HYDROLOGY

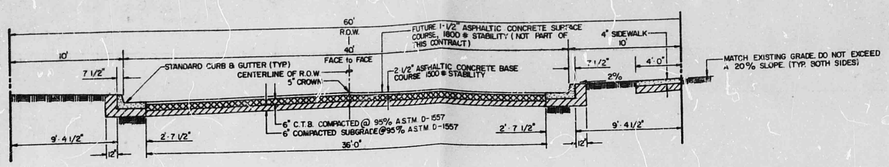
M10/D4

FOUR PLANS

4 PLANS FOR

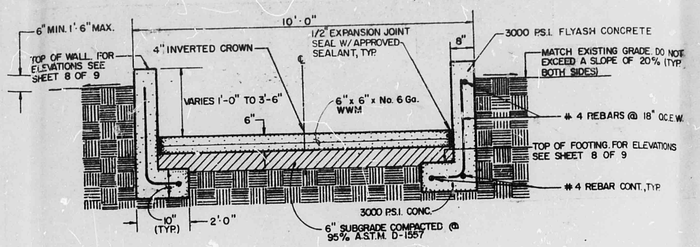
WESTGATE HEIGHTS
ELEM. SCHOOL

M-10-D4



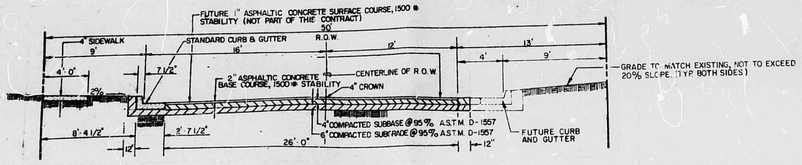
SECTION A-A

SCALE: 1" = 6'



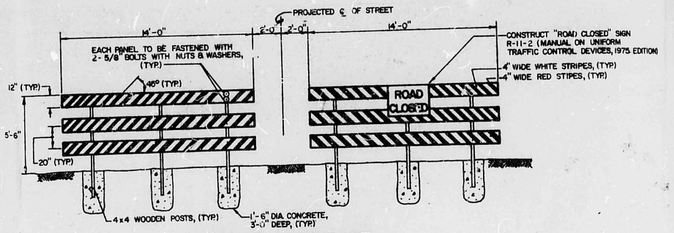
SECTION E-E

SCALE: 1" = 2'



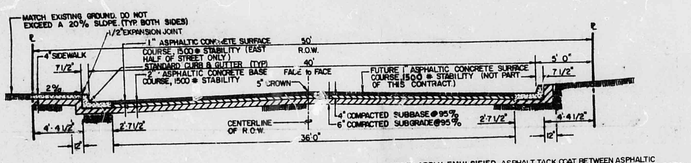
SECTION B-B

SCALE: 1" = 6'



TYPE III BARRICADE

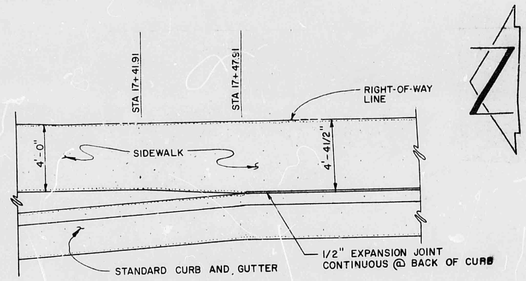
SCALE: 1" = 5'



NOTE: APPLY EMULSIFIED ASPHALT TACK COAT BETWEEN ASPHALTIC CONCRETE SURFACE COURSE AND ASPHALTIC CONCRETE BASE COURSE.

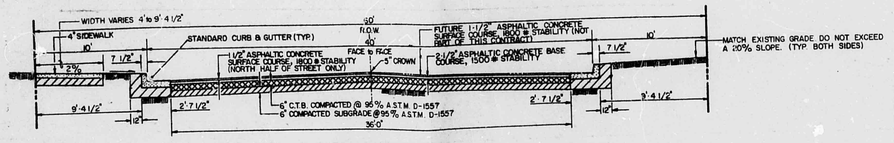
SECTION C-C

SCALE: 1" = 6'



SIDEWALK TRANSITION DETAIL (1/4)

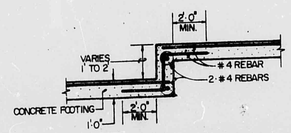
SCALE: 1" = 4'



SECTION D-D

SCALE: 1" = 6'

NOTE: APPLY EMULSIFIED ASPHALT TACK COAT BETWEEN ASPHALTIC CONCRETE SURFACE COURSE AND ASPHALTIC CONCRETE BASE COURSE.



