HYDROLOGY K13/D20 2 PLANS

K13/D20

2 Plans

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 24, 1981

Mr. Dale Crawford, AIA
Dale Crawford & Assoc. Architects
P. O. Box 8503
Albuquerque, New Mexico 87198

Re: Zoo's Parking Lot Drainage Plan

Dear Dale:

Submitted herewith are three (3) proposals with their cost estimates (Block to Block) for the Zoo's Parking Lot Drainage Plan.

The criteria used to design these drainage schemes were based on the Interim Drainage Guidelines for the Valley and the existing ground conditions. If an MSL elevation of 4,944' is maintained around the perimeter of the parking lot and is sloped towards the proposed grate elevation, the required ponding will be satisfied and the amount of grading will be minimized.

Since the flows in the storm drain will act as a restrictor, we did not propose an orfice for the pond outlet.

Please be advised that the inverts provided for the storm drain connections were based on as-built plans in our office and will have to be verified in the field.

If I can be of any further service, please feel free to call on me.

Sincerely,

Fred Aguirre, P.E.
Civil Engineer/Hydrology

FA/fs
Enclosure
cc: Reading File
8140A

PROPOSAL 1

QUANTITY	ITEM	COST/ITEM	COST
215'	TRENCHING, BACKFILLING, AND COMPACTION FOR 18" TO 36" PIPE, LESS THAN 8' TRENCH DEPTH, PER LF (S-17)	$8.00	1720
215'	18" RCP, CLASS IV, COMPLETE IN PLACE, IN TRENCH, PER LF (K-3)	$16.50	3548
1	TYPE "D" CATCH BASIN, SINGLE GRATE, COMPLETE IN PLACE, PER EACH (K-33)	$1400	1400
(15'x4') ≈ 7 SY	CUTTING, REMOVAL, + DISPOSAL OF EXISTING SIDEWALK AND DRIVEPADS, PER SY (P-14)	$3.00	21.00
15 ft	REMOVAL + DISPOSAL OF EXISTING PORTLAND CEMENT CONC. CURB + GUTTER, PER L.F. (P-13)	$3.00	45.00
(15'x4') 60 ft²	PORTLAND CEMENT CONC. SIDEWALK, 4" THICK, COMPLETE IN PLACE, PER SF (P-42)	$1.65	99.00
15 ft	PORTLAND CEMENT CONC. STANDARD CURB + GUTTER, COMPLETE IN PLACE, INCLUDING SUBGRADE PREP, PER LF (P-44)	$6.70	101
(20 ft x 20 ft) 44 SY	ASPHALT PAVING REMOVAL AND REPLACEMENT AS PER STANDARD DETAIL DWG P-25, WITHOUT MACHINE LAYDOWN, WHERE EXISTING SUBGRADE MATL. CAN BE PREPARED AND COMPACTED IN PLACE, PER SY (M-36)	$23.50	1034
NA	4' DIA. TYPE "C" OR "E" MH 10'-14' DEPTH, IN PLACE PER EACH (S-23)	$12.80	
NA	REMOVAL OF EXISTING CATCH BASIN, ANY TYPE, INCLUDING CLEANUP, PER EACH (K-38)	$100	
		TOTAL	$7968

COSTS OBTAINED FROM CONTRACT DOCUMENTS FOR CITY-WIDE UTILITIES AND CASH PAVING NO. 30

PROPOSAL 2

QUANTITY	ITEM	COST/ITEM	COST
30ft	TRENCHING, BACKFILLING, AND COMPACTION FOR 18" TO 36" PIPE, LESS THAN 8' TRENCH DEPTH, PER LF (S-17)	$8.00	240
30ft	18" RCP, CLASS IV, COMPLETE IN PLACE, IN TRENCH, PER L.F (K-3)	$16.50	49
1	TYPE "D" CATCH BASIN, SINGLE GRATE, COMPLETE IN PLACE, PER EACH (K-33)	$1400	1400
7 SY	CUTTING, REMOVAL, + DISPOSAL OF EXISTING SIDEWALK AND DRIVEPADS, PER SY (P-14)	$3.00	21.00
15ft	REMOVAL + DISPOSAL OF EXISTING PORTLAND CEMENT CONC. CURB + GUTTER, PER L.F. (P-13)	$3.00	45.00
60ft²	PORTLAND CEMENT CONC. SIDEWALK, 4" THICK, COMPLETE IN PLACE, PER SF (P-12)	$1.65	99.00
15 ft	PORTLAND CEMENT CONC. STANDARD CURB + GUTTER, COMPLETE IN PLACE, INCLUDING SUBGRADE PREP, PER LF (P-46)	$6.70	101
44	BITUMINOUS PAVING REMOVAL AND REPLACEMENT AS PER STANDARD DETAIL DWG P-25, WITHOUT MACHINE LAYDOWN, WHERE EXISTING SUBBASE MATL. CAN BE PROVISED AND COMPACTED IN PLACE, PER SY (M-36)	$23.50	1034
NA	4' DIA. TYPE "S" ONE MH 10' TO 14' DEPTH, IN PLACE PER EACH (S-23)	$12.80	
NA	REMOVAL OF EXISTING CATCH BASIN, ANY TYPE, INCLUDING CLEANUP, PER EACH (K-38)	$100	
		TOTAL	$3435

COSTS OBTAINED FROM CONTRACT DOCUMENTS FOR City-Wide UTILITIES AND CAIN PAVING No. 30

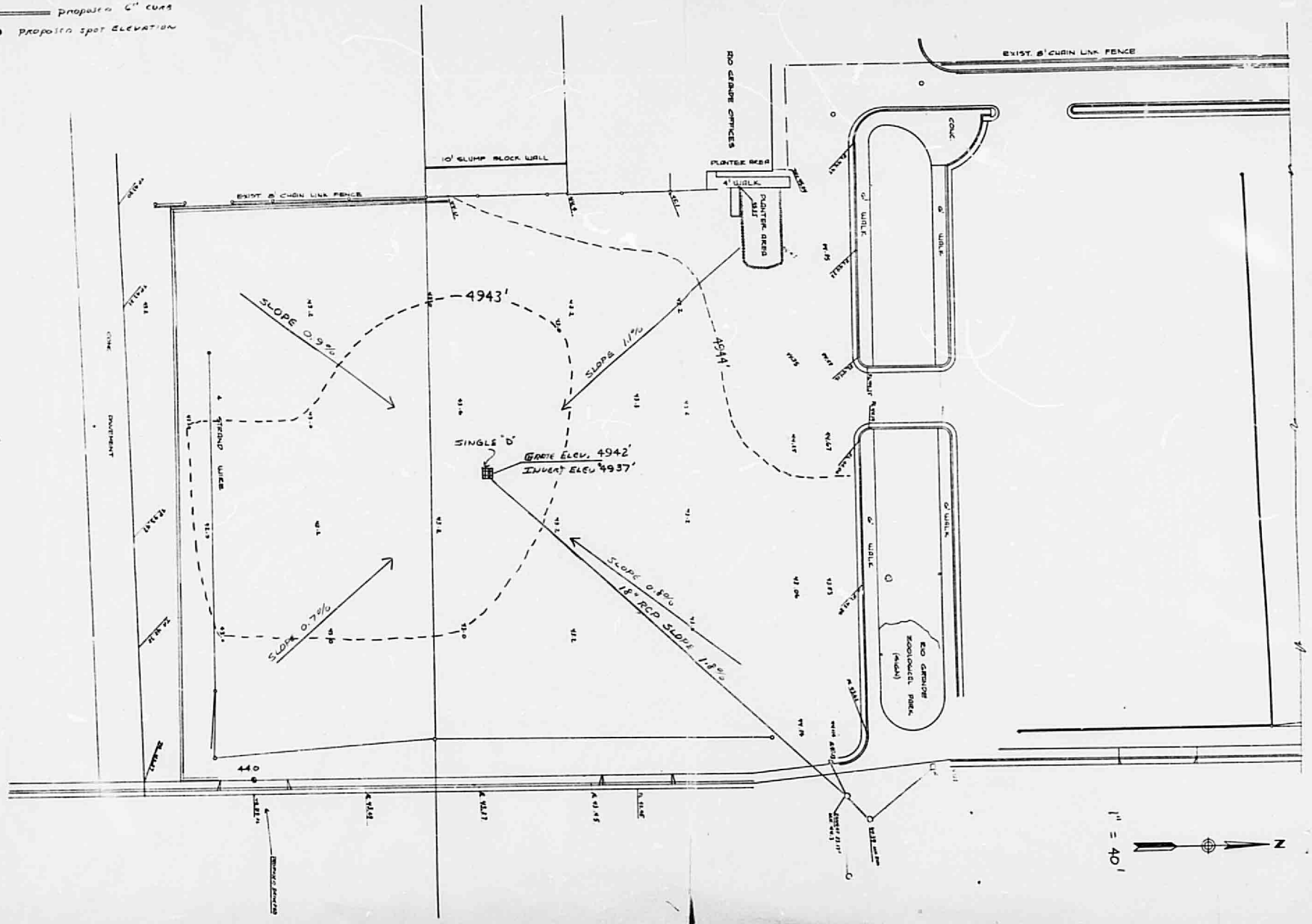
PROPOSAL 3

QUANTITY	ITEM	COST/ITEM	COST
125 ft	TRENCHING, BACKFILLING, AND COMPACTION FOR 18" TO 36" PIPE, LESS THAN 8' TRENCH DEPTH, PER LF (S-17)	$8.00	1000
125 ft	18" RCP, CLASS IV, COMPLETE IN PLACE, IN TRENCH, PER LF (K-3)	$16.50	2063
1	TYPE "D" CATCH BASIN, SINGLE GRATE, COMPLETE IN PLACE, PER EACH (K-33)	$1400	1400
7 SY	CUTTING, REMOVAL, + DISPOSAL OF EXISTING SIDEWALK AND DRIVEPADS, PER SY (P-14)	$3.00	21.00
15 ft	REMOVAL + DISPOSAL OF EXISTING PORTLAND CEMENT CONC. CURB + GUTTER, PER L.F. (P-13)	$3.00	45.00
60 ft²	PORTLAND CEMENT CONC. SIDEWALK, 4" THICK, COMPLETE IN PLACE, PER SF (P-12)	$1.65	99.00
15 ft	PORTLAND CEMENT CONC. STANDARD CURB + GUTTER, COMPLETE IN PLACE, INCLUDING SUBGRADE PREP, PER LF (P-46)	$6.70	101.00
44	ASPHALTIC PAVING REMOVAL AND REPLACEMENT AS PER STANDARD DETAIL DWG P-25, WITHOUT MACHINE LAYDOWN, WHERE EXISTING SUBGRADE MATL. CAN BE PROPERLY PREPARED AND COMPACTED IN PLACE, PER SY (M-26)	$23.50	$1034
1	4' DIA. TYPE "C" OR "E" MH, 10' TO 14' DEPTH, IN PLACE PER EACH (S-23)	$1280	1280
1	REMOVAL OF EXISTING CATCH BASIN, ANY TYPE, INCLUDING CLEANUP, PER EACH (K-38)	$100	100
		TOTAL	$7143.

