A"
PROJECT SITE
UNIVERSITY
AVE.
SCHOOL
RD.
INDIAN
5050
5060
5070
5080
5030
X38.5
X41.1
X80.6
X79.4
X80.8
X65.2
65.6 X
X30.3
X70.6

0869

DRAINAGE REPORT

for

ALBUQUERQUE, NEW MEXICO

Prepared by
A & E Engineering

1. Ponds for 10 year storm.
2. Positive discharge of ponds. 5 year underdrain
3. Pond in parking lot.
4. Slope for Pond D pond control, and detail of perforation).
   24 hour drain design.
5. Optional curb & gutter at Pond "D" wave protection requirement.
6. Design at opening at parking lot (1st pond) guided properly.
7. Roof drainage controlled by scuppers
8. gravel to hold irrigation water.

DRAINAGE REPORT

FOR

UNITED BLOOD SERVICES

ALBUQUERQUE, NEW MEXICO

PREPARED FOR:

UNITED BLOOD SERVICES
DIVISION OF BLOOD SYSTEMS
1515 UNIVERSITY BOULEVARD
ALBUQUERQUE, NEW MEXICO

PREPARED BY:

A & E ENGINEERING, INC.
1330 SAN PEDRO NE - SUITE 114
ALBUQUERQUE, NEW MEXICO 87110

APRIL 15, 1981

THEODORE M. CONRARDY
REGISTERED PROFESSIONAL
ENGINEER NO. 2933

A&E ENGINEERING INC.
CIVIL ENGINEERING, LAND PLANNING, AND SURVEYING

April 15, 1981

Antoine Predock
300 12 NW
Albuquerque, New Mexico

RE: UNITED BLOOD SERVICES - DIVISION OF BLOOD SYSTEMS

Dear Sir:

We are transmitting this drainage report for Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc. in Albuquerque, New Mexico. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with the present City of Albuquerque drainage policies.

We do appreciate this opportunity to serve you and if any questions develop, we will be available to assist you in any responses regarding this report.

Very truly yours,

A & E ENGINEERING, INC.

John F. Esquibel, President

JFE:mhe

ALBUQUERQUE, NEW MEXICO 87110 505/266-8791

DRAINAGE REPORT

TABLE OF CONTENTS

GENERAL:

This drainage report consists of a hydrologic study of a probable 100-year storm affecting the proposed development on a portion of Lot 3 of the replat of a portion of Tract "A", Land of Fundamentals Inc.

LOCATION AND DESCRIPTION:

The property under study is a parcel of land zoned C-3 Fundamentals Inc., and contains approximately 2.98 acres. It is located on University Boulevard approximately 1200 feet north of the intersection of University Boulevard and Indian School Road. This property is more particularly described as Lot 3 of the replat portion of Tract "A", Land of Fundamentals, Inc.

The existing terrain for the parcel slopes to the west at about 4.5% grade.

PROPOSED DEVELOPMENT:

This parcel of land is to be developed into The United Blood Services. It will be graded, paved and landscaped to shed storm water off the property, so that the runoff drains into proposed ponds and shall be controlled in a similar manner as existing conditions.

PROPOSED DRAINAGE PLAN:

In order to control offsite and onsite runoff of this development, the area has been designed with grades, landscaped area and ponds to collect the runoff.

The drainage has been divided into three (3) drainage areas to prevent concentration of runoff at only one point. (See plate 1 drainage plan).

Drainage area "A" (offsite drainage from undeveloped parcels directly north and east) affecting this project shall flow across the proposed parking lot by means of a swale and shall discharge in

similar manner to the existing conditions. Drainage area "B" the paved area west of the building and the building roof both drain into three (3) ponds located along the south side of the southwest corner of the parking lot. Excess runoff will discharge over the ponds and will be controlled in a similar manner to the existing conditions.

The drainage from Area "C", area in front of building, shall flow into Pond"D" located in center of circular donor's parking lot and any excess will flow into University Boulevard.

DISCUSSION OF METHOD:

The development of this area will be controlled by the guidelines set forth in the recent Resolution of the Albuquerque Metropolitan Arroyo Flood Control Authority and the City of Albuquerque.

