HYDROLOGY

C19/D5
2 PLANS

C19/D5

2 Plans

CONSTRUCTION NOTES:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE AT 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 OBSTRUCTION. 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 CITY RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OF ALBUQUERQUE STANDARDS AND PROCEDURES.

NORTH
SCALE: 1"=20'

BENCH MARK.

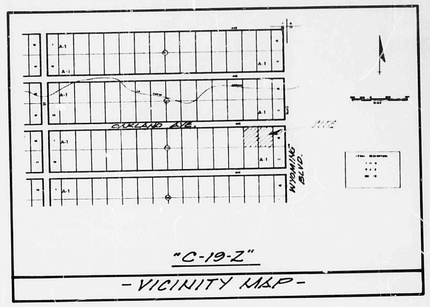
CITY OF ALBUQUERQUE BENCH MARK "5-C19", LOCATED AT THE INTERSECTION OF BARSTOW ST. AND WILSHIRE AVE., N.E. IN THE SOUTHWEST QUADRANT OF THE INTERSECTION: AN "X" CHISLED ON TOP OF A WHITE ANGLE IRON PROPERTY CORNER MARKER, ELEVATION = 5486.708

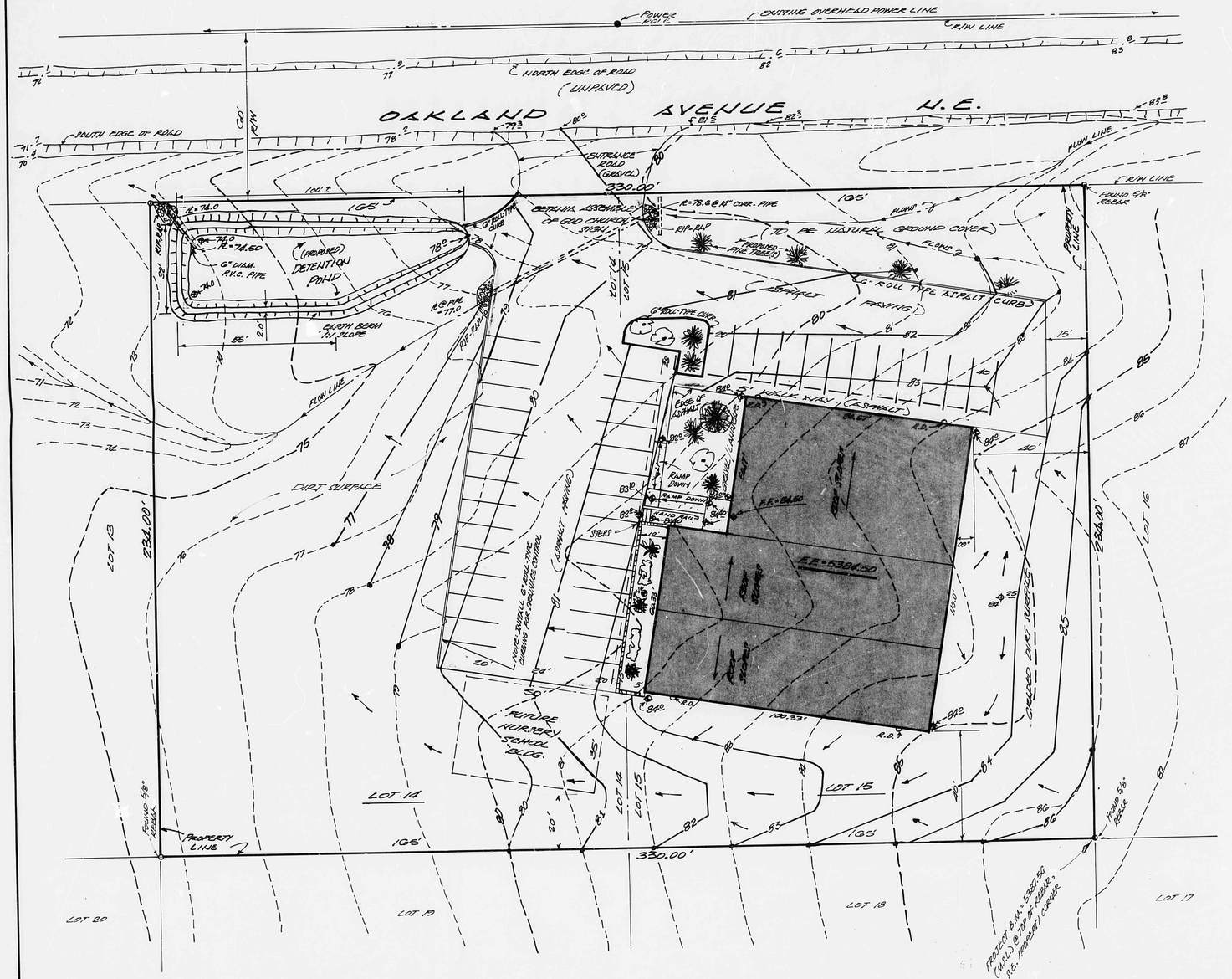
LEGAL DESCRIPTION:

