HYDROLOGY F17/D1 TWO PLAN

F17-D1

2 PLANS

March 24, 1972

Mr. Erwin F. Hensch
Director of Public Works
City of Albuquerque
Albuquerque, New Mexico

Dear Mr. Hensch:

We are sending two (2) copies of the Utilities Plan for Albuquerque II Montgomery Apartments for your consideration and approval.

The 6" water main connected to existing City line in the northeast corner of the property is being looped with the existing 6" water main in the north side of Montgomery Boulevard.

The construction of the 6" water main will be accomplished by the Kassuba Development Company, the owner of the above mentioned property. The constructed lines with easements as shown will be dedicated to the City of Albuquerque. The easement for the water lines and fire hydrants will be provided on the Land Division Map.

We would appreciate any comments you may have regarding the plans.

Very truly yours,

R. R. Gibson
Chief Engineer

RRG:mec

Enclosure

cc: Mr. Larry Coleman

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD., N. E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

July 13, 1972

Mr. Erwin F. Hensch
Director of Public Works
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. Q. R. Kielich

Regarding: Kassuba II Apartments
Montgomery Boulevard

Dear Sir:

Enclosed herewith are two additional copies of the drainage report on Kassuba II as submitted in March of this year. We are also enclosing a copy of the letter of submittal which accompanied these reports and the utility sheets for this project which were submitted at that time for your approval.

In the time interval since this drainage report was submitted, there have been changes in the accepted methods of draining individual developments to comply with new A.M.F.C.A. regulations. The developer will adjust the grading in the field during construction to provide for flow retention and infiltration in the landscaped areas to bring the proposed drainage in line with the above regulations.

Please expedite the processing of the estimate for engineering services and design as requested by Mr. Gibson, of our firm on behalf of our client, Walter T. Kassuba Development Corporation. The developer is anxious to initiate construction immediately on the project.

Your earliest attention will be appreciated. Please contact us if you have further questions or comments.

Very truly yours,

R. R. Gibson, P.E.
Chief Engineer

RRG/MNA

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Chief Engineer

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BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.
ENGINEERS & PHOTOGRAMMETRISTS
4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

Bob Francis
file with my plan.
M

December 12, 1972

Mr. John Keleher
c/o Hyder Eyestone Inc.
218 Gold S.W.
Albuquerque, New Mexico

RECEIVED
DEC 12
CITY ENGINEER

RE: Albuquerque Apartments
Glenwood Hills, Montgomery Boulevard.

Dear John:

I have made an examination of the revised site plan dated November 5, 1972 by Jerry Leonhardt for this development. I believe the revised plan meets the drainage criteria used in preparation of the plan covered in our drainage report of June 22, 1972.

The new plan reduces the buildings to 78 or about a 28% reduction. The courtyards may not be reduced quite as significantly but there is a reduction in paved area. The holding areas for drainage represented by shrubbery planting, courtyard planters, the swimming pool and other developments may be also partially reduced. The drives may have about a 15% reduction.

The reduction of units increases the grass areas by about 6% with a corresponding increase of on site retention and lowered runoff peaks.

It is my understanding that the roofs and courtyards will now be built to drain without retention and that all retention will be accomplished in the southwest corner of the property.

The amount of retention lost by draining two roofs and courtyards is approximately 1.19 acre feet. This is computed by adding the roof area of 51,880 square feet, the courtyards of 73,100 square feet and the holding area of 32,950 square feet, and applying a 4" rain. This is conservative in two ways. The holding areas will not be eliminated, but only cut down somewhat by the new design. Several planting areas will still be capable of holding runoff and the swimming pool will not retain runoff.

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

There is a very small possibility that a full 4" rain will fall on the site in any given 24 hour period.

The area designated in the southwest corner has a surface area of 31,400 square feet. If this area is shaped in a shallow depression of 3' depth with very flat side slopes of 6:1 or flatter, the retention volume will be approximately 1.3 acre feet. This will hold the runoff previously ponded on roofs and courtyards.

It is recommended that the changed site plan be approved because it will actually improve the drainage aspect of the development. The retention pond will be more effective in holding water than the roofs and courtyards and will also provide infiltration. The increased lawn area will increase retention times and also provide a certain amount of infiltration.

