HYDROLOGY D11/D8 3 of 3 21 PLANS

| LOT | B.Y. AREA ($FT^2$) | P (IN.) | D.R.O. (IN.) | $V_{pond}$ (C.F.) |
|---|---|---|---|---|
| 54 | 7800 | 2.2 | 0.89 | 580 |
| 55 | 6700 | 2.2 | 0.89 | 500 |
| 56 | 6700 | 2.2 | 0.89 | 500 |
| 57 | 6700 | 2.2 | 0.89 | 500 |
| 42 | 6460 | 2.2 | 0.89 | 480 |
| 43 | 6430 | 2.2 | 0.89 | 480 |
| 44 | 6430 | 2.2 | 0.89 | 480 |
| 45 | 6430 | 2.2 | 0.89 | 480 |
| 46 | 6650 | 2.2 | 0.89 | 500 |

B.Y. AREA = 2/3 (Lot area)

P = 2.2 in. from NOAA Atlas 2

D.R.O. = Direct Runoff = $\frac{(P-0.25)^2}{P+0.85} = 0.89$

$$S = \frac{1000}{CN} - 10 = \frac{1000}{84} - 10 = 1.9$$

$$V_{pond} = \frac{DRO}{12} \text{ (B.Y. Area)}$$

TABLE 3: POND VOLUMES

## CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are presented for the development of the Shenandoah Subdivision:

1. Drain each lot so that the runoff generated by the back yard area will drain either to the front yard or be directed to a shallow pond in the back yard. These ponds, if necessary, will be constructed by the homeowner to hold the volumes listed in Table 3. These pond volumes are in excess of that volume of runoff generated by a 100-year frequency storm falling upon the anticipated back yard area. Swales should be provided to convey all overflow runoff to the streets.
2. All front yards shall drain to the street.
3. No residential lot shall drain onto another residential lot.
4. House pads shall be constructed by the perspective homeowner. House pads should be located approximately one (1) foot above corresponding top of curb.
5. Streets have been designed so that all runoff flowing in the street generated by a 100-year frequency storm will be contained between the curbs. Runoff generated by storms of greater magnitude than a 100-year frequency storm may overflow the top of curb elevation.
6. The runoff flowing within the streets in the P-Basin will be conveyed through the streets to two (2)

drainage channels which drain to the South Branch of the Piedras Marcadas Arroyo. Details concerning the design and construction of these drainage channels are presented at the back of this report.

7. Runoff flowing within the streets in the M-Basins will be conveyed through the streets and discharged onto Homestead Circle. The peak discharge leaving the M-Basins does not exceed the historic peak discharge which flows onto Homestead Circle from the site in the existing state.

8. That portion of the south branch of the Piedras Marcadas Arroyo which lies along the north boundary of the site shall be improved in conjunction with the development of the subdivision. These improvements will be confined within a 100-foot drainage right-of-way along the north property line and shall conform with the typical channel section. A discussion of channel grade, design flow and capacity appears in the body of this report.

9. The volume of runoff discharged from the site has not been increased when compared to the undeveloped state. To ensure this, ponds have been designed to contain the excess runoff. These ponds will be located in the bed of the South Branch of the Piedras Marcadas Arroyo.

10. The proposed improvements will not increase the flooding potential of adjacent properties.

11. The site does not lie within a designated flood hazard zone as demonstrated by Figure 6.

12. Erosion within the site will be controlled by the individual property owners by landscaping and ponding. Erosion in the South Branch of the Piedras Marcadas Arroyo will be controlled by the construction of ponds, the placement of rip-rap and the revegetation of the channel bed.

13. Lots bounded by the perimeter wall and having back yards which do not drain to the front yard will pond water in the back yard. Water will pond up to the level of weepholes (one CMU turned sideways at 10' o.c.) provided in the perimeter wall. Each lot owner should exercise caution to ensure that the house pad is elevated one foot above the corresponding perimeter wall weepholes.

CALCULATIONS

Drainage Channel at Cedar Creek Drive Cul-de-Sac:

1. Rundown (Weir Analysis)
   For geometry, see Detail D

   At curb line,

   $Q = 3.33\ L\ H^{1.5} = 8.6$ cfs
   where $L = 8.67' + 1/2\ (5'+5') = 13.67'$
   $H = 0.33'$

   At R.O.W. line,

   $Q = 3.33\ L\ H^{1.5} = 18.7$ cfs
   where $L = 8.67'$
   $H = 0.83 + 0.67 = 0.75'$

   $Q_{100} = 3.3$ cfs ∴ weir opening is O.K.