The amount of storm water is computed by using a 100-year storm, this being a storm consisting of 100-year 6 hours precipitation as shown by the rainfall frequency maps for New Mexico, June 1967, published by the Special Studies Branch, Office of Hydrology, United States Weather Bureau.

The pond area was calculated so that the volume of water ponded would equal the volume of runoff produced by the development.

OFFSITE DRAINAGE CALCULATIONS:

The quantity of offsite runoff that will flow into the west half of this property parking lot was determined by using the rational formula:

$$Q = C.I.A. \quad \text{(Rational formula method)}$$

$$t_c = \left(\frac{11.2\ (L)^3}{H}\right)^{0.385}$$

$$I = \frac{189}{t_c + 25} \quad \text{(100 yr. frequency)}$$

Undeveloped Area

A = 1.68 acres H = 7 ft. L = 0.0663 mi.
t_c = 0.0522 x 60 = 3.13 min. I= 7.55 C = 0.40

Q = C.I.A. = 0.40 x 7.55 x 1.68 = 4.50 c.f.s.

The offsite runoff shall flow across the proposed parking lot by means of a swale and shall discharge in the ponds. The ponds will allow for the runoff to flow in similar manner as its existing conditions.

AREA "A" OFFSITE UNDEVELOPED Q (runoff)

Q = C.I.A. (rational formula method)

$$I = \frac{189}{t_c + 25} = \frac{189}{3.13 + 25} = 6.7$$

$$t_c = \left(\frac{11.2\ (L)^3}{H}\right)^{0.385} = \left(\frac{11.2\ (0.0663)^3}{7}\right)^{0.385} = .0522 \times 60 \text{ min.}$$

= 3.13 min (time of concentration)

A = 1.68 acres

Q = (0.4) (6.7) (1.68) = 4.50 c.f.s. or pg. 1 for area "A" only.

AREA "B" ONSITE UNDEVELOPED Q

$$0.4 \times \frac{2.4}{12} \times 37{,}772.37 = 3021.78 \text{ c.f.}$$

Onsite Developed

Impervious Area: (roof & paving)

$$0.9 \times \frac{2.4}{12} \times 33{,}270 = 5988.60 \text{ c.f.}$$

Previous Area (33,270 SF)

$$0.4 \times \frac{2.4}{12} \times 33{,}270.0 \text{ SF} = 2661.6 \text{ cf}$$

Volume read to be ponded
5988.6 - 2661.6 = 3327.0 cf

Ponds "A", "B", "C" Volume

"A" 15' x 44' x 2' = 1320 c.f.
"B" 15' x 40' x 2.5 = 1500 c.f.
"C" 15' x 40' x 2' = 1200 c.f.
4020 c.f.

Note: Area "B" has an excess of 393 cf.

AREA "C" ONSITE UNDEVELOPED Q (TOTAL AREA)

$$0.4 \times \frac{2.4}{12} \times 17{,}851 = 1428.0 \text{ c.f.}$$

Revised 6'30 8'

Onsite Developed

Impervious Area: Paving

$0.9 \times \frac{2.4}{12} \times 7148 = 1286.64$ c.f.

Landscape Area

$0.4 \times \frac{2.4}{12} \times 10{,}703 = 856.24$ c.f.

Undeveloped AREa: (7148) cf

$0.4 \times \frac{2.4}{12} \times 7148\text{sf} = 571.8$ c.f.

V dev. = 1286.6

V underdev. = 571.8

V reqd. to be ponded = 714.8 c.f.

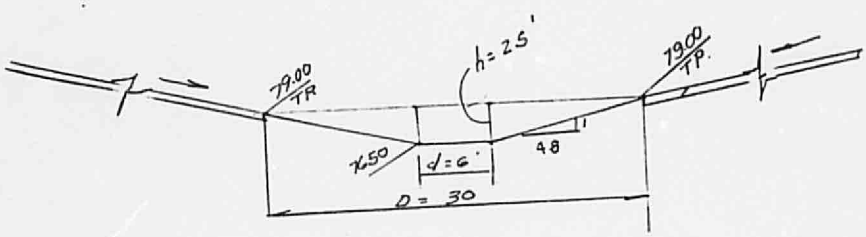
Pond "D" Volume

$V = 0.2618 \times h(D^2 + Dd + d^2)$

$h = 2.50$

$V = 0.2618 \times 2.50 \times 1116 = 730.4$ cu. ft.