TYPICAL SECTION OF FOOTING STEP

SCALE: 1" = 4'-0"

AS BUILT INFORMATION

CONTRACT #
WORK DONE BY
INSPT. FORES
FIELD CHANGE BY
DATE
FIELD VERIFICATION BY
DATE
DRAWING CORRECTED BY
DATE

MICRO-FILM INFORMATION

RECORDED BY
DATE
NO.

BENCH MARKS

A STANDARD CITY OF ALBUQUERQUE BRASS CAP STAMPED "2N10", SET IN CONC. 0.2' ABOVE GROUND LOCATED: 75' M. WEST OF THE INTERSECTION OF SOUTH COORS RD. AND ARENAL RD. STA. 18 50' SOUTH OF THE CENTERLINE OF ARENAL RD. AND APPROX. 350' EAST FROM THE EXTENSION OF THE CENTERLINE OF UNSER BLVD. B.M.

ELEV. = 5031.51 FEET (NGVD)

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

NO.	DATE	REMARKS	BY

811 DALLAS N.E. - ALBUQUERQUE - NEW MEXICO - 87110
ENGINEERS

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: SAPPHIRE ST. S.W. & KIMELA DR. S.W.

DETAILS & SECTIONS

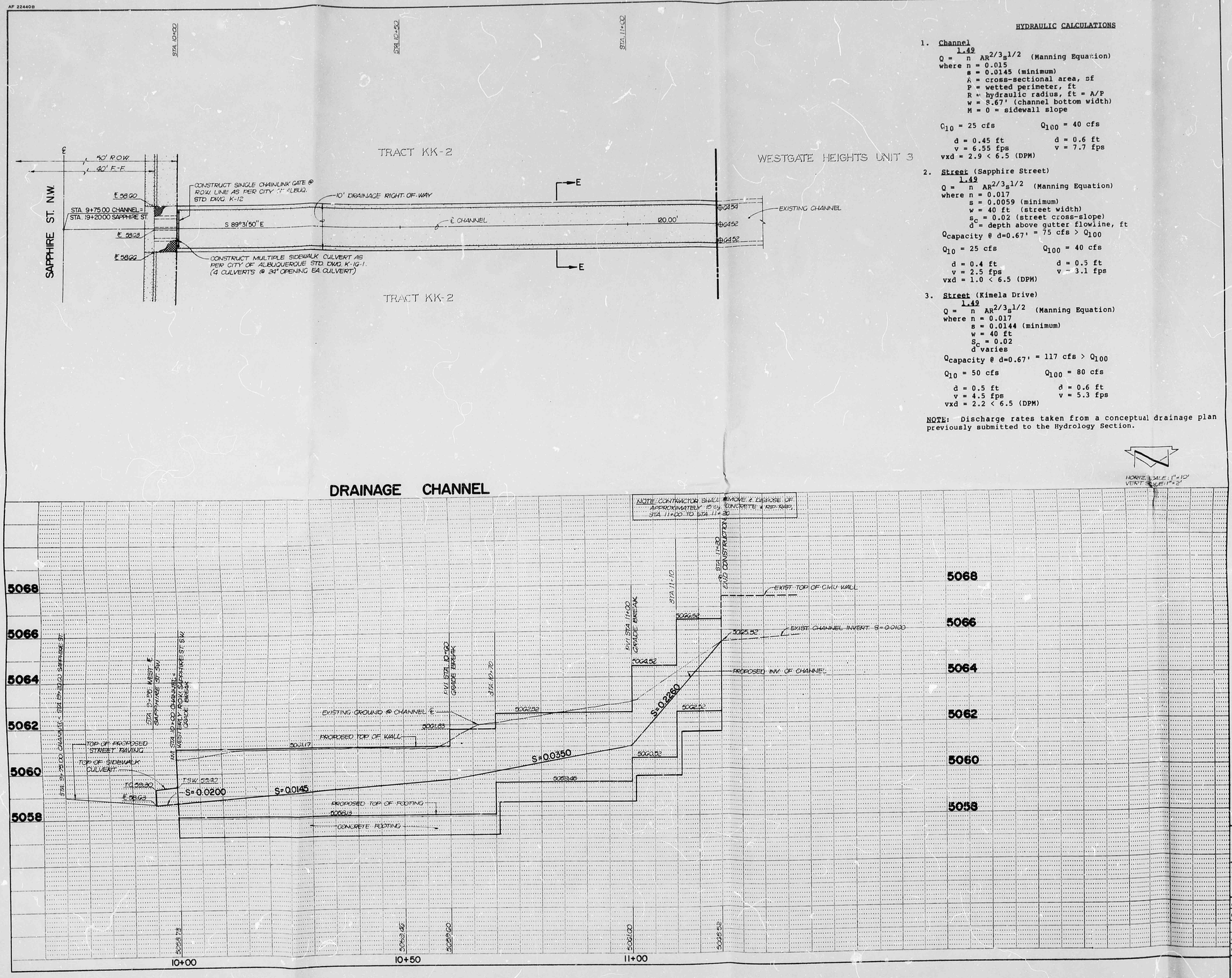
APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer	C. A. Lujan	10/21/83	Liquid Waste	N.A.	J. E. Estgaard 10/14/83
A.C.E.-Design	[illegible]	5/21/83	Traffic		[illegible] 10/14/83
A.C.E.-Hydrology	[illegible]	10/10/83	Water	N.A.	J. E. Estgaard 10/14/83