2. Channel (Manning Equation)
   For geometry, see Section 7

   $Q = \frac{1.49}{n} AR^{2/3}s^{1/2} = 104$ cfs (capacity)
   where $n = 0.015$
   $A = 6.50$ sf
   $P = 10'$
   $R = \frac{A}{P} = 0.65'$
   $s = 0.0460$

   $Q = 3.3$ cfs, $d = 0.16'$ at centerline
   $v = 3.9$ fps

Drainage Channel at Shiloh Court Knuckle:

1. Rundown (Weir Analysis)
   for geometry, see Detail C

   At curb line,

   $Q = 3.33\ L\ H^{1.5} = 14.95$ cfs
   where $L = 18.67 + 1/2\ (5+5) = 23.67'$
   $H = 0.33'$

   At R.O.W. line,

   $Q = 3.33\ L\ H^{1.5} = 47.8$ cfs
   where $L = 18.67'$
   $H = 0.84'$

   $Q_{100} = 16.9$ cfs ∴ water will back-up slightly @ curb line, but will enter channel with ease at R.O.W. line.

Drainage Channel at Shiloh Court Knuckle - continued:

2. Channel (Manning Equation)
For geometry, see Section 8

$$Q = \frac{1.49}{n} AR^{2/3} s^{1/2} = 131.7 \text{ cfs (capacity)}$$

where $n = 0.015$
$A = 15.6$ sf
$P = 20'$
$R = \frac{A}{P} = 0.78'$
$s = 0.0100$

$Q = 16.9$ cfs, $d = 0.5'$ at centerline
$v = 3.6$ fps

Piedras Marcadas Channel:

1. Channel (Manning Equation)
For geometry, see Typical Section

$$Q = \frac{1.49}{n} AR^{2/3} s^{1/2} = 1{,}088 \text{ cfs (capacity)}$$

(using minimum slope = 0.0170)
For $Q = 200$ cfs, $d = 0.73'$
$v = 4.4$ fps

(Design Q determined from Matotan Study, i.e. 197 cfs.)

2. Pond Volumes

a. Outlet from Cedar Creek Drive

V = 1/2 (top area + bottom area) x depth
top area = 2,640
bottom area = 1,820 sf
depth = 1.5'
V = 3,345 cf
$V_T = 2 \times V = 6{,}690$ cf

$$V_{Req'd} = \Delta V_{100} = 7{,}900 - \frac{3.4}{19.6}(12{,}500) = 5{,}732 \text{ cf}$$

Volumes determined from Table 1 for P-2 (existing) and P-2A (developed).

$V_{provided} = 6{,}690 < V_{Req'd}$ ∴ O.K.

Piedras Marcadas Channel - continued:

b. Outlet from Shiloh Court

top area = 3,060
bottom area = 2,010 sf
depth = 1.5'

$V_{pond}$ = 3,800 cf

$V_{Req'd} = \Delta V_{100} = 40,200 - \frac{16.2}{19.6}(12,500) = 29,868$ cf

$V_{Remaining} = 29,868 - 3,800 = 26,068$ cf

See Sheet 19 of the Construction Drawings for remaining volume of ponding provided.

Streets (Manning Equation):

$$Q = \frac{1.49}{n} AR^{2/3}s^{1/2}$$

where $n = 0.020$
$A = 5.28$ sf
$P = 32.7$ '
$R = \frac{A}{P} = 0.16'$
$S$ varies

1. Basin M-1B
   Min. slope = 0.0400
   $Q_{capacity}$ = 22.8 cfs
   $Q_{100}$ = 1.6 cfs < $Q_{capacity}$ ∴ O.K.

2. Basin M-1C
   Min. slope = 0.0112
   $Q_{capacity}$ = 12.1 cfs
   $Q_{100}$ = 0.9 cfs < $Q_{capacity}$ ∴ O.K.

3. Basin P-2A
   Min. slope = 0.0240
   $Q_{capacity}$ = 17.7 cfs
   $Q_{100}$ = 3.3 cfs < $Q_{capacity}$ ∴ O.K.

4. Basin P-2B
   Min. slope = 0.0225
   $Q_{capacity}$ = 17.1 cfs
   $Q_{100}$ = 16.9 cfs < $Q_{capacity}$ ∴ O.K.

# APPENDIX A:

# RUNOFF CALCULATIONS

RUNOFF CALCULATIONS:

Storm runoff is determined by the Soil Conservation Service (SCS) Curve Number Method for small watersheds (less than 2,000 acres). This method determines the peak discharge and associated volume of runoff for a given frequency storm falling within the study area. The following criteria were used to quantify runoff:

Watershed Curve Numbers: The runoff curve numbers for the various watershed conditions are listed in Table 2. Using these values, a composite curve number (CN) is computed for an entire watershed.

