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

March 16, 2001

Michael Smith
Resource Technology
1720-B Randolph Road SE
Albuquerque New Mexico 87106

RE: Revised Final Drainage Report for La Cueva Oeste Units 2, 3, and 4 (2nd Revision) (C18-D24A) Received January 2, 2001

Dear Mr. Smith:

The above referenced revision is approved. The approval allows the amendment of the Infrastructure List. The storm drain requirement in Holly Avenue can be eliminated. Please be advise if Holly Avenue has to be paved then the storm drain will have to be constructed.

Sincerely,

Carlos A. Montoya
City/County Floodplain Adm.

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

CITY OF
Albuquerque

Martin J. Chávez, Mayor

September 5, 1996

Donald S. Dixon, P.E.
Resource Technology, Inc.
2129 Osuna Road NE, Suite 200
Albuquerque, New Mexico 87113

RE: REVISED GRADING PLAN FOR LA CUEVA OESTE PHASE IA (C18/D24), ENGINEER'S STAMP DATED 5/2/96.

Dear Mr. Dixon:

Based on the information provided in the submittal of August 16, 1996, the above referenced plan is acceptable.

Please be aware that an Engineer's Certification will be required for the revised pad elevation on Lot 1, Block 6, Unit 1A after the grading is complete.

If you should have any questions, or if I may be of further assistance to you, please call me.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Terry Brown
File

CITY OF
Albuquerque

May 13, 1996

Martin J. Chávez, Mayor

Donald S. Dixon, P.E.
Resource Technology, Inc.
2129 Osuna Road NE, Suite 200
Albuquerque, New Mexico 87113

RE: GRADING CERTIFICATION FOR LA CUEVA OESTE PHASE I (C18/D24) AND PHASE IA (C18/D24A), SUBMITTED FOR SUBDIVISION CERTIFICATION APPROVAL, ENGINEER'S STAMP DATED 5/2/96.

Dear Mr. Dixon:

Based on the information provided in the submittal of May 2, 1996, the above referenced plan is adequate to satisfy the requirement for Subdivision Certification for release of financial guarantees per the Infrastructure List dated July 17, 1995.

If you should have any questions, or if I may be of further assistance to you, please call me.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Terry Brown
Terri Martin
File

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

September 22, 1995

Donald S. Dixon, P.E.
Resource Technology, Inc.
2129 Osuna Road NE, Suite 200
Albuquerque, New Mexico 87113

RE: FINAL DRAINAGE REPORT FOR LA CUEVA OESTE SUBDIVISION PHASE I, (C18/D24) SUBMITTED FOR FINAL PLAT APPROVAL, ENGINEER'S STAMP DATED 9/1/95.

Dear Mr. Dixon:

Based on the information provided with the submittal of September 6, 1995 and the additional information received on September 21, 1995, the above referenced plan is approved for Final Plat action.

Please be aware that prior to sign-off of the final Plat, the drainage easements and covenants for the off-site ponds must be in place. Also prior to sign-off, City Hydrology must have written concurrence from Wilson & Co. that the proposed upgrade to the Paseo del Norte storm drain system is feasible and that the proposed cost estimate for this upgrade is reasonable.

If you should have any questions regarding these comments, please do not hesitate to call me at 768-2666.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Andrew Garcia
Terry Brown
File

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

REVISED
FINAL DRAINAGE REPORT

FOR

LA CUEVA OESTE

Units 2, 3, and 4

(2nd Revision)

Prepared For:

Development Services, Ltd.

Prepared By:

Resource Technology, Inc.

Civil Engineering ✦ Environmental Sciences ✦ Water Resources
Landscape Architecture ✦ Planning

1720 – B Randolph Road SE
Albuquerque, NM 87106
Phone: (505) 243-7300
Fax: (505) 243-7400
Email: rti@nmia.com

RECEIVED
HYDROLOGY SECTION

C18/D24A

RTI Project No. 95-330 And 00-210

August 1996

Revised December 2000

ELVIDIO DIAZ
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
7711

Drainage Report for
La Cueva Oeste
Units 2, 3, and 4

Introduction

This Drainage Report addresses phases 2, 3, and 4 of the La Cueva Oeste Subdivision, which lie to the west and south of the Phase 1 development. These later phases of the project were re-zoned from I-P to residential in the fall of 1995.

The Phase 1 Drainage Report (C-18/D-24) addressed the larger issue of outfalls for both Phase 1 and the area bounded by San Pedro Boulevard on the west, Paseo del Norte on the South, Corona on the north and Louisiana on the east, which includes Units 1, 2, 3, and 4. The outfalls identified were the Lower North Domingo Baca Detention Dam outfall pipe in Anaheim and the Paseo del Norte storm drain (upgraded to accommodate future condition flows from this area, see Figures 1, 2 and 3 in Appendix A). This Drainage Report addresses the interior grading and drainage issues and revises the previous interim ponding requirements before the Paseo del Norte storm drain system was constructed. The first revised version included the deletion of 2.7 acres originally part of Unit 3 that were found to be on an old landfill site. This revision reflects the division of Unit 2 and Unit 3 into Units 2, 3, and 4.

Methodology

The standard hydrologic computational procedures put forth in the City of Albuquerque Development Process Manual were utilized along with the companion AHYMO (1-94) computer program. Basin designations follow those used in the Phase 1 Drainage Report in order to facilitate comparisons. The 24-hour storm was used since this was the design storm for both the dam and the DMP.

Hydrology

Existing Conditions

The 1996 existing conditions drainage basins are shown on Exhibit 1 (Revised) and reflect the conditions after completion of Phase 1 of La Cueva Oeste as well as SAD221. The later phases' basins are shown for comparative purposes. Table 1 shows 1996 basin characteristics, 10-year and 100-year runoff rates and volumes. Unit 1a was included in the Phase 1 Drainage Report but pad elevations were established under a separate drainage submittal. Overall 1996 existing conditions are addressed in greater detail in the Phase 1 Drainage Report.

TABLE 1

EXISTING (1996) CONDITION DRAINAGE BASIN CHARACTERISTICS AND FLOW RATES

BASIN	AREA	TP HR	LAND TREATMENT				Q_{10}	V_{10}	Q_{100}	V_{100}
			A%	B%	C%	D%	CFS	AC-FT	CFS	AC-FT
939.14	.0112	.13	0	10	30	60	18.5	.71	29.9	1.20
939.16	.0128	.13	0	34	16	50	18.4	.70	31.2	1.22
936.00	.0163	.13	80	0	10	10	8.6	.29	22.8	.73
940.10	.0124	.13	80	0	10	10	6.6	.22	17.4	.56
940.20	.0156	.13	0	34	16	50	22.5	.85	38.0	1.49
940.30	.0145	.13	80	0	10	10	7.7	.26	20.3	.65
943.10	.0120	.13	0	15	20	65	20.0	.79	32.3	1.32
943.20	.0130	.13	80	0	20	0	5.5	.14	16.8	.48
960.00	.0075	.13	0	60	20	20	7.8	.25	15.0	.51
443.12	.0640	.13	80	0	10	10	33.8	1.13	89.6	2.87
443.14	.0447	.13	80	0	10	10	23.6	.79	62.5	2.00
443.16	.0775	.13	80	0	10	10	41.0	1.37	109.0	3.47

Future Conditions

Future Conditions drainage basins and the proposed replat of the thirty-six original North Albuquerque Acres area lots into 200 new lots are shown on Exhibit 2 (Revised). Approximately 1000 feet of Carmel Avenue Right-of-Way was vacated and replaced by two east-west streets and five north-south streets, plus a 25-foot drainage and utility easement that follows the old Carmel alignment, as shown on Exhibit 4 (Revised). Access will be from Holly on the south and both the east and west ends of the project from Louisiana Boulevard and San Pedro Boulevard respectively, using the remaining Carmel Right-of-Way. Future conditions basin characteristics and runoff rates and volumes are shown in Table 2.

Off-site flows from east of the project site are intercepted by Carmel Avenue and conveyed in the central drainage and utility easement (formerly Carmel R-O-W) to the west end of the project. With the exception of the northern tier of lots (Basin 940.3), which drains to the Anaheim outfall pipe, all of the subdivision interior drainage is routed either to Carmel Avenue or the central drainage and utility easement. The portion of the project that does not drain to the Anaheim facility is picked up by storm drain extensions in San Pedro and Carmel of the Paseo del Norte storm drain system. This 48"-60" storm drain (see Exhibit 5 (Revised) and Figures 1, 2 and 3 in Appendix A) was an upgrade of the system designed by Wilson & Co. in 1991 for the City of Albuquerque. Final construction of this system occurred in 2000.