Area "C" has ponding capacity of 730.4 cf. which has an excess of (730.4 cf. - 714.8 cf.) = 15.6 cf.



POND "D" Detail

Revised 6-30-81

Hydraulic Calculations
For 2" pvc drain pipe

$L = 88'$

$H_s = H_1 - H_2 = 71.30 - 71.0 = 0.8$

$S = \frac{0.80}{88'} = 0.010$

Area = $16.7' \times 6.4' = 106.9\,sf / 43560\,sf = 0.002$ Acres

$Q = C\,i\,A$ $\quad t_c = 10.\ min \quad i = 5.4$

$Q = 0.9\,(5.4)(0.002) = 0.01\ cfs$

$V = 1.318 \cdot C\, R^{0.63} S^{0.54} \qquad R = A/P = 0.04$

$V = 1.318(1.50)(0.04)^{0.63}(0.01)^{0.54}$

$V = 0.02\ fps$

$Q = A \cdot V$

$0.001 = \frac{\pi D^2}{4}(0.02) \qquad D = 0.039"$

Therefore a 2" pvc will handle the flow created by this sump area.

The plans call for a 2" pvc to be installed.

6/30/81

Hydraulics Calculations Ponds

The ponds have been designed as a changing rate orifice retention basin for a 100 year frequency storm. The storm water will drain from the pond at a maximum rate equivalent to a 5-year (Q_5) storm calculated for the undeveloped condition.

Total Area; that was undeveloped = 1.306 Acres

$H = 79.0 - 71.0 = 8.0'$
$L = 0.073$ miles
$C = 0.40$

From: Noaa Hydrological curves - 2 Vol. 4

$i = 3.43$

$Q_{allow} = Q_5 = CIA$

$Q_5 = 0.4\ (3.43)\ (1.306) = \underline{1.79\ cfs}$

Therefore the flow of $Q_5 = 1.79$ cfs will be used to design the outlet spillway openings for the ponds A, B & C

By Weir approach ($Q = 3.33\ L\ H^{3/2}$)

$L = Q / 3.33\ H^{3/2} = \frac{1.79}{3.33\ (0.5)^{1.5}}$

$L = 1.79 / 1.18 = 1.51\ H.$

The plans call for the openings on the drainage plan, to be 1.75 feet by 6" min.

6/30/80

AREA "A" Offsite (Plate "A")

Orfice inlets along north wall.

$Q = 4.50$ cfs (Area "A" runoff

By weir approach

$$Q = 3.33 L H^{3/2}$$

$$L = Q/3.33 \, H^{1/2} \quad \text{(when } H = 0.67 \text{ or } (8")\text{)}$$

$$L = \frac{4.50}{3.33} (0.67)^{3/2} = 1.03 \text{ ft min}$$

Therefore by using two openings; 2.67' by 0.67' as shown on the plans it will cause flow to flow into the parking lot at least 4 times easier and openings can handle as much as flow that will be genereated by Area "A"

AREA B1P (plate "B")

AREA B1P is the western most part of the parking lot. The flow generated by this parking lot and the offsite of 4.50 cfs.

Flow or runoff generated by this portion of the parking lot is equal to:

$Q = cia$ $\quad a = 10010 \text{ SF} = 0.216 \text{ Acres}$

$c = 0.90$

$H = H_2 - H_1 = 78.0 - 70.9 = 7.1$ ft.

