

FILED

9:00 O'Clock, a M

MAR 27 1985 ✓

BARBARA BOYLE, Clerk

By Donna K. Gwone
Deputy

IN THE SUPERIOR COURT OF THE STATE OF ARIZONA
IN AND FOR THE COUNTY OF YAVAPAI

In the Matter of)	
)	
VERDE DITCH COMPANY AND)	No. 4772
LOWER VERDE DITCH COMPANY.)	
)	PETITION FOR APPROVAL OF
)	DRAINAGE DESIGN AND
)	MODIFICATION TO VERDE DITCH

TED ALLERT, GLEN W. EVERETT and VINCE V. HIGGINBOTHAM, duly appointed Commissioners of the VERDE DITCH COMPANY, respectfully request that the Court approve the drainage design and modification to the Verde Ditch, as more fully set forth in the attached Memorandum Of Points And Authorities.

MEMORANDUM OF POINTS AND AUTHORITIES

The Copa Corporation has purchased land situate below the Verde Ditch and plans to build a nursing home complex called "The Arbor." Copa Corporation has requested that the ditch bank of the Verde Ditch be altered and modified. The Copa Corporation's Registered Professional Engineer, Dave M. Summers, has submitted a Drainage Design Report, a copy of which is attached hereto as Exhibit "A" and by this reference made a part hereof.

Such report shows the alteration of the original ditch bank and includes the placement of a protective structure within the ditch bank to a depth of ten (10) feet or bedrock, whichever

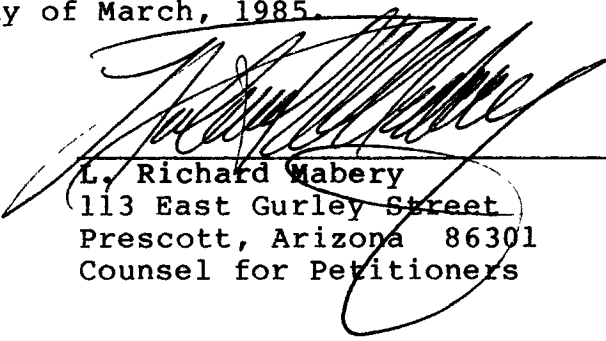
L. Richard Mabery, P.C.
ATTORNEY AT LAW
113 East Gurley Street
PRESCOTT, ARIZONA 86301
(602) 778-1116

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

is reached first. The outer ditch bank will also have a changed finish grade.

The Drainage Design Report submitted by Dave M. Summers has been approved by the duly appointed Verde Ditch Commissioners, and said Commissioners respectfully request that the Court enter an order approving the modification to the Verde Ditch, as set forth in the Drainage Design Report submitted herewith.

DATED this 27th day of March, 1985.



L. Richard Mabery
113 East Gurley Street
Prescott, Arizona 86301
Counsel for Petitioners

ORDER

UPON the Petition For Approval Of Drainage Design And Modification To Verde Ditch being submitted; and upon the Court's review of the same;

IT IS HEREBY ORDERED that the Drainage Design Report is approved and the modifications to the Verde Ditch are approved, as set forth in the Drainage Design Report submitted.

DONE IN OPEN COURT this 27 day of March, 1985.



JUDGE OF THE SUPERIOR COURT



Offices of

DAVID M. SUMMERS, PE, LS
Consulting Engineers

DRAINAGE DESIGN

REPORT

for

THE ARBOR

Camp Verde, Arizona



KOBUK & ASSOCIATES
P.O. Box 805
(South Access Road)
Camp Verde, AZ 86322
(602) 567-6257

EXHIBIT "A"

SUMMERS & ASSOCIATES
P.O. Box 1115
(501 West Main)
Payson, AZ 85541
(602) 474-6625

THE ARBOR

A. OFFSITE DRAINAGE

This parcel contains 3.76 ac. for The Arbor Nursing Center with its location noted on Plate I, Camp Verde, Az.