APPROVED FOR CONSTRUCTION
C. A. Lujan
CITY ENGINEER for CHIEF DATE 10/21/83

DRAWING NO.	MAP NO.	SHEET	OF
1889	M-10	9	9

M10 / D4

AF 22440B



HYDRAULIC CALCULATIONS

1. **Channel**

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

where n = 0.015
s = 0.0145 (minimum)
A = cross-sectional area, sf
P = wetted perimeter, ft
R = hydraulic radius, ft = A/P
w = 8.67' (channel bottom width)
M = 0 = sidewall slope

Q_{10} = 25 cfs Q_{100} = 40 cfs

d = 0.45 ft d = 0.6 ft
v = 6.55 fps v = 7.7 fps
vxd = 2.9 < 6.5 (DPM)

2. **Street** (Sapphire Street)

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

where n = 0.017
s = 0.0059 (minimum)
w = 40 ft (street width)
s_c = 0.02 (street cross-slope)
d = depth above gutter flowline, ft

$Q_{capacity}$ @ d=0.67' = 75 cfs > Q_{100}

Q_{10} = 25 cfs Q_{100} = 40 cfs

d = 0.4 ft d = 0.5 ft
v = 2.5 fps v = 3.1 fps
vxd = 1.0 < 6.5 (DPM)

3. **Street** (Kimela Drive)

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

where n = 0.017
s = 0.0144 (minimum)
w = 40 ft
S_c = 0.02
d varies

$Q_{capacity}$ @ d=0.67' = 117 cfs > Q_{100}

Q_{10} = 50 cfs Q_{100} = 80 cfs

d = 0.5 ft d = 0.6 ft
v = 4.5 fps v = 5.3 fps
vxd = 2.2 < 6.5 (DPM)

NOTE: Discharge rates taken from a conceptual drainage plan previously submitted to the Hydrology Section.

AS BUILT INFORMATION
CONTRACTOR | DATE
WORK STAKED BY
INSPECTOR'S ACCEPTANCE BY | DATE
FIELD VERIFICATION BY | DATE
DRAWINGS CORRECTED BY | DATE
MICRO-FILM INFORMATION
RECORDED BY | DATE

BENCH MARKS
A STANDARD CITY OF ALBUQUERQUE BRASS CAP STAMPED "2M10", SET IN CONC., 0.2' ABOVE GROUND LOCATED 0.75 MI. WEST OF THE INTERSECTION OF SOUTH COORS RD AND AVENAL RD STA 15+50.0' SOUTH OF THE CENTERLINE OF AVENAL RD. AND APPROXIMATELY 340' EAST FROM THE EXTENSION OF THE CENTERLINE OF UNSER BLVD S.W.
ELEV. = 5031.01 FEET (MSL 27)

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
JEFFREY E. MONTOYA
NEW MEXICO
No. 7894