The connection to the San Pedro/Paseo del Norte storm drain consists of a 42"-24" storm drain in Carmel and the central drainage and utility easement. The central drainage and utility easement includes a surface swale for pipe overflows and also serves as a pedestrian/bicycle route through the project. The maximum 100-year surface flow in the swale in this easement was 25 cfs under interim conditions and less than 10 cfs under future conditions. The remainder of the flow will be picked up by the pipe. Where the drainage swale crosses streets at low points, sidewalk culverts are utilized. All of the 10-year flow will be intercepted by the pipe.

While none of the subdivision flow is directed to Holly Avenue and the portion of Holly that is part of the project infrastructure for future construction, a conceptual Holly storm drain is shown in Exhibit 6 (Revised) for the purpose of the infrastructure estimate.

The site development was segmented into three phases. Unit 2 consists of 83 lots at the east end of the site, adjacent to Unit 1. The 105 lots of Unit 3 are immediately to the west of Unit 2. The remaining 12 lots of the proposed Unit 4 are primarily adjacent to Holly Ave. An Interim Retention Pond (discussed below) was located on Unit 3 to provide a temporary outfall for Unit 2 drainage. Unit 3 was built during the completion of the Paseo del Norte storm drain. After completion of Unit 3 and the Paseo del Norte Storm Drain, the northern tier of lots in basin 940.3, immediately south of Anaheim, drain down Sonrisa Place to street inlets that will take the flow to the existing Anaheim storm drain. The remainder of Units 2, 3, and 4 will drain to Carmel or the central drainage easement storm drain, which will connect to the Paseo Del Norte system via the San Pedro storm drain.

Interim Conditions Pond

Unit 2 was constructed prior to the completion of the Paseo del Norte system. Therefore, an interim pond, previously located on Unit 3, was required. *Exhibit 3, the interim pond design, is not included in this submittal because it is no longer required, and the pond has been filled in.* The pond was sized for the ten day, 100-year storm volume for the half of basins 940.3 and 443.12 that were developed as Unit 2 as well as the 6-hour, 100-year storm sediment allowance volume for the off-site basin 940.1. The 100-year runoff from basin 940.1 passed through the pond and on down Carmel, but the peak was reduced to less than 4 cfs due to the routing effects of the pond. The total volume requirement for the retention pond was computed to be 5.75 ac-ft (see calculations in Appendix A). Table 3 shows a comparison of the 1996 existing, future and interim flow rates at selected points.

TABLE 2

FUTURE CONDITION DRAINAGE BASIN CHARACTERISTICS AND FLOW RATES

BASIN	AREA	TP HR	LAND TREATMENT				Q_{10}	V_{10}	Q_{100}	V_{100}
			A%	B%	C%	D%	CFS	AC-FT	CFS	AC-FT
939.14	.0112	.13	0	10	30	60	18.5	.71	29.9	1.20
939.16	.0128	.13	0	34	16	50	18.4	.70	31.2	1.22
939.18	.0023	.13	0	15	15	70	4.0	.16	6.3	.26
940.10	.0124	.13	0	34	16	50	17.9	.68	30.2	1.18
940.20	.0156	.13	0	34	16	50	22.5	.85	38.0	1.49
940.30	.0145	.13	0	34	16	50	20.9	.79	35.4	1.38
940.40	.0062	.13	0	34	16	50	8.9	.34	15.9	.55
943.10	.0120	.13	0	15	20	65	20.0	.79	32.3	1.32
943.20	.0140	.13	0	34	16	50	21.2	.76	34.1	1.33
960.00	.0075	.13	0	25	25	50	11.1	.42	18.6	.73
443.12	.0606	.13	0	34	16	50	87.3	3.31	147.7	5.77
443.14	.0447	.13	0	34	16	50	64.4	2.4	109.0	4.26
443.16	.0775	.13	0	15	15	70	132.5	5.4	212.2	8.83

TABLE 3

COMPARISON OF 100-YEAR FLOW RATES AT SELECTED LOCATIONS FOR EXISTING (1996), INTERIM AND FUTURE CONDITIONS

LOCATION	100-YEAR Q (cfs)		
	Existing	Interim	Future
AP-1, San Pedro, between Carmel and Anaheim	71	36	16
AP-2, San Pedro at Holly	116	107	265*

*The total flow under future conditions will be in the San Pedro storm drain and includes all flow from basins 443.12 (148 cfs) and 443.14 (121 cfs) but does not include any flow from east of Louisiana Boulevard (basins 940.1 and 936) since these are intercepted by the Louisiana Blvd. branch of the Paseo del Norte storm drain.

Revised Hydrology for Holly Avenue (December, 2000)

Development of Unit 4 previously required financial guarantees for a storm drain in Holly Ave. from San Pedro east to the east edge of Unit 4. Eleven lots that front Holly and one additional lot in Units 2 and 3 were divided as Unit 4, and the storm drain pipe is listed on the infrastructure list for Unit 4. None of the units of La Cueva Oeste drain to Holly Ave., and the development of Unit 4 was postponed rather than constructing the entire 1,700 feet of pipe.

The drainage conditions along Holly have changed since the August 1996 Final Drainage Report for La Cueva Oeste was approved, and the required length of the storm drain has consequently been reduced. The Sanchez development (7.4 acres) on the south side of Holly Ave. west of Louisiana will drain directly to the Paseo del Norte storm drain system rather than to Holly Ave. Although the conceptual grading and drainage plan prepared by Easterling and Associates, Inc. and dated March 2000 refers to this drainage plan as an interim solution, this will be the final drainage solution for this property. The overall effect of the Sanchez property draining directly to Paseo del Norte is to reduce the contributing drainage area and consequently, the required length of the storm drain in Holly Ave. As originally planned, Unit 4 will not drain to Holly Ave.

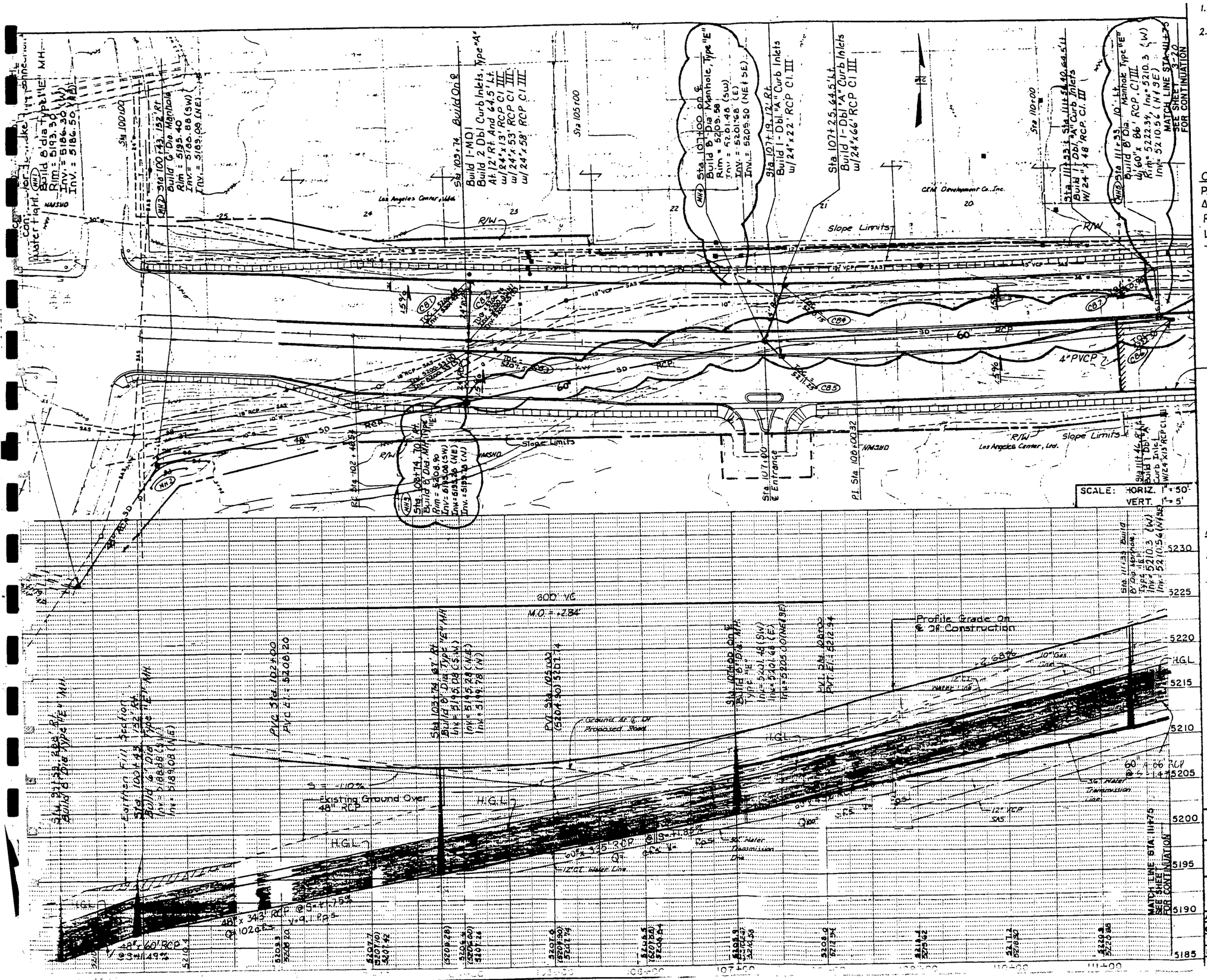
The drainage to Holly was evaluated at station 19+00, see Exhibit 6 (Revised), approximately 100 feet downstream of the western edge of La Cueva Oeste Unit 4. Drainage at this location is from the Breeze at La Cueva subdivision, ½ the R-O-W from station 28+00 to 36+40 (the Sanchez property drainage system intercepts the other ½), the R-O-W from station 19+00 to 28+00, and the property on the south side of Holly Ave. and west of the Sanchez property. These basins are identified as Basins 1, 2, 3, and 4 respectively, and the drainage computations are shown in Appendix B.