All offsite tributary drainage from the North is intersected by an irrigation ditch (10' x 6' deep) along the North project boundary line. All present run-off is sheet flow from the ditch bank, cross southeasterly across silty sand towards Salt Mine Rd. then East along the road bank to a low point on the North side of the road at its juncture with the Payson Highway. There are no outlets for this water across either road or highway.

A doctor's clinic, dental clinic and ambulance bay are situated, per Plate I, with finish floor elevations approximating the Salt Mine Rd pavement. Special consideration must be given to sufficient on-site retention, with subsurface injection, which will not allow flooding of this low area, at the Payson Highway.

B. ON-SITE DRAINAGE

Project site dimensions are approximate 14,330' (East-West) by 510' (North-South) or 164,000 s.f. Preconstruction flow is unimpeded from the Northwest corner towards the Southeast corner with an average grade of 4%.

All runoff is collected on inverted drives, then draining South to a 10,000 c.f. retention basin at Salt Mine Rd. A minor retention basin - 2,000 c.f. - is located at the main building entrance, between asphalt drives; to decrease volume to the Southeast corner.

The runoff produced from the site in its existing undeveloped state and that produced under the fully developed concept was calculated.

Design criteria was based upon hydrology and retention calculations for a 10 year storm of 24 hour precipitation with surface water dissipation within 36 hours.

1) Existing Drainage

utilizing a "C" factor 0.30 for this undeveloped parcel, Table II.

$I = 3.73''$ from Table III

$$Q = CIA$$

$$= (0.30) \left(\frac{3.73 \text{ in/hr}}{12 \text{ in/ft}} \right) \left(\frac{1 \text{ hr}}{3600 \text{ sec}} \right) (168,000 \text{ s.f.})$$

$$= 4.35 \text{ c.f.s.}$$

B. (cont.)

2) Post-Construction Drainage

a) Surface areas

roof, sidewalk, asphalt	89,000 s.f.
planting areas	75,000 s.f.
<hr/>	
total direct area	164,000 s.f.
offsite grading infl.	4,000 s.f.
total effective area	168,000 s.f.

b) Deriving a composite "C" factor

$$C_{ave.} = \frac{(0.95)(89,000) + 0.20(75,000)}{164,000}$$
$$= 0.61$$

c) Runoff due to improvements

$$Q = 0.61 \left(\frac{3.73}{72} \right) \left(\frac{1}{3600} \right) (168,000)$$
$$= 8.85 \text{ c.f.s.}$$

$$\Delta Q = 8.85 - 4.35 = 4.50 \text{ c.f.s.}$$

$$4.50 / 8.85 = 50.8\% \text{ need be detained}$$

ADDENDUM

Verde Ditch Bank Design

The south ditch bank crest width was increased from an average width of 7 feet to 15 feet with a 2.5:1 negative slope toward a storm water swale immediately north of the building site -- see Plate II. This swale at its critical points, carries the same water cross-sectional area as the Verde Ditch. The horizontal distance from the ditch bottom to bank slope will be increased from 20 feet to 35 feet.

This swale feeds westerly, then south, to the North-South inversed parking lot drive. All surface flow feeds the 19000 + c.f. detention basin, with dry well, at Salt Mine Rd.

Ditch bank eruption occurs occasionally at crest widths of 5-8 feet. Ditch officials agree that gophers burrow in from the outside slope and crayfish burrow into the bank from the water, tending to weaken the banks structure. Tree and shrub roots also weaken the bank. No structures, lumber, or root producing vegetation should be permitted on the ditch slope.

A 200-foot concrete curtain will be installed along the ditch bank to a depth at least one foot below the ditch bottom -- See Plate III. This interior wall is a membrane to prevent any complete bank penetration.