It is imperative that the infiltration and retention area on the southwest corner be constructed to impound a total depth of 3' or an average depth of 1'-6" over the surface area. This amount of retention will provide protection for the downstream owners. The retention will prevent increased peak flows and it will also prevent an increase in total runoff.

Very truly yours,

Raymond R. Gibson, P.E.& L.S.
Chief Engineer

cc: The Albuquerque Metropolitan Arroyo Flood Control Authority

Mr. Varne Kimmick
City of Albuquerque - Engineering Division

RRG/teg

Bob
MS

DRAINAGE REPORT

Albuquerque II

An Apartment Complex
in
City of Albuquerque, New Mexico

March 1972

Sponsor:
Kassuba Development Company
350 Royal Palmway Beach
Palm Beach, Florida 33480

Engineer:
Bohannan Westman Huston
& Associates, Inc.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico
Phone: 345-2681 87107

DRAINAGE REPORT

for

Albuquerque II

An Apartment Complex

in

City of Albuquerque, New Mexico

March 1972

Bohannan Westman Huston & Assoc. Inc.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico
Phone: 345-2681

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
NO. 3789
NEW MEXICO
RAYMOND R. GIBSON

Submitted by:

Raymond R. Gibson

INDEX

		Page
I	Purpose of the Report	1
II	Location	1
III	Terrain	1&2
IV	Soil	2
V	Vegetation	3
VI	Drainage Formula Selection	3
VII	Drainage Areas	3&4
VIII	Conclusions and Recommendations	4
IX	Drainage Analysis and Tables of Street Carrying Capacities	5,6,7, 8,9
X	Plates	10
XI	References	11

DRAINAGE REPORT

Albuquerque II

An Apartment Complex
in
City of Albuquerque, New Mexico

I. PURPOSE OF REPORT: The purpose of this report is to determine the amount of storm water within Albuquerque II, an apartment complex in the City of Albuquerque, New Mexico, and land adjacent thereto which may affect the addition, and to recommend the most satisfactory method for safely carrying this water through future inhabited areas without endangering life or property.

II. LOCATION: Albuquerque II, referenced above, is located in Section Thirty-five (35), Township Eleven North (T-11N), Range Three East (R-3E), New Mexico Principal Meridian in the north-easterly protion of the City of Albuquerque, Bernalillo County, New Mexico and is bounded as follows:

Montgomery Boulevard on the South;

Joe Azar and Don Erickson Apartment Complex on the North-West

D.D. Haynes' Estates and Verl H. Shrader's Estates on the South-West

30' City and Public Service Company easement on the North.

III. TERRAIN: The complex is located within seven miles of the foothills of the Sandia Mountains on the relatively constant slope of alluvial fans of dry arroyos discharging from these mountains.

The general slope of the land is from east to west with a grade of from 1 1/2% to 2 1/2%. The elevation varies from 5155 feet above mean sea level at the easterly boundary of the addition to 5131 feet at the westerly boundary. The terrain of the adjacent property to the east is approximately the same as the addition itself. All drainage to the south is intercepted by Montgomery Boulevard and discharged into storm sewers.

Existing drainage to the west is presently intercepted by the Azar and Erickson construction project with a block wall. Upon completion of the proposed improvements the drainage from this addition will be intercepted by paved drives draining north and discharging into an existing drainage ditch north of the property.

The property to the east of the addition owned also by the Kassuba Development Corp., presently drains as sheet flow to and across the addition with no definite drains or channels. However, after the completion of the improvements now under construction, the property will have the same drainage pattern as the proposed addition i.e. to the north and out to the existing drainage ditch.

IV. <u>SOIL</u>: No exact sieve analysis was run, but from visual inspection, the soil found within the addition is decayed granite of a sandy texture; The soil within the drainage area above and to the east of the addition is relatively the same as within the addition.