The developed condition 100-year runoff at station 19+00 is 57.3 cfs resulting in a street depth of 0.463 feet and an EGL of 1.0 foot, and the drainage computations are shown in Appendix B. It is therefore recommended that Type Double A inlets be placed at station 19+00, which is downstream of the La Cueva Oeste subdivision, Unit 4. Consequently, Unit 4 may be constructed with a financial guarantee for future Holly Ave. paving improvements (in lieu of building this portion of the pavement at this time) without the storm drain.

APPENDIX A

APPENDIX A

PDN Storm Drain Modifications	1-3
AHYMO Input Files	4-19
AHYMO Summary File	20-27
MISC Hydrologic and Hydraulic Calculations	28-46
Pond Calculations (Interim)	47-56
Correspondence	57-60



1. All Dimensions Are To Back Of Curb Unless Otherwise Noted.
2. Rt & Lt. Location Dimensions Of Curb Inlets Are From Roadway Centerline To The Back Side Of The Proposed Inlets, Unless Otherwise Shown On Plans.

Curve Data
P.I. Sta. 108+00.32
Δ = 08° 17' 32.3"
R = 7,639.44'
L = 1105.64
T = 553.79'
D = 00°45'00"

NOTE:
See Sheets 3-30 to 3-35 For Storm Drain Laterals.

CHANGES RECOMMENDED BY RTI 12/95

A-1

FIGURE 1

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: STORM DRAIN PLAN & PROFILE
STA. 99+59 TO 111+75
PASEO DEL NORTE I-25 TO WYOMING BLVD.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN		6-22-93	WATER		6/9/93
TRANSPORTATION		6-09-93	WASTE WATER		
HYDROLOGY		6-21-93			

AS BUILT INFORMATION
CONTRACTOR — DATE
NOTES BY — DATE
ASSISTANCE BY — DATE
FIELD VERIFICATION BY — DATE
MARKUP BY — DATE
CORRECTIONS BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
STANDARD ACS BRASS TABLET STAMPED "11-D18-1978" SET IN TOP OF A CONCRETE POST FLUSH WITH GROUND LOCATED 69' SOUTH OF THE CENTERLINE OF PASEO DEL NORTE BLVD. N.E. AND 30.5' EAST OF THE CENTER-LINE OF SAN PEDRO DR. N.E.
ELEVATION = 5235.67

SURVEY INFORMATION
FIELD NOTES

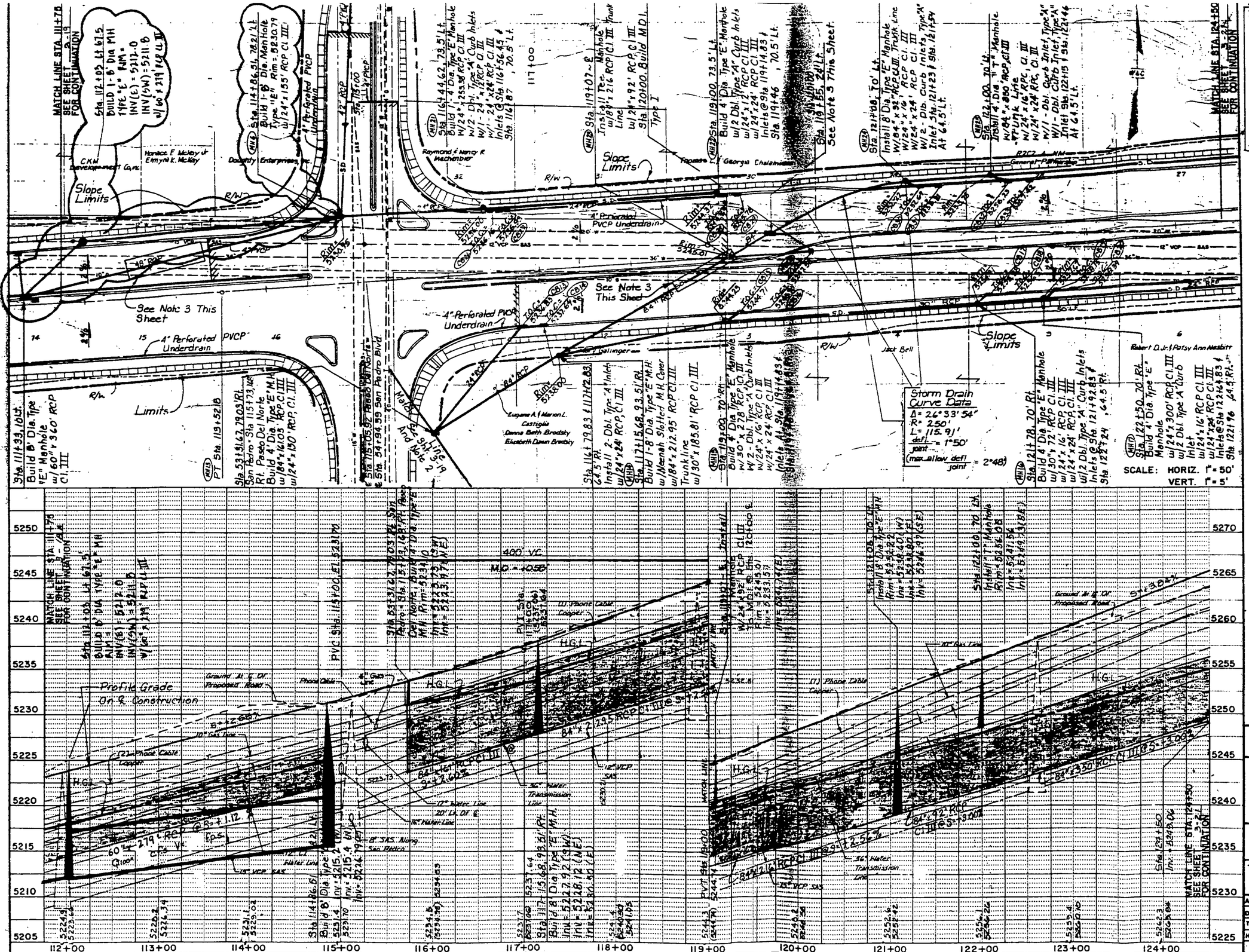
NO.	BY	DATE
ONE	BOHANNAN HUSTON	10-1-91
TWO	BOHANNAN HUSTON	10-16-91

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY

REVISIONS

WILSON & COMPANY, ENGINEERS & ARCHITECTS
DESIGNED BY — DATE 2/92
DRAWN BY KLS — DATE 2/92
CHECKED BY SLM — DATE 2/92



~~The contractor shall notch the proposed 84" RCP where intersection with the existing 20" D.I. water line occurs. The contractor is to make the intersection of the two pipes in the notched area a sealed leak-proof connection. A concrete diaper shall be poured around the existing 20" D.I. water line and the 84" RCP storm drain line.~~

2. Equation ℄ 84" RCP. Sta. 137+61.65 Back = Sta. 115+73; 168' Rt. ℄ Paseo Del Norte Ahead.

3. Existing Utilities To Be Lowered:
   - (A) Exist 20" & 36" Waterline This Workorder.
   - (B) Telephone Line (By Others)
   - (C) 10" High Pressure Gas Line (By Others.)