TABLE #1

<u>Land Use</u>	<u>"C" Value</u>
Commercial, industrial areas	.95
Residential depressed lots	.95

For areas where storm drain is to be provided with no depressed lot storage a composite runoff coefficient based on the percentage of different types of surface in the drainage area may be calculated using the following "C" values:

TABLE #2

<u>Land Use</u>	<u>"C" Value</u>
Central Storage Area	.95
Pavement (Asphalt Concrete, Concrete, Brick)	.95
Roofs	.95
Grass Lawn (non-depressed; no retention)	
Average slopes 0-7%	.20
Steep slopes 7%	.35
Desert Lawn or Rock Lawn	.70
Farm Land	.10
Bare Ground	.25
Undeveloped Land	.25 - .35

NOTE: A composite value is to be used for storm drain design purposes only. Required retention volume is calculated per Section IV.

C. Rainfall intensity is related to time of concentration and shall be obtained from Table II. Time of concentration is the summation of Overland Flow Time, Street Time and Pipe Time.

- (1) Overland Flow Time is that time required for a drop of water falling on an open area (lawn, field, etc.) to reach an outlet point (street, ditch, pipe, etc.).
- (2) Street Time is that time required for the runoff to travel from entrance onto the street to entrance into a catch basin, drainage channel (or to some other point along the street where the runoff exits from the street).
- (3) Pipe Time is that time required for the runoff to travel in the pipe from the entrance catch basin to another point along the storm drain - usually an entrance structure for another drainage area, retention basin, drainage channel, etc.

Keep in mind that the time of concentration is calculated from the part most remote in time, not necessarily in distance. In the rational method, average intensities have no time sequence relation to actual rainfall pattern.

ESTIMATED RETURN PERIODS FOR SHORT-DURATION PRECIPITATION IN ARIZONA
(Inches)

RETURN PERIOD (YEARS)

	1	2	5	10	25	50	100
5 min.	0.25	0.29	0.35	0.40	0.46	0.50	0.56
10 min.	0.38	0.45	0.54	0.62	0.71	0.78	0.85
15 min.	0.48	0.57	0.68	0.78	0.89	0.99	1.09
30 min.	0.67	0.79	0.95	1.03	1.24	1.37	1.52
1 hr.	0.85	1.00	1.20	1.37	1.57	1.74	1.92
2 hr.	1.00	1.18	1.44	1.64	1.89	2.10	2.32
3 hr.	1.14	1.36	1.66	1.90	2.20	2.45	2.7
6 hr.	1.50	1.80	2.23	2.55	2.90	3.32	3.67
12 hr.	1.82	2.19	2.73	3.13	3.67	4.09	4.53
24 hr.	2.15	2.60	3.26	3.73	4.33	4.90	5.42