$t_c = 10$ min

$$I = \frac{109}{t_c + 25} = 5.40$$

$$Q_{B1P} = 0.9(5.40)(2.16) = 1.05 \text{ cfs}$$

6/30/81

The design of the inlet orfices into pond "A" is calculated for the worst condition, this being for the maximum flow condition of a $Q_{offsite}$ = 4.50 cfs and onsite flow from the Parking lot Area A_{1P} equal to 1.05 cfs for a maximum Q_{1P} = 5.55 cfs

Pond entrance (Submerged orfice)

$V = C_v \sqrt{2gh}$

$C_v = 0.82$

$g = 32.2$ fps

$\Delta h = h = 71.0 - 70.0 = 1.0'$

$V = 0.82 \sqrt{2(32.2)(1)}$

$V = 6.58$ fps

$Q = A \cdot V$

$A = Q/V = 5.55/6.58 = 0.84$ SF.

Depth = 0.5'

Width (W) = $0.84'/0.5 = \underline{1.68'}$ min

Note. We have designed a total of 3 openings in pond "A". all four (4.0) wide by 0.5' deep. These openings will handle the flow that will flow into this pond.

Area B_{1P} also has an additional parking lot surface storage of 1650SF x 0.5 = 825 cu.ft. Therefore the total ponding capacity of pond "A" and the Parking lot is equal to 1320 + 825 = 2145 cu.ft. Area A_{1P} generates a total of $0.9 \times \frac{2.4}{12} \times 10,010$SF = 1802 cu. ft. Therefore we have an excess of 343 cu.ft ponding Capacity for Area B_{1P}.

3'D

6/30/18

AREA B2P

Area B2P is the center portion of the parking lot which drains into pond "B"

Volume = $0.9 \times \frac{2.4}{12} \times 8100\,sf = 1458.0\ cuft$

Pond "B" Capacity = $40' \times 15' \times 2.5' = \underline{1500\ cu\,ft}$.

$Q_{2P} = CiA$

$= 0.9(5.4)\left(\frac{8100}{43560}\right) = 0.90$ cfs.

$h = h_2 - h_1 = 73 - 72.0 = 1'$

Pond entrance

$V = Cu\sqrt{2gh} = 0.82(\sqrt{2(32.2)1}) = 6.58$

$A = Q/V = 0.90/6.58 = 0.137\ SF$

Depth = 0.5'

Width = $0.137/0.5 = 0.27\ ft$

The 4' openings will allow for water to flow into pond without causing excess ponding on the parking lot area.

AREA B3P (EAST side of Parking lot.)

Voulume = $0.9 \times \frac{2.4}{12} \times 6771\,sf = 1219\ cuft$

pond "C" capacity is equal to 1260 cuFt

The Openings will allow for water to flow into Pond "C" without ponding on the parking lot area.

6/30/81

SUMMARY:

It is recommended that this development be approved since the computations show that the proposed design is adequate to satisfactorily handle a 100-year storm.