4. See Sht's. 3-30, 3-31 & 3-32 For Storm Drain Branch Line Profiles.

CHANGES RECOMMENDED BY RTI 12/95

A-2

FIGURE 2

84" RCP STORM DRAIN TRUNKLINE

NO.	BY	DATE	REMARKS	BY
ONE	BOHANNAN HUSTON	10-1-91		
TWO	BOHANNAN HUSTON	10-16-91		

SURVEY INFORMATION — FIELD NOTES

BENCH MARKS — STANDARD ACS BRASS TABLET STAMPED "11-D18-1978" SET IN TOP OF A CONCRETE POST FLUSH WITH GROUND LOCATED 69' SOUTH OF THE CENTERLINE OF PASEO DEL NORTE

AS BUILT INFORMATION — CONTRACTOR / ENGINEER / INSPECTOR / ACCEPTANCE BY / FIELD VERIFICATION BY / DRAWING CORRECTIONS BY

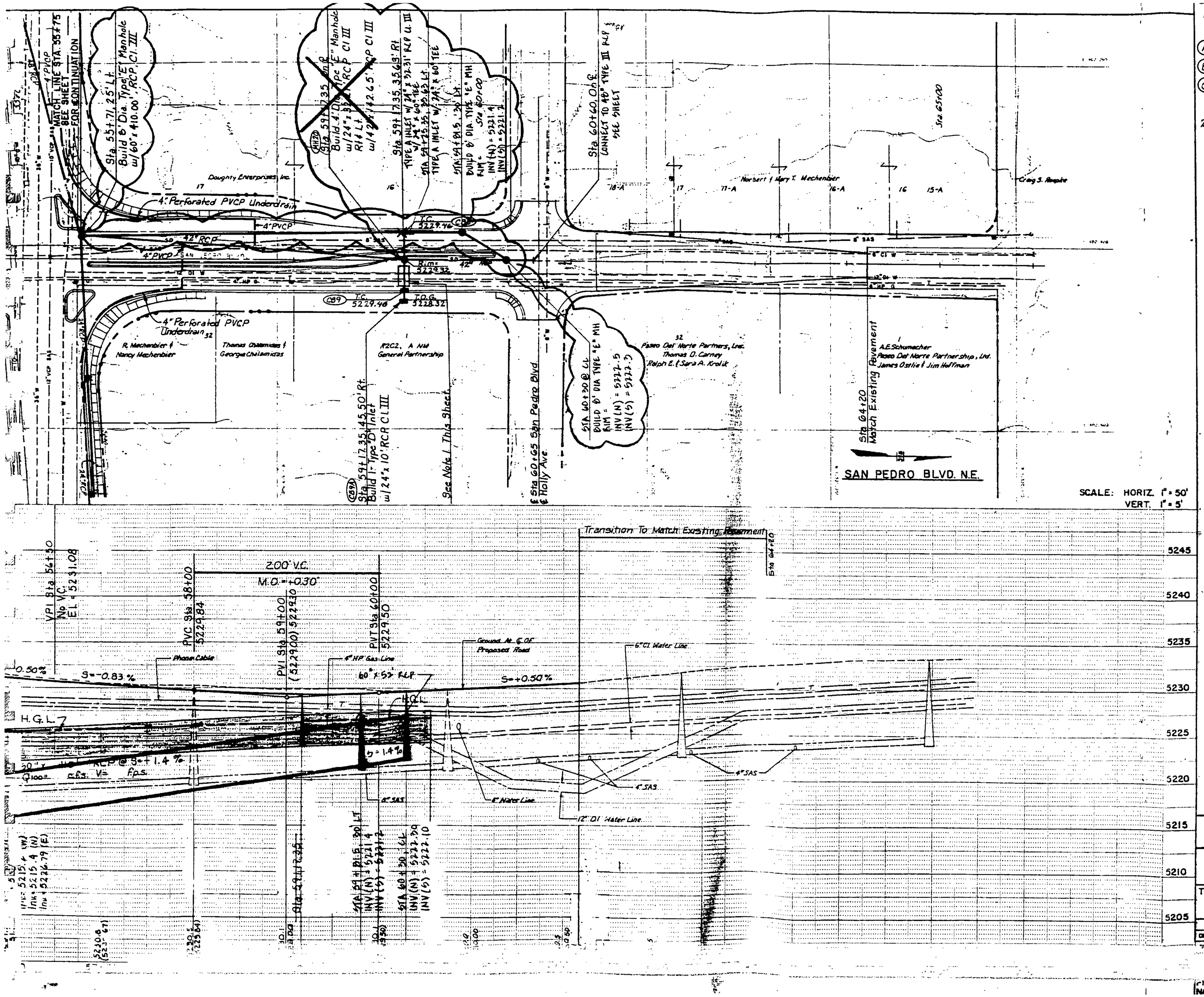
ENGINEER'S SEAL

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: STORM DRAIN PLAN & PROF
STA. 111 + 75 TO 124 + 50
PASEO DEL NORTE I-25 TO WYOMIN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINE
DRC CHAIRMAN		6-23-93	WATER	
TRANSPORTATION		6-09-93	WASTE WATER	
HYDROLOGY		7-14-93		

PROJECT NO.	MAP NO.	SHEET
4083.90	D-18-Z	3-20



1. Existing Utility Lines To Be Lowered This Work Order.
   - (A) Lower Exist. 12" Waterline
   - (B) Lower Exist. Telephone By Others.
   - (C) Lower Exist. 4" High Pressure Gas By Others.
2. See Sht. 3-35 For Storm Drain Branch Line Profiles.

CHANGES RECOMMENDED BY RTI 12/95

A-3

FIGURE 3

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: STORM DRAIN PLAN & PROFILE
STA. 55 + 75 TO 68 + 50
SAN PEDRO BLVD.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN	[illegible]	6-23-93	WATER	[illegible]	6/9/93

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE
ONE	BOHANNAN HUSTON	10-1-91
TWO	BOHANNAN HUSTON	10-16-91

BENCH MARKS

STANDARD ACS BRASS TABLET STAMPED "11-D18-1978" SET IN TOP OF A CONCRETE POST FLUSH WITH GROUND LOCATED 69' SOUTH OF THE CENTERLINE OF PASEO DEL NORTE BLVD. N.E. AND 30.8' EAST OF THE CENTER-LINE OF SAN PEDRO DR. N.E.
ELEVATION = 5235.67

AS BUILT INFORMATION

CONTRACTOR — DATE
WORK STAKED BY — DATE
FIELD VERIFICATION BY — DATE
ACCEPTANCE BY — DATE
MATERIAL CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