D
U
R
A
T
I
O
N

TABLE III

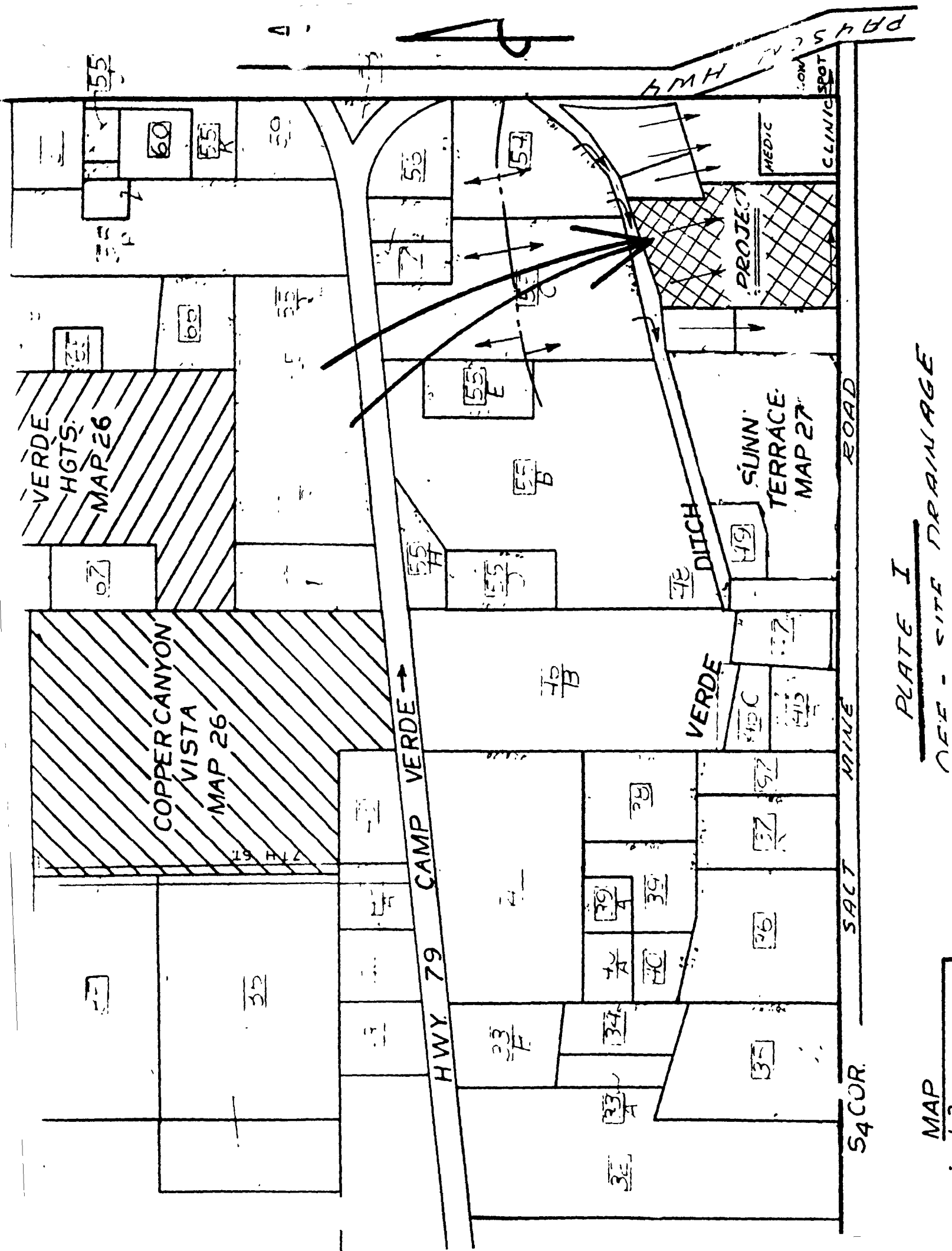