LOTS 14 AND 15, BLOCK 3, TRACT 2, UNIT 3, NORTH ALBUQUERQUE ACRES SUBDIVISION.

LEGEND:

EXISTING CONTOURS ---- 81 ----
PROPOSED CONTOURS ——— 81 ———
EXISTING SPOT ELEVATION — 82.3
PROPOSED SPOT ELEVATION 83.0 84.25
ROOF DRAIN = R.D.





DRAINAGE CALCULATIONS

I. REFERENCES:

A. City of Albuquerque Development Process Manual (DPM) Volume 2, Design Criteria, Chapter 22, Drainage, Flood Control and Erosion Control.
B. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, United States Department of Agriculture, Soil Conservation Service.
C. Floodway Map, Panel 10 of 50, Federal Emergency Management Agency.

II. GENERAL INFORMATION:

A. Soil Type (Ref. B., Sheet No. 11) Soil Type is 5-C(Embudo Triemas Complex, Hydrologic Soil Group "B".
B. Imperviousness:

Type of Surface	Existing Area Sq.Ft.	Existing Area Acres	Proposed Area Sq.Ft.	Proposed Area Acres
Building Roof	-	-	10,000	0.23
Concrete Surfaces	-	-	250	0.006
Asphalt Surfaces	-	-	14,000	0.307
Landscaping	-	-	450	0.010
Undeveloped surface	77,220	1.773	52,420	1.158
Site total	77,220	1.773	77,220	1.774
Percent Impervious	0%			34%

C. "C" Factor (See Ref. A., Plate 22.2 D-1)
1. Undeveloped "C" Factor = 0.34
2. Developed "C" Factor = 0.50

D. Rainfall, 100-year, 6-hour, R_6: (See Ref. A., Plate 22.2 D-1) R_6 = 2.33 inches.

E. Time of Concentration, T_c: Use Kirpich Equation.
Assume longest possible path from site corner to N.W. corner: L = 904 ft. ; Delta Elev. = 20 ft. ; S = 0.0353
$T_c = 0.0078(904)^{0.77}/20^{0.385} = 9.85$ min.
Use 10 minutes.

F. Rainfall Intensity, I: (See Ref. A, Plate 22.2 D-2)
$I = R_6 \times (T_c/6)^{-0.51} = 2.33 \times (10/6)^{-0.51}$
I = 4.02 in/hr

III. PEAK DISCHARGE:

A. Existing Conditions: Use Rational Equation
$Q_{100} = (0.34 \times 4.02 \times 1.773) = 2.00$ cfs
$Q_{10} = 0.557 \times 2.00 = 1.02$ cfs