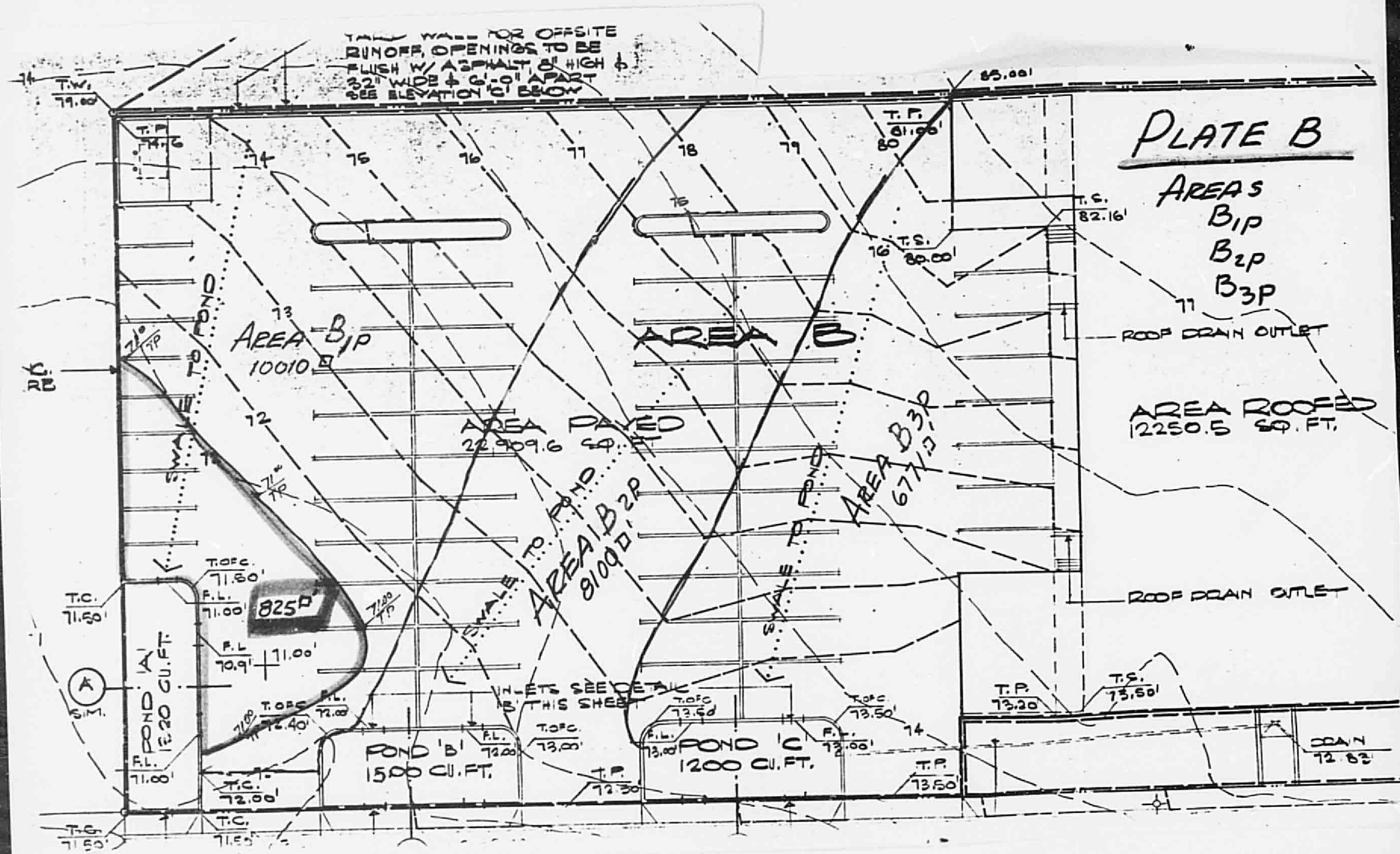


PLATE B
AREAS
B_{1P}
B_{2P}
B_{3P}
AREA B
AREA B_{1P}
10010 □
AREA PAVED
22,909.6 SQ. FT.
AREA B_{2P}
8100 □'
AREA B_{3P}
6771 □
AREA ROOFED
12250.5 SQ. FT.
ROOF DRAIN OUTLET
ROOF DRAIN OUTLET
SWALE TO POND
SWALE TO POND
SWALE TO POND
825P
POND 'A'
1220 CU. FT.
POND 'B'
1500 CU. FT.
POND 'C'
1200 CU. FT.
INLETS SEE DETAIL
'B' THIS SHEET
WALL FOR OFFSITE
RUNOFF, OPENINGS TO BE
FLUSH W/ ASPHALT, 8" HIGH &
32" WIDE & 6'-0" APART
SEE ELEVATION 'C' BELOW
T.W.
79.00'
85.00'
T.P.
81.00'
T.S.
82.16'
T.S.
80.00'
T.S.
73.50'
T.P.
73.20
T.P.
73.50
T.P.
72.30
DRAIN
72.83
T.OF C.
71.50'
F.L.
71.00'
F.L.
70.9'
11.00'
T.OF C.
72.40'
F.L.
72.00
F.L.
72.00
T.OF C.
73.00'
T.OF C.
73.50'
F.L.
73.00'
T.OF C.
73.50'
F.L.
73.00'
F.L.
71.00'
T.C.
71.50'
T.C.
72.00'
T.C.
71.50'
T.C.
71.50'
SIM.
RB

