HYDROLOGY F17/D19 ONE PLAN

F17-D19

1 PLAN

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

MAYOR
David Rusk

May 29, 1979

Gardner Engineers, Inc.
7833 Lomas Blvd. N.E.
Albuquerque, N.M. 87108

Re: Sego Subdivision - Tract K-1-B-1

F17-D19

Gentlemen:

Due to the large number of drainage reports received in the past three weeks by the City Engineer's Office and to the limited staff resources, it has not been possible to reply within the time specified by the AMAFCA Res. 72-2. This letter is to acknowledge the reception of your drainage report and assure you that the best efforts will be made to reply in the shortest possible time.

Very truly yours,

Richard S. Heller

Richard S. Heller
City Engineer

BC/RSH/ms

cc- Richard Leonard-AMAFCA
Drainage File
Reading

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

MAYOR
David Rusk

June 18, 1979

F17-D19

Mr. Gilbert D. Gardner
Gardner Engineers, Inc.
7533 Lomas Blvd. N.E.
Albuquerque, New Mexico 87108

Re: Drainage Study for Tract K-1-B-1 of Sego Subdivision

Dear Mr. Gardner:

I have reviewed the drainage report for the captioned development, and while I am in agreement with the concept discussed in the report, I find that the site grading plan does not follow the recommendations of the report. The runoff would exit from the site instead of being conveyed to the ponds adjacent to Jefferson Street. It is therefore requested that the site grading plan be modified, to convey all the runoff of the ponding areas.

It is also recommended that a positive outlet from the ponds to the street be provided in the form of a small drainpipe installed through the curb face. A controlled or restricted inlet must insure that the runoff has a minimum detention time of 24 hours. These corrections to the site grading plan will allow expeditious review and approval of the construction plans.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs

cc - Richard Leonard, AMAFCA
Richard Heller, City Engineer
Fred Aguirre, Assistant Hydrology Engineer
Drainage File

RECEIVED
MAY 21 1979
CITY ENGINEER

STORM DRAINAGE STUDY

For Tract K-1-B-1 of Sego Subdivision, Albuquerque, New Mexico

RECD 5-16-79

CITY ENGINEER
ADDRESS BASED ON INFORMATION
☐ FURNISHED BY REQUESTEE
MAY 1 1979
☐ 4' ☐ 6' SIDEWALK
SET TO ☒ CURB ☐ PROPERTY
IN ACCORDANCE WITH
ORDINANCE

GILBERT D. GARDNER
NEW MEXICO
5853
LAND SURVEYOR
REGISTERED PROFESSIONAL ENGINEER

GARDNER ENGINEERS, INC.
ALBUQUERQUE, NEW MEXICO

MAY, 1979

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FIGURE 1

PLATE 1

PLATE 2

STORM DRAINAGE STUDY
For Tract K-1-B-1 of Sego
Subdivision,
Albuquerque, New Mexico

1. PURPOSE

The purpose of this report is to present a drainage plan for anticipated development at the project location necessary to satisfy drainage requirements.

2. SCOPE

The scope of this report includes an investigation of both existing and anticipated future conditions, both on and off (adjacent to) the site with respect to the design storm runoff, drainage requirements, and recommendations.

3. LOCATION AND DESCRIPTION

The site consists of Tract K-1-B-1 Sego Subdivision, located within the City of Albuquerque.

Situated at 4812 Jefferson N.E., the site is presently undeveloped and undisturbed with the exception of cut slopes and fences at the perifery of the property. The soils appear to be of the sandy silty variety, typical of the fluvial deposits of the meandering arroyos atop the East Mesa. The tract is sparsely vegetated.

4. EXISTING DRAINAGE

Small portions of the site drain on to the northern and southern adjacent properties. In addition, small portions of the south and east adjacent properties contribute flow to the site. The major portion of the site runoff flows to the Jefferson Street R.O.W. as does the runoff of the north and south adjacent properties. (See Plates 1 & 2).