Time of Concentration: The time of concentration ($T_c$) is the time it takes for runoff to travel from the most distant part of the watershed area to the point of discharge. Time of concentration is estimated by the Kirpich equation:

$$T_c = 0.00013 \frac{L^{0.77}}{s^{0.385}}$$

where L = hydraulic length of the watershed, in feet,

and s = average slope of the watershed in feet/feet.

Rainfall: The depth of rainfall is determined from the NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume IV - New Mexico. The 100-year, 6-hour precipitation = 2.2", and the 10-year, 6-hour precipitation = 1.4" for the study area.

Direct Runoff: The SCS runoff equation is used to determine the amount of runoff:

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

where Q = accumulated volume of runoff in inches over the drainage area.

P = accumulated rainfall in inches over the drainage area.

S = Potential maximum retention of water in equivalent inches over the drainage area.

CN = Watershed Curve Number.

Distribution Curve: The distribution curve (DC) is based on the percent of one hour versus 24 hours precipitation and is dependent upon the geographic location of the drainage basin. Based upon Figure 8, the SCS Peak Rates of Discharge for Small Watersheds, DC = 75.

Peak Discharge: The peak discharge is obtained from Figure 9 which plots the cfs/ac/inch of runoff versus $T_c$ for various distribution curves. This is multiplied by the drainage area in acres and the direct runoff in inches to obtain the peak discharge in cfs.

Volume of Runoff: The volume of runoff in acre-feet from a watershed is expressed as the direct runoff in feet multiplied by the watershed area.

The SCS Curve Number Method was computerized for ease of calculation and convenience in the presentation of results.

The results of the analysis follow in which existing and fully developed conditions have been analyzed.

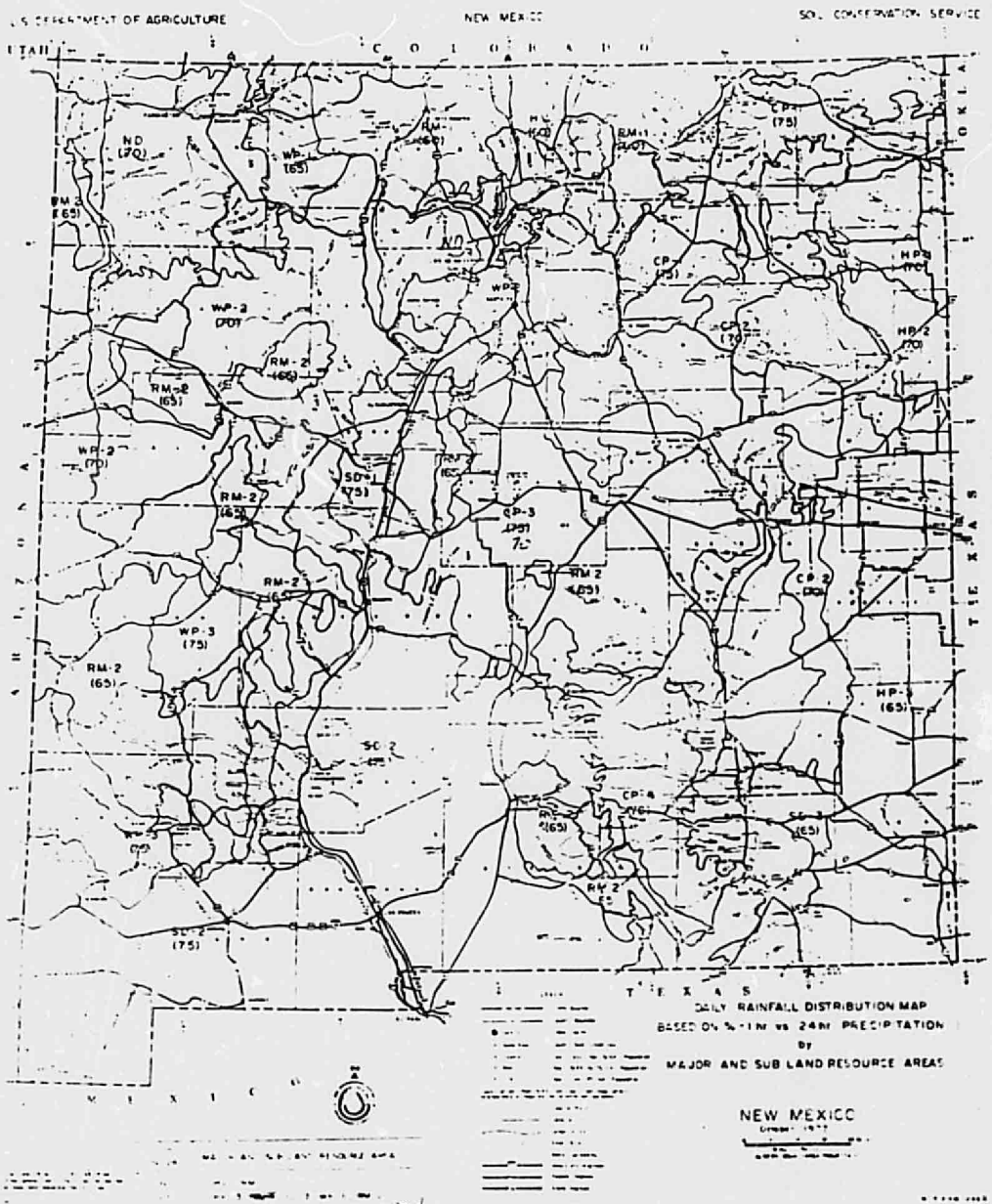
U.S. DEPARTMENT OF AGRICULTURE
NEW MEXICO
SOIL CONSERVATION SERVICE
UTAH
COLORADO
ARIZONA
OKLA
TEXAS
MEXICO
DAILY RAINFALL DISTRIBUTION MAP
BASED ON % 1 IN vs 24H PRECIPITATION
by
MAJOR AND SUB LAND RESOURCE AREAS
NEW MEXICO