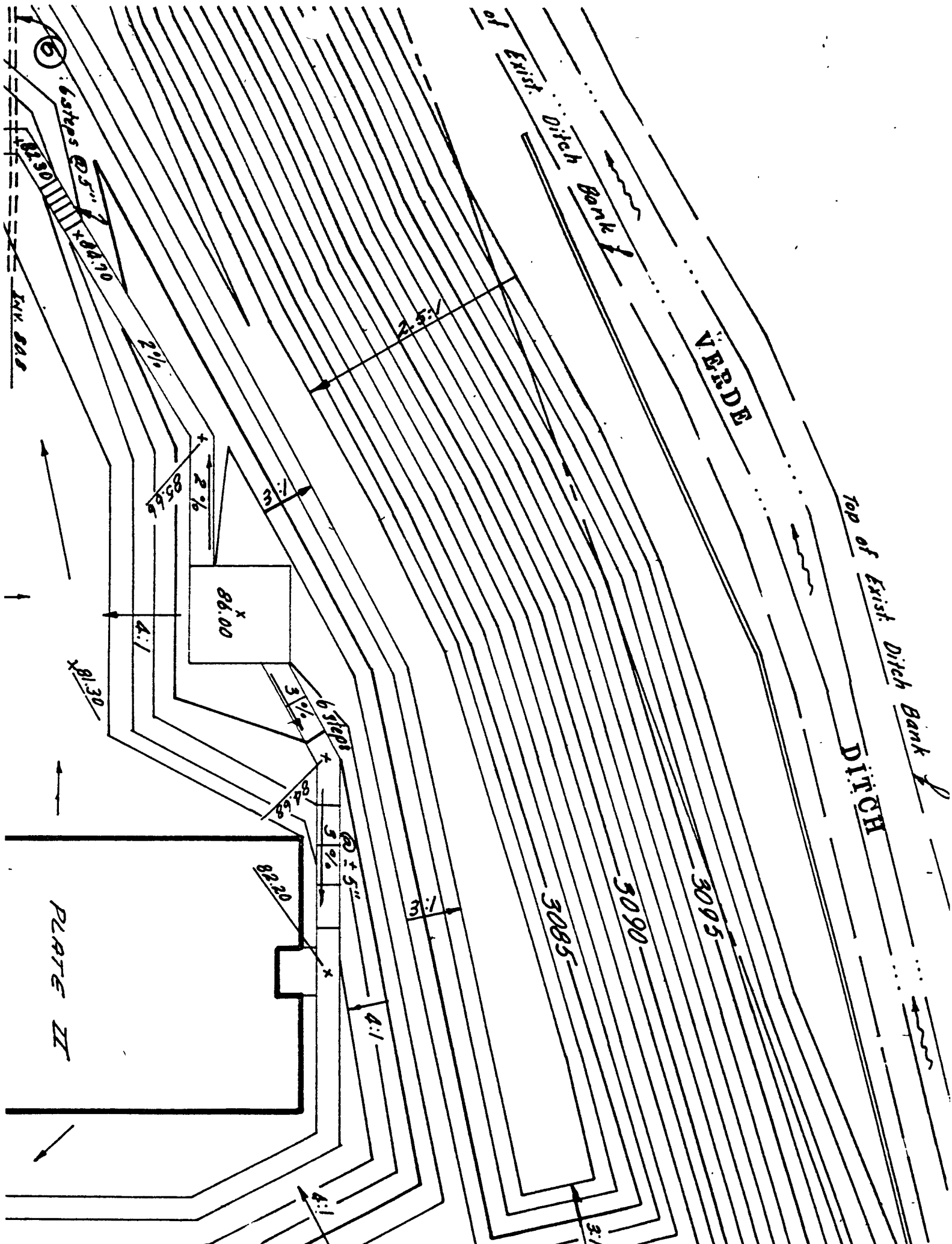