5. PROPOSED DRAINAGE

A. Criteria

1. General: Resolution No. 1972-2, Albuquerque Metropolitan Arroyo Flood Control Authority. City of Albuquerque Drainage Guidelines.

2. Design Storm: 100 year frequency; intensity duration as shown on chart 1, "1963 Master Plan of Drainage for the City of Albuquerque and Environs". (See Fig. 1 this report) prepared by Gordon Herkenhoff and Associates, Inc., Consulting Engineers.

B. Flood protection: The minor flows onto the site will be conveyed, along with the in-site runoff, to ponding areas, and will present no hazards to the proposed improvements and surrounding properties. The only significant adjacent water course will be the accumulated surface runoff in Jefferson Street, and since the major portion of the site will be from one to several feet above the top of curb, the flow in the R.O.W. will also not present any hazards.

C. Site Drainage: Since the site is located on the East Mesa, the satisfaction of A.M.A.F.C.A. 72-2 requirements will also fulfill the City's drainage requirements. The onsite runoff is greatly increased by the development of the site with paved and/or roofed surfaces: In order to meet or exceed A.M.A.F.C.A. requirements, on site ponding is used to reduce by a compensating amount of areas contributing to the onsite runoff and thereby reducing the peak flow to less than the existing peak. (See drainage calculations in the appendix).

6. CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the site grading plan be performed so as to conform with the Drainage Plane shown on plate 2 of the enclosures, especially with respect to the ponding volumes and locations shown. In conclusion, provided the aforementioned recommendations are adhered to, the site will be in no hazard of flood damage, nor shall the site development present any additional hazard to adjacent properties.

APPENDIX

I METHODOLOGY

Peak Runoff (Q) Calculated by "Rational" method.

$$Q = C \times A \times I$$

Where:

Q = Flow (CFS)*
C = Estimated Runoff Coeffecient (Dimensionless)
A = Contributing Area (Acres)
I = Rainfall Intensity (Inches per Hour)

*CFS ≈ Acre Inches per hour

Note: Where areas consist of a composite of surfaces with differing runoff coeffecients (C) is a weighted runoff coeffecient.

Intensity (I) ascertained by trial and error using Yarnell Equation.

$$I = \frac{a}{(b + Tc)}$$ (See Fig. 1)

Where:

I = Intensity (Inches per Hour)
a = Yarnell Coeffecient (Inches - Minutes per hour)
b = " " (Minutes)
Tc = Time of Concentration (Minute)

Time of Concentration (Tc) is calculated as the summation of the flow-time from the most remote point in the contributing area consisting of a combination of overland (sheet) flow and channel flow.

Overland flow time (Tc (sheet)) is calculated as the integral over the length L of the flow path of the reciprocal of the velocity. (V) where velocity varies along the path as a function of Intensity (I), distance along the path (L'), slope (S) and n (Manning's roughness coeffecient). All expressions used for flow or velocity are derived from Manning's Formula.

Channel Flow Time (Tc (Channel)) is calculated solving Manning's Equation for flow depth, the flow being known based on an assumed intensity, and, in turn, Velocity for a typical section. In the event the contributing

I METHODOLOGY (CONT'D)

area is broken into subreaches, the average velocity is used since flow time is equal to the reciprocal of the average velocity times the length of the reach.

The summation of flow times is substituted into the expression for intensity and the calculation repeated until substantial agreement is arrived at between Tc and Flow Time.

II. EXISTING CONDITIONS

The area is subdivided into on-site and off-site contributing areas according to existing drainage patterns as shown in plates 1 & 2 of the enclosures.

BASIN TABULATION

Basin ID	Area (A) Onsite	Area (A) Offsite	Runoff Coeffecient (C)	A x C Onsite	A x C Offsite	Total A x C
1	.116 Ac.	*Not Necessary	.4	.046	--	.046
2	.476 Ac.	.040	.4	.190	.016	.206
		.033	.9	--	.030	.030
						.236
3	.084 Ac.	.020	.4	.034	.008	.042
		.106	.9	--	.095	.095
						.137
4		6.29	.5	--	--	3.145
Total Onsite =	.676	--	.4	.270	--	--

Existing site runoff is essentially sheet flow. Based on a roughness of .070, a flowpath of 260' @ 3.365%, Tc = 13 minutes.