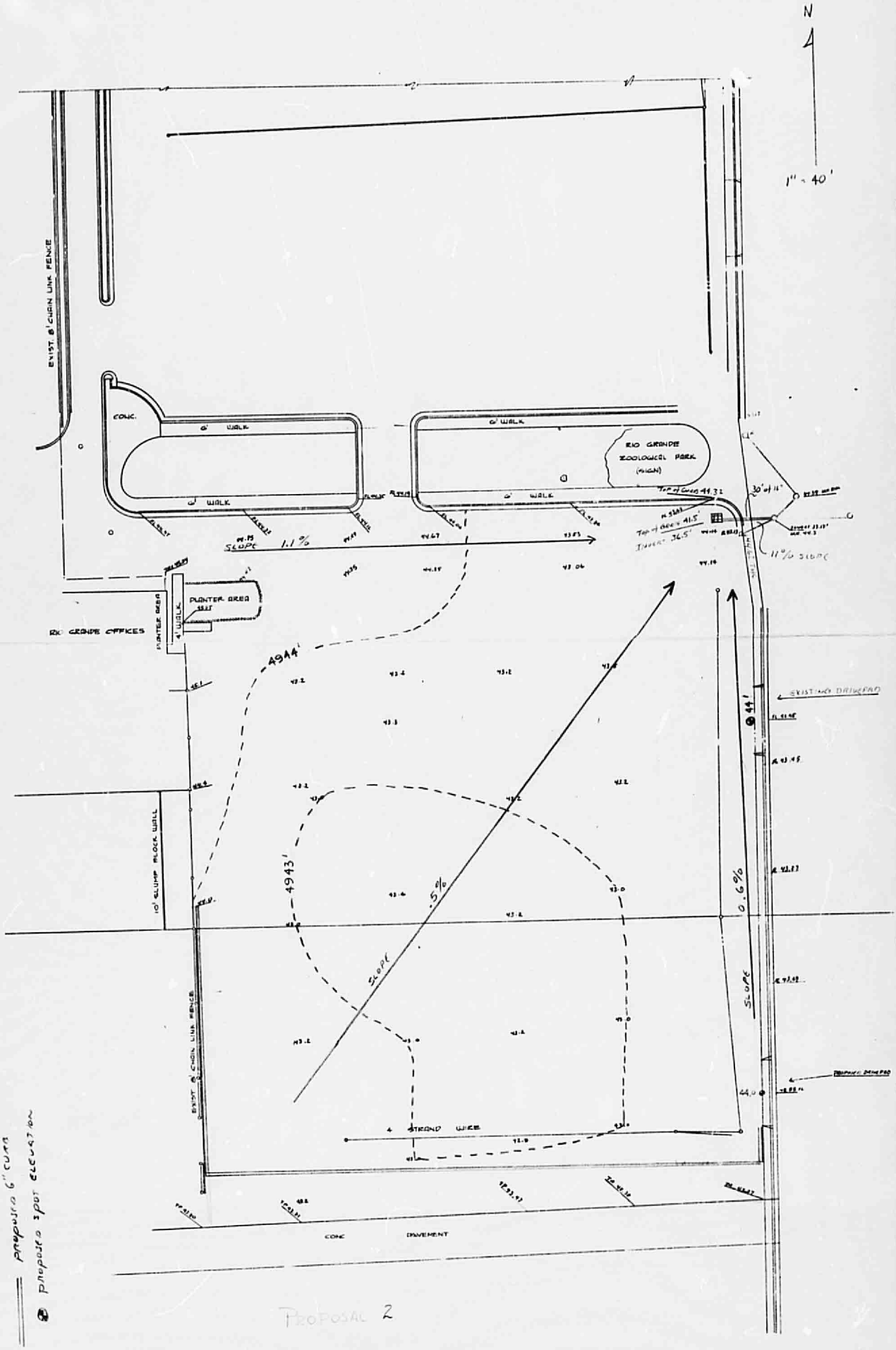
COSTS OBTAINED FROM CONTRACT DOCUMENTS FOR CITY-WIDE UTILITIES AND CASH PAVING NO. 30

LEGEND

- - - - - EXISTING CONTOUR
═══ PROPOSED 6" CURB
● PROPOSED SPOT ELEVATION



Preparer 1


N
1" = 40'
EXIST. 8' CHAIN LINK FENCE
CONC.
6' WALK
6' WALK
6' WALK
6' WALK
RIO GRANDE ZOOLOGICAL PARK (SIGN)
SLOPE 1.1%
PLANTER AREA
RIO GRANDE OFFICES
4' WALK
4944'
4943'
5%
SLOPE
0.6%
SLOPE
EXISTING DRIVEWAY
10' SLUMP BLOCK WALL
EXIST. 8' CHAIN LINK FENCE
4 STRAND WIRE
CONC PAVEMENT
11% SLOPE
30' of 11'
LEGEND
EXISTING CONTOUR
PROPOSED 6" CURB
PROPOSED SPOT ELEVATION