PLATE I
 SEE - SITE DRAINAGE

MAP



VERDE

of Exist. Ditch Bank
 Top of Exist. Ditch Bank
 DITCH

3085
 3090
 3095

86.00

82.20

PLATE II

6 STEPS @ 5"
 83.10

6 STEPS @ 5"

6 STEPS @ 5"

85.5

81.30

2.5:1

3:1

3:1

4:1

4:1

4:1

3:1

2%

5%

3%

2%

EX. 84.8

87.5

84.8

84.10

85.5

86.00

87.5

89.0

90.5

92.0

93.5

95.0

96.5

98.0

99.5

101.0

102.5

104.0

105.5

107.0

108.5

110.0

111.5

113.0

114.5

116.0

117.5

119.0

120.5

122.0

123.5

125.0

126.5

128.0

129.5

131.0

132.5

134.0

135.5

137.0

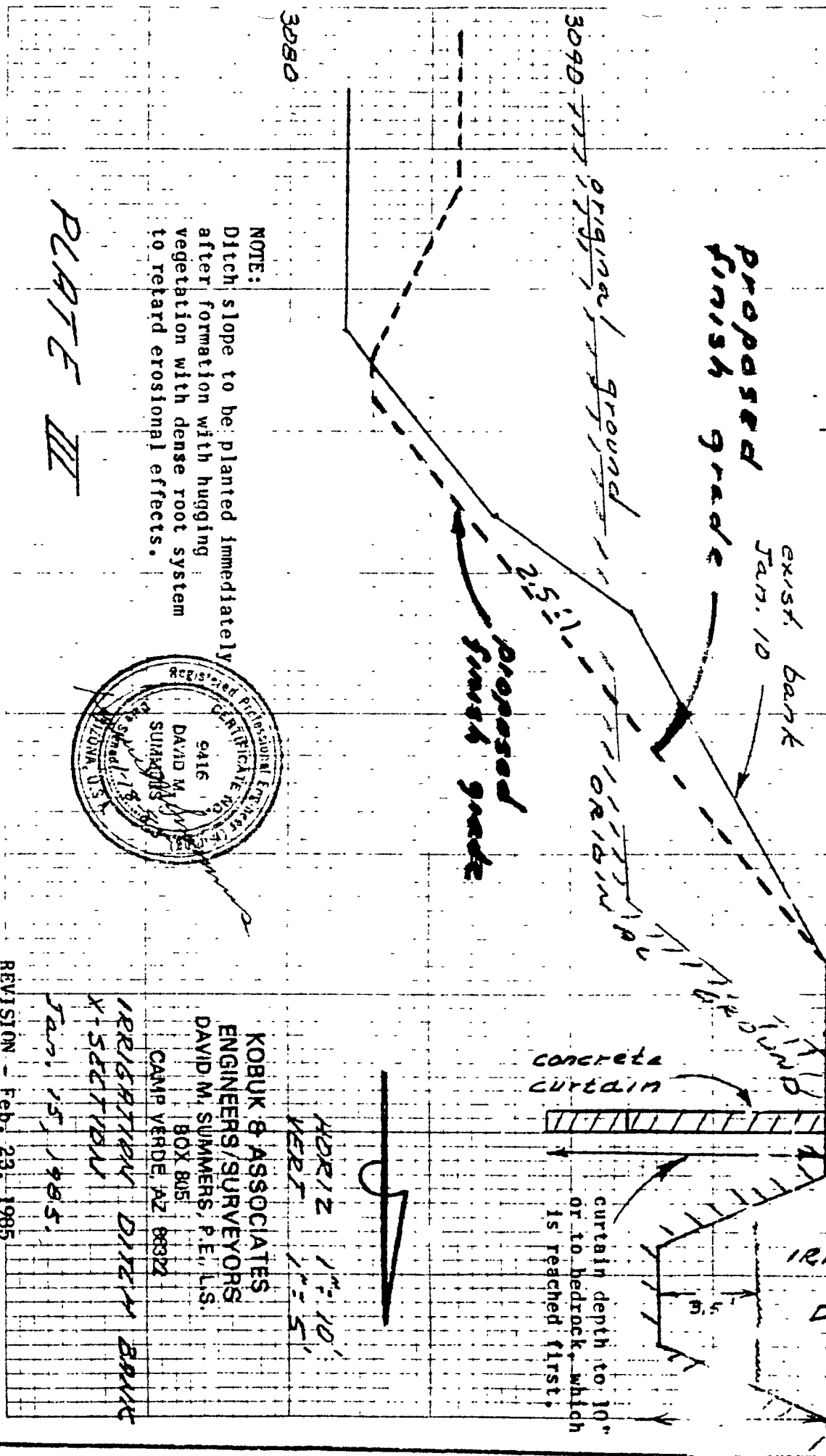
138.5

140.0

141.5

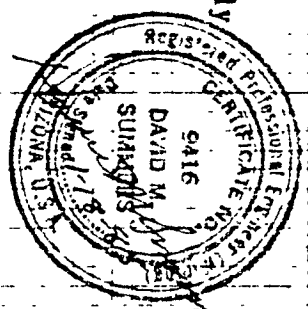
B L D G

NOTE:
Curtain to be placed as close to the ditch as is feasible without disturbing the inside ditch wall. Note to be closer than 4".



NOTE:
Ditch slope to be planted immediately after formation with hugging vegetation with dense root system to retard erosional effects.

PLATE III



REVISION - Feb. 23, 1985

KOBUK & ASSOCIATES
ENGINEERS/SURVEYORS
DAVID M. SUMMERS, P.E., L.S.
BOX 805
CAMP VERDE, AZ 86322

IRRIGATION DITCH BANK
Jan. 15, 1985.

HORIZ 1"=10'
VERT 1"=5'