FIGURE 8

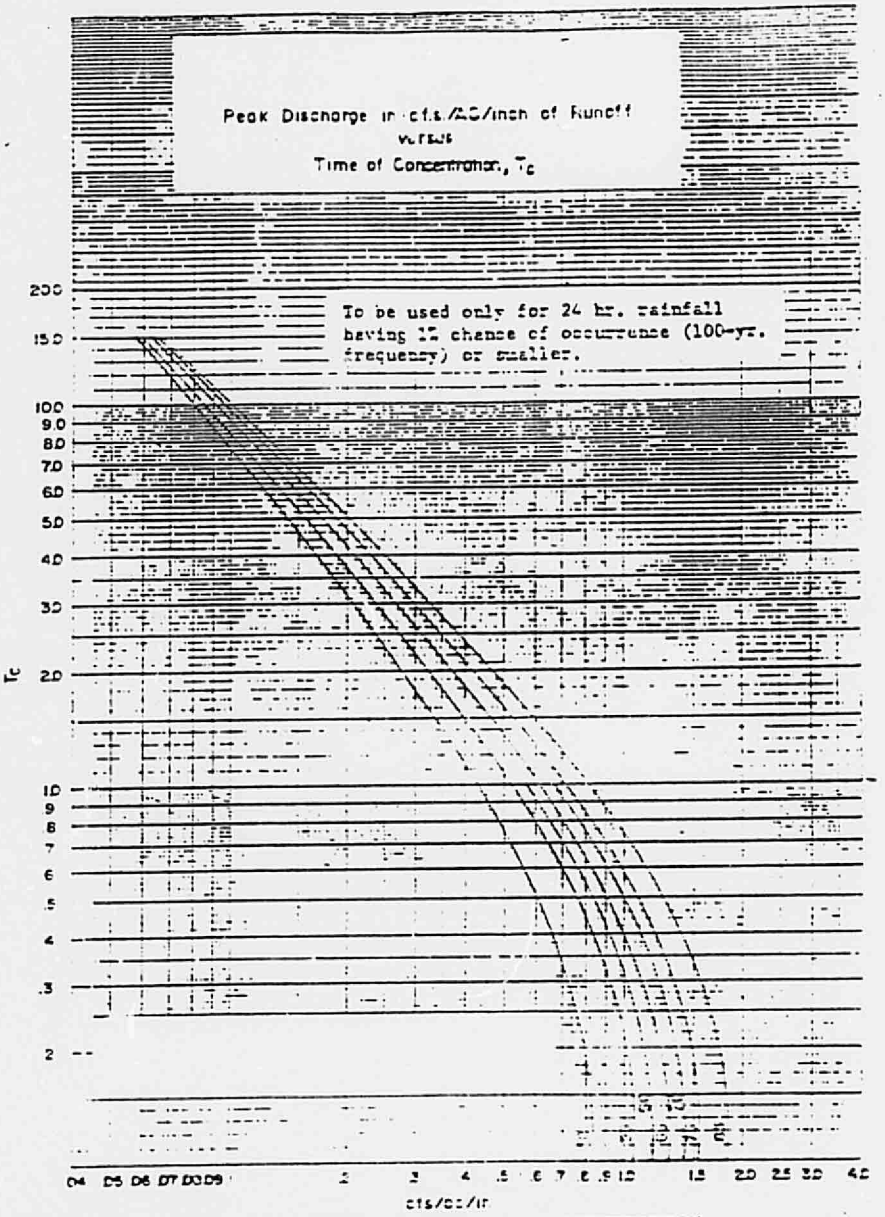


FIGURE 9: PEAK DISCHARGE VS. TIME OF CONCENTRATION

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PROJECT: SHEMPA004 SUBDIVISION
PROJECT NO.: 0-12