Peak Runoff = $\frac{189}{38}$ x .676 x .4 = 1.34 CFS

Since Time - Intensity Curve Value at 5 minutes is considered valid for TC $\leq$ 5 minutes, Peak Runoff to adjacent north area = 6.3" per hour x .046 = .29 CFS

Peak runoff to adjacent south area = 6.3" per hour x .034 = .21 CFS.

PEAK FLOW IN JEFFERSON STREET R.O.W.

Using Empirical Expression

$$Tc = \left(\frac{2\ L\ N}{3\sqrt{S}}\right)^{1/2.14}$$

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Peak runoff to adjacent south area = 6.3" per hour x .034 = .21 CFS.

PEAK FLOW IN JEFFERSON STREET R.O.W.

Using Empirical Expression

$$Tc = \left(\frac{2\ L\ N}{3\sqrt{S}}\right)^{1/2.14}$$

II. EXISTING CONDITIONS (CONT'D)

L = 360' Δ = 1.5

L = 675' Δ = 17'

1035 18.5 = 01.787% 12.07 minutes

Should yield highly conservative result.

Use 13 Minutes

4.974 x 3.518 = 17.50 CFS

$A = d^2 Z$

$WP = d\,(2 + 2\sqrt{1 + Z^2})$

$$dn = \left(\frac{Qn}{1.486\, S^{\frac{1}{2}}} \; \frac{(2 + 2\sqrt{1 + Z^2})^{2/3}}{Z^{5/3}} \right)^{3/8}$$

Using $S = \frac{1}{175}$ & N = .015, dn = .379'

Flow in Jefferson within curb.

III. DEVELOPED CONDITIONS

As shown in plate 2 of the enclosure, the addition of a structure as well as paved parking and traffic areas are proposed.

BASIN TABULATION

Basin ID	A x C Onsite	A x C Offsite	Runoff Coeffecient (C)	A x C Onsite	A x C Offsite	Total
A	.140	--	.9	.126	--	.126
	.002	--	.4	.001	--	.001
						.127
B	.051	--	.9	.046	--	.046
C	.117	.029	.9	.105	.026	.131
	.018	--	.4	.007	--	.008
				.112		.138
D	.266	.106	.9	.239	.095	.334
	.025	.040	.4	.010	.016	.010
				.249	.111	.344
E	.002	--	.4	.001	--	.001
F	.028	--	.9	.025	--	.025
G	.021	--	.4	.008	--	.008
	.006	.004	.9	.005	.004	.009
				.013		.017

Since basin "A" would have a time of concentration of less than five minutes. The five minute intensity will control for all "Developed Condition".

Runoff:

Peak Runoff = $\sum$ qs for basins A, B, E, F

= 6.3" per hour X (.127 + .046 + .001 + .025)

= 1.25 CFS < 1.34 CFS (existing) OK

Runoff to south adjacent property is negligible. Storage required (Basin D)

$$= .249 \times 43560 \quad \frac{189}{(25 + 60)} \times \frac{1}{12} = 2010 \text{ cu. feet (Onsite)}$$

$$.111 \times 43560 \times \frac{189}{85} \times \frac{1}{12} = \underline{896 \text{ cu. feet}} \text{ (Offsite)}$$

2906 cu. feet Total

Ponding of offsite contribution is not required, however, it is more economical to pond this flow than to provide an overflow section in order to release it.

Flow to the north adjacent property is = 6.3" per hour X .046 = .29 CFS

= .29 CFS (existing) OK

Volume required for basin C:

$$\text{for onsite} = .112 \times 43560 \times \frac{189}{85} \times \frac{1}{12} = 904 \text{ cu. feet}$$

$$\text{for offsite} = .026 \times 43560 \times \frac{189}{85} \times \frac{1}{12} = 210^{*}$$

= 1114 cu. feet Total

Volume required for basin G:

$$\text{For onsite} = .013 \times 43560 \times \frac{189}{85} \times \frac{1}{12} = 105 \text{ Cu. feet}$$

$$\text{For offsite} = .004 \times 43560 \times \frac{189}{85} \times \frac{1}{12} = \underline{33^{*} \text{cu. feet}}$$

138 cu. feet Total

*Volume for offsite contribution not necessary since adjacent paved area would serve adequately to convey overflow to the street.