NO.	DATE	REMARKS	BY

MH for GRO 10/21/83

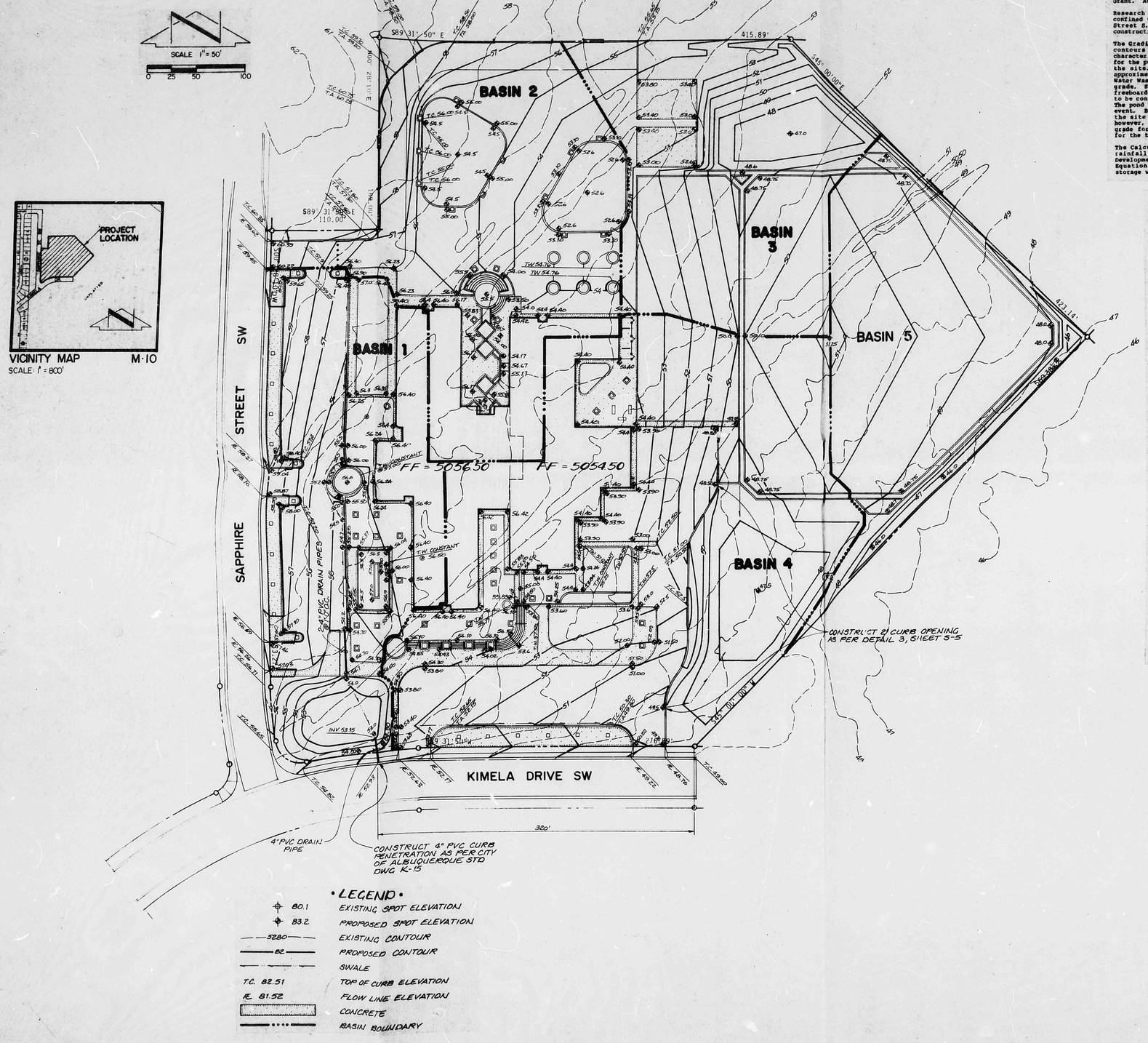
CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

TITLE: SAPPHIRE ST. S.W. & KIMELA DR. S.W.
STORM DRAINAGE CHANNEL
PLAN & PROFILE

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER
City Engineer		10/21/83	Liquid Waste N.A.	J.E. Estyment
A.C.E.-Design		5/20/83	Traffic	
A.C.E.-Hydrology		10/19/83	Water N.A.	J.E. Estyment
Q.A.				