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: EXISTING

| DESCRIPTION | AREA (ac) | Q-100 (cfs) | V-100 (fps) | Q-10 (cfs) | V-10 (cfps) |
|---|---|---|---|---|---|
| | 11.00 | 6.4 | 15.200 | 1.4 | 2.400 |
| B-1 | 15.50 | 6.1 | 14.900 | 0.9 | 2.200 |
| B-1 | 10.00 | 5.3 | 12.500 | 0.8 | 1.900 |
| B-2 | | | | | |

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

PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: M-1
CONDITION: EXISTING

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 7.00 | 68 | 64 % |
| NATIVE GRASS (MWA) | B | 4.00 | 79 | 36 % |
| | COMPOSITE: | 11.00 | 73 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1560 ft.
DROP: 55 ft.
SLOPE: 3.5 %
TIME OF CONCENTRATION: 0.14 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.38 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 6.4 c.f.s.

VOLUME: 15,200 c.f. 0.35ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.09 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.4 c.f.s.

VOLUME: 3,400 c.f. 0.08ac.ft.

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

PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-1
CONDITION: EXISTING

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 15.50 | 68 | 100 % |
| | COMPOSITE: | 15.50 | 68 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1350 ft.
DROP: 21 ft.
SLOPE: 1.5 %
TIME OF CONCENTRATION: 0.17 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.: 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.27 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 6.1 c.f.s.

VOLUME: 14,900 c.f. 0.34ac.ft.

FREQUENCY: 10 yr.: 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.04 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 0.9 c.f.s.

VOLUME: 2,200 c.f. 0.05ac.ft.

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-2
CONDITION: EXISTING

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | Cn | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 13.00 | 68 | 100 % |
| | COMPOSITE: | 13.00 | 68 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1540 ft.
DROP: 55 ft.
SLOPE: 3.5 %
TIME OF CONCENTRATION: 0.13 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.27 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 5.3 c.f.s.

VOLUME: 12,500 c.f. 0.29ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.04 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.8 c.f.s.

VOLUME: 1,900 c.f. 0.04ac.ft.

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: DEVELOPED

| DESCRIPTION | AREA (ac) | Q-100 (cfs) | V-100 (cf) | Q-10 (cfs) | V-10 (cf) |
|---|---|---|---|---|---|
| M-1A | 1.00 | [illegible] | [illegible] | 0.0 | 100 |
| M-1B (INCLUDES M-1A) | 3.30 | 1.6 | 2,700 | 0.2 | 500 |
| M-1C | 1.80 | 0.8 | 2,300 | 0.3 | 700 |
| M-1D | 4.35 | 3.8 | 9,100 | 1.2 | 2,800 |
| M-1 (TOTAL) | 15.50 | 6.1 | 14,900 | 2.5 | 2,200 |
| P-1 | 8.40 | 3.3 | 7,600 | 1.1 | 2,600 |
| P-2A | 18.20 | 16.9 | 40,200 | 5.8 | 13,600 |
| P-2B | 19.60 | 19.3 | 45,100 | 6.6 | 16,500 |
| P-2 | | | | | |

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: M-1A
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 1.00 | 68 | 100 % |
| | COMPOSITE: | 1.00 | 68 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 250 ft.

DROP: 6 ft.
SLOPE: 2.4 %

TIME OF CONCENTRATION: 0.04 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.27 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 900 c.f. 0.02ac.ft

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.04 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.0 c.f.s.

VOLUME: 150 c.f 0.00ac.ft

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: M-1B (INCLUDES M-1A)
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 1.00 | 68 | 43 % |
| MEDIUM DENSITY | A | 1.30 | 79 | 57 % |
| | COMPOSITE: | 2.30 | 74 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 600 ft.

DROP: 18 ft.
SLOPE: 3.0 %

TIME OF CONCENTRATION: 0.07 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.46 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.6 c.f.s.

VOLUME: 3,700 c.f. 0.08ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.13 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 900 c.f. 0.02ac.ft.

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: M-1C
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | Cn | % OF TOTAL |
|---|---|---|---|---|
| MEDIUM DENSITY (BKD) | A | 1.00 | 79 | 100 % |
| | COMPOSITE: | 1.00 | 79 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 570 ft.