PROPOSAL 2

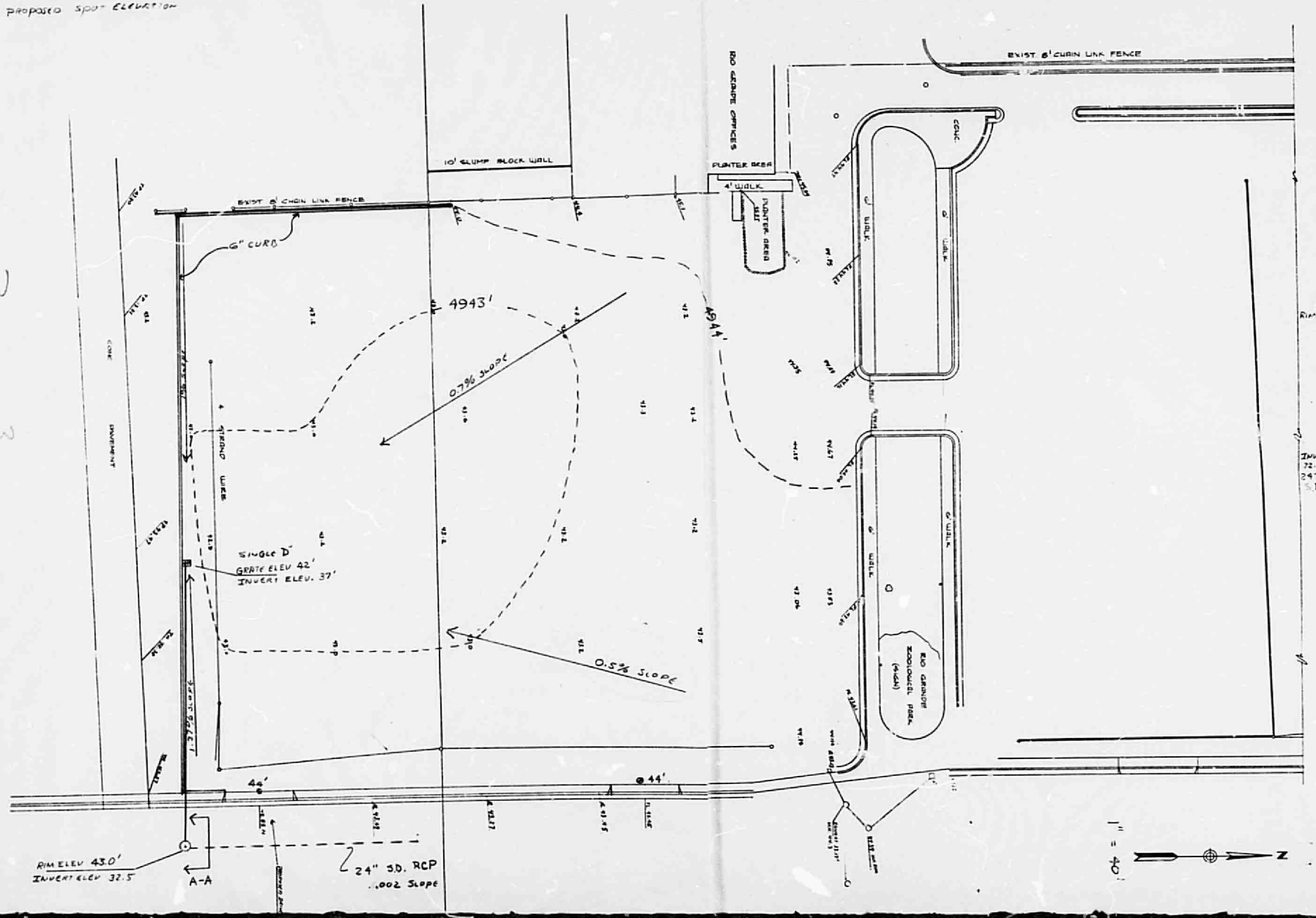
LEGEND

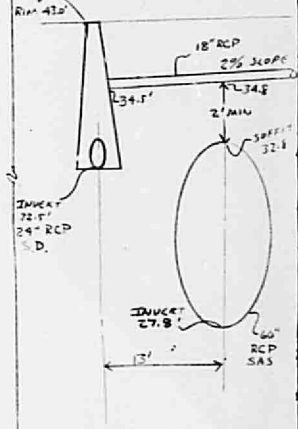
- - - - EXISTING CONTOUR

═══ PROPOSED 6" CURB

⊕ PROPOSED SPOT ELEVATION

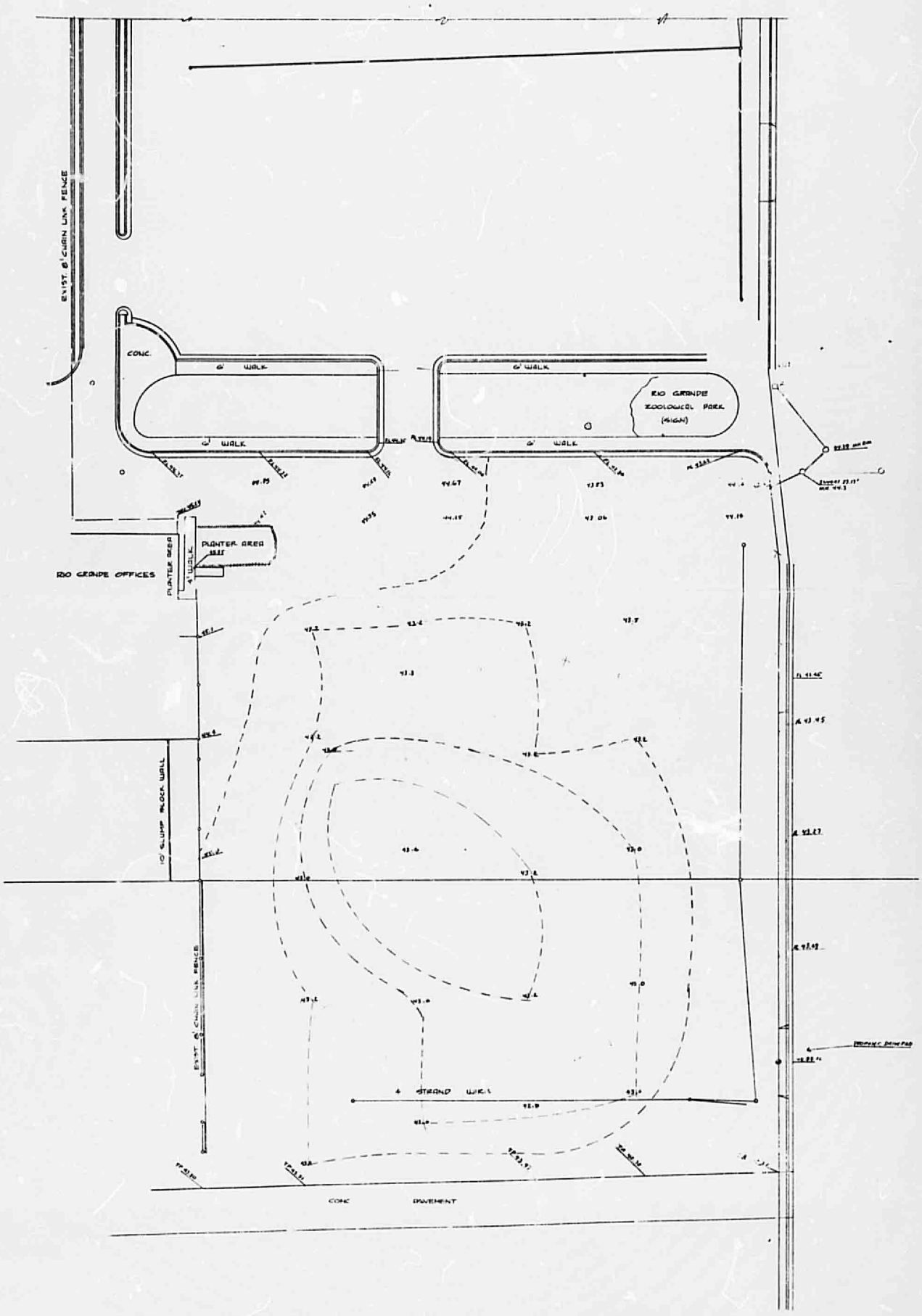
Proposal 3

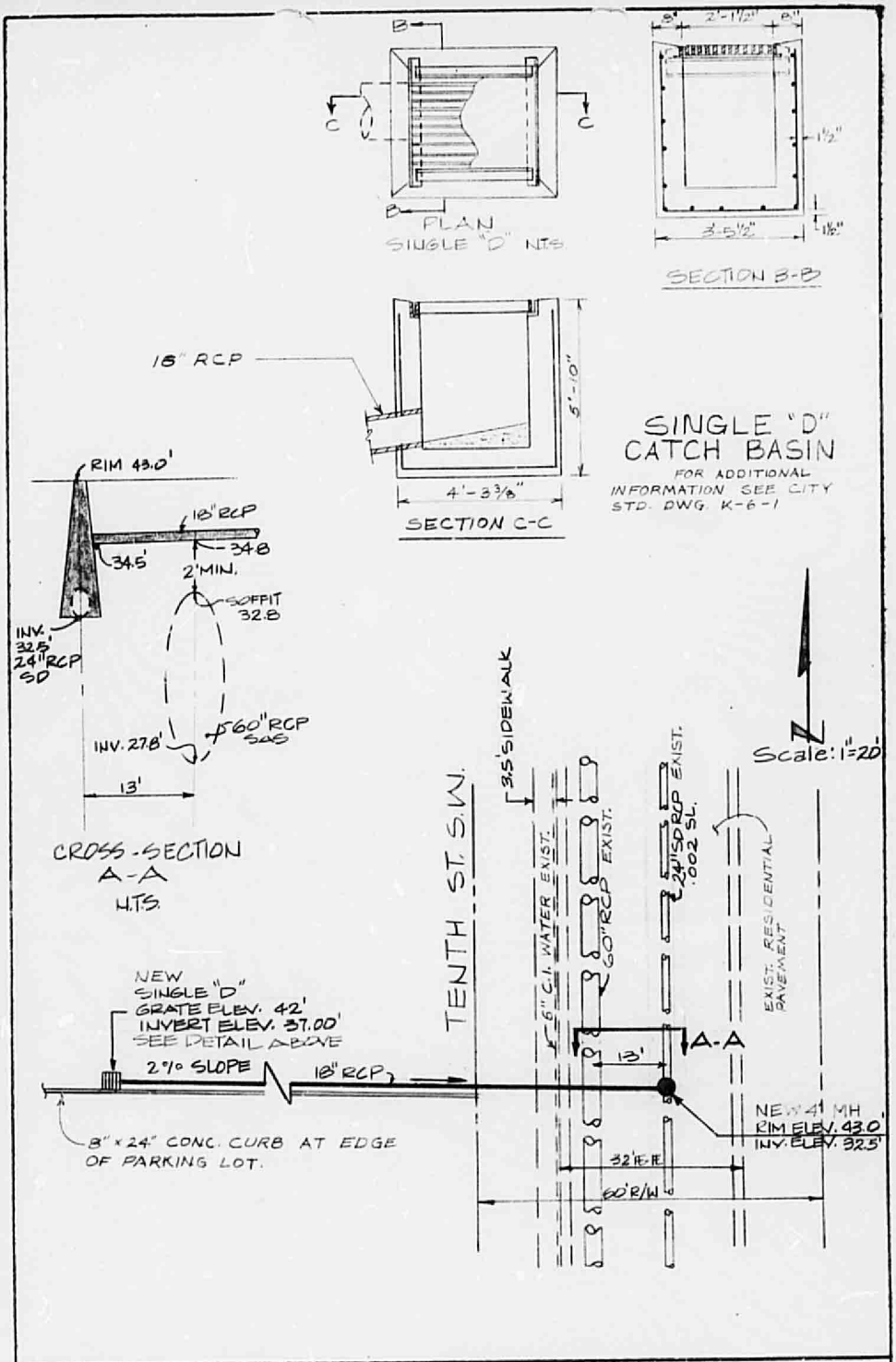




CROSS-SECTION
A-A
N.T.S.

10137
328.97


EXIST. 6' CHAIN LINK FENCE
CONC.
6' WALK
6' WALK
6' WALK
6' WALK
RIO GRANDE ZOOLOGICAL PARK (SIGN)
PLANTER AREA
PLANTER BED
4' WALK
RIO GRANDE OFFICES
10' SLUMP BLOCK WALL
EXIST. 6' CHAIN LINK FENCE
4' STRIPE WALK
CONC PAVEMENT



CITY OF ALBUQUERQUE

APPROVALS	ENGINEER	DATE	TITLE: ZOO PARKING LOT DRAINAGE	
A.C.E. DESIGN		18 Dec 81		
HYDROLOGY			PROJECT NO. 1350	MAP NO. K-13
CITY ENGINEER				

PROJECT NO. 1350

LOCATION. Zoo Parking Lot Drainage

ROUTE	INITIAL	DATE
MASTER SCHEDULER	~~tele~~	12/18
Hydrology		
MASTER SCHEDULER		
MASTER SCHEDULER		
MASTER SCHEDULER		
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MASTER SCHEDULER		

AREA = 255' X 325' = 82875 ft^2

INCHES OF RAINFALL (50yr-6hr) = 2"

"C" = .4 EXISTING

"C" = .95 PROPOSED

PONDING REQUIRED (VALLEY REQUIREMENTS PER INTERIM DRAINAGE GUIDELINES)

$$82875\,ft^2 \times 2.0'' \times \frac{1'}{12''} \times .95 = 14071.9\,ft^3$$

PROPOSAL 1 (PONDING AVAILABLE ≅ 38000 ft^3)

QUANTITY	ITEM	COST/ITEM	COST	TOTAL
215'	TRENCHING (ft)	8.00/ft	1720	
215'	LAYING 16" RCP (ft)	16.5/ft	3548	
1	SINGLE "D" CATCH BASIN (EA)	$1400/EA	1400	
7	REMOVAL OF SIDEWALK (SQ YD)	$3/SQ YD	21.00	
15'	REMOVAL OF CURB + GUTTER (LIN ft)	$3/LIN ft	45.00	
60 ft^2	PLACEMENT OF SIDEWALK (ft^2)	$1.65/$ft^2$	99.00	
15 ft	PLACEMENT OF CURB + GUTTER (ft)	$6.7/LIN ft	101	
44	REMOVAL AND REPLACEMENT OF ASPHALT (SQ YD)	23.5/SQ YD	1034	
				$7,968

PROPOSAL 2 (PONDING AVAILABLE ≅ 44000 ft^3)

30'	TRENCHING ft	8/ft	240	
30'	LAYING 16" RCP (ft)	16.50/ft	495	
1	SINGLE "D" CATCH BASIN (EA)	1400 EA	1400	
7 SQ YD	REMOVAL OF SIDEWALK (SQ YD)	3/SQ YD	21.00	
15'	REMOVAL OF CURB + GUTTER (LIN ft)	3/LIN ft	45	
60'	PLACEMENT OF SIDEWALK (ft^2)	1.65/ft^2	99	
15'	PLACEMENT OF CURB + GUTTER	6.7/LIN ft	101.00	
44	REMOVAL AND REPLACEMENT OF ASPHALT (SQ YD)	23.5/SQ YD	1034	
				$3,435

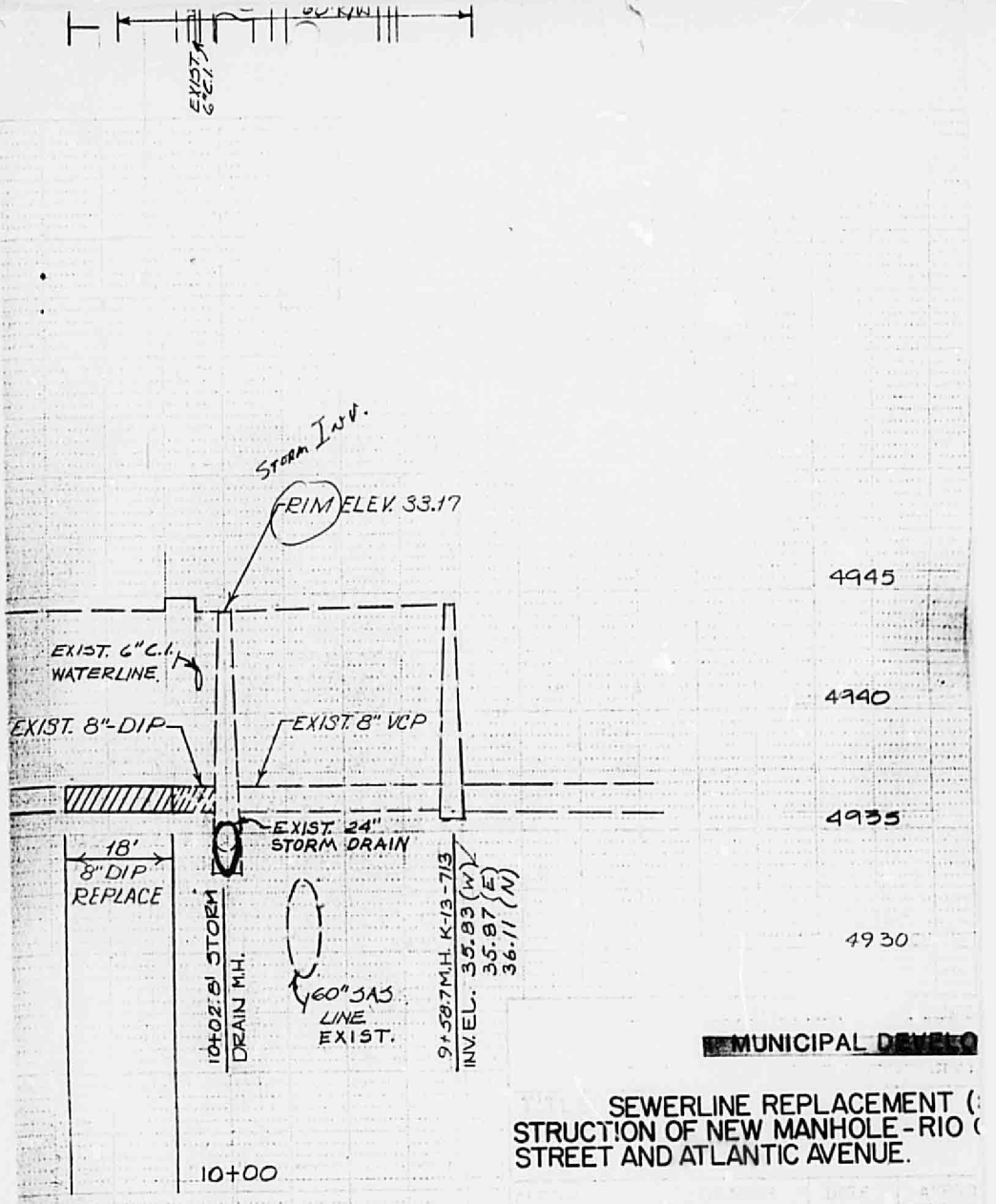
PROPOSAL 3 (RETAINING WALL)