DRAWING NO 1889 | MAP NO. M-10 | SHEET 8 OF

M10/D4



Drainage Plan

The following items concerning the Westgate Elementary School 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 Kimela Drive S.W. and Sapphire Street S.W. The site is more particularly described as Tract EX-1, Town of Atrisco Grant. At present, the site is undeveloped. The site is intended for development as an elementary school campus.

Research has revealed that the site does not lie within a designated flood hazard zone. Off-site flows will be confined within the adjacent streets as demonstrated in the construction drawings for the construction of Sapphire Street S.W. and Kimela Drive S.W. (City Project 1889). Street grades are also set forth on the above mentioned construction drawings.

The Grading Plan shows 1) existing contours at 1'0" intervals, 2) proposed grades indicated by spot elevations and contours at 1'0" intervals, 3) proposed street grades in accordance with City Project 1889, and 4) the limit and character of all proposed improvements. As shown by this plan, the site has been divided into five drainage basins for the purpose of drainage analysis. Basin 1 drains to a positive discharge pond located at the southwest corner of the site. This pond releases runoff via a 4" PVC drain pipe to Kimela Drive S.W. The pond bottom is located approximately 2" below the invert of the 4" pipe to control nuisance flows in accordance with the City of Albuquerque Water Waste Ordinance. Basin 2 drains to the sand play areas which are recessed approximately 6" below finish asphalt grade. Storage will be attained by using the void space within the twelve inch layer of sand and the six inches of freeboard. Any overflow runoff from this basin will enter Basin 3. Basins 3 and 4 drain to relatively shallow ponds to be constructed within unpaved portions of the site. These ponds are situated at each end of the athletic field. The pond volumes provided in Basins 3 and 4 far exceed the required volumes generated by the 100-year, 6-hour rainfall event. Basin 5 will consist almost entirely of landscaped area. The runoff generation potential of this portion of the site is believed to be negligible. It is because of this that a specific ponding area has not been provided, however, the area between the property line and the edge of the tract will be excavated approximately one foot below grade for the planting of trees along the perimeter of the site. This ditch will not only contain irrigation water for the trees, but will also collect and hold excess runoff generated by the athletic field.

The Calculations which appear below 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 2A. The analysis of the pond release rate for Basin 1 is based upon the Orifice Equation. The analysis of pond volumes is based upon the average end-area method. The analysis of sub-surface storage within the sand layer is based upon a fraction of voids equal to 1/3 (this assumes a void ratio of 50%).

Calculations

Ground Cover Information

1. From SCS Bernalillo County Soil Survey, Plate 40: BCC Bluepoint loamy fine sand
   Hydrologic Soil Group A

2. Existing Condition

   A_{total} = 435,600 sf = 10 Ac

   A_{imp} = 0

   % impervious = 0%

   'C' = 0.16 (DPM Plate 22.2 C-1)

3. Developed Condition

   Individual basin calculations appear below.

Rational Method

1. Discharge: $Q = CIA$

   where C varies

   $i = P_6 (6.84) t_c^{-0.51} = 4.65$ in/hr

   P_6 = 2.2 in (DPM Plate 22.2 D-1)

   T_c = 10 min (minimum)

   A = area, acres

2. Volume: $V = CP_6A(1/12)$

   where C varies

   P_6 = 2.2 in (DPM Plate 22.2 D-1)

   A = area, sf

Existing Condition

$Q_{100} = CIA = 0.16(4.65)(10) = 7.4$ cfs

$V_{100} = CP_6A = 0.16(2.2/12)(435,600) = 12,780$ cf

Developed Condition

1. Basin 1

   Area = 73,200 sf = 1.68 Ac

   Impervious area = 56,700 sf

   % impervious = 77%

   C = 0.62 (DPM Plate 22.2 C-1)

   $Q_{100} = 0.62(4.65)(1.68) = 4.8$ cfs

   $V_{100} = 0.62(2.2/12)(73,200) = 8320$ cf

   $Q_{release} = CA\sqrt{2gh} = 0.5$ cfs

   where C = 0.75

   A = 0.0873 sf (4" dia pipe)

   g = 32.2 ft/sec^2

   h = 54.3 - 53.15 - ½(4/12) = 1'