V. VEGETATION: The existing vegetation within the addition and adjacent thereto is sparse grass.

VI. DRAINAGE FORMULA SELECTION: There are several drainage formulas suitable for these calculations; namely the Burkli-Ziegler Formula, the Rational Formula, the Talbot Formula, the Unit Hydrograph and many others, done with well documented experiments of justification and others theoretical. The Rational Formula was selected for this report; for reasons of common usage, simplicity and accuracy. This formula is as follows:

$Q = C\ i\ A$, where

Q = Runoff = Peak discharge of water shed in cubic feet per second (c.f.s.) due to maximum storm assumed.

A = Area of watershed in acres.

C = Coefficient of Runoff

i = Intensity of rainfall in inches per hour based on concentration time.

Concentration Time = Time required for rain falling at most remote point to reach discharge point

The design storm of 100 years was used with the intensity taken from Master Plan of Drainage, City of Albuquerque, New Mexico and Environs. The Coefficient of runoff "C" has been selected as 0.50, an amount commonly used for developed areas.

VII DRAINAGE AREAS: There are no outside contributing drainage areas. All drainage is contained within the apartment complex area. For the purpose of this report all land, inside the boundaries of the Albuquerque II Apartment Complex, is assumed to be developed with

paved drives and parkings.

VIII. CONCLUSIONS AND RECOMMENDATIONS: The drainage analysis of the Albuquerque II Apartment Complex indicates that the provisions for drainage within the complex as shown on Plate II are adequate to provide for safe and positive handling of storm runoff waters throughout the area.

Plat 1 shows the area under consideration as it relates to the surrounding terrain and existing contours.

Plate 2 (sh. 1 & 2) is a general grading and drainage plan with internal drainage areas outline

Drainage Analysis Sheet gives a tabulation of drainage areas and their respective peak runoffs.

Table III shows carrying capacities of the proposed street cross-section (1 1/2" crown, 6" curbs) in relation to slope.

Table IV (sh. 1 & 2) gives the storm water carrying capacity of streets adjacent to the area.

It is necessary that the drives and parking areas within the Apartment Complex be constructed to the grades and elevations shown on Plate 2 Grading and Drainage Plan, in order to meet the discharge conditions given in Drainage Analysis.

It is recommended that the storm waters collected at the points shown on Plate 2 should be carried North and discharged to the existing drainage ditch. A suitable rundown with rock protection for bottom and sides should be built for that prupose. Details of such a rundown are shown on sh. 2, Plate 2.

DRAINAGE ANALYSIS

Rational Formula
(Q = cia)

SPONSOR:
Kassuba Development Corp.
Palm Beach, Florida

PROJECT Kassuba II Apartments in Albuquerque, N.M.

DATE: March 1972

By R. H. Walczak

Design Storm Frequency 100 yr.

"C" Value 0.50

Designation	"a" Area Acres	Length & Time Overland Flow	Length & Time Channel Flow	Total Time Min.	Intensity Inches per Hour "i"	Q cfs
A-1	0.84	500 @ 0.38% 16.5	40' @ 4% 0.10	16.6	4.49	1.89
A-2 4.23	3.39	—	390 @ 1.2% 1.24	17.8	4.30	3.09
A-3	3.00	500 @ 1.67% 13.0	740 @ 1.4% 2.16	21.2	4.00	6.00
A-4 11.33	2.93	—	720 @ 1.2% 2.29	23.4	3.82	11.33
A-5	5.46	—	720 @ 0.6% 3.15	26.6	3.60	20.50
B	1.06	100 @ 0.7% 12.3	405 @ 1.1% 1.42	13.7	4.75	2.52

Assumed: Overland Flow on "Poor Grass" maximum length 500'

"i" taken from Intensity-Duration-Frequency Curves for Albuquerque Area, Master Plan of Drainage.

UNIT No. Albuquerque II
Apartment Complex

Date March 3, 1972
By A.W.H.