330' (2 HIGH)	K-75 (RETAINING WALL)	6/ft^2	3960	
27.5 yd^3	(K-76) FOOTING	215 yd^3	5913	
			9873	

PROPOSAL _____

QUANTITY	ITEM	COST/ITEM	COST
	TRENCHING, BACKFILLING, AND COMPACTION FOR 18" TO 36" PIPE, LESS THAN 8' TRENCH DEPTH, PER LF (S-17)	$8.00	
	18" RCP, CLASS IV, COMPLETE IN PLACE, IN TRENCH, PER L.F (K-3)	$16.50	
	TYPE "D" CATCH BASIN, SINGLE GRATE, COMPLETE IN PLACE, PER EACH (K-33)	$1400	
	CUTTING, REMOVAL, + DISPOSAL OF EXISTING SIDEWALK AND DRIVEPADS, PER SY (P-14)	$3.00	
	REMOVAL + DISPOSAL OF EXISTING PORTLAND CEMENT CONC. CURB + GUTTER, PER L.F. (P-13)	$3.00	
	PORTLAND CEMENT CONC. SIDEWALK, 4" THICK, COMPLETE IN PLACE, PER SF (P-42)	$1.65	
	PORTLAND CEMENT CONC. STANDARD CURB + GUTTER, COMPLETE IN PLACE, INCLUDING SUBGRADE PREP, PER LF (P-42)	$6.70	
	BITUMINOUS PAVING REMOVAL AND REPLACEMENT AS PER STANDARD DETAIL DWG P-25, WITHOUT MACHINE LAYDOWN, WHERE EXISTING SUBGRADE MATL. CAN BE PREPARED AND COMPACTED IN PLACE, PER SY (M-36)	$23.50	
	4' DIA. TYPE "C" OR "E" MH, 10' TO 14' DEPTH, IN PLACE PER EACH (S-3)	$1280	
	REMOVAL OF EXISTING CATCH BASIN, ANY TYPE, INCLUDING CLEANUP, PER EACH (K-38)	$100	
		TOTAL	

COSTS OBTAINED FROM CONTRACT DOCUMENTS FOR City-Wide Utilities AND CASH PAVING No. 30



MUNICIPAL DEVELO

SEWERLINE REPLACEMENT (
STRUCTION OF NEW MANHOLE - RIO (
STREET AND ATLANTIC AVENUE.

R S Weller 12/2/80
J Kelich 1 Dec 80

T DRAWINGS
R-FIELD

APPROVED FOR CONSTRUCTION
R.S. Weller 12/8/80
ENGINEER DATE

DRAWING NO. SAS-29-314

SANTA FE ADDITION

STA 56+95 (4' LT)
BUILD SSMH-4-PL
INV EL 39.51

STA 57+05
BUILD SMH-4-C
INV EL 36.40

STA 57+16 (8' LT)
BUILD SMH-4-C
INV EL 36.44
NORTH INV EL 37.10

Offset New W.L
#14 6" 45° Bend

Replace W/New 6" CI 0' west of ℄
(Field verify)

SANTA FE ADDITION

PI STA 59+80.00 (11' RT)
EQUATION
PI STA 59+93.10 (LT AHD)
Δ 34°00'00" RT
BUILD SMH-8-C

Shoring and/or steel sheet piling as required
Both sides

BUILD NEW SINGLE "E" INLET

PI STA 57+12.8 BK
EQUATION
STA 57+13.42 AHD
BUILD SMH-8-C
Fabricate Bend

TERMINUS TO BE
FIELD VERIFIED

PACIFIC ST SW

REPLACE WITH NEW 6" CI

BUILD NEW SINGLE "E" INLET

STA 57+12.342 BK TAH
BUILD SMH-4-C
ON EXIST. ℄ LINE

NEW 8" VC TO BE TERMINATED
WITH SMH-4-C AS DIRECTED
BY THE ENGINEER

BUILD NEW SINGLE "E" INLET

PROVIDE
1-6"x6"x6" Cross
1-2" gate valve w/valve box
1-6" Gate Valve w/valve box
2-6" 90° Bends
Connection pieces as needed
Blocking

STA 56+97 (4' RT)
BUILD SSMH-4-PL
INV EL 39.44

PI STA 58+50 (14' RT)
Δ 34°00'00" LT
BUILD SMH-8-C
BOX ℄ SSMH-4-PL

REMOVE JUNCTION
SEE SHEET FOR DETAILS

TENTH

SANTA FE ADDITION

Existing Asphalt Pavement

8" VC

S=0.004

S=0.001

60" RCP

CLASS III

STA 60+40 (4' RT)
BUILD SSMH-6-C
INV EL 32.36

Offset water line
2-6" 11.25° Bends

REPLACE WITH NEW 6" CI

STA 62+31 (4' LT)
BUILD TERMINAL
SMH-4-C

TENTH ST SW

Existing and New 24" RCP
Storm Sewer

STA 64+75
BUILD 8'-0" C MH

STA 65+48
BUILD 4' SSMH

STA 65+00
BUILD 4'-0" C MH

Offset water line
2-6" CI Cross
2-6" Gate valves w/valve boxes
1-6" Plug
Blocking