   $V_{required}$ = 6710 cf (by hydrograph analysis)

   $V_{pond} = ½[(A_{53}+A_{54})(54-53)+(A_{54}+A_{54.3})(54.3-54)]$

   $= ½[(3600+6000)(1)+(6000+6800)(0.3)]$

   $= ½(9600+3840) = 6720$ cf > $V_{required}$

2. Basin 2

   Area = 85,300 sf = 1.96 Ac

   Impervious area = 67,800 sf

   % impervious = 79%

   C = 0.63 (DPM Plate 22.2 C-1)

   $Q_{100} = 0.63(4.65)(1.96) = 5.7$ cfs

   $V_{100} = 0.63(2.2/12)(85,300) = 9850$ cf

   $V_{required} = V_{100} < V_{pond}$

   V_{pond} = (area of sand play areas x freeboard) + (area of sand play areas x depth of sand x fraction of voids)

   = 15,340(0.5)+15,340(1)(0.33)

   = 7670+5113 = 12,780 cf

3. Basin 3

   Area = 66,900 sf = 1.54 Ac

   Impervious area = 15,000 sf

   % impervious = 22%

   C = 0.27 (DPM Plate 22.2 C-1)

   $Q_{100} = 0.27(4.65)(1.54) = 1.9$ cfs

   $V_{100} = 0.27(2.2/12)(66,900) = 3310$ cf

   $V_{required} = V_{100} < V_{pond}$

   $V_{pond} = ½[(A_{47}+A_{48})(48-47)+(A_{48.75}+A_{48})(48.75-48)]$

   $= ½[(0+5540)(1)+(7980+5540)(0.75)]$

   $= ½(5540+10,080) = 7810$ cf

   This pond oversized to accommodate overflow from Basin 2.

4. Basin 4

   Area = 148,200 sf = 3.40 Ac

   Impervious area = 88,500 sf

   % impervious = 60%

   C = 0.49 (DPM Plate 22.2 C-1)

   $Q_{100} = 0.49(4.65)(3.40) = 7.7$ cfs

   $V_{100} = 0.49(2.2/12)(148,200) = 13,310$ cf

   $V_{required} = V_{100} << V_{pond}$

   $V_{pond} = ½[(A_{49}+A_{48})(49-48)+(A_{48}+A_{47.5})(48-47.5)]$

   $= ½[(23,200+9900)(1)+(9900+0)(0.5)]$

   $= ½(33,100+4950) = 19,020$ cf

5. Basin 5

   Area = 62,000 sf = 1.42 Ac

   Impervious area = 0

   % impervious = 0%

   C = 0.16 (DPM Plate 22.2 C-1)

   $Q_{100} = 0.16(4.65)(1.42) = 1.1$ cfs

   $V_{100} = 0.16(2.2/12)(62,000) = 1820$ cf

   No actual ponding provided for this Basin. Excess runoff will be collected by the ditch to be constructed at the property line. The purpose of this ditch is to hold irrigation water for the perimeter trees and also collect and hold the excess runoff from the athletic field.

M10/D4

STATE OF NEW MEXICO
JACK S. SAMPLE
No. 645
ALBUQUERQUE, NEW MEXICO
REGISTERED ARCHITECT

ARCHITECT

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
JOHN P. WOOD
8911

ENGINEER

WESTGATE ELEMENTARY SCHOOL

ALBUQUERQUE PUBLIC SCHOOLS

ALBUQUERQUE, NM

WSM

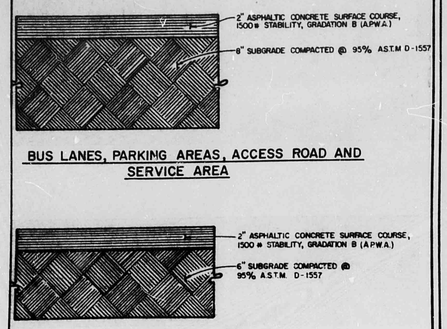
3939-B San Pedro NE, Suite 1
Albuquerque, NM 87110 505-883-7445
Post Office Box 1027
Roswell, NM 88201 505-623-3600