ENGINEER'S SEAL

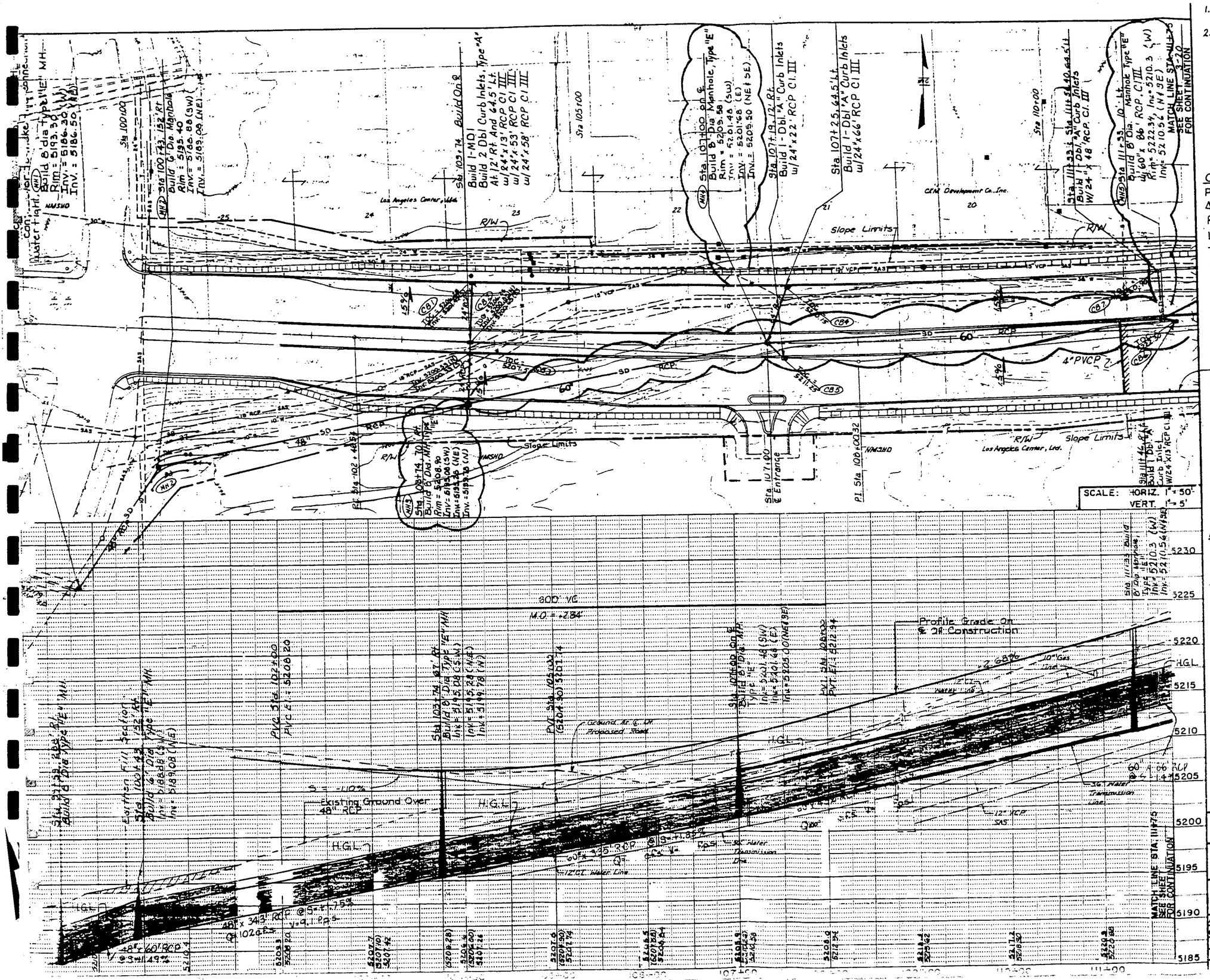
NO.	DATE	REMARKS	BY

REVISIONS

WILSON & COMPANY, ENGINEERS & ARCHITECTS
DESIGNED BY JMS DATE 2/92
DRAWN BY KIS DATE 2/92
CHECKED BY SJM DATE 2/92

PROJECT NO. 4083.90 | MAP NO. C-18-Z | SHEET 3-35 OF

1. All Dimensions Are To Back Of Curb Unless Otherwise Noted.
2. Rt & Lt. Location Dimensions Of Curb Inlets Are From Roadway Centerline To The Back Side Of The Proposed Inlets, Unless Otherwise Shown On Plans.



Curve Data
P.I. Sta. 108+00.32
Δ = 08° 17' 32.3"
R = 7,639.44'
L = 1105.64
T = 553.79'
D = 00°45'00"

NOTE:
See Sheets 3-30 to 3-35 For Storm Drain Laterals.

CHANGES RECOMMENDED BY RTI 12/95

A-1

FIGURE 1

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING GROUP

TITLE: STORM DRAIN PLAN & PROFILE
STA. 99+59 TO 111+75
PASEO DEL NORTE I-25 TO WYOMING BLVD.

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
CRC CHAIRMAN		6-22-93	WATER		6/9/93
TRANSPORTATION		6-09-93	WASTE WATER		
HYDROLOGY		6-21-93			

AS BUILT INFORMATION
CONTRACTOR | WORK STAKED BY | TESTING BY | INSPECTOR'S ACCEPTANCE BY | FIELD ENGINEER | DRAWINGS CORRECTED BY | DATE
MICRO-FILM INFORMATION
RECORDED BY | DATE | NO.

BENCH MARKS
STANDARD ACS BRASS TABLET STAMPED "II-D18-1978" SET IN TOP OF A CONCRETE POST FLUSH WITH GROUND LOCATED 69' SOUTH OF THE CENTERLINE OF PASEO DEL NORTE BLVD. N.E. AND 30.5' EAST OF THE CENTER-LINE OF SAN PEDRO DR. N.E.
ELEVATION = 6235.67

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE
ONE	BOHANNAN HUSTON	10-1-91
TWO	BOHANNAN HUSTON	10-16-91

ENGINEER'S SEAL

REVISIONS

NO.	DATE	REMARKS	BY

WILSON & COMPANY, ENGINEERS & ARCHITECTS
DESIGNED BY WMS DATE 2/92
DRAWN BY KLS DATE 2/92
CHECKED BY SJM DATE 2/92

ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

443.12 FUTURE

Total Area = .0606 Sq. mi = 38.8 Acres

A. = 23.9 Acres = 62%

B = 6.4 Acres = 16%

C = 5.0 Acres = 13%

D = 3.5 Acres = 19%

Off site To CARMEL (100-yr)

50% of C or 6.5% of 443.12 9.6 cfs

SUB AREA Q + Vol FUTURE

	100 yr Q	100 yr Vol	10-yr Q	10-yr Vol
A	89.2	3.48	52.7	2.00
B	23.6	.92	14.0	.53
C	19.2	.75	11.3	.43
D	12.9	.50	7.6	.29

FUTURE + (INTERIM)

CARMEL + SABADO

Offsite + 1/3 A = 9.6 + 34 = 43.6 (61.6 cfs)

CARMEL + VILLE CT

Offsite + 1/2 A = 9.6 + 44.6 = 54.2 cfs (72.2 cfs)

CARMEL + SANTA CLARITA

Off site + 2/3 A = 9.6 + 68 = 77.6 cfs (95.6)

CARMEL + CALLE AVION

Offsite + A = 9.6 + 89.2 = 98.8 cfs (116.8)

Pipe Capacity Calculations for Central Drainage Easement

RUN NO.	PIPE FLOW CFS	SLOPE '/,	N	DIAMETER (FT)	PIPE CAPACITY CFS	d/D	VELOCITY '/S
1	100.00	.030	.013	2.50	71.12	1.00	20.37

* FLOW EXCEEDS CAPACITY FOR NON PRESSURE FLOW

DO YOU WANT A PRINT OF THE OUT PUT ? Y/N?

.LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

RUN NO.	PIPE FLOW CFS	SLOPE '/,	N	DIAMETER (FT)	PIPE CAPACITY CFS	d/D	VELOCITY '/S
1	50.00	.030	.013	2.00	39.20	1.00	15.92

* FLOW EXCEEDS CAPACITY FOR NON PRESSURE FLOW

DO YOU WANT A PRINT OF THE OUT PUT ? Y/N?