REMOVE EXISTING
BUILD SINGLE C IN

BUILD SMH-6-C

Existing Asphalt

S=0.004

S=0.002

STORM SEWER

60" RCP

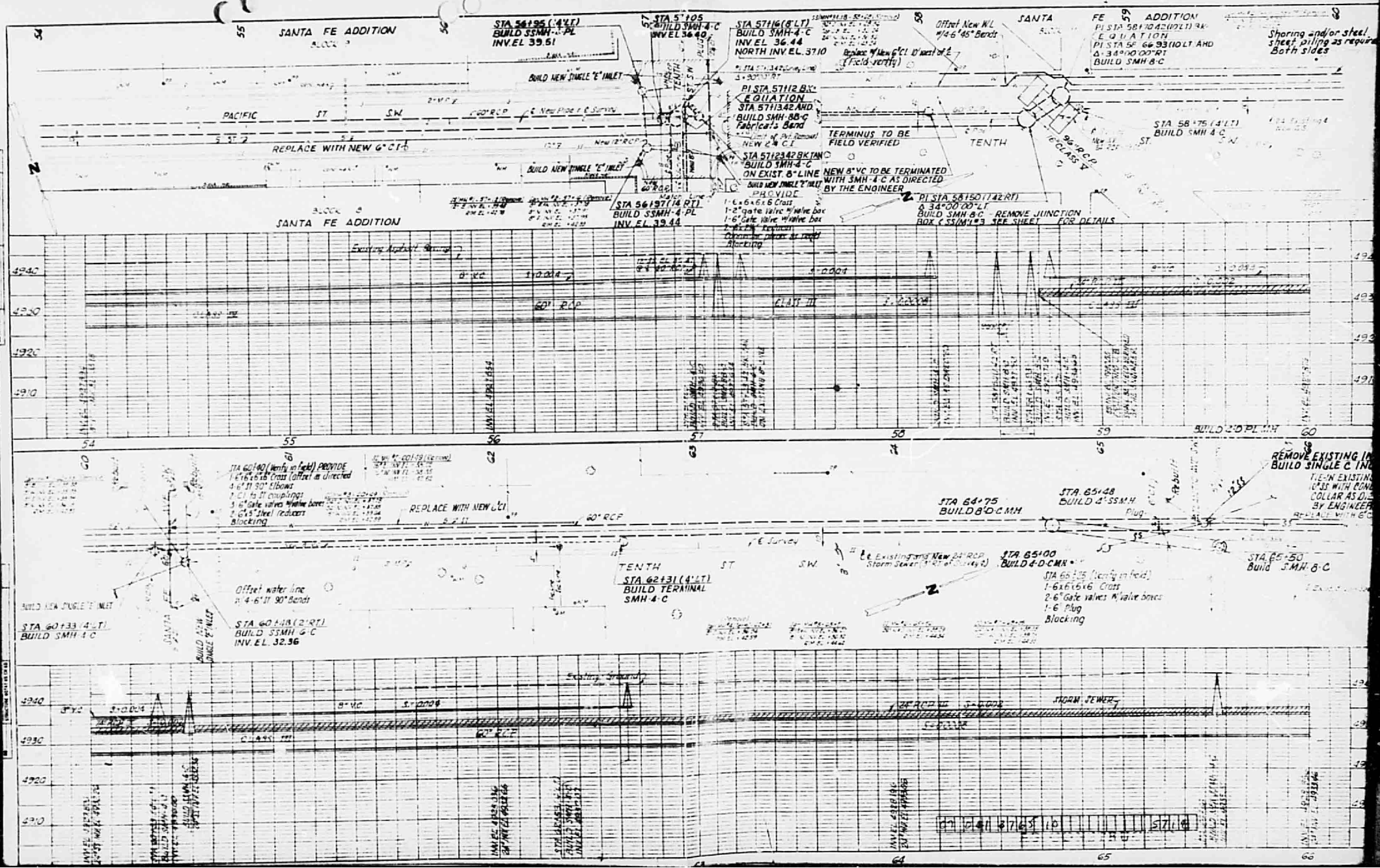
CLASS III

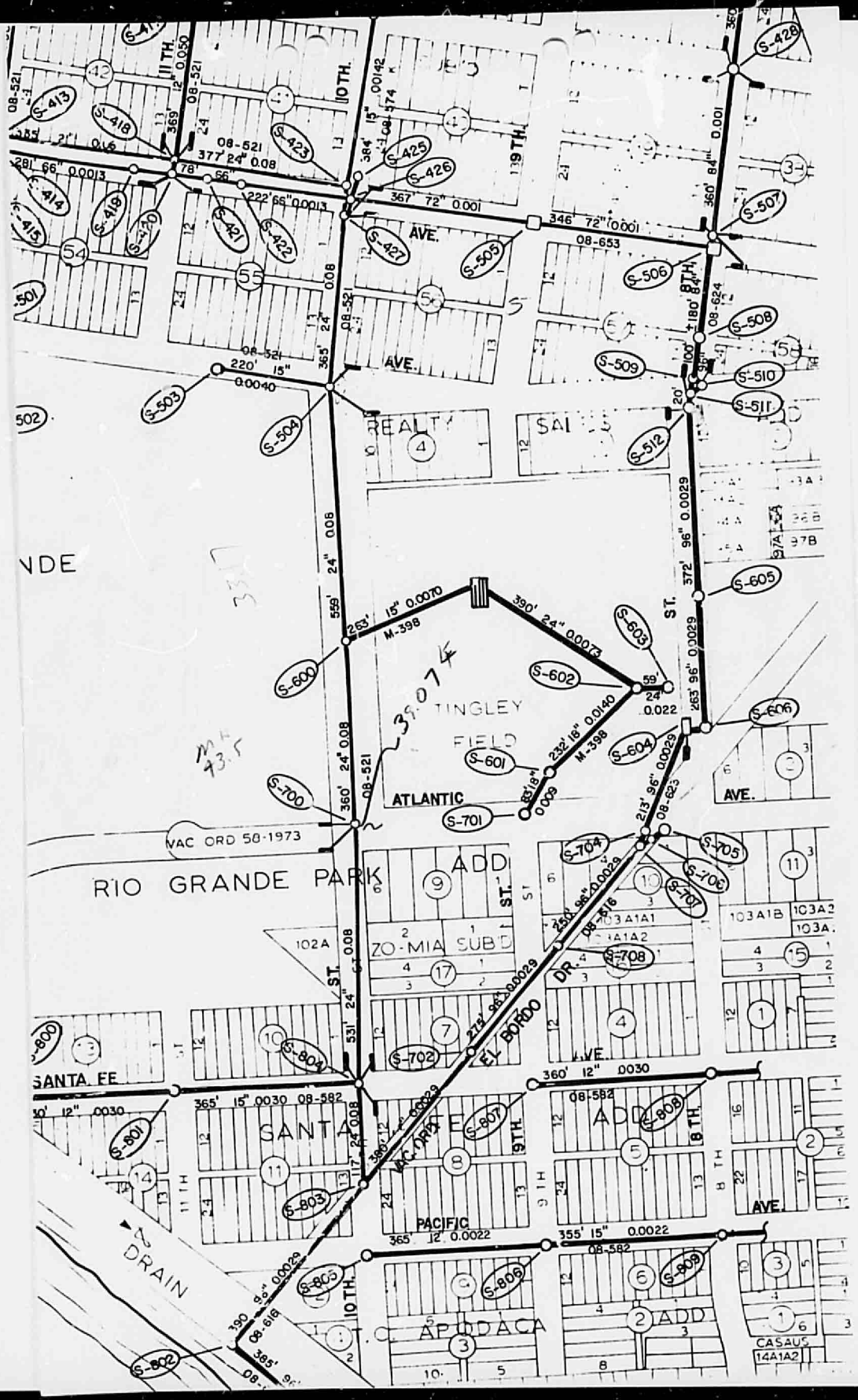
INV EL 42.39
24" W/C EL 41.86

INV EL 42.66
24" W/C EL 42.13

INV EL 42.66
24" W/C EL 42.13

54 55 56 57 58 59 60 61 62 63 64 65 66


SANTA FE ADDITION
STA 54+95 (4'LT)
BUILD SSMH-4-PL
INV.EL 39.51
STA 5'+05
BUILD SMH-4-C
INV EL 36.40
STA 57+16 (8'LT)
BUILD SMH-4-C
INV.EL 36.44
NORTH INV.EL. 37.10
Offset New W.L
w/4-6" 45° Bends
SANTA FE ADDITION
PI STA 58+70.42 (10'LT) BK
EQUATION
PI STA 58+66.93 (10 LT AHD
Δ = 34°00'00" RT
BUILD SMH 8-C
Shoring and/or steel sheet piling as requir
Both sides
BUILD NEW SINGLE "E" INLET
PACIFIC ST SW
60" RCP
REPLACE WITH NEW 6" C.I.
PI STA 57+12 BK
EQUATION
STA 57+13.42 AHD
BUILD SMH-8B-C
Fabricate Bend
NEW 24" C.I.
TERMINUS TO BE
FIELD VERIFIED
TENTH ST.
STA 58+75 (4'LT)
BUILD SMH 4-C
STA 57+23.42 BK TAN
BUILD SMH-4-C
ON EXIST. 8" LINE
NEW 8" VC TO BE TERMINATED
WITH SMH-4-C AS DIRECTED
BY THE ENGINEER
PROVIDE
1-6x6x6x6 Cross
1-2" gate valve w/valve box
1-6" Gate Valve w/valve box
Blocking
STA 56+97 (14' RT)
BUILD SSMH-4-PL
INV. EL. 39.44
PI STA 58+50 (7.42' RT)
Δ 34°00'00" LT
BUILD SMH-8-C - REMOVE JUNCTION
BOX C S(M)1-3 SEE SHEET FOR DETAILS
SANTA FE ADDITION
Existing Asphalt Ground
8" VC
60" RCP
CLASS III
4940
4930
4920
4910
54
55
56
57
58
59
60
61
62
63
64
65
66
BUILD 2'D PL MH
STA 60+40 (Verify in field) PROVIDE
1-6x6x6x6 Cross (offset as directed
4-6" 90° Elbows
2-C.I. to 2" couplings
3-6" Gate valves w/valve boxes
2-6x3" Steel reducers
Blocking
REPLACE WITH NEW C.I.
60" RCP
STA 64+75
BUILD 8'D.C.MH
STA 65+48
BUILD 4' SSMH
Plug
REMOVE EXISTING IN
BUILD SINGLE C INL
TIE-IN EXISTING
CASE WITH CONC
COLLAR AS DIR
BY ENGINEER
REPLACE WITH 6"C
TENTH ST SW
STA 62+31 (4'LT)
BUILD TERMINAL
SMH-4-C
Offset water line
w/4-6" 11.25° 90° Bends
STA 60+48 (2' RT)
BUILD SSMH 6-C
INV. EL. 32.36
STA 60+33 (4'-T)
BUILD SMH 4-C
BUILD NEW SINGLE "E" INLET
STA 65+00
BUILD 4-D-CMH
STA 65+75 (Verify in field)
1-6x6x6x6 Cross
2-6" Gate valves w/valve boxes
1-6 Plug
Blocking
STA 65+50
Build SMH-8-C
Existing Ground
8" VC
60" RCP
24" RCP
STORM SEWER
4940
4930
4920
4910
64
65
66


11TH.
10TH.
9TH.
8TH.
AVE.
ST.
DR.
ATLANTIC
PACIFIC
EL BORDO
MC ARDLE
SANTA FE
TINGLEY FIELD
RIO GRANDE PARK ADD
ZO-MIA SUB'D
SANTA FE ADD
APODACA ADD
CASAUS
DRAIN
VAC ORD 58-1973
M-398
08-521
08-653
08-624
08-623
08-582
08-618
S-413
S-414
S-415
S-418
S-419
S-420
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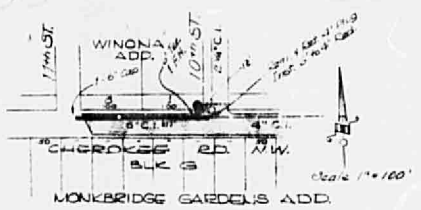
2" Yokke Ld
N. & completed
5-1-68

EST #112-68

Entered on maps
11-5-68



Work Order No. 488

APPROVALS

Z.T.B.
MB

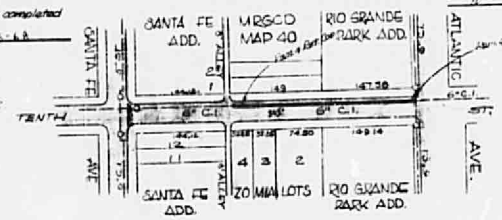
03-0973-2666-0111-6011

P.D. 166-A
TENTH ST.

Work completed
10-1-68

Map #K-13-S
EST. #113-68

POLICY 3 #70
Entered on maps
10-1-68



Work Order No. 488

Scale 1" = 100'

APPROVALS

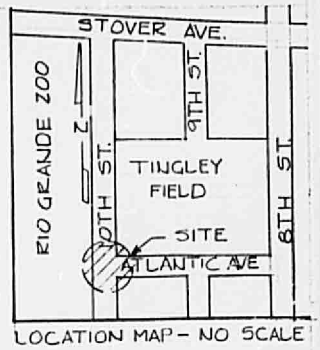
Z.T.B.
MB

03-0974-2666-0111-6057-1324

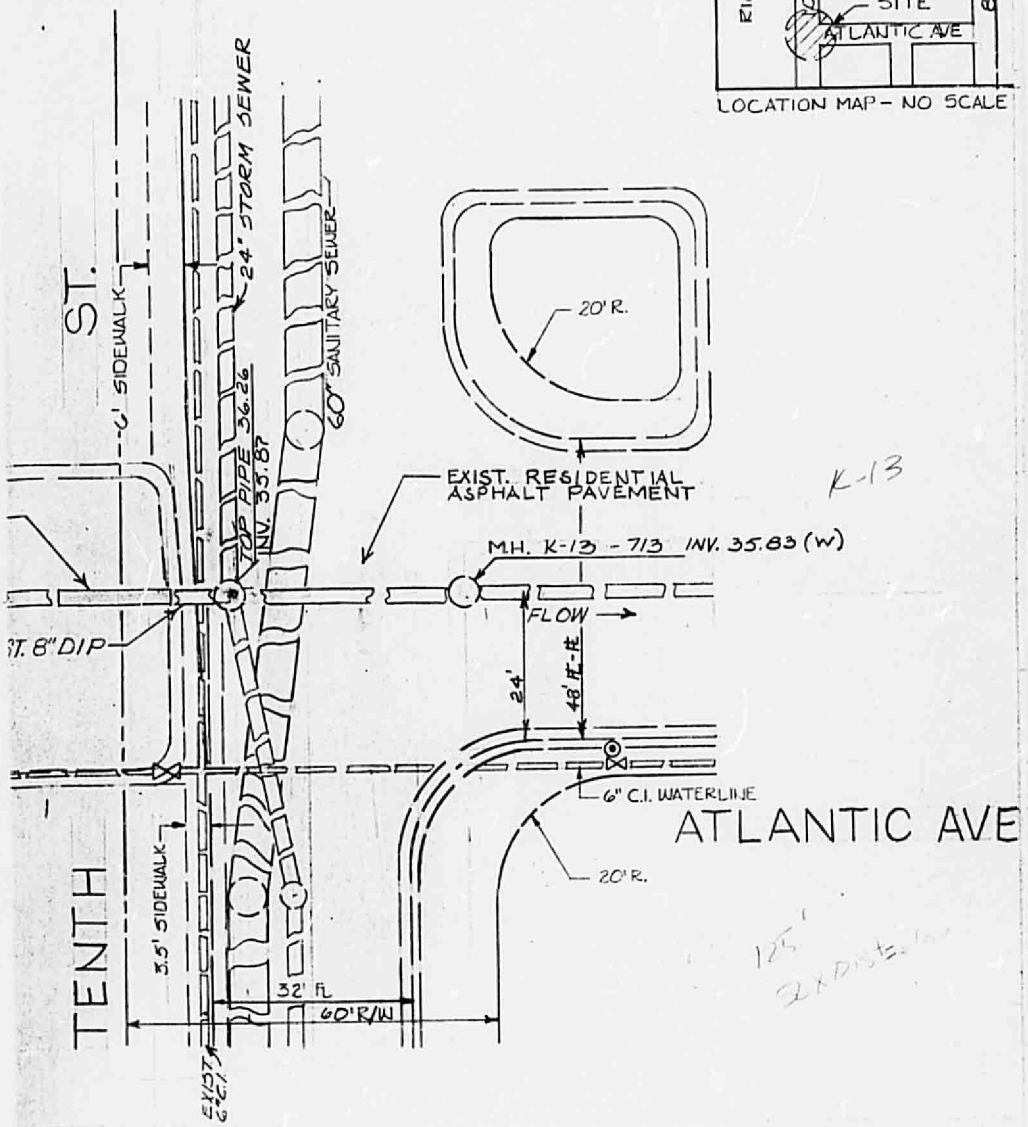
Sheet 14	1968
Checked	Approved
	Water S.Board Engr.
	Asst. City Engineer-Design

CAUTION!
BURIED CABLES
BEFORE EXCAVATION
CALL TEL. CO. EXT.