DROP: 41 ft.
SLOPE: 7.1 %

TIME OF CONCENTRATION: 0.05 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.64 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.9 c.f.s.

VOLUME: 2,300 c.f. 0.05ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.21 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.3 c.f.s.

VOLUME: 700 c.f. 0.02ac.ft.

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: M-1 (TOTAL)
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (BKD) | A | 1.00 | 68 | 23 % |
| MEDIUM DENSITY (BKD) | A | 2.30 | 79 | 53 % |
| MEDIUM DENSITY (MWA) | B | 1.00 | 84 | 23 % |
| | COMPOSITE: | 4.30 | 78 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1650 ft.

DROP: 56 ft.
SLOPE: 3.3 %

TIME OF CONCENTRATION: 0.15 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.58 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 3.8 c.f.s.

VOLUME: 9,100 c.f. 0.21ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.18 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 1.2 c.f.s.

VOLUME: 2,800 c.f. 0.06ac.ft.

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PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-1
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | Cn | % OF TOTAL |
|---|---|---|---|---|
| NATIVE GRASS (PKD) | A | 15.50 | 68 | 100 % |
| | COMPOSITE: | 15.50 | 68 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1350 ft.

DROP: 21 ft.
SLOPE: 1.5 %

TIME OF CONCENTRATION: 0.17 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.27 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 6.1 c.f.s.

VOLUME: 14,900 c.f. 0.34ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.04 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.50 cfs/ac/in
PEAK DISCHARGE (Q): 0.9 c.f.s.

VOLUME: 2,200 c.f. 0.05ac.ft.

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

PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-2A
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | CN | % OF TOTAL |
|---|---|---|---|---|
| MEDIUM DENSITY (BKD) | A | 3.40 | 79 | 100 % |
| | COMPOSITE: | 3.40 | 79 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 860 ft.

DROP: 25 ft.
SLOPE: 2.9 %

TIME OF CONCENTRATION: 0.09 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.64 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.3 c.f.s.

VOLUME: 7,900 c.f. 0.18ac-ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.21 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.1 c.f.s.

VOLUME: 2,600 c.f. 0.06ac-ft.

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

PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-2B
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | Cn | % OF TOTAL |
|---|---|---|---|---|
| MEDIUM DENSITY (BKD) | A | 13.20 | 79 | 81 % |
| MEDIUM DENSITY (MWA) | B | 3.00 | 84 | 19 % |
| | COMPOSITE: | 16.20 | 80 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1520 ft.

DROP: 47 ft.
SLOPE: 3.0 %

TIME OF CONCENTRATION: 0.14 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.68 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 16.9 c.f.s.

VOLUME: 40,200 c.f. 0.92ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.24 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 5.8 c.f.s.

VOLUME: 13,800 c.f. 0.32ac.ft

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

PROJECT: SHENANDOAH SUBDIVISION
PROJECT NO.: 0-127

DRAINAGE BASIN: P-2
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

| DESCRIPTION | SOIL GROUP | AREA (ac) | Cn | % OF TOTAL |
|---|---|---|---|---|
| MEDIUM DENSITY (BKD) | A | 16.60 | 79 | 85 % |
| MEDIUM DENSITY (MWA) | B | 3.00 | 84 | 15 % |
| | COMPOSITE: | 19.60 | 80 | 100 % |

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 2280 ft.

DROP: 57 ft.
SLOPE: 2.5 %

TIME OF CONCENTRATION: 0.21 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 0.68 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.45 cfs/ac/in
PEAK DISCHARGE (Q): 19.2 c.f.s.

VOLUME: 48,100 c.f. 1.10ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.23 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.45 cfs/ac/in
PEAK DISCHARGE (Q): 6.6 c.f.s.

VOLUME: 16,500 c.f. 0.38ac.ft.

APPENDIX B:

PERTINENT CORRESPONDENCE

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

HYDROLOGY SECTION PROJ. NO. D-11 DATE: 6/22/81

PLANNING DIVISION NO. _____

CONFERENCE RECAP

SUBJECT: SHENANDOAH SUBDIVISION

| | WHO | REPRESENTING |
|---|---|---|
| ATTENDANCE: | JEFF MORTENSEN | TOM MANN & ASSOC. |
| | CRIS CASTENADA | CITY ENGINEERING |
| | CM EASTERLING | CITY ENGINEERING |

FINDINGS:

1 USE OF MATOTAN REPORT HYDROLOGY ACCEPTABLE
2 DOWNSTREAM CHANNEL STABILITY, OUTFALL WILL BE QUESTIONS RAISED
3 CHANNEL IMPROVEMENTS AND ADEQUATE CHANNEL RIGHT-OF-WAY MUST BE ADDRESSED
4 MASTER PLAN OF DRAINAGE FOR ENTIRE TRACT 14, TRACT 3 AND PORTION OF TRACT T-2. WHICH CONTRIBUTES TO S. BRANCH OF PIEDRAS MARCADAS MUST BE SUPPLIED WITH CHANNEL DISCUSSIONS.