No.	Channel Length Ft.	Slope S	$S^{1/2}$	Street Width Ft.	Area A Ft.	Hydr. Radius r	$r^{2/3}$	Velocity V Ft./Sec	Flow Time Min.
A-1	48	0.04	0.2	20	8.75	0.42	0.561	9.53	0.1
A-2	390	0.012	0.11	"	"	"	"	5.24	1.24
A-3	740	0.014	0.12	"	"	"	"	5.12	2.16
A-4	720	0.012	0.11	"	"	"	"	5.24	2.29
A-5	720	0.006	0.08	"	"	"	"	3.81	3.15
A, B	405	0.011	0.10	"	"	"	"	4.76	1.42

Manning Formula

$$v = \frac{1.486}{n} S^{1/2} r^{2/3}$$

Assumed:

$n = 0.0175$ for paved streets. $\frac{1.486}{0.0175} = 84.91$

Channel Flow (Street): 20' wide Face to Face of Curbs. Curbs 6" high. 1½" Crown

TABLE III

STREET CARRYING CAPACITIES

20' Street; 1½" Crown; 6" curbs.

slope	Q c.f.s.	slope	Q c.f.s.	slope	Q c.f.s.
0.0043	27.47	0.0067	34.21	0.0150	50.84
0.0045	27.91	0.0070	35.00	0.0175	55.04
0.0047	28.79	0.0075	36.22	0.0200	58.80
0.0050	29.57	0.0080	37.10	0.0225	62.48
0.0053	30.45	0.0085	38.32	0.0250	65.89
0.0057	31.24	0.0090	39.55	0.0275	69.21
0.0060	32.11	0.0095	40.42	0.0300	72.10
0.0063	32.90	0.0100	41.65		
0.0065	33.78	0.0125	46.64		

TABLE IV

STREET CARRYING CAPACITIES
(CFS)

Slope	32' Street 6" Crown at center line or 6" sidehill with no crown	32' Street Flat Cross-section	32' Street 6" Inverted crown at center line	32' Street with 8" sidehill with no crown	32' Street with 12" sidehill with no crown	40' Street 6" Crown at center-line or 6" sidehill with no crown	44' Street 6" Crown at center-line or 6" sidehill with no crown	48' Street 6" Crown at center-line or 6" sidehill with no crown
0.0025	37	78	133	25	17	47	51	56
0.0050	53	111	189	36	23	66	72	79
0.0075	65	136	231	44	29	81	89	97
0.0100	75	156	267	51	33	93	102	112
0.0125	84	175	299	57	37	104	115	125
0.0150	92	193	328	62	41	114	126	138
0.0175	99	207	352	67	44	123	135	148
0.0200	105	221	376	71	47	131	144	158
0.0225	112	235	400	76	50	139	154	168
0.0250	118	247	422	80	52	147	162	177
0.0275	124	260	444	84	55	155	170	186
0.0300	129	271	462	88	57	161	177	193
0.0325	134	282	480	91	59	167	184	202
0.0350	139	293	499	95	62	174	191	209
0.0375	145	304	518	98	64	180	199	217
0.0400	149	313	534	101	66	186	205	224
0.0425	154	322	550	104	68	192	211	231
0.0450	158	332	566	107	70	197	217	237
0.0475	163	341	582	110	72	203	223	244
0.0500	167	350	598	113	74	208	230	251

Coefficient of Roughness = n = 0.015 for all streets.
Carrying Capacity Given in Cubic Feet per Second (C.F.S.)
Arterial Design (Stage & Final) has a 42% Slope from the Top of Curb to the top of Median Curb.
Curb Height = 8"

Table IV - Street Carrying Capacities (CFS)
Page 2

Slope	66' & 86' Arterial Stage Construction	66' Arterial Final Construction	86' Arterial Final Construction
0.0025	56	53	54
0.0050	79	74	76
0.0075	97	91	93
0.0100	112	105	108
0.0125	125	118	121
0.0150	138	130	133
0.0175	148	139	142
0.0200	158	148	152
0.0225	168	158	162
0.0250	177	166	170
0.0275	186	175	179
0.0300	193	182	186
0.0325	202	189	194
0.0350	209	197	202
0.0375	217	204	209
0.0400	224	210	215
0.0425	231	217	222
0.0450	237	223	228
0.0475	244	229	235
0.0500	251	236	241