REGISTERED PROFESSIONAL ENGINEER
NO. 1329
NEW MEXICO

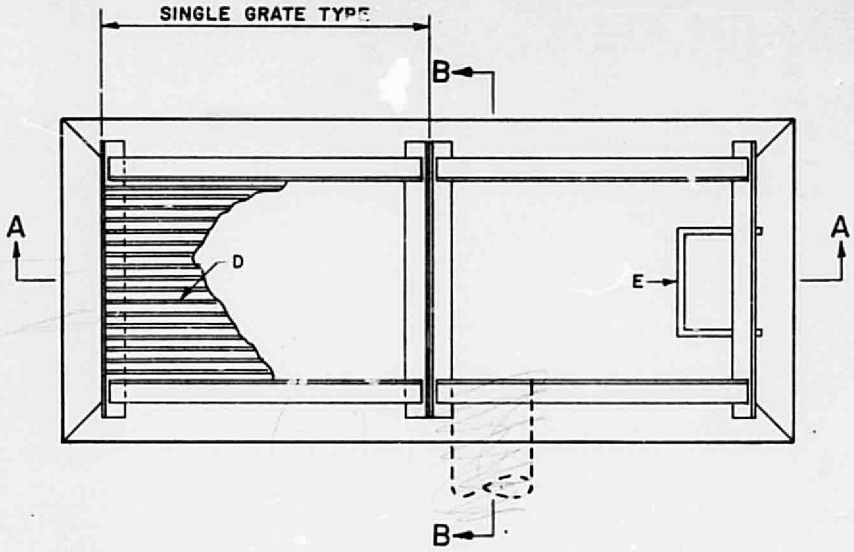


LOCATION MAP - NO SCALE

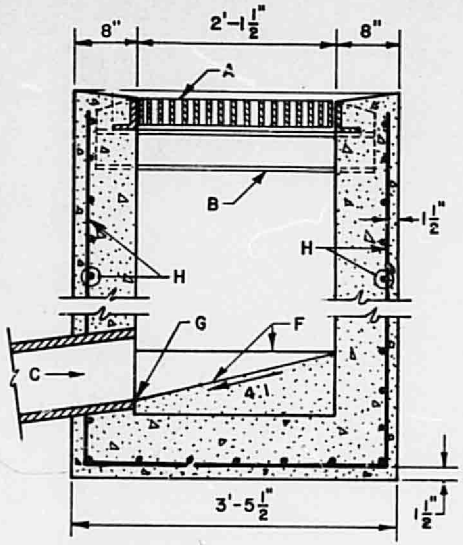


K-13

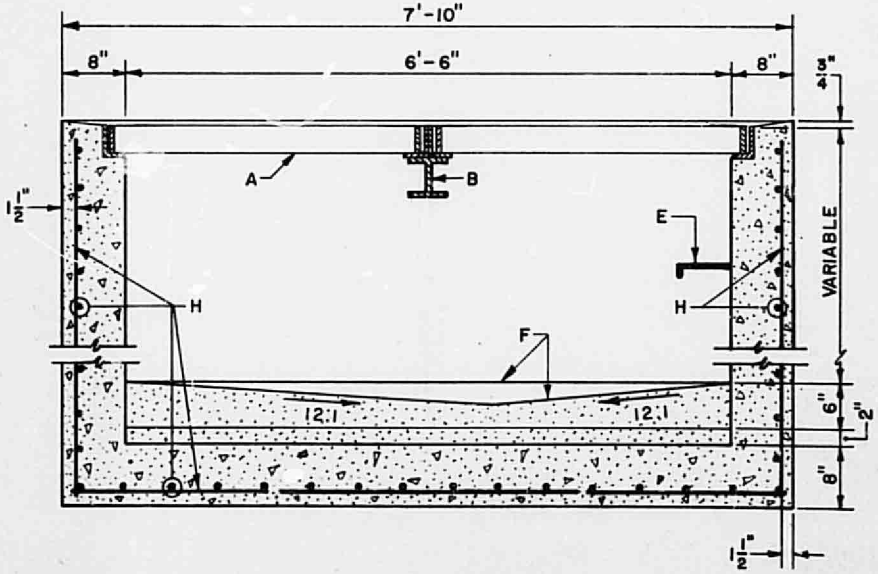
125'
2 x Dist.



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. FOR SINGLE GRATE TYPE CATCH BASIN, MOVE ONE END WALL TO FORM NEW SINGLE GRATE CATCH BASIN.
2. FRAME OF GRATING SHALL BE WELDED AND/OR RIVETED.
3. AFTER CLEANING SURFACE OF SCALE, RUST ETC., GRATING FRAME AND CENTER SUPPORT TO BE PAINTED WITH ONE SHOP COAT RED OXIDE. TWO FINISH COATS ALUMINUM PAINT (AASHO M69).

CONSTRUCTION NOTES:

A. SEE DWG. K-8 FOR FRAME AND GRATING DETAILS.

B. SEE DWG. K-9 FOR CENTER SUPPORT ASSEMBLY.

C. CUT ONE HORIZONTAL AND ONE VERTICAL BAR MAX. AT PIPE OPENING.

D. SPACERS, SEE DWG. K-8.

1 E. USE STANDARD MH STEPS, SEE DWG. S-11. FIRST STEP TO BE 18" FROM TOP OF GRATE AND SHALL PROTRUDE 7." SPACING BETWEEN STEPS TO BE AT 12" O.C., LAST STEP 18" MAX. FROM BOTTOM.

F. CONC. FILL, SEE NOTE E, DWG. K-1.

G. INVERT PER DESIGN.

H. NO. 4 BARS AT 6" O.C. EACH WAY.

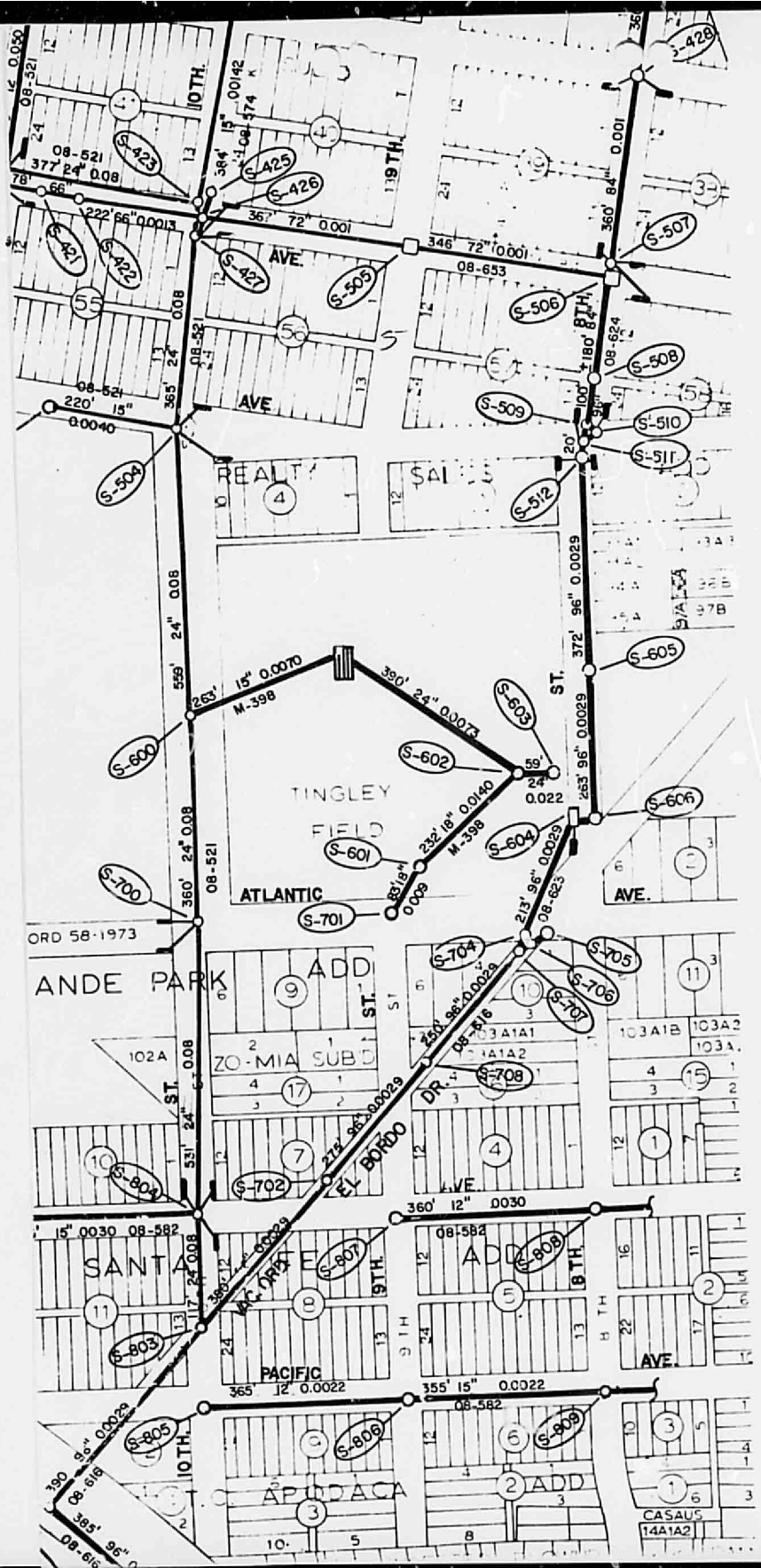
1" = 3/4" Scale

CITY OF ALBUQUERQUE

REVISIONS
1 1-26-81

DRAINAGE

CATCH BASIN DOUBLE "D"