LIST 2RUN 3LOAD" 4SAVE" 5CONT 6,"LPT1 7TRON 8TROFF9KEY 0SCREEN

RUN NO.	PIPE FLOW CFS	SLOPE '/,	N	DIAMETER (FT)	PIPE CAPACITY CFS	d/D	VELOCITY '/S
1	115.00	.030	.013	3.50	174.65	0.59	19.42

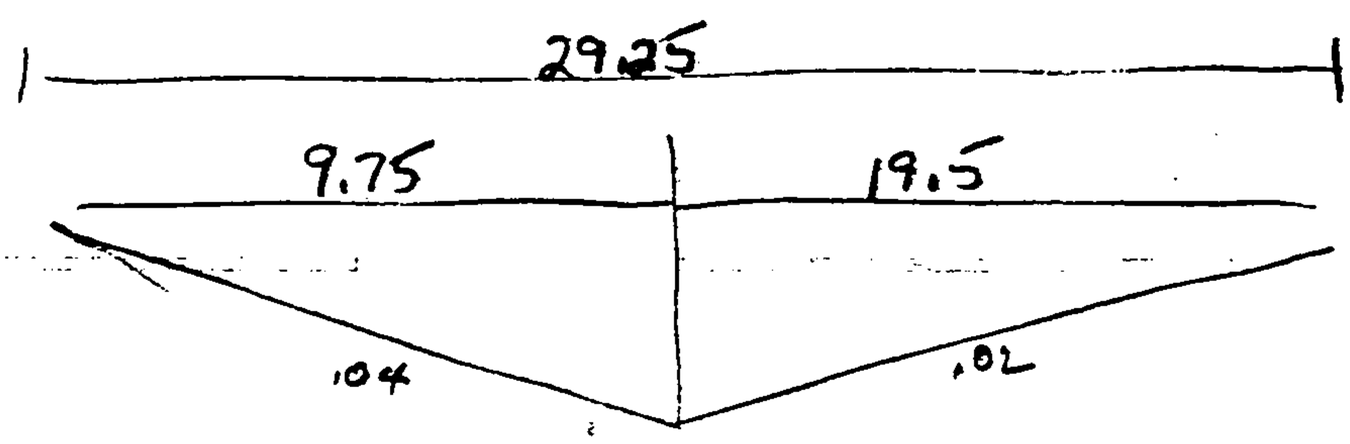
CHANNEL LINING ANALYSIS

Central Drainage Easement Swale

Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope Rt. (Horz. to 1)	Channel Slope (ft/ft)
0.10	50.0	25.0	0.030

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Concrete	99.00	35.0	0.19	0.015

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
0.39	5.98	5.85	0.74	Stable



Worst case: CARMEL, east of Monte Quando

$Q = 27.4$ cfs, $S = .0223$ ft/ft $n = .017$ $S_x = .02$

from $Q = \frac{.56}{n} S_x^{1.67} S^{.5} T^{2.67}$

See attached charts 2+3 from FHWA "Drainage of Highway Pavements"

Crown flow; $T = 16'$ $Q\frac{1}{2}$ street $= 11.12$ cfs

full flow in street $= 22.24$ cfs, $d = S_x T = .32'$

$V = 1.12/n \; S^{.5} S_x^{.67} T^{.67} = 4.58$ ft/s

Since actual interim $Q_{100} = 27.4$ cfs > 22.2 cfs flow is above crown.

Try increment of .1'

at $d = .32'$ $A = 5.12'$ $P = 32.646'$ $R = .15683$
$Q = 22.24$ cfs (see above)

at $d = .42$ $A = 8.32$ $P = 32.846$ $R = .2533$

by Mannings eqn: $Q = 43.4$ cfs > 27.4 cfs

try $d = .37'$ $A = 6.72$ $P = 32.746$ $R = .20522$

by Mannings: $Q = 30.4$ cfs ~ 27.4 cfs

$\Rightarrow$ $V = \frac{Q}{A} = \frac{30.4}{6.72} = 4.52$ ft/s

$HGL = .37'$ $EGL = \frac{V^2}{2g} + d = .32' + .37'$

$EGL = .69' < .87'$ ok

Holly

Revised Unit 3 G+D plan eliminates flow from La Cueva Oeste to Holly.

At east end, Q to Holly from Des. Q.

½ 443.12C + ⅕ of 443.14 at 32+00

.5 (.13)(147.7) + .20(109) = Q at 32+00

9.6 + 21.8 = 31.4 cfs at 32+00

S = 3.39%

Q street cap < 44 cfs

AT 26+00

½ 443.12 C + .38 of 443.14

9.6 + 40.9 cfs = 50.5 cfs

S = 2.84%

Capacity, AT crown flow T = 16'

$Q = .56/n \; S_x^{1.67} S^{.5} T^{2.67}$

Q = 32.9 (.00145)(.1675)(16^2.67) = 13.25 cfs

Q full street @ crown flow = 26.5 cfs d = .32'

Try increment of .10', d = .42'

A = 8.22 P = 32.846 R = .2533 Q = 49 cfs

∴ d ~ .45' $V = \frac{50.5}{8.35} = 6.03$ f/s

HGL = .45' EGL = .57' + .45' = 1.02'

∴ START SD AT 26+00 with 2-Type A

Capacity of inlet ~ 12 cfs ea, Total 24 cfs.

Holly: Slopes vary from .0232 '/, to .0339 '/,

At S = .0232 Qcap = 32 cfs (see Sonrisa Calculations)

At S = .0339 '/, calculate Qcap.

from $Q = .56/n \; S_x^{1.67} S^{.5} T^{2.67}$

T = 16'
S_x = .02
n = .017

Qcrown = 14.5 cfs

Q full to crown = 29 cfs

Try increment of .1'

At d = .42' A = 8.32 SF P = 32.846 R = .2533

by Mannings, Q = 60.6 cfs

At d = .42', A = 8.32 SF, V = 7.29 '/s

$EGL = HGL + \frac{V^2}{2g} = 1.24' > 1.0'$

At d = .37' A = 6.72 SF P = 32.746 R = .20522

Q = 42.5 cfs V = 6.33'

$EGL = HGL + \frac{V^2}{2g} = .37' + .62' = .99' < 1.0'$

∴ Keep street flow below 61 cfs, closer to 42.5 cfs

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Sonrise Street flow calcs. Worst Case

BASIN 940.3 Q_{100} (Fut) = 35.4 cfs

Slope = 2.39% (min) T=16'
S_x = .02

from $Q = .56/n \, S_x^{1.67} S^{.5} T^{2.67}$

Qcrown = 12.2 cfs (half street)

both sides at crown flow (d = .32'), Q = 24.4 cfs

Try increments of .1'

at d = .32' A = 5.12 SF P = 32.646' R = .15683

at d = .42' A = 8.32 SF P = 32.846 R = .2533

by Mannings Q = 44.9 cfs > 35.4 cfs

∴ d ~ .37' A = 6.72 SF P = 32.746 R = .20522

by Mannings Q = 31.5 cfs < 35.4

⟹ use d = .40' A = 7.68 SF

$V = \frac{35.4}{7.68} = 4.61$ V/s

$EGL = HGL + \frac{V^2}{2g} = .40' + .33' = .73' < 1.0'$

and less than curb height of .83'

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Inlet capacity calculations
using FHWA "Drainage of Highway Pavements" 1984

Type A Inlets at Sag locations - worst case at Carmel & Monte Querido

Off site $Q = 27.4$ cfs

on-site $\frac{5}{38.8} = .129(147.7) = 19.03$ cfs

Total Q to 2 Type A inlets = 27.4 + 19 = 46.4 cfs

Capacity of curb opening for 2 Type 'A' inlets

$Q_i = C_w L d^{1.5}$

$C_w = 2.3$

$L = 2 \times 7 = 14'$

$d_{max} = .83'$

$Q_i = 24.5$ cfs

Capacity of grates for 2 Type "A" inlets

$Q_i = C_w P d^{1.5}$ $P = 2(2.5 + 2.5 + 3) = 16'$

$C_w = 3.0$

$d_{max} = .83'$

$Q_i = 36.3$ cfs

Total Capacity at Sag for 2 Type A = 24.5 + 36.3 = 60.8
60.8 cfs > 46.4 cfs ∴ d less than .83'

Inlet Capacity Calculations

Worst Case - Sonrisa Place Cul-de-Sac

2 x 100-YR = 70 cfs Sag location

from previous page, at d = .83' Q capacity = 61 cfs

61 cfs < 70 cfs.