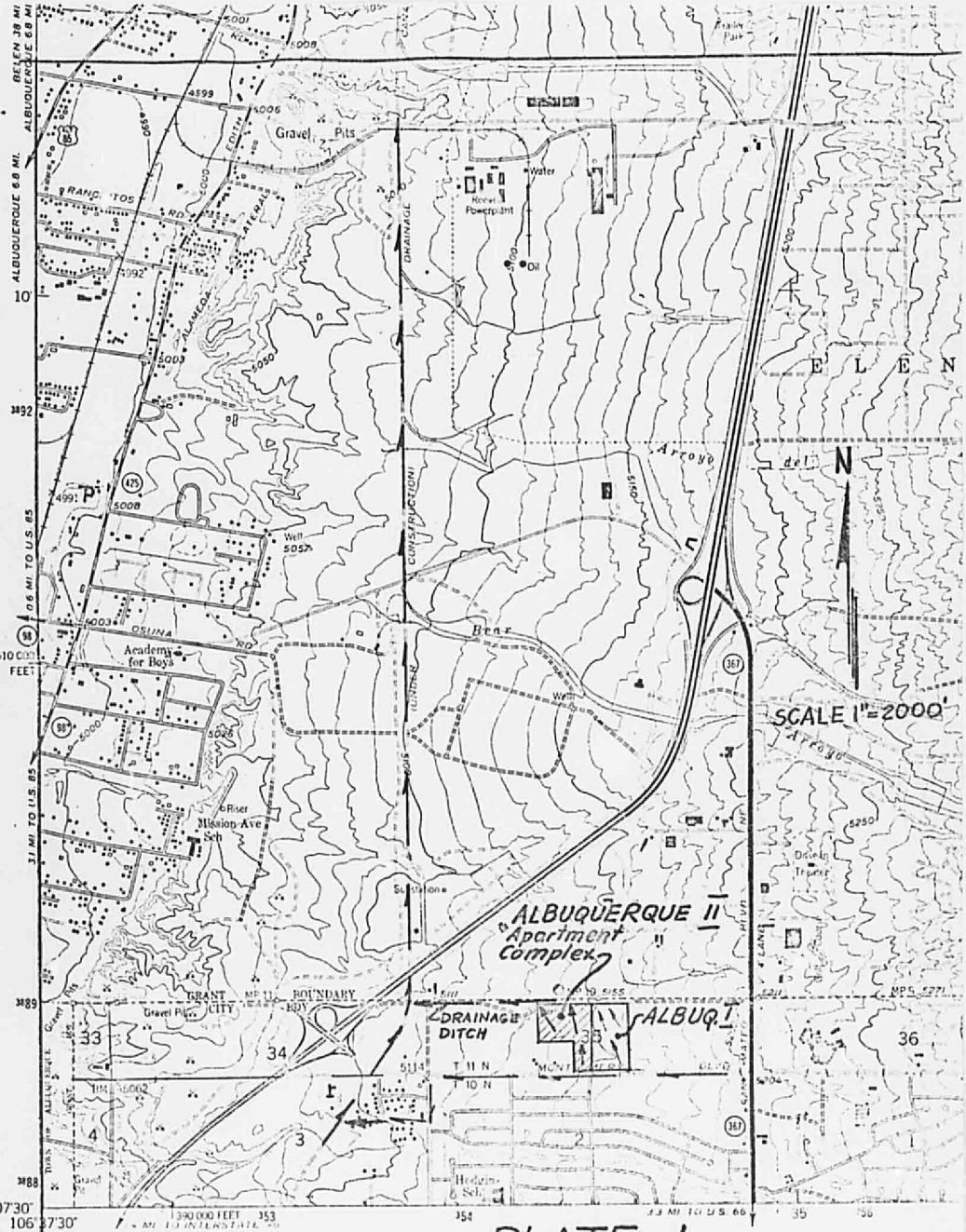
Coefficient of Roughness = n = 0.015 for all streets.
Carrying Capacity given in Cubic Feet per Second (C.F.S.)
Arterial design (Stage & Final) has a +2% slope from the top of curb to the top of median curb
Curb Height = 8"

X. PLATES: The plates consist of the following:

1. Location Plan
2. Topography and general grading and Drainage Plan of Albuquerque II Apartment Complex. (sh. 1 & 2)

XI. REFERENCES:

1. "Data Book for Civil Engineers" by Elwyn E. Seelye
2. "Highway Engineering" by Ritter and Paquette
3. "Hydrology" by Wisler and Brater
4. "Geology for Engineers" by Trefethen
5. "Rainfall Intensity - Duration Curves" by D. L. Yarnell
6. Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963 by Gordon Herkenhoff and Assoc.