B. Developed Conditions:
$Q_{100} = (0.50 \times 4.02 \times 1.774) = 3.41$ cfs
$Q_{10} = 0.557 \times 3.41 = 1.90$ cfs

IV. PEAK VOLUME:

A. Existing Conditions:
$V_{100} = 0.34 \times 2.33 \times 1.773 \times 3600 = 5140$ cf
$V_{10} = 0.557 \times 5140 = 3377$ cf

B. Developed Conditions:
$V_{100} = (0.50 \times 2.33 \times 1.774 \times 3600) = 7559$ cf
$V_{10} = (0.557 \times 7559) = 4056$ cf

V. POND CALCULATIONS:

A. Duration, T = 2V/60Q = 2(7559)/(60x4.41) = 57.14 min.
B. Allowable discharge rate: use maximum recommended by the City of Albuquerque of 0.5 cf per acre, or 0.89 cfs.
C. Required Pond volume V = 60(3.32(57.60+1.5))0.5
V = 4871 cf

D. Positive discharge pipe.
For Orifice Equation, $Q = CA(2gH)^{1/2}$
Solve for H. $H = (Q/CA)^2/2g$; A = 0.1963 sq.ft. ; C=0.6
H = (0.89/0.6 x .1963)^2/2 x 32.2 = 0.94 ft.
Therefore, the difference between spillway and spillway. Use Weir Equation $Q = CLH^{3/2}$
The of pipe should not be greater than 0.89 feet.

E. Spillway. Use Weir Equation $Q = CLH^{3/2}$
C = 3.3 ; L = 4 ft. ; Solve for H.
$H = (Q/CL)^{2/3} = 4.41/(3.3 \times 4)^{.667} = 0.48$
Therefore, the depth of water over the spillway for Q_{100} is approximately 0.5 feet.

RECEIVED OCT 11 1985 HYDROLOGY SECTION

RECEIVED OCT 11 1985 HYDROLOGY SECTION

FRANK D. LOVELADY NEW MEXICO 6512 REGISTERED PROFESSIONAL ENGINEER 4/12/85

GRADING & DRAINAGE PLAN FOR BETHANY ASSEMBLY OF GOD CHURCH

NORTH ALBUQUERQUE ACRES ADDITION
BERNALILLO COUNTY, NEW MEXICO
MARCH, 1985

CONSTRUCTION NOTES:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE AT 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 CITY RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OE ALBUQUERQUE STANDARDS AND PROCEDURES.

BENCH MARK:

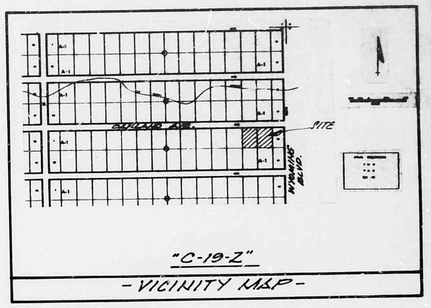
CITY OF ALBUQUERQUE BENCH MARK "5-C19, LOCATED AT THE INTERSECTION OF BARSTOW ST. AND WILSHIRE AVE., N.E. IN THE SOUTHWEST QUADRANT OF THE INTERSECTION: AN "X" CHISLED ON TOP OF A WHITE ANGLE IRON PROPERTY CORNER MARKER, ELEVATION = 5486.708