DATE

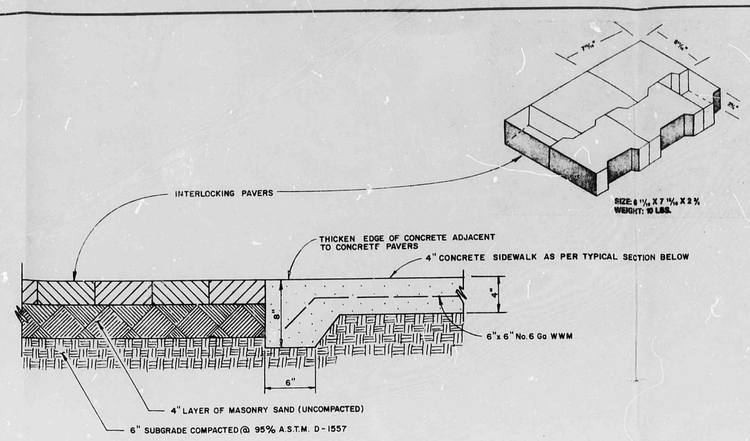
SEPT. 22, 1983

S2

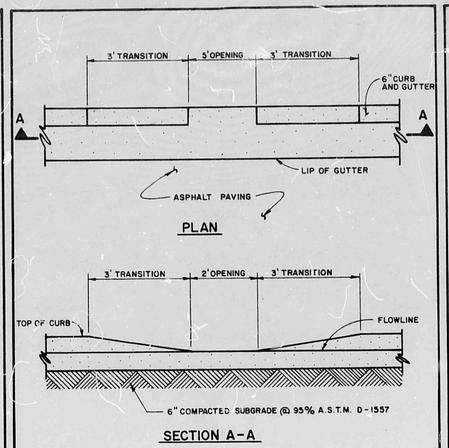
SHEET NO.



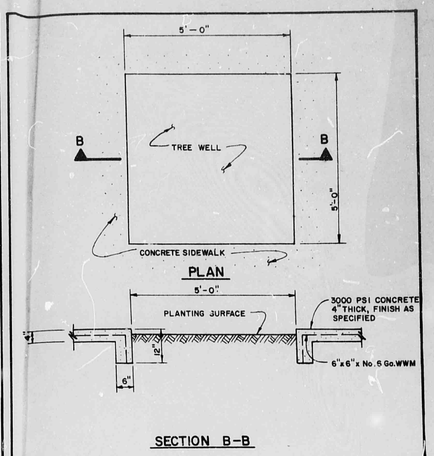
ASPHALT PAVEMENT SECTIONS NOT TO SCALE | 1



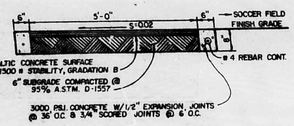
INTERLOCKING PAVERS SCALE 1-1/2"=1'-0" | 2



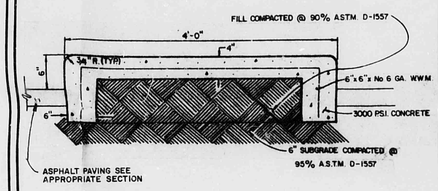
2' CURB OPENING DETAIL SCALE 1/2"=1'-0" | 3



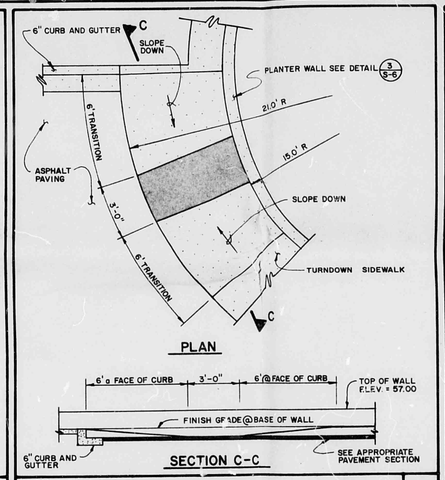
TREE WELL DETAIL SCALE 1/2"=1'-0" | 4



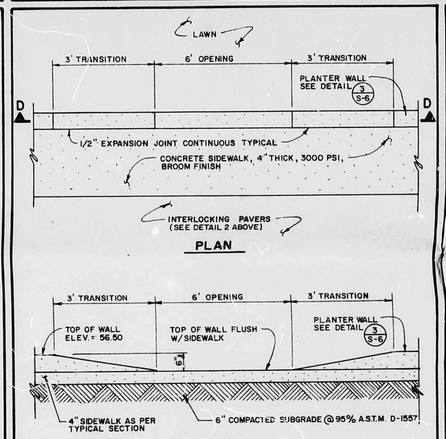
TRACK SECTION NOT TO SCALE | 5



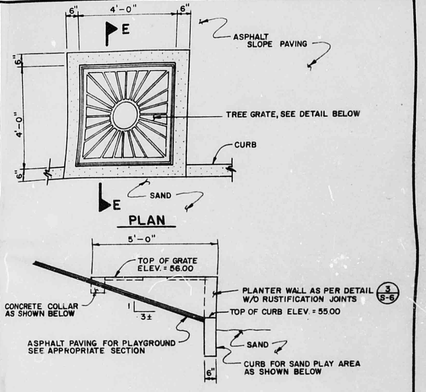
CONCRETE ISLAND SECTION NOT TO SCALE | 6



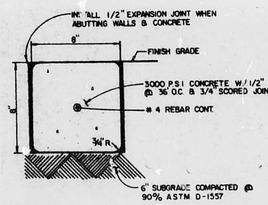
WHEEL CHAIR RAMP DETAIL SCALE 1/4"=1'-0" | 7



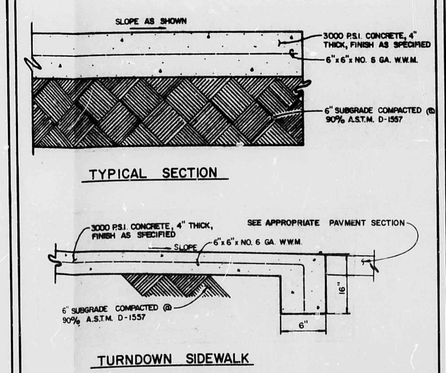
MOWER RAMP DETAIL SCALE 1/2"=1'-0" | 8



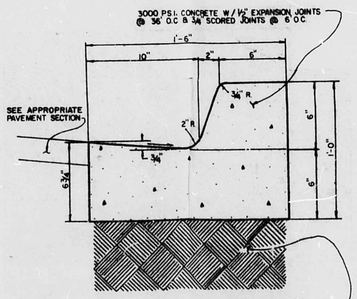
RAISED TREE GRATE DETAIL SCALE 3/8"=1'-0" | 9



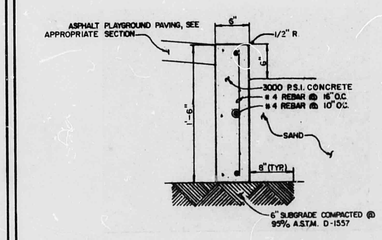
MOW CURB SECTION NOT TO SCALE | 10



SIDEWALK SECTIONS NOT TO SCALE | 11

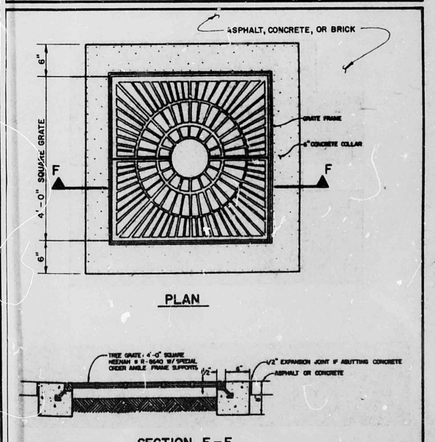


6" CURB AND GUTTER SECTION NOT TO SCALE | 12



NOTE: WHERE TREE GRATES ABUT CURB, ANGLE FRAME SUPPORTS SHALL BE SET IN CURB IN LIEU OF CONCRETE COLLAR.

SAND PLAY AREA CURB SECTION NOT TO SCALE | 13



TREE GRATE DETAIL NOT TO SCALE | 14

M10/D4

STATE OF NEW MEXICO
JACK S. SAMPLE
No. 645
ALBUQUERQUE, NEW MEXICO
REGISTERED ARCHITECT

ARCHITECT

REGISTERED PROFESSIONAL ENGINEER
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WESTGATE ELEMENTARY SCHOOL

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OCT 12 1983
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Post Office Box 1027
Roswell, NM 88201 505-623-3600

DATE

SEPT. 22, 1983

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