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Culture and drainage in part compiled from aerial photographs

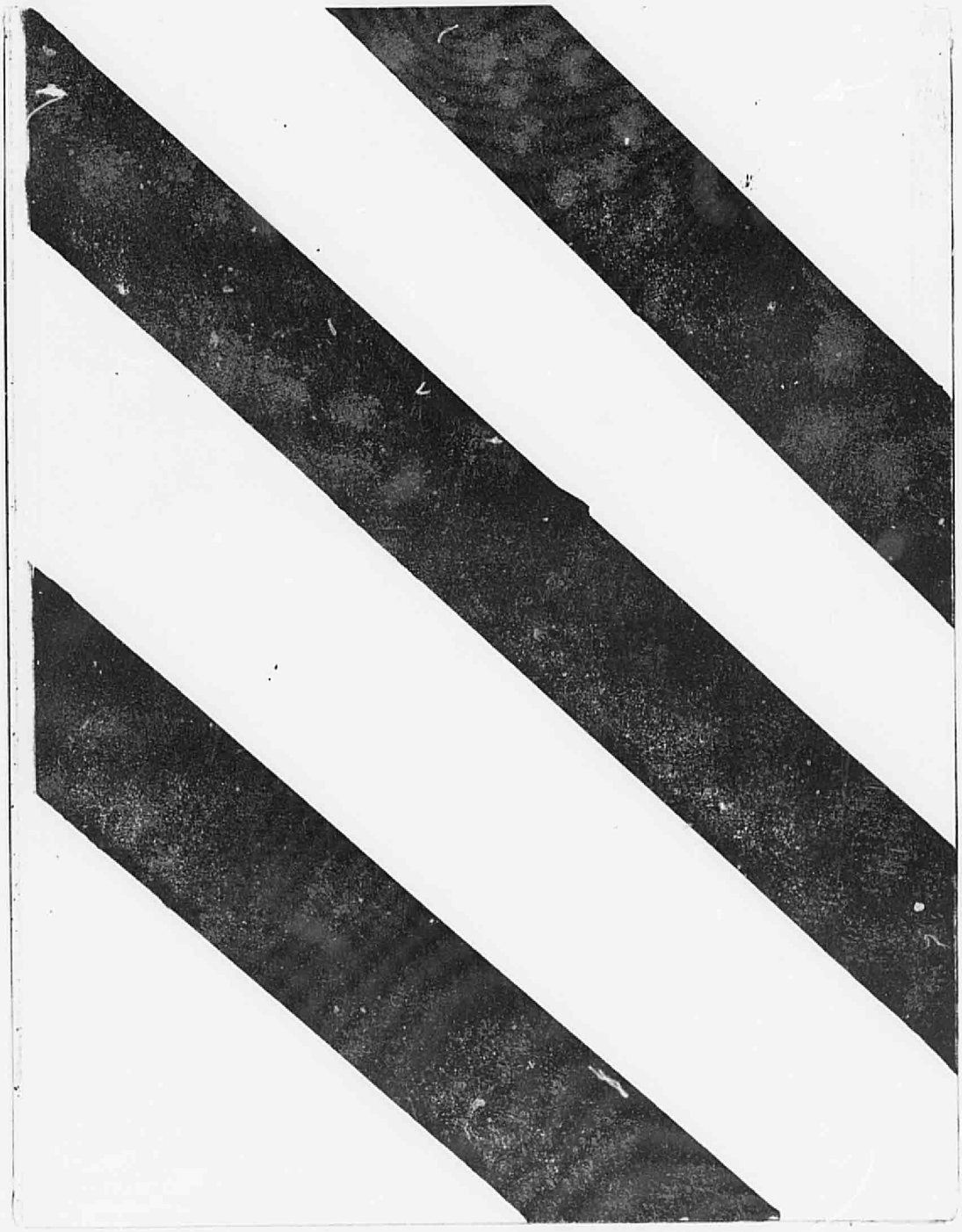



PLATE .1