TINGLEY
FIELD
ATLANTIC
AVE.
ANDE PARK
ADD
ZO-MIA SUBD
EL BORDO
DR.
SANTA
ADD
PACIFIC
APODACA
ADD
CASAUS
14A1A2
10TH.
9TH.
8TH.
119TH.
ST.
M-398
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08-624
08-623
08-616
08-582
08-521
S-421
S-422
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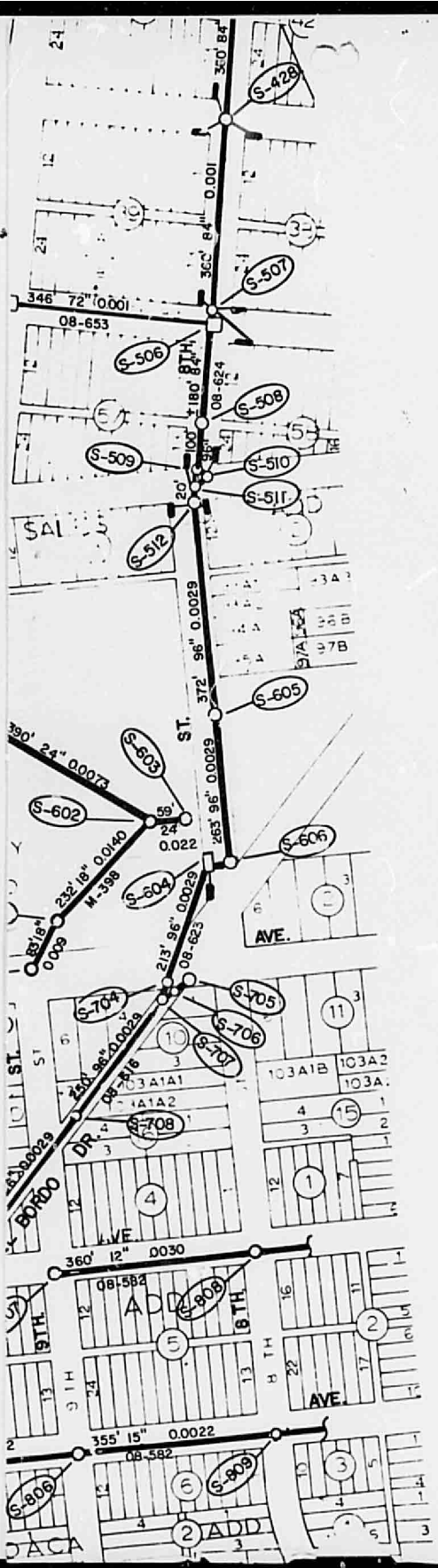


LEGAL DESCRIPTION

T 10 N

R 3 E

SEC 19

TOWN OF ATRISCO GRANT

M R G C D MAP 40

SUBSOIL INVESTIGATION
FOR PROPOSED ADDITION TO ENTRANCE
RIO GRANDE ZOO
ALBUQUERQUE, NEW MEXICO

FOX Consulting Engineers and Geologists

TABLE OF CONTENTS

GENERAL	Page	1
PROPOSED CONSTRUCTION AND SITE CONDITIONS		1
SUBSOIL CONDITIONS		2
FOUNDATION - CONVENTIONAL SPREAD FOOTINGS		3
INTERIOR FLOOR SLAB CONSTRUCTION		4
EXTERIOR SLABS		4
REINFORCING		4
BACKFILL AND SURFACE DRAINAGE		5
IRRIGATION OF LANDSCAPED AREAS		5
PAVEMENT SECTION DESIGN		6
CONSTRUCTION INSPECTION		7
TEST HOLE LOCATION PLAN	Figure	1
LOGS OF TEST HOLES		2
SWELL-CONSOLIDATION TEST		3
SUMMARY OF LABORATORY TEST DATA	Table	1
APPENDIX - GUIDE SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL	Page	A-1

GENERAL

This report presents the results of the subsoil investigation conducted at the site of the proposed addition to the entrance of the Rio Grande Zoo, Albuquerque, New Mexico.

The investigation was made to determine the best types and depths of foundations, allowable soil bearing pressures, groundwater conditions, pavement section thickness, and any special precautions which should be taken in the design or construction of the structures due to soil conditions.

The conclusions and recommendations presented are based on the data gathered during the site investigation, on the results of laboratory testing, and on our experience with similar soil conditions. Data gathered during the field and laboratory investigations are presented in Figures 1 through 3 and Table 1.

PROPOSED CONSTRUCTION AND SITE CONDITIONS

The new zoo entrance will be a wooden canopy supported by columns. The attached restroom facilities will be constructed utilizing masonry block bearing walls. The structure located to the west will be constructed in a similar manner using masonry block bearing walls and a concrete slab-on-grade. Column loads from the proposed canopy will be on the order of 70 to 75 kips. Wall loads on the one-story masonry block structures will be less than 1 kip per linear foot.

The site is presently level and slopes gently to the west. The north portion of the existing parking lot is presently paved, and the south portion is unpaved. The zoo administration building is located

immediately adjacent to the proposed zoo entrance structure. Visual inspection indicates no present structural distress. Landscaping, consisting of large cottonwood trees and grass, covers the western part of the building site.

SUBSOIL CONDITIONS

As shown on the Logs of Test Holes, Figure 2, subsoil conditions across the site are uniform but vary with depth. Generally, one to four feet of silty to very silty sand was encountered overlying medium to coarse-grained clean sand. Small amounts of topsoil and man-made fill, consisting of moderate plasticity clay and organic material, were encountered in Test Holes 1 and 2, overlying the sand. Medium to coarse-grained sand with gravel and interbedded silty layers was encountered at depths of 7 to 9 feet. Test Hole 2 encountered silty and clayey sands at a depth of 15 feet.

Groundwater was encountered in all three test holes at depths of 6.5 feet. No bedrock was encountered to a depth of 20 feet, the maximum depth of exploration.

The topsoil and man-made fill encountered across the site is not suitable for foundation support. The silty and very silty sands will consolidate significantly under light to moderate loading with an increase in moisture content. The clean sand will consolidate slightly under the proposed loading. Refer to the Swell-Consolidation Test, Figure 3. The amount of possible settlement can be minimized by means of densification of the soils as well as methods designed to control the moisture content of the soil.

FOUNDATION - CONVENTIONAL SPREAD FOOTINGS

Settlement is the governing criteria for foundation design of the proposed structures. Therefore, the structures should be supported on conventional spread footings placed on compacted natural soil, or structurally controlled fill if required to meet final grading plan. Any man-made fill or topsoil should be removed prior to construction. Foundations should be designed for a maximum soil bearing pressure of 3,000 pounds per square foot.

Prior to placement of structurally controlled fill, and prior to placing foundations where there will be no fill, the natural soils should be moistened to optimum moisture content (± 2%) and compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. Vibratory compaction techniques should not be employed during earthwork operations due to the proximity of the proposed structures to existing buildings. However, the use of heavy construction equipment is recommended.

During excavation for the structures adjacent to the existing administration building, care should be taken to insure that existing footings are not undercut. New foundations should be placed an appropriate distance from existing foundations to avoid the possible damaging effects of stress influences.

Footings should be proportioned as much as practicable in order to minimize differential settlement. Prior to footing placement, care should be taken to insure that all loose materials on the bearing surface are removed or recompacted to the specified density. Exterior footings should be placed a minimum of 18 inches below final exterior grade for frost protection.

INTERIOR FLOOR SLAB CONSTRUCTION

The interior floor slabs should be placed on the natural soils or structurally controlled fill. Prior to placement of slabs, the natural soils should be moistened to optimum moisture content (± 2%) and compacted to a minimum of 90% of maximum density as determined by ASTM D-1557. Any existing fill or topsoil should be removed and replaced with structurally controlled fill. New fill placed for slab support should be compacted in accordance with the specifications as outlined in the attached Appendix.

It is good practice to separate slabs from all bearing members and utility lines to allow their independent movement. However, if desired, slabs may be tied into foundation walls. Where concentrated loads are anticipated, a gravel layer should be placed beneath the slabs to help distribute these loads. Frequent joints should be scored in the slab to control the location of any cracking.

EXTERIOR SLABS

Backfill and any soil disturbed around the foundation walls should be well compacted prior to placing exterior slabs or sidewalks. It is good practice to support small exterior slabs on haunches to prevent differential settlement.

REINFORCING

Foundations and masonry walls should be well reinforced to minimize the effects of differential movement. Refer to the foundation design

for details.

BACKFILL AND SURFACE DRAINAGE

Backfill around the foundations should be free of trash and construction debris and should be moistened and compacted to a minimum of 90% of the maximum density as determined by ASTM D-1557. Backfill should not be puddled or jetted.

The final grade should have a good slope away from foundation walls and exterior slabs on all sides. A minimum slope of 1 foot of fall in the first 10 feet is recommended. Drainage from roofs and all other surface water should not be allowed to pond in the backfill areas. Backfill adjacent to the foundation walls should be protected from erosion and subsequent ponding of water by suitable means. Any ponding areas required for control of surface runoff should be located as far from the foundation walls as possible, a minimum of 15 feet.

IRRIGATION OF LANDSCAPED AREAS

Do not install sprinkler system lines next to foundation walls. If a sprinkler system is installed, the sprinklers should be placed so that the spray from the heads under full pressure does not fall within 5 feet of foundation walls. Irrigation should be minimized and controlled. Any planters adjacent to the structure should be watertight and we recommend employing plants native to the area which require minimal irrigation.

PAVEMENT SECTION DESIGN

One test hole was drilled to a depth of 20 feet in the area of the proposed parking lot. Samples were obtained from the test hole and were tested in our laboratory to determine their proper AASHTO Classification. Based on the test results of these near-surface materials encountered in the test hole, and based on the New Mexico Highway Commission's "A Project Guide for Surfacing Required" and "Structural Design Guide for Flexible Pavement", the guideline pavement section thickness requirement has been established.

We recommend that the pavement consist of a 2-inch asphalt surface course placed over 4 inches of aggregate base course. This recommendation was established by structural coefficient factors of AASHTO Road Tests, and on established EDLA and serviceability coefficients. The pavement subgrade should be compacted to 95% of maximum density as determined by ASTM D-1557. It is recommended that the base course material be Class I or Class II material meeting the following requirements:

BASE COURSE CLASSIFICATION
PERCENT PASSING

Sieve Size	Class I	Class II
1"	100	100
3/4"	80-100	85-100
No. 4	30-60	40-70
No. 10	20-45	30-55
No. 200	3-10	4-12
Soundness Loss	18 or less	18 or less
L.A. Abrasion Loss	50 or less	50 or less
Liquid Limit	24 or less	25 or less

The base course should be compacted to 100% of maximum density as determined by ASTM D-1557, and the asphalt surface course should be compacted to 96% of Marshall density (75 blows).

CONSTRUCTION INSPECTION

The recommendations outlined are based on current plans for the proposed structures. If the plans become significantly modified in the future, we should be contacted for supplemental recommendations.

In any foundation investigation, it is necessary to assume that the subsoil conditions do not vary greatly from the conditions encountered in the test holes. Our experience has shown that variations do exist and that they are generally apparent in the foundation excavation. For this reason, we strongly recommend that we be called to inspect the soils exposed in the foundation excavation prior to construction and to supervise any fill placement.