Try 2 Type double "A" inlets

L = 2 x 9.5' = 19'

Cw = 2.3 d = .83'

<u>Curb opening capacity</u> $Q_i = C_w L d^{1.5}$

$= 2.3(19)\,.83^{1.5}$

$Q_i = \underline{33 \text{ cfs}}$

<u>Grate capacity</u> - 2 Type "A" (double grates)

$Q_i = C_w P d^{1.5}$ $C_w = 3.0$ $d = .83'$

$P = 2(6+1.5+1.5) = 18'$

$Q_i = 3(18)\,.83^{1.5} = \underline{43 \text{ cfs}}$

Total capacity for 2 Type double "A" inlets

= Grate + Curb capacity = 43 cfs + 33 cfs = 76 cfs

<u>76 cfs > 71 cfs</u> <u>OK</u>

Inlet Capacity Calculations

Type A Inlet on Grade — worst case on Holly @ 13+00±

$Q = 22$ cfs

Grate capacity:

$S = 2.23\%$ $\quad S_x = .02$ $\quad S_w = \frac{4.25}{30} = .14$

$S_w / S_x = 7$

$w/T = \frac{2.5}{16} = .16 \implies E_o = .45$

$E_o = \frac{Q_w}{Q}$ $\quad Q_w = .45(22) = 9.9$ cfs grate cap.

Curb Opening Capacity

$Q = 12.1$ cfs $\quad S = .0223$ $\quad n = .017$ $\quad S_x = .02$

from chart 9 $\quad L_T = 62'$

$L/L_T = \frac{7}{62} = .113$ $\quad E = .2$ (from chart 10)

$Q_i = .2(12.1) = 2.42$ cfs

Total capacity of Type A on grate = 9.9 + 2.4 = 12 cfs.

Carry over to type double "C" on Holly = 9.7

for Type Double C, grate capacity = .45(9.7) = 4.4 cfs

Curb opening ~ same as Type A, Q_i (curb opening) = 2.4 cfs

Total capacity of type double C = 4.4 + 2.4 = 6.8 cfs.

carry over to San Pedro = 9.7 − 6.8 cfs = 2.9 cfs ok.

Inlet capacity on Sonrisa + Carmel (west end)

Sonrisa

Q = 35.4 cfs to low point (sag)

2 - Type Double "A" Inlets

$Q_i = C_w L d^{1.5}$ (curb opening only)

$C_w = 2.3$

$L = 10$

$d_{max} = .83'$

each inlet $Q_i = 17.4$ cfs

2 inlets, Q_{max} (curb only) = 34.8 cfs.

∴ curb opening nearly has capacity for 100-year Q even without grate capacity.

Carmel (west end) @ Calle Avion

$Q = \frac{1}{3} A$, $A = .62(413.12)$; $Q_{100} = .33(.62)147.7 = 30.2$

most comes down Calle Avion from south (25 cfs ±)
min slope = 1.3%

from $Q = .56/n S_x^{1.67} S^{.5} T^{2.67}$ $Q_{max} = 9$ cfs (½ section)

full street (to crown) $Q_{max} = 18$ cfs.

Try +.05' A = 6.72 P = 32.746 R = .20522

Q(+ d = .37) = 23.2 cfs ~ 25 cfs

use d = .40' V = 25/7.7 = 3.25'/s EGL = .40 + .16

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Carmel & Calle Avion

inlet capacity of 4 Type A inlets (see p.-
curb only = 2 x 24.5 cfs = 49 cfs >> 25 cfs.
i.e. curb opening only has twice
the capacity needed for 100-year flow
at Carmel + Calle Avion.

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PROJECT NO. 95-330
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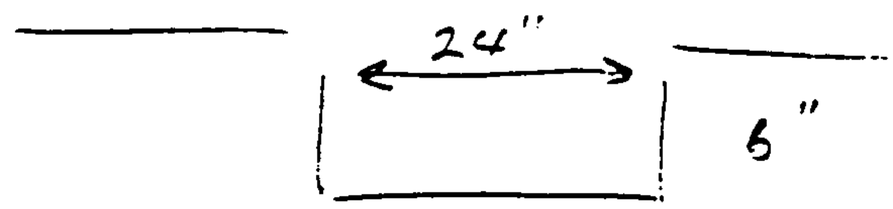
SW Culvert calcs



$Q_i = C_w L d^{1.5}$ (FHWA eqn: 20)

$C_w = 2.3$ $L = 2'$ $d = .6'$

$Q_i = 2.14$ cfs

∴ need 1 SW culvert for each 5 lots (30x100 drained.

Since no more than 8 backyards (equivalent to 4 full lots) drains to any one S.W. culvert 1-24" S.W. Culvert at each location will be required.

Flow To Pond, Interim Conditions Only

½ of 443.12 + 940.1 + ½ 940.3

Sizing:

$V_{10\ day} = V_{6hr} + A_D (P_{10\ day} - P_{6hr})/12$ 100-YR

For 940.3 + 443.12 only, including both subdivision + undeveloped areas. Basin 940.1 (east of Louisiana) will be routed through pond but not 100% retained. Total Q_{100} + V_{100} at AP-1 must be equal to or lower than under existing cond. Pond vol. will also include sediment allowance for undev. areas.

Area: ½ 443.12 = 19.4 Acres $V_{100} = 2.16$ $Q_{100} = 64.0$

½ 940.3 = 9.3 Acres $V_{100} = 0.62$ $Q_{100} = 17.8$

$V_{100\text{-}6hr}$ = 2.78 Ac-FT

Imp Area = 5.7 + 4.7 = 10.4 Ac

$V_{10\ day}$ = 10.4 (4.9" - 2.6")/12 = 2.0 Ac Ft

Sed allowance from undev. area (BF=9%)

$A_{undev} = 5.34 + 7.94 = 13.3$ Acres.

$V_{6hr} = 13.3(.8(.66) + .10(1.29) + .10(2.36))/12$

$= .99$ Ac-ft

$V_{TOTAL} = V_{6hr} + V_{10day} + V_{sed}$

$$\boxed{V_{TOTAL} = 2.78 + 2.00 + 1.00 = 5.78 \text{ Ac-ft}}$$

At AP-1 Interim Cond

$\frac{1}{2}$ 940.3(dev) + $\frac{1}{2}$ 443.12(dev) + 940.1(undev) to Pond
+ $\frac{1}{2}$ 940.3(undev) + $\frac{1}{2}$ 443.12(undev) + $\frac{1}{2}$ 940.1(undev)

$Q_{100} = 36$ cfs
$V_{100} = 2.07$ Ac ft

from AHYMO File LCPH2INT.10R

at AP-1 Exist. Cond

$Q_{100} = 116$ cfs

$V_{100} = 4.16$ Ac-ft

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Elev	Area	Vol	Σ Vol	Ac-ft	deduct Sed
525.4	33544	0	0		
55	35804	34668	34668	.80	0
56	38135	36963	71631	1.64	.64
57	40538	39330	110961	2.54	1.54
58	43013	41769	152730	3.51	2.51
59	45561	44296	197026	4.52	3.52
60	48148	46848	243874	5.60	4.60
61	50902	49517	293391	6.74	5.74

PROJECT NO. _____ SHEET 1 OF _____

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PROJECT NAME _____ APPROVED _____ DATE _____

TITLE LA CUEVA OESTE BY MDS DATE _____

FLOW TO HOLLY BETWEEN LOUISIANA & SAN PEDRO AT STATION 19+00. FLOW TO 1ST UPSTREAM INLETS

1. ½ BASIN 443.12C (BREEZE AT LA CUEVA)

2. HOLLY ½ ROW STA 28+00 TO 36+40

3. HOLLY ROW STA 19+00 TO 28+00

4. AREA W OF SANCHEZ PROP / S OF HOLLY

USING "40 ACRE OR LESS METHOD" FROM DPM

AREA	ACRES	% C	% O	Q100 (CFS)
1	2.4	20	80	~~10.00~~ 8.59 From Breeze at L.C.
2	0.58	15	85	2.78
3	1.24	15	85	5.93
4	8.50	20	80	40.00

Q_{TOTAL} = 57.3 CFS

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TITLE L. C. O. BY MDS DATE _____

ON HOLLY SLOPE VARIES FROM 0.0232 TO 0.0339

FROM MANNINGS $Q = \frac{1.49}{0.017} AR^{2/3} S^{1/2}$ $S = .0232$ WORST CASE slope on Holly

D (ft)	A (ft²)	P (ft)	R	Q (cfs)
.42	8.32	32.24	.2533	44.0
.52	11.52	33.04	.3487	76.0
.47	9.92	32.94	.3012	59.5
.467	9.624	32.934	.2923	56.6
.463	9.696	32.926	.2945	57.29 ∴

$V = 5.91$ ft/s

HGL = 0.463 ft

$EGL = 0.467 + \frac{V^2}{2g} = 1.0 = 1.0$ ft OK

∴ UPSTREAM INLETS SHOULD BE PLACED AT STA 19+00.