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: C.M. Easterling SIGNED: Jeffrey G. Mort

TITLE: PRIN. ASSIST. CITY ENGINEER TITLE: PROJECT ENGINEER

DATE: 6/22/81 DATE: 6/22/81



EXHIBIT A

builders/realtors/developers
commercial & residential

**Dale Bellamah Land Co., Inc.**

JUN 1 9 1981

June 19, 1981

Mr. Bill McMillan
Albuquerque Public Schools
P. O. Box 25704
Albuquerque, N.M. 87125

Dear Bill: Re: Tract T-2, Taylor Ranch

Currently we are designing the SHENANDOAH subdivision which is immediately east of Tract T-2. A preliminary drainage study reveals a small amount of drainage crossing the northwest corner of Shenandoah from Tract T-2 and continuing into the Piedras Marcadas Arroyo. We are requesting permission to enter on to Tract T-2 and construct a temporary drainage swale, parallel to your easterly property line. In so doing, the flows would be diverted from Shenandoah and would be discharged directly into the Piedras Marcadas Arroyo.

The enclosures describe the location and dimensions of the swale. As shown in the cross-section, the centerline of the swale would be 50 feet from the easterly property line of Tract T-2 and have a depth of four feet. The easterly embankment of the swale would be graded at an 8% slope. The slope for the westerly embankment is such that no grading is required. The swale would begin at the northeast corner of Tract T-2 and continue south for approximately 400 feet.

If you concur with the contents of this letter, please sign on the line below. If I can be of any assistance please don't hesitate to call me.

Sincerely,

TAYLOR RANCH JOINT VENTURE
DALE BELLAMAH LAND CO. INC.
Managing Partner

V. M. Kimmick, P.E., Manager
New Mexico Development

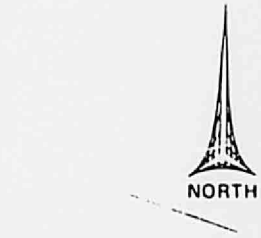
Approved: Albuquerque Public Schools

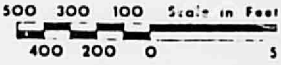
By: Bill McMillan
Bill McMillan

j.