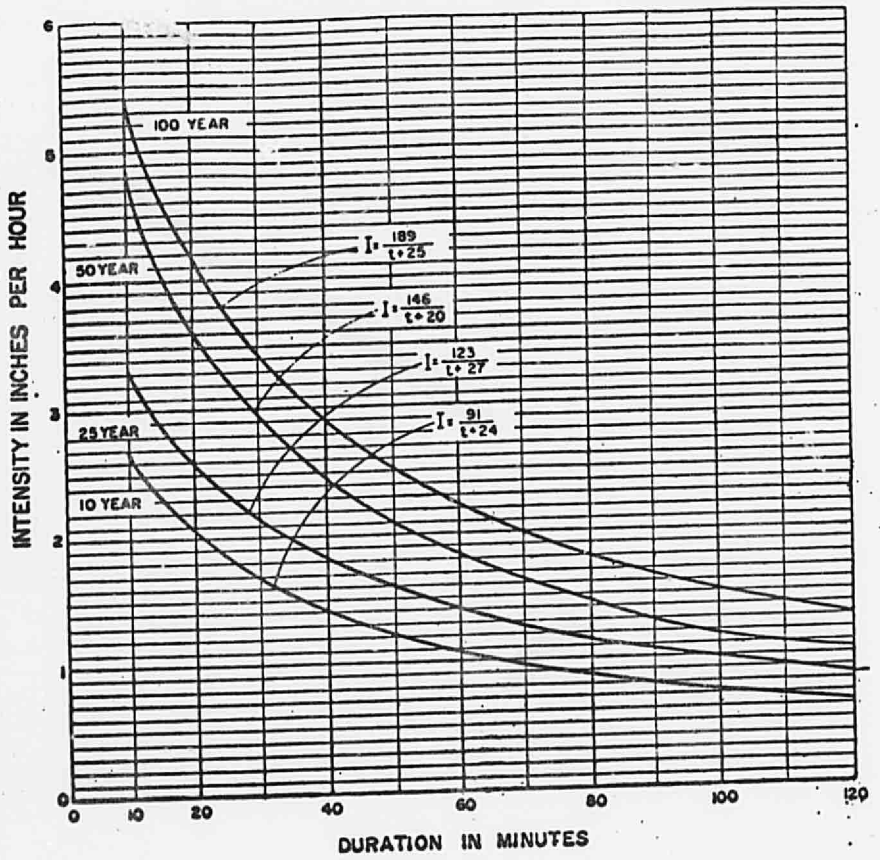


Fig. 1

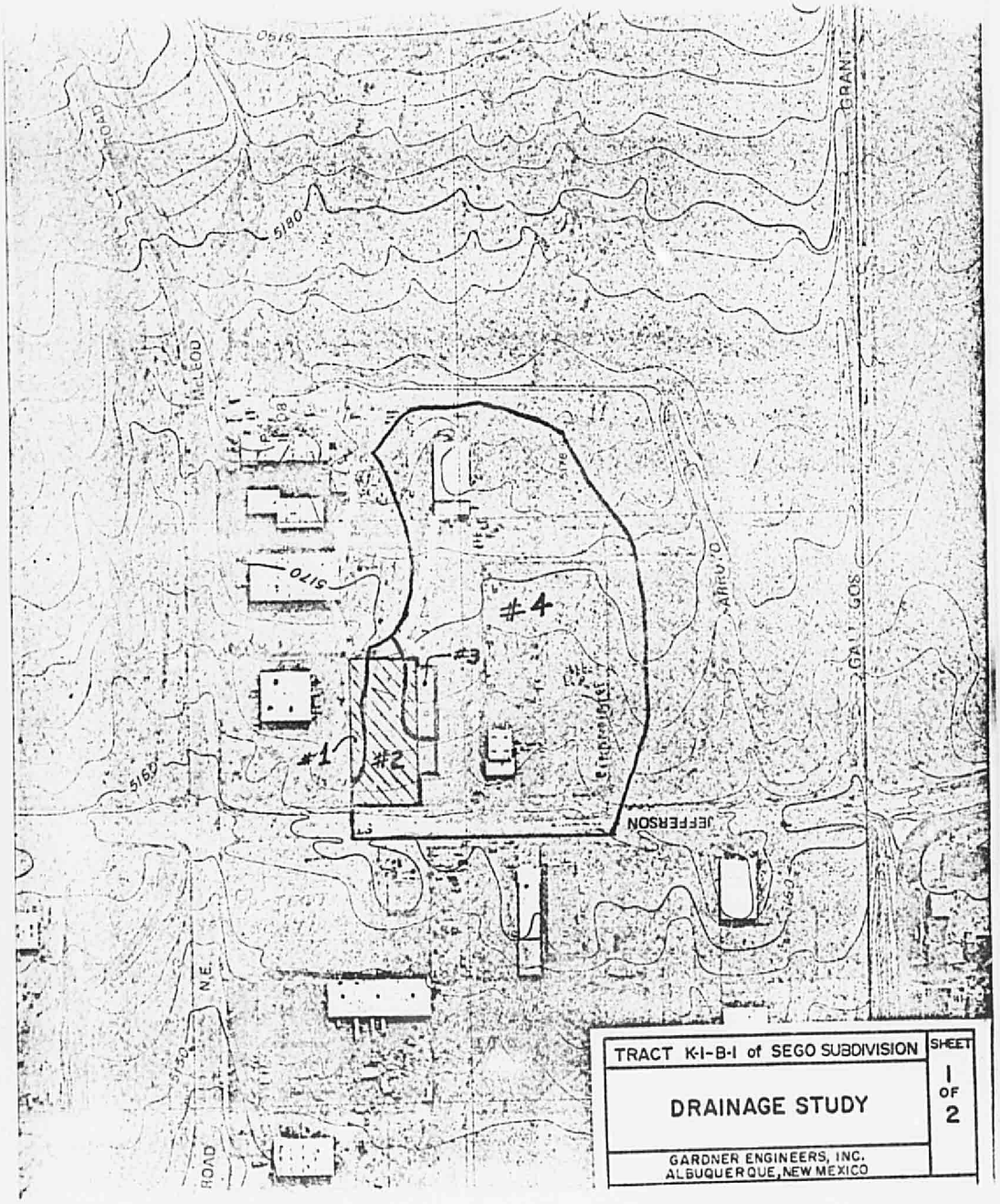
MASTER PLAN OF DRAINAGE
CITY OF ALBUQUERQUE - NEW MEXICO
AND ENVIRONS

INTENSITY DURATION
FREQUENCY CURVES

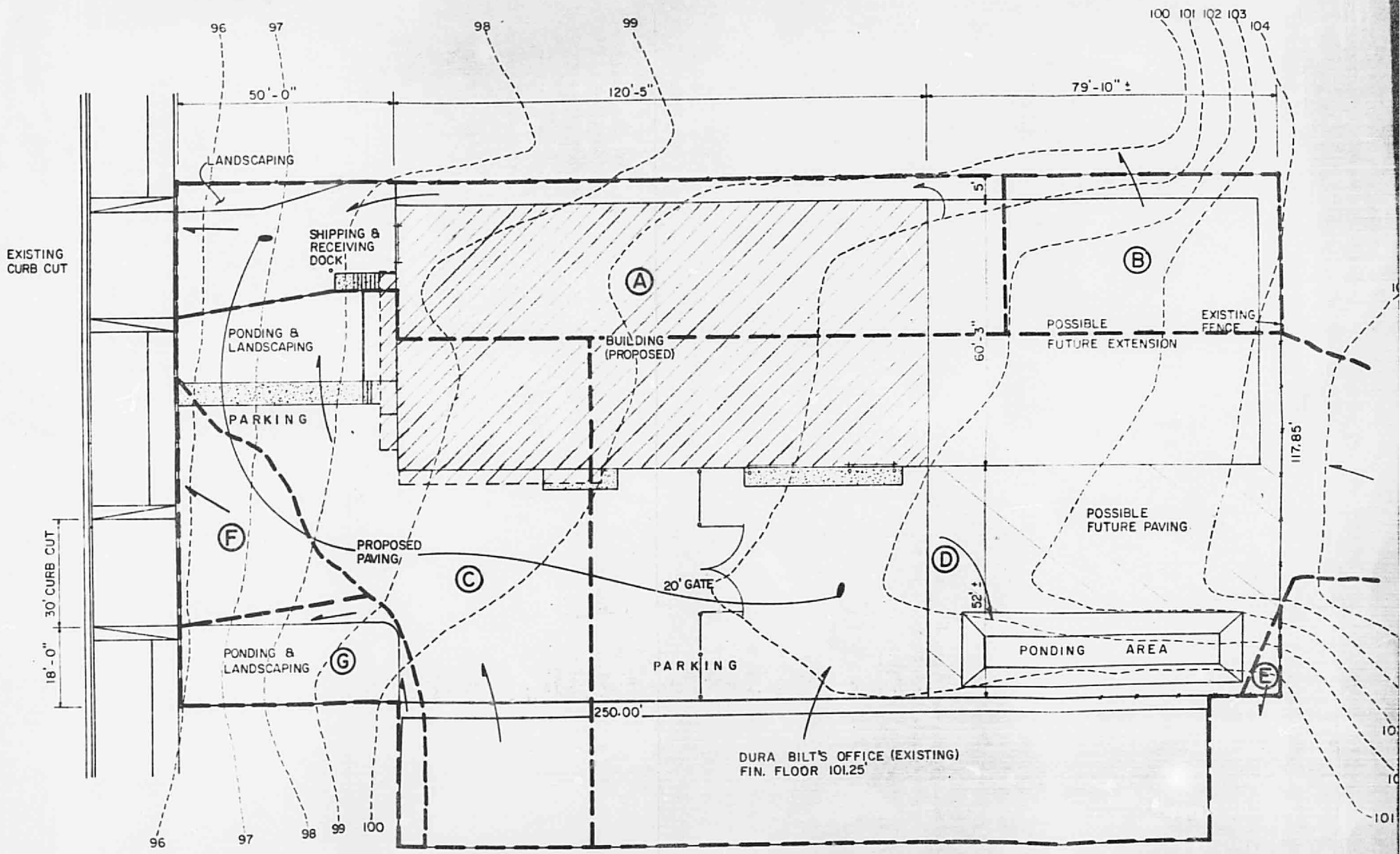
(ALBUQUERQUE AREA - 1961)

GORDON HERKENHOFF & ASSOC
CONSULTING ENGINEERS
ALBUQUERQUE, NEW MEXICO

THIS MICROFICHE IMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT



TRACT K-I-B-I of SEGO SUBDIVISION	SHEET
DRAINAGE STUDY	1 OF 2
GARDNER ENGINEERS, INC. ALBUQUERQUE, NEW MEXICO	


96
97
98
99
100
101
102
103
104
50'-0"
120'-5"
79'-10" ±
LANDSCAPING
EXISTING CURB CUT
SHIPPING & RECEIVING DOCK
PONDING & LANDSCAPING
PARKING
A
B
BUILDING (PROPOSED)
5'
60'-3"
POSSIBLE FUTURE EXTENSION
EXISTING FENCE
117.85'
POSSIBLE FUTURE PAVING
F
PROPOSED PAVING
C
20' GATE
D
52' ±
PONDING AREA
E
30' CURB CUT
18'-0"
PONDING & LANDSCAPING
G
PARKING
250.00'
DURA BILT'S OFFICE (EXISTING)
FIN. FLOOR 101.25'

2 2 8 4