INLET CAPACITY ≈ 12 cfs each 4x12 = 48 cfs

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 2
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		0.5800	A	
2			B	
3	x		C	15.00
4			D	85.00

Output

Volume			(ac-ft)
	2-YR	6-hr	0.038
		24-hr	0.059
		4-day	0.073
		10-day	0.077
	10-YR	6-hr	0.066
		24-hr	0.087
		4-day	0.101
		10-day	0.105
	100-YR	6-hr	0.106
		24-hr	0.127
		4-day	0.162
		10-day	0.201

Q-Peak		(cfs)
	2-YR	1.074
	10-YR	1.845
	100-YR	2.775

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 3
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		1.2400	A	
2			B	
3	x		C	15.00
4			D	85.00

Output

Volume

		(ac-ft)
2-YR	6-hr	0.081
	24-hr	0.125
	4-day	0.156
	10-day	0.165
10-YR	6-hr	0.141
	24-hr	0.185
	4-day	0.216
	10-day	0.225
100-YR	6-hr	0.227
	24-hr	0.271
	4-day	0.346
	10-day	0.429

Q-Peak

	(cfs)
2-YR	2.295
10-YR	3.945
100-YR	5.933

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT: (MDS) Eldorado Park Subdivision

BASIN : Area 4

CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		8.5000	A	
2			B	
3	x		C	20.00
4			D	80.00

Output

Volume (ac-ft)

2-YR	6-hr	0.533
	24-hr	0.816
	4-day	1.014
	10-day	1.071
10-YR	6-hr	0.938
	24-hr	1.221
	4-day	1.420
	10-day	1.476
100-YR	6-hr	1.520
	24-hr	1.803
	4-day	2.285
	10-day	2.823

Q-Peak (cfs)

2-YR	15.198
10-YR	26.452
100-YR	40.001

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT NO.

PROJECT NAME

TITLE

Resource Technology, Inc.

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SHEET 6 OF

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FLOW TO 2ND INLETS AT STA 14+96

5 ROW STA 19+00 TO 14+96 STREET W = 32'

ROW = 60'

6 PROPERTY NORTH OF HOLLY (19+00 TO 14+96)
W = 250'

7 PROPERTY SOUTH OF HOLLY (19+00 TO 14+96)
W = 430'

FUTURE CONDITIONS

AREA	ACRES	% C	% D	Q_{100} (cfs)
5	0.5565	15	85	2.66
6	2.3186	20	80	10.91
7	4.1735	20	80	19.64

Q_{100} = 33.21

+ overflow 9.3

42.51 cfs

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 5
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		0.5565	A	
2			B	
3	x		C	15.00
4			D	85.00

Output

Volume			(ac-ft)
	2-YR	6-hr	0.036
		24-hr	0.056
		4-day	0.070
		10-day	0.074
	10-YR	6-hr	0.063
		24-hr	0.083
		4-day	0.097
		10-day	0.101
	100-YR	6-hr	0.102
		24-hr	0.122
		4-day	0.155
		10-day	0.193

Q-Peak		(cfs)
	2-YR	1.030
	10-YR	1.771
	100-YR	2.663

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

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PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 6
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		2.3186	A	
2			B	
3	x		C	20.00
4			D	80.00

Output

Volume

		(ac-ft)
2-YR	6-hr	0.145
	24-hr	0.223
	4-day	0.277
	10-day	0.292
10-YR	6-hr	0.256
	24-hr	0.333
	4-day	0.387
	10-day	0.403
100-YR	6-hr	0.415
	24-hr	0.492
	4-day	0.623
	10-day	0.770

Q-Peak

	(cfs)
2-YR	4.146
10-YR	7.215
100-YR	10.911

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 7
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		4.1735	A	
2			B	
3	x		C	20.00
4			D	80.00

Output

Volume (ac-ft)

2-YR	6-hr	0.262
	24-hr	0.401
	4-day	0.498
	10-day	0.526
10-YR	6-hr	0.460
	24-hr	0.600
	4-day	0.697
	10-day	0.725
100-YR	6-hr	0.746
	24-hr	0.885
	4-day	1.122
	10-day	1.386

Q-Peak (cfs)

2-YR	7.462
10-YR	12.988
100-YR	19.640

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

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SHEET 10 OF

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BY DATE

FLOW TO 3RD SET OF INLETS AT STA 10+46

8 ROW STA 14+96 to 10+46

9 PROPERTY NORTH OF HOLLY (14+96 TO 10+46)

10 PROPERTY SOUTH OF HOLLY (14+96 TO 10+46)

FUTURE

AREA	ACRES	% C	% O	Q100 (CFS)
8	0.3444	15	85	1.65
9	2.5626	20	80	12.15
10	4.6427	20	80	21.88

Q_{100} = 35.68

11

PROJECT: (MDS) Eldorado Park Subdivision

BASIN : Area ~~7~~ 8

CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		0.3444	A	
2			B	
3	x		C	15.00
4			D	85.00

Output

Volume			(ac-ft)
	2-YR	6-hr	0.023
		24-hr	0.035
		4-day	0.043
		10-day	0.046
	10-YR	6-hr	0.039
		24-hr	0.051
		4-day	0.060
		10-day	0.062
	100-YR	6-hr	0.063
		24-hr	0.075
		4-day	0.096
		10-day	0.119

Q-Peak		(cfs)
	2-YR	0.637
	10-YR	1.096
	100-YR	1.648

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 9
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		2.5826	A	
2			B	
3	x		C	20.00
4			D	80.00

Output

Volume			(ac-ft)
	2-YR	6-hr	0.162
		24-hr	0.248
		4-day	0.308
		10-day	0.325
	10-YR	6-hr	0.285
		24-hr	0.371
		4-day	0.431
		10-day	0.449
	100-YR	6-hr	0.462
		24-hr	0.548
		4-day	0.694
		10-day	0.858

Q-Peak		(cfs)
	2-YR	4.618
	10-YR	8.037
	100-YR	12.154

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

PROJECT: (MDS) Eldorado Park Subdivision
BASIN : Area 10
CONDITION:

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1		4.6487	A	
2			B	
3	x		C	20.00
4			D	80.00

Output

Volume (ac-ft)

2-YR	6-hr	0.291
	24-hr	0.446
	4-day	0.555
	10-day	0.586
10-YR	6-hr	0.513
	24-hr	0.668
	4-day	0.776
	10-day	0.807
100-YR	6-hr	0.831
	24-hr	0.986
	4-day	1.250
	10-day	1.544

Q-Peak (cfs)

2-YR	8.312
10-YR	14.467
100-YR	21.877

* City of Albuquerque Development Process Manual, Volume 1, 1997 Revision, pages 22-7 to 22-16.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 12/21/2000

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Curb Opening, Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0284
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0104
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.00
a	Gutter Depression (inch)		10.75
Q	Discharge (cfs)		28.650
T	Width of Spread (ft)		20.93

Gutter Flow

Eo	Gutter Flow Ratio	0.228
d	Depth at Curb (ft)	0.40
V	Average Velocity (ft/sec)	6.57

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Curb Opening	35.64	6.45	0.17	4.864	23.786
Parallel Bar P-1-7/8	2.00	2.95	0.28	6.763	17.022
Combination			0.41	11.628	17.022

15

Inlets at 19+00
Worksheet for Circular Channel

Project Description	
Project File	c:\haestad\fmw\la cueva.fm2
Worksheet	comps
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.038400	ft/ft
Diameter	30.00	in
Discharge	48.00	cfs

Results		
Depth	1.39	ft
Flow Area	2.81	ft^2
Wetted Perimeter	4.21	ft
Top Width	2.48	ft
Critical Depth	2.27	ft
Percent Full	55.67	
Critical Slope	0.011968	ft/ft
Velocity	17.10	ft/s
Velocity Head	4.54	ft
Specific Energy	5.93	ft
Froude Number	2.83	
Maximum Discharge	86.46	cