HYDROLOGY

F21/D37C

TWO PLANS

2 PLANS

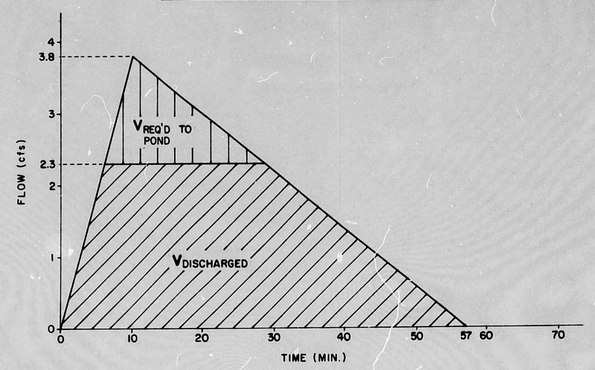
FOR

F21. D37C

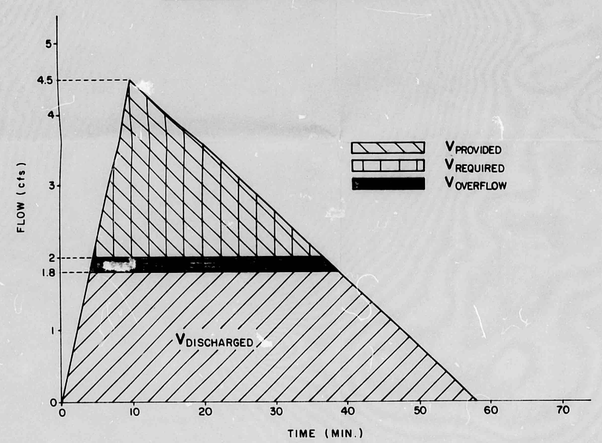
AAA MONTGOMERY

OFFICE Bldg.

HYDROGRAPH FOR BASIN 2



HYDROGRAPH FOR BASIN 3



Analysis of Basin 1 - Drains directly to street.

Analysis of Basin 2 - Detention ponding at northwest corner.

Ponding provided $\longrightarrow$ 1935 cf

Ponding needed $\longrightarrow$ 1035 cf

therefore: 900 cf of pond not used.

Calculations

$$\text{Volume of Pond} = \tfrac{1}{2}(A_{51.00} + A_{50.38})\ (\ \Delta\ \text{DEPTH})$$

$$= \tfrac{1}{2}(6240\ sf + 0.00\ sf)\ (51.00 - 50.38)$$

$$= 1935\ cf$$

Flow discharged by curb opening

$$q_{discharged} = CA\sqrt{2g\,\Delta h} \qquad \text{Orifice equation}$$

where $C = 0.80$

A = width x height

$= 1' \times 0.5' = 0.5\ sf$

$g = 32.2\ ft/sec^2$

$h = 0.5\ ft.$

$$\text{therefore: } q_{discharged} = (0.80)(0.50)\ \ 2(32.2)(0.50)$$

$$= 2.3\ cfs$$

Volume required to pond

$$V_{required} = \tfrac{1}{2}(3.8 - 2.3)(23\ min)(60\ s/min)$$

$$= 1035\ cf$$

Analysis of Basin 3 - Detention ponding at southwest corner.

Ponding provided $\longrightarrow$ 2460 cf

Ponding required $\longrightarrow$ 2750 cf

therefore: 290 cf overflows existing pond

Calculations

$$\text{Volume of Pond} = \tfrac{1}{2}(A_{51.00} + A_{50.25})\ (\ \Delta\ \text{DEPTH})$$

$$= \tfrac{1}{2}(2460 + 0.00)(51.00 - 50.25)$$

$$= 2460\ cf$$

Flow discharged by curb opening

$$q_{discharged} = 3.33\ LH^{3/2} \qquad \text{Weir equation}$$

where: $L = 10''/12in/ft = 0.83\ ft$

$H = 0.75\ ft$

$$q_{discharged} = 3.33(0.83)(0.75)^{3/2}$$

$$= 1.8\ cfs$$

Volume required to pond

$$V_{required} = \tfrac{1}{2}(4.5 - 1.8)(34)(60)$$

$$= 2750\ cf$$

Overflow = Flow entering the Pond - (Flow retained by Pond + Flow exiting Pond Via Curb opening)

See Hydrograph

$$q_{ovfl} = q_{entr} - (q_{ret.} + q_{exit})$$

$$= 4.5 - (2.5 + 1.8)$$

$$= 0.2\ cfs$$

Depth of overflow

$$Q = 3.33\ LH^{3/2} \qquad \text{Weir equation}$$

where:

$Q = 0.2\ cfs$

$L = 100'$ (Assumed to flow over southern curb of pond)

$$H = \left(\frac{Q}{3.33(L)}\right)^{2/3}$$

$$= \left(\frac{0.20}{3.33(100)}\right)^{2/3}$$

$$= 0.0069\ ft = .08\ inches$$

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HYDROLOGY SECTION

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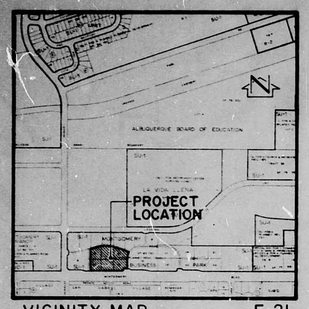
F21/D37C



VICINITY MAP F-21
SCALE 1" = 800'

LEGEND

- EXIST. CONTOUR
- PROPOSED CONTOUR
- EXIST. SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- PROPOSED CONCRETE
- PROPOSED RETAINING WALL

LEGAL DESCRIPTION

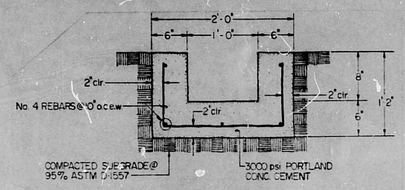
TRACT B, MONTGOMERY BUSINESS PARK

PROJECT BENCHMARK

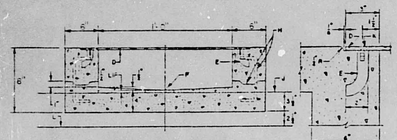
ADD BRASS TAB SET FLUSH WITH CURB ON THE NORTHWEST CORNER OF THE INTERSECTION OF MONTGOMERY BLVD. N.E. & MORRIS ST. N.E.
ELEV. @ 5630.11 FT. (MSLD)

TEMPORARY BENCHMARK

TOP OF CURB @ PROJECTION OF SOUTHWEST CORNER OF TRACT B, ONTO MONTGOMERY BLVD. N.E.
ELEV. @ 5642.01 FT. (MSLD)



SECTION A-A
1" = 1'-0"



SECTION B-B
N.T.S.

ANCHOR DETAIL

DOWEL DETAIL

CONSTRUCTION NOTES

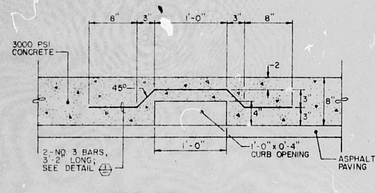
A. JOINT NEAREST SCORE LINE OR WEAKENED PLANE JOINT, PLACE ½" EXPANSION JOINT MATERIAL.
B. SIDEWALK ON SETBACK (VARIABLE).
C. 3" RADIUS, (TYPICAL).
D. ½" CHECKERED STEEL PLATE CULVERT TOP
E. ROD ANCHOR (4.5')
F. 4" INVERT.
G. SIDEWALK GRADE.
H. DOWEL AND JOINT, (OPTIONAL).
J. GUTTER FLOWLINE ELEV.
K. ¼" x ¾" FH CSUNK STAINLESS STL MACHINE SCREW
L. BOTTOM OF GUTTER
M. DRAIN WIDTH, 24" MAX. 12" MIN.
N. SLOPE ¼" PER FT. MIN.

EROSION CONTROL MEASURES

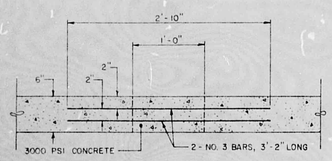
1. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE INTO PUBLIC RIGHT-OF-WAY OR ONTO PRIVATE PROPERTY. THIS CAN BE ACHIEVED BY CONSTRUCTING TEMPORARY BERMS AT THE PROPERTY LINES AND WETTING THE SOIL TO KEEP IT FROM BLOWING.
2. THE CONTRACTOR SHALL PROMPTLY CLEAN UP ANY MATERIAL EXCAVATED WITHIN THE PUBLIC RIGHT-OF-WAY SO THAT THE EXCAVATED MATERIAL IS NOT SUSCEPTIBLE TO BEING WASHED DOWN THE STREET.
3. THE CONTRACTOR SHALL SECURE "TOPSOIL DISTURBANCE PERMIT" PRIOR TO BEGINNING CONSTRUCTION.

CONSTRUCTION NOTES:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE 765-1234, FOR LOCATION OF EXISTING UTILITIES.
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL POTENTIAL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
3. ALL WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS CONCERNING CONSTRUCTION SAFETY AND HEALTH.
4. ALL CONSTRUCTION WITHIN PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OF ALBUQUERQUE STANDARDS AND PROCEDURES.



SECTION C-C
SCALE 1" = 1'-0"



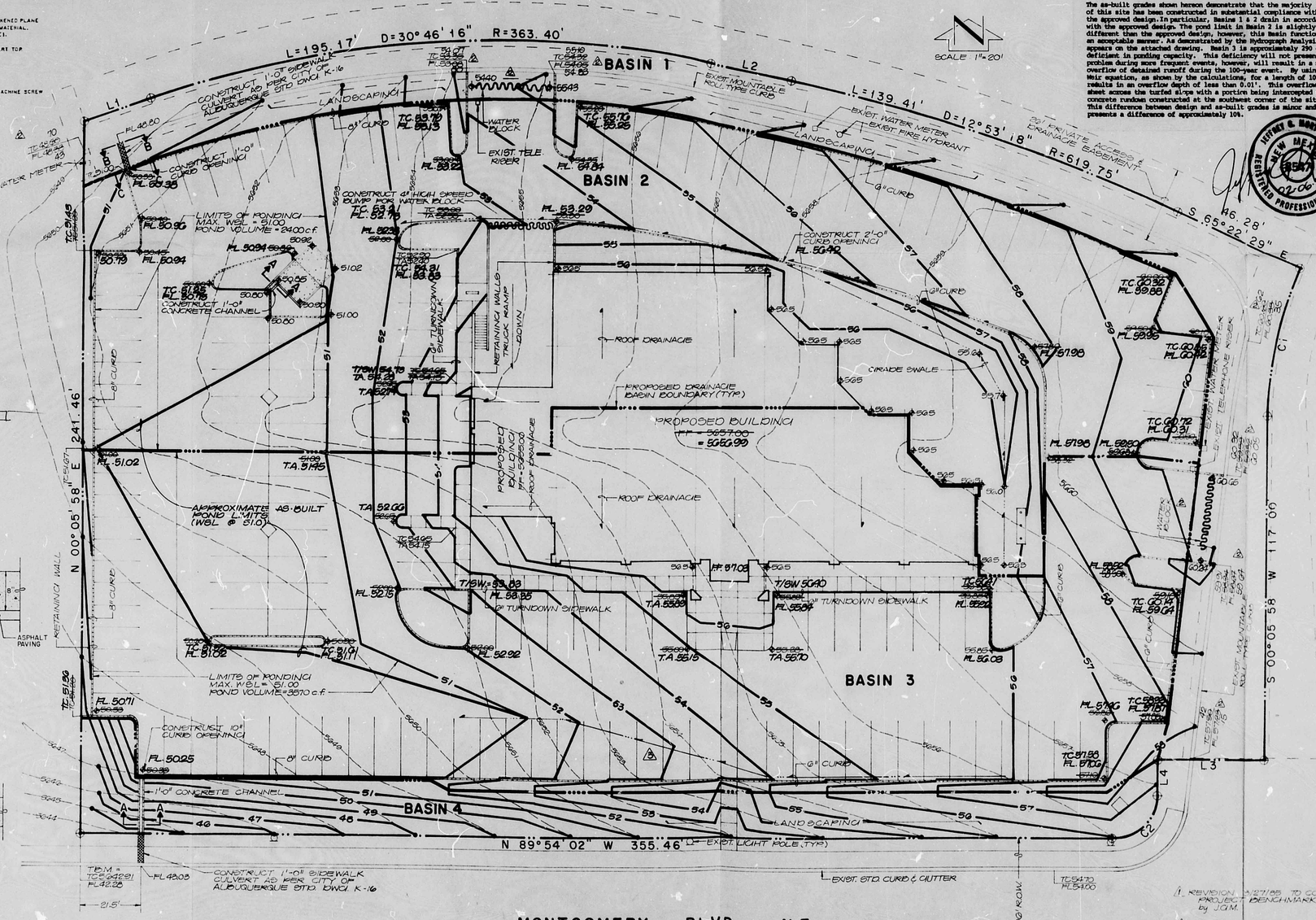
DETAIL
SCALE 1" = 1'-0"

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 70°57'56" E	24.41
L2	S 78°15'47" E	29.06
L3	N 89°54'02" W	37.00
L4	S 0°05'58" W	12.00

CURVE TABLE

CURVE	ARC	DELTA	RADIUS
C1	51.37	24°31'33"	120.00
C2	23.56	90°00'00"	15.00



SCALE 1" = 20'

DRAINAGE PLAN

The following items concerning the AAA Montgomery Office Building Drainage Plan are contained hereon:

1. Vicinity Map
2. Grading Plan
3. Calculations

The proposed improvements, as shown by the Vicinity Map, are located at the northeast corner of the intersection of Montgomery Boulevard N.E. and Morris Street N.E. Presently, the site is undeveloped. The surrounding area is currently undergoing development.

A Conceptual Grading and Drainage Plan has been prepared and approved for this site. This plan, dated December 17, 1984, identifies the drainage concept upon which the design of this site is based, as well as offsite flows. These characteristics of the site remain unchanged, in fact, this drawing is practically identical to the previous submittal.

The Grading Plan shows 1) existing and proposed grades indicated by spot elevations and contours at 1'0" intervals, 2) continuity between existing and proposed elevations, 3) the limit and character of the proposed improvements, 4) the proposed drainage basin boundaries, and 5) ponding limits. As shown by this plan, the proposed improvements include the construction of an office building, asphalt paving, and landscaping. Four drainage basins are also shown on this plan. Drainage Basin 1 is that portion of the internal street that exists within the subject site along with those portions of the site which drain directly to that street. It will remain in its present condition. Drainage Basin 2, consisting of the north portion of the site, will drain from east to west to the northwest corner of the parking lot and discharge at a controlled rate through an interim pond to the private street. The pond depth will not exceed eight inches. Drainage Basin 3, consisting of the south portion of the site, will drain from east to west to the southwest corner of the parking lot and discharge at a controlled rate through an interim pond to Montgomery Boulevard N.E. Drainage Basin 4 consists entirely of a landscaped area adjacent to Montgomery Boulevard N.E. It will slope from north to south and discharge only that runoff which falls upon the landscaping to Montgomery Boulevard N.E.

The Calculations which appear hereon analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Rational Method has been used for this analysis in accordance with the City of Albuquerque Development Process Manual, Volume II. As shown by these calculations, the proposed improvements will result in a decrease in the peak discharge to the northwest corner of the site by approximately 0.4 cfs. The proposed improvements will also result in a decrease in the peak discharge to the southwest corner of the site by approximately 0.4 cfs. The pond release rate was determined based upon the Bohannan-Huston drainage report. The required ponding volumes were determined based upon Hydrograph Analysis. Pond volumes have been determined by the Average End-Area Method.

DRAINAGE CERTIFICATION

The as-built grades shown hereon demonstrate that the majority of this site has been constructed in substantial compliance with the approved design. In particular, Basins 1 & 2 drain in accordance with the approved design. The pond limit in Basin 2 is slightly different than the approved design, however, this basin functions in an acceptable manner. As demonstrated by the Hydrograph Analysis which appears on the attached drawing. Basin 3 is approximately 290 c.f. deficient in ponding capacity. This deficiency will not present a problem during more frequent events, however, will result in a minor overflow of detained runoff during the 100-year event. By using the Weir equation, as shown by the calculations, for a length of 100', results in an overflow depth of less than 0.01'. This overflow would sheet across the turfed slope with a portion being intercepted by the concrete rundown constructed at the southwest corner of the site. This difference between design and as-built grades is minor and represents a difference of approximately 10%.

JEFFREY G. MORTENSEN NEW MEXICO 8347 REGISTERED PROFESSIONAL ENGINEER 02-06-86

CALCULATIONS

Ground Cover Information

From SCS Bernalillo County Soil Survey, Plate 22:
EtC, Embudo-Tijeras Complex; Gravelly Fine Sandy Loam
Hydrologic Soil Group B

Rational Method

Discharge: $Q = CiA$
where C varies
$i = P_6 (6.84)\, T_c^{-0.51} = 5.28$ in/hr
$P_6 = 2.5$ in (DPM Plate 22.2D-1)
$T_c = 10$ min (minimum)
A = area, acres

Volume: $V = CP_6A(1/12)$
where C varies
$P_6 = 2.5$ in (DPM Plate 22.2D-1)
A = area, sf

Existing Condition

Private Street

$A_{total} = 14{,}425$ sf = 0.33 Ac
$A_{imp} = 8{,}280$ sf; % impervious = 57%
'C' = 0.61 (DPM Plate 22.2C-1)
$Q_{100} = CiA = 0.61\ (5.28)(0.33) = 1.1$ cfs
$V_{100} = CP_6A = 0.61\ (2.5/12)(14{,}425) = 1{,}835$ cf

Remaining Site

$A_{total} = 86{,}485$ sf = 1.99 Ac
$A_{imp} = 0$ sf; % impervious = 0%
'C' = 0.34 (DPM Plate 22.2C-1)
$Q_{100} = CiA = 0.34\ (5.28)(1.99) = 3.6$ cfs
$V_{100} = CP_6A = 0.34\ (2.5/12)(86{,}485) = 6{,}125$ cf

Developed Condition

Basin 1 (Private Street) no change

$Q_{100} = CiA = 0.61\ (5.28)(0.33) = 1.1$ cfs
$V_{100} = CP_6A = 0.61\ (2.5/12)(14{,}425) = 1{,}835$ cf

Basin 2 (North Portion of Development)

$A_{total} = 37{,}550$ sf = 0.86 Ac
$A_{imp} = 32{,}720$ sf; % impervious = 87%
'C' = 0.83 (DPM Plate 22.2C-1)
$Q_{100} = CiA = 0.83\ (5.28)(0.86) = 3.8$ cfs
$V_{100} = CP_6A = 0.83\ (2.5/12)(37{,}550) = 6{,}495$ cf

$Q_{release} = CA\sqrt{2gh}$ (Orifice Equation)
where Q = 1.5 cfs, C = 0.8, g = 32.2 ft/sec^2, h = 0.5 ft
$1.5 = 0.8\ A\sqrt{2(32.2)(0.5)}$; A = 0.33 ft

Area = width x height
where A = 0.33 ft and H = 0.33 ft
0.33 = width x 0.33; width = 1.0 ft

Use 1'-0" x 0'-4" curb opening and sidewalk culvert

$V_{pond} = 1/2\ [A_{5100} + A_{50.33}](51.00 - 50.33)$
$V_{pond} = 1/2\ [1{,}850 + 0](0.67)$
$V_{pond} = 2{,}565$ cf > $V_{ponding\ required}$ (determined by Hydrograph Analysis)

Basin 3 (South Portion of Development)

$A_{total} = 42{,}430$ sf = 0.97 Ac
$A_{imp} = 39{,}000$ sf; % impervious = 92%
'C' = 0.88 (DPM Plate 22.2C-1)
$Q_{100} = CiA = 0.88\ (5.28)(0.97) = 4.5$ cfs
$V_{100} = CP_6A = 0.88\ (2.5/12)(42{,}430) = 7{,}780$ cf

$Q_{release} = 3.33\ L\ H^{3/2}$ (Weir Equation)
where Q = 1.5 cfs, H = 0.67 ft
$1.5 = 3.33\ (L)(0.67)^{2/3}$; L = 0.82 ft

Use 10" curb opening

$V_{pond} = 1/2\ [A_{5100} + A_{50.33}](51.00 - 50.33)$
$V_{pond} = 1/2\ [10{,}845 + 0](0.67)$
$V_{pond} = 3{,}635$ cf > $V_{ponding\ required}$ (determined by Hydrograph Analysis)

Basin 4 (Discharge to Montgomery Boulevard N.E.)

$A_{total} = 6{,}505$ sf = 0.15 Ac
$A_{imp} = 0$ sf; % impervious = 0%
'C' = 0.34 (DPM Plate 22.2C-1)
$Q_{100} = CiA = 0.34\ (5.28)(0.15) = 0.3$ cfs
$V_{100} = CP_6A = 0.34\ (2.5/12)(6{,}505) = 460$ cf

Comparison

Northwest Corner

$\Delta Q_{100} = 1.8 - 1.5 = 0.3$ cfs (decrease)
$\Delta V_{100} = 6{,}495 - 3{,}065 = 3{,}430$ cf (increase)

Southwest Corner

$\Delta Q_{100} = 1.7 - 1.5 = 0.30$ cfs (decrease)
$\Delta V_{100} = 7{,}780 - 3{,}065 = 4{,}715$ cf (increase)

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AAA Office Building
Montgomery & Morris St. N.E.
Albuquerque, New Mexico

GRADING AND DRAINAGE PLAN

March, 1985

C2

F21/D37C

1. REVISION 3/27/85 TO CORRECT PROJECT BENCHMARK ELEVATION. by J.G.M.
2. REVISION 6/4/85 OF CURB ELEVATIONS IN PRIVATE ROADS & ADJUSTMENT OF BOTH DRIVEWAYS GRADES. by J.T.O.
3. REVISION 07-30-85, ADJUST PAVING GRADES ON SOUTH SIDE OF BUILDING