EXHIBIT B

6121 Indian School Road NE / PO Box 3325 / Albuquerque New Mexico 87190 / (505) 883-3000




SCALE: 1" = 500' (
CONTOUR INTERVA
VERTICAL DAT
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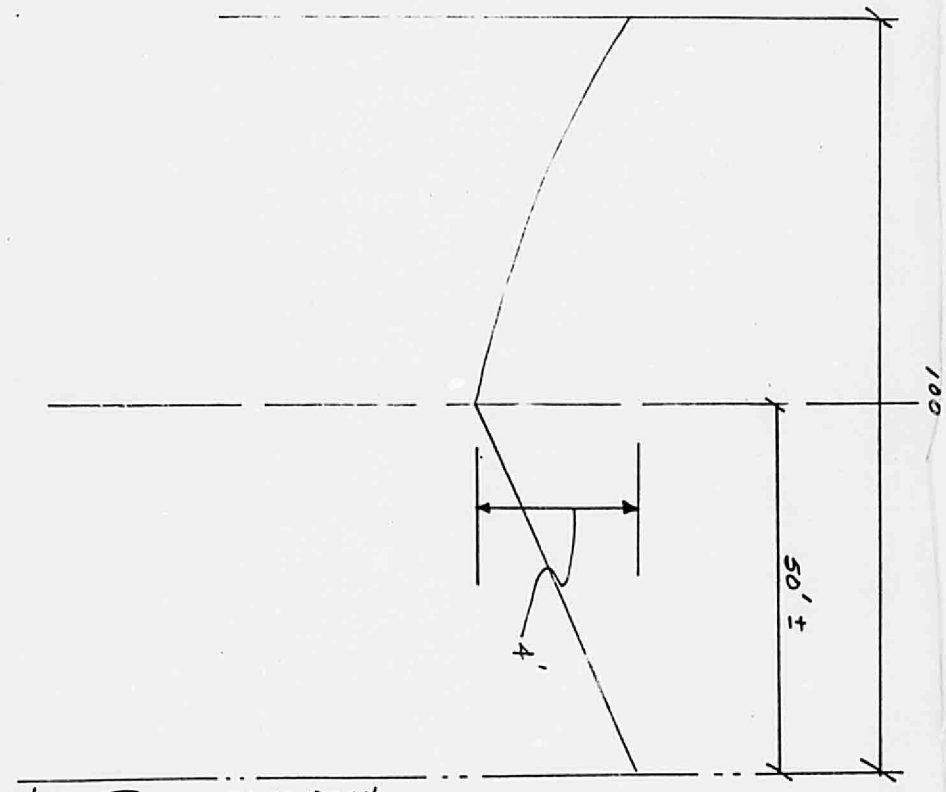
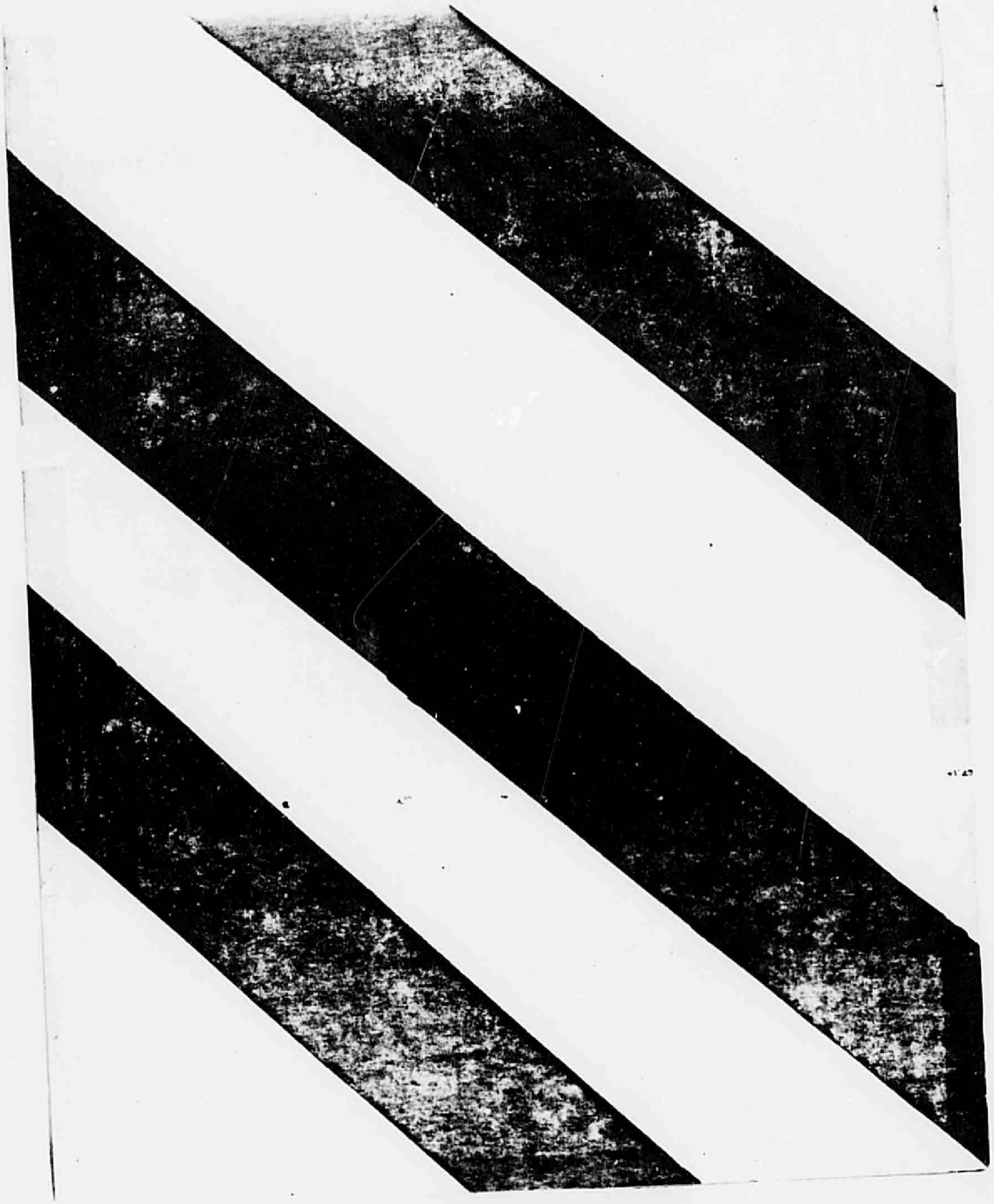
A PORTION

**METROPOLI**
**ALBUQUER**




WEST ℞ OF SHENANDOAH