F. M. FOX & ASSOCIATES OF THE SOUTHWEST, INC.

Barbara Bridgeman

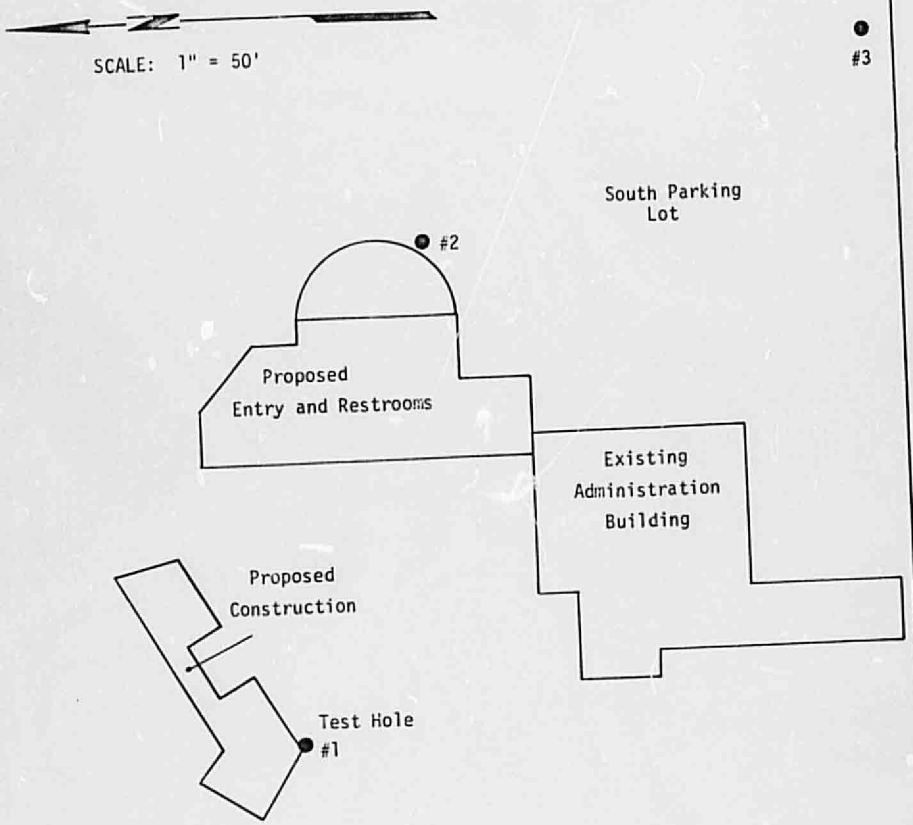
Barbara Bridgeman
Staff Geotechnical Engineer

Reviewed by:

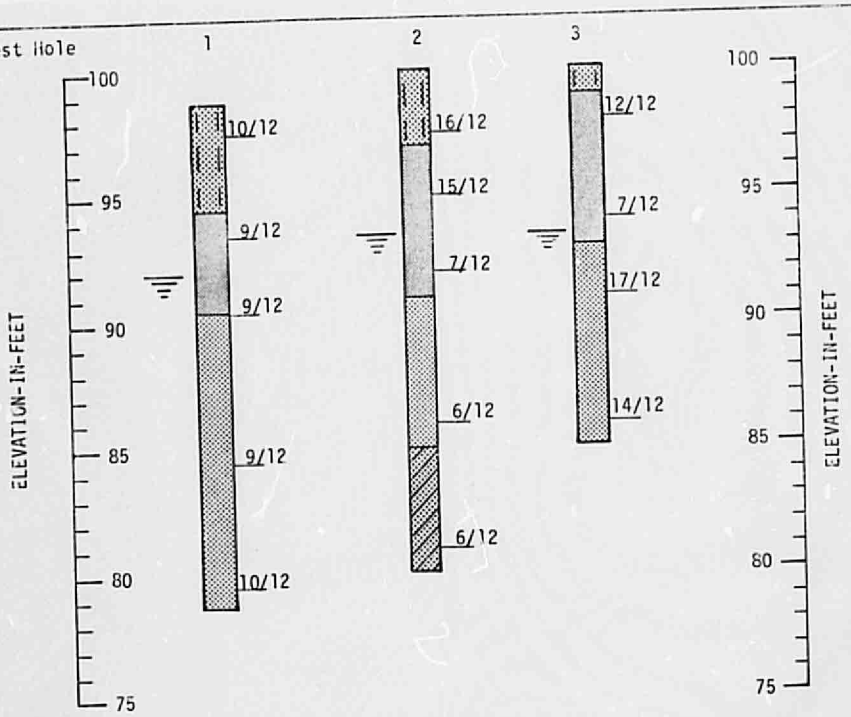
CHARLES M. MILLER
STATE OF
No 6018
NEW MEXICO
REGISTERED PROFESSIONAL

Charles M. Miller, P.E.
Principal Geotechnical Engineer

Copies: Dale Crawford & Associates, Architects (3)



TEST HOLE LOCATION PLAN	Job No:	31224060400
	Date:	November 19, 1980
FOX Consulting Engineers and Geologists	Figure	1



LEGEND

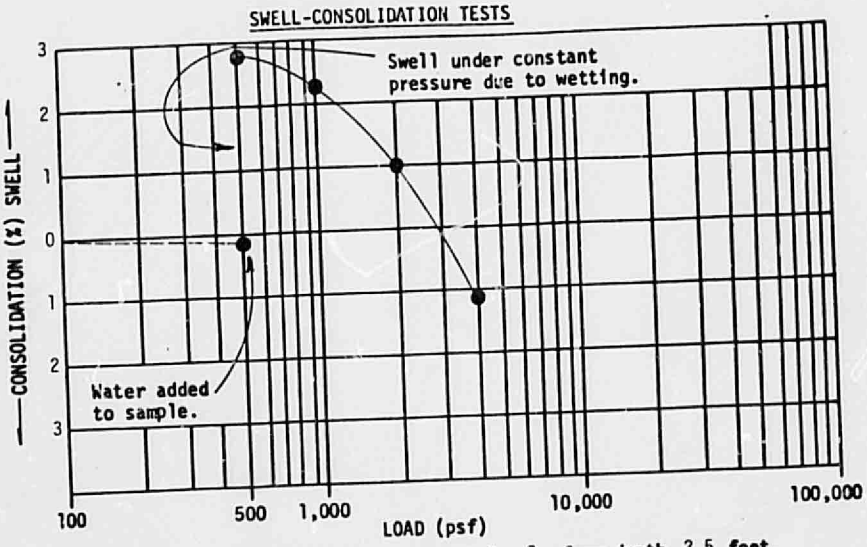
- SAND, fine-grained, silty to very silty, loose to medium dense, slightly moist to medium moist, dark brown to brown (SM).
- SAND, medium to fine-grained, clean, loose to medium dense, slightly moist to wet, brown (SP)
- SAND, coarse to fine-grained, gravelly, clean to slightly silty, loose to medium dense, slightly moist to wet, grey to brown (SP)
- SAND, fine-grained, clayey, silty, loose, wet, brown (SC-SM)
- indicates water table 6 days after drilling

NOTES

1. Test holes were drilled on 10/31/80, with a 6-inch diameter hollowstem continuous flight power auger.
2. (10/12) location of Standard Penetration Test; indicates that 10 blows with a 140-pound hammer, falling 30 inches, were required to drive a 2-inch diameter sampler 12 inches.
3. Elevations taken with a hand level and are approximate.

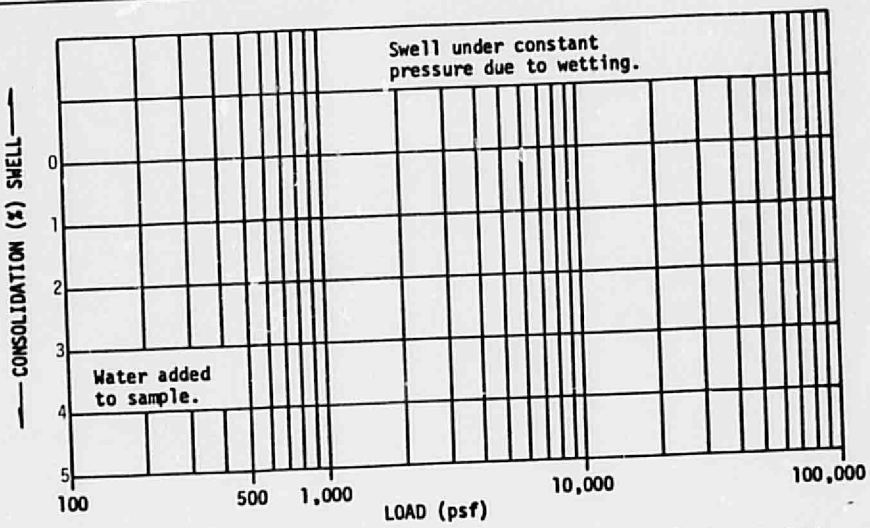
LOGS OF TEST HOLES	Job No: 31224060400
FOX Consulting Engineers and Geologists	Date: November 19, 1980
	Figure 2

SWELL-CONSOLIDATION TESTS



Sample of sandy CLAY from test hole 2 from depth 2.5 feet.

Natural Moisture Content 14.2% Natural Dry Density 98 pcf



Sample of _____ from test hole ____ from depth ____ feet.

Natural Moisture Content _____ Natural Dry Density _____

FIGURE 3

Form 1-109

SUMMARY OF LABORATORY TEST DATA

Hole No.	Depth of Sample (ft)	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits LL	Atterberg Limits PI	Sieve Analysis % Passing No. 4	Sieve Analysis % Passing No. 10	Sieve Analysis % Passing No. 40	Sieve Analysis % Passing No. 200	Soil Description	Remarks
2	2.5	98	14.2	-	-	-	-	-	-	sandy CLAY	Figure 3
2	5	99	1.8	NV	NP	100	100	96	1	clean SAND	
3	2	-	-	NV	NP	100	99	91	8	slightly silty SAND	

NP indicates Non-Plastic

NV indicates No Value

Table 1

APPENDIX

GUIDE SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

GENERAL

The Soils Engineer shall be the owner's representative to control the fill operations. The Soils Engineer shall approve the material, the method of placing and compaction, and shall give written approval of the completed fill after having taken sufficient tests to assure compliance with the specifications.

Fill Material Under Foundation and Within 3 Feet of Slabs.

The fill materials shall be gravel, sand, or silt mixtures which have plasticity index not greater than 12. Material larger than 6 inches shall not be placed in the fill, and material larger than 4 inches shall not be placed within 1 foot of bearing surfaces of slabs, or foundations. Materials shall be approved by the Soils Engineer.

Preparation of Bearing Surfaces. The excavated surfaces for foundations shall be scarified, moistened to optimum moisture content (± 2%), and then compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

PLACING FILL

No brush, sod, frozen material, or other perishable or unsuitable material shall be placed in the fill. Distribution of material shall be such as to avoid lenses differing substantially from the surrounding material. The materials shall be delivered to the fill in such a manner as to result in a well and uniformly compacted fill.

Before compacting, the fill material shall be spread in approximately horizontal layers not greater than 8 inches thick.

MOISTURE CONTROL

The material, while being compacted, shall contain the optimum moisture for compaction distributed uniformly throughout the layers. The contractor shall be required to add moisture to the material in the excavation if, in the opinion of the Soils Engineer, it is not possible to obtain proper and uniform moisture by adding water on the fill surface.

COMPACTION

When the moisture content and condition of each individual layer is satisfactory, it shall be compacted by method approved by the Soils Engineer. A Proctor test should be performed on each typical fill material and frequent density tests of the fill shall be taken.

When compacting cohesionless free-draining materials such as sands and gravels, the material shall be deposited in layers and compacted by treads of a crawler-type tractor, surface of internal vibrators, smooth or pneumatic rollers, hand or power tampers, or by any other means approved by the Soils Engineer. The thickness of the horizontal layers after compaction shall not exceed 6 inches compacted thickness if compaction is performed by tractor treads, surface vibrators or similar equipment, or not more than the penetrating length of the vibrator head if compaction is performed by internal vibrators. The material may be ponded or flooded to aid in the compaction only if free-draining material underlies the new fill.

DENSITY REQUIREMENTS

Fill placed for foundation support shall be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Fill placed for slab support shall be compacted to a minimum of 90% of maximum density as determined by ASTM D-1557.