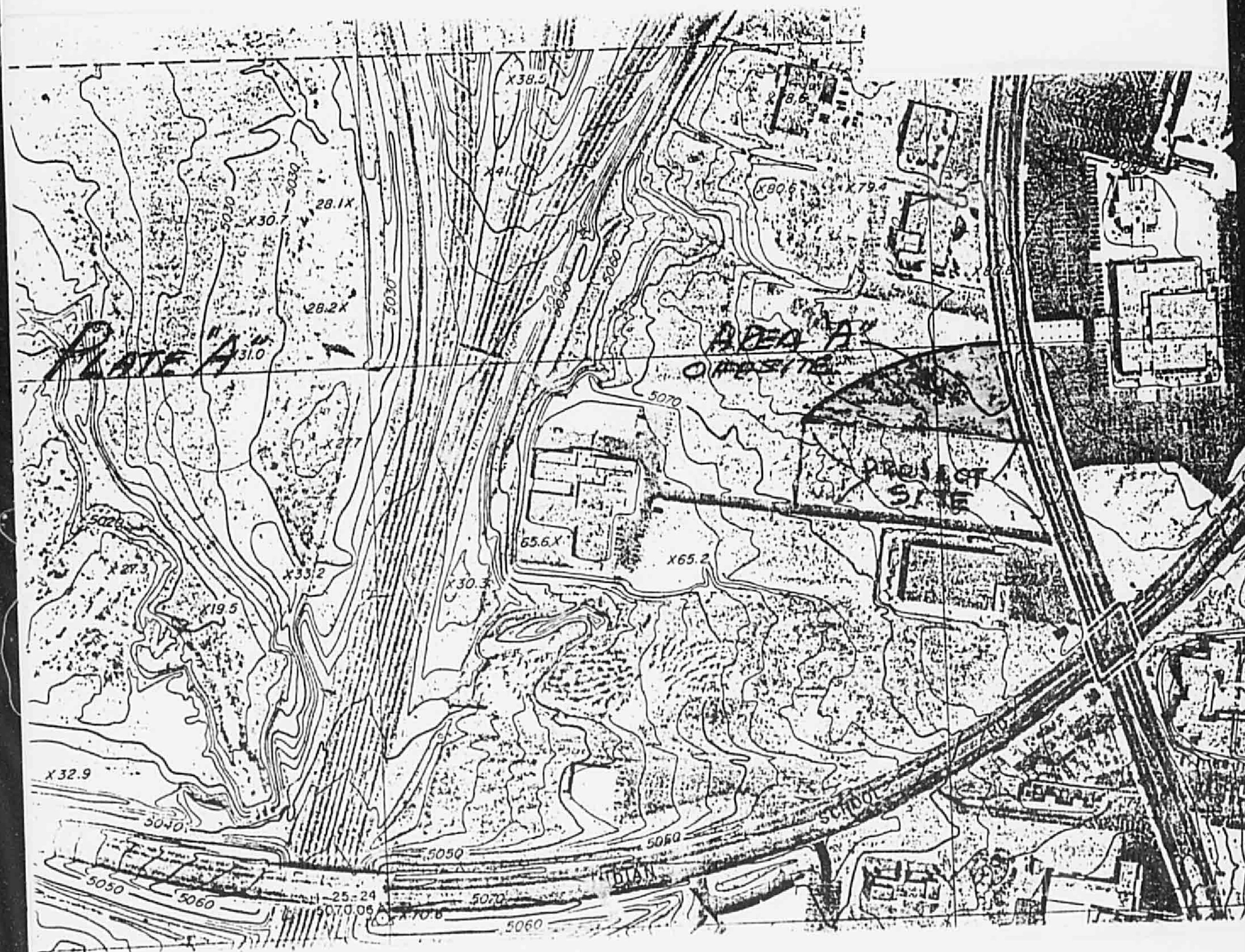


PLATE "A"
AREA "A"
OFFSITE
PROJECT SITE
SCHOOL
5020
5030
5040
5050
5060
5070
X38.5
X80.6
X79.4
X30.7
28.1X
28.2X
31.0
X27.7
X33.2
X30.3
65.6X
X65.2
X27.3
X19.5
X32.9