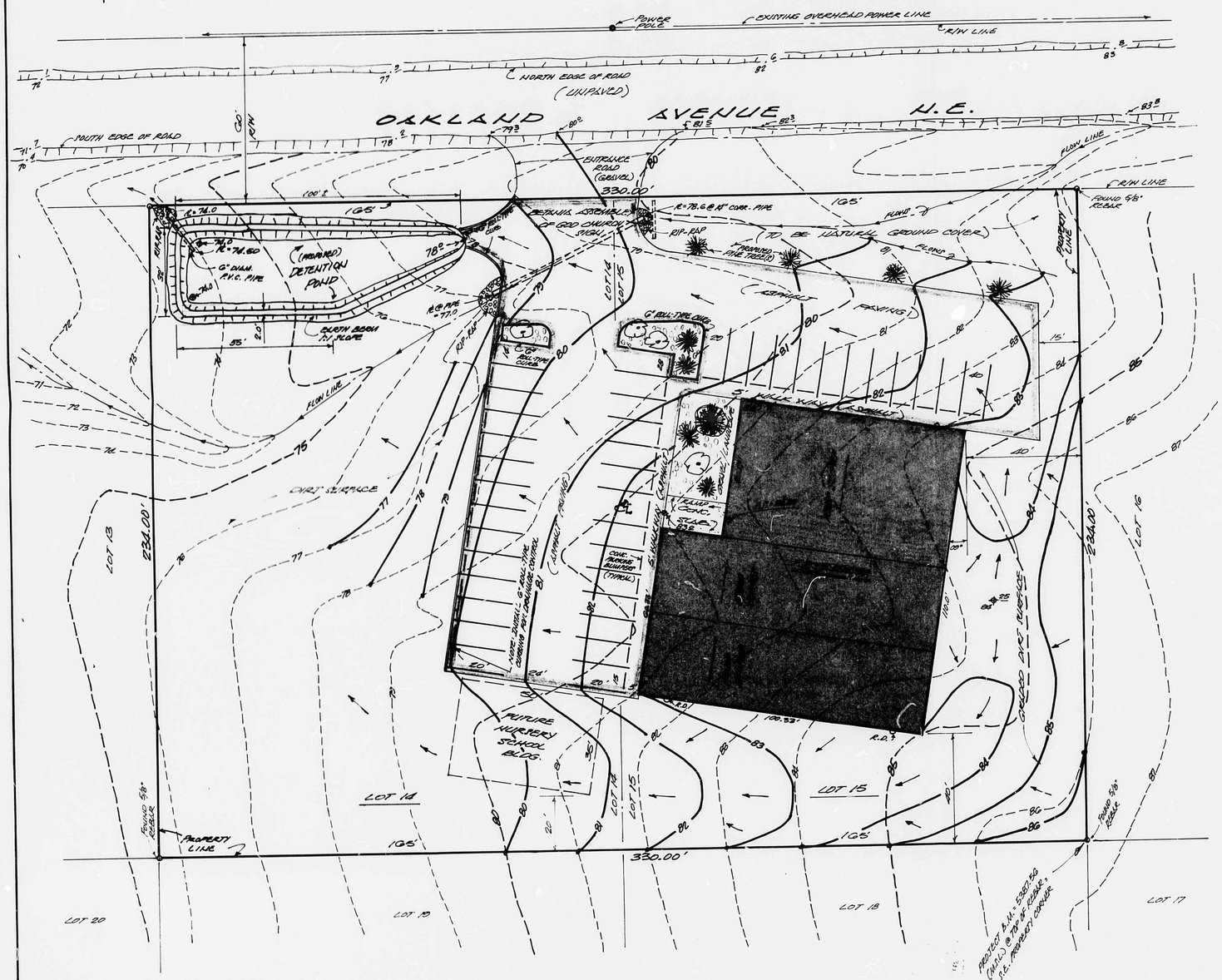
LEGAL DESCRIPTION:

LOTS 14 AND 15, BLOCK 3, TRACT 2, UNIT 3, NORTH ALBUQUERQUE ACRES SUBDIVISION.

LEGEND:

EXISTING CONTOURS
PROPOSED CONTOURS — 81 —
EXISTING SPOT ELEVATION • 82.3
PROPOSED SPOT ELEVATION 83.0 84.25
ROOF DRAIN = R.D.





BP-85-501

DRAINAGE CALCULATIONS

I. REFERENCES:

A. City of Albuquerque Development Process Manual (DPM) Volume 2, Design Criteria, Chapter 22, Drainage, Flood Control and Erosion Control.

B. Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, United States Department of Agriculture, Soil Conservation Service.

C. Floodway Map, Panel 10 of 50, Federal Emergency Management Agency.

II. GENERAL INFORMATION:

A. Soil Type (Ref.B., Sheet No. 11) Soil type is ErC(Embudo Tijeras Complex, Hydrologic Soil Group "B".

B. Imperviousness:

Type of Surface	Existing Area Sq.Ft.	Existing Area Acres	Proposed Area Sq.Ft.	Proposed Area Acres
Building roof	-	-	10,100	0.232
Concrete Surfaces	-	-	250	0.006
Asphalt Surfaces	-	-	16,000	0.367
Landscaping	-	-	450	0.010
Undeveloped surface	77,220	1.773	50,420	1.158
Site total	77,220	1.773	77,220	1.773
Percent impervious	0%		34%	

C. "C" Factor (See Ref. A., Plate 22.2 C-1)
1. Undeveloped "C" Factor = 0.34
2. Developed "C" Factor = 0.50

D. Rainfall, 100-year, 6-hour, R_6: (See Ref.A., Plate 22.2 D-1) R_6 = 2.35 inches.

E. Time of Consentration, T_c: Use Kirpich Equation. Assume longest possible path from S.E. corner to N.W. corner: L = 564 ft. ; Delta Elev. = 20 ft. ; S = 0.0355

$T_c = 0.0078(564^{0.77}/0.0355^{0.385}) = 3.70$ min.

Use 10 minutes.

F. Rainfall Intensity, I: (See Ref. A, Plate 22.2 D-2)

$I = R_6 \times 6.84 \times T_c^{-0.51} = 2.35 \times 6.84 \times (10)^{-0.51}$

I = 4.97 In/Hr

III. PEAK DISCHARGE:

A. Existing Conditions. (Use Rational Equation)

$Q_{100} = 0.34 \times 4.97 \times 1.773 = 3.00$ cfs

$Q_{10} = 0.657 \times 3.00 = 1.97$ cfs

B. Developed Conditions:

$Q_{100} = 0.5 \times 4.97 \times 1.773 = 4.41$ cfs

$Q_{10} = 0.657 \times 4.41 = 2.90$ cfs

IV. PEAK VOLUME:

A. Existing Conditions:

$V_{100} = 0.34(2.35/12)77200 = 5140$ cf

$V_{10} = 0.657 \times 5140 = 3377$ cf

B. Developed Conditions:

$V_{100} = (0.5/0.34)5140 = 7559$ cf

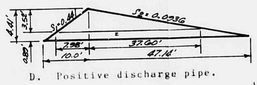
$V_{10} = (0.5/0.34)3370 = 4956$ cf

V. POND CALCULATIONS:

A. Duration. T = 2V/60Q = 2(7559)/(60x4.41) = 57.14 min.

B. Allowable discharge rate; use maximum recommended by the City of Albuquerque of 0.5 cf per acre, or 0.89 cfs.

C. Required Pond volume V = 60(3.52(37.60+7.98))0.5
V = 4813 cf



D. Positive discharge pipe.

Use Orlfice Equation, $Q = CA(2gH)^{1/2}$

Solve for H $H = (Q/CA)^2/2g$ A = 0.1963 sq.ft. C=0.6

$H = (0.89/0.6 \times 0.1963)^2/2 \times 32.2 = 0.89$ ft.

Therefore, the difference between spillway and spring-line of pipe should not be greater than 0.89 feet.

E. Spillway. Use Weir Equation $Q = CLH^{3/2}$
C = 3.3 ; L = 4 ft. ; Solve for H.

$H = (Q/CL)^{2/3} = 4.41/(3.3 \times 4)^{0.667} = 0.48$

Therefore, the depth of water over the spillway for Q_{100} is approximately 0.5 feet.

FRANK D. LOVELADY NEW MEXICO 6512 REGISTERED PROFESSIONAL ENGINEER 8/12/85

GRADING & DRAINAGE PLAN
FOR
BETHANIA ASSEMBLY OF GOD CHURCH
NORTH ALBUQUERQUE ACRES ADDITION
BERNALILLO COUNTY, NEW MEXICO
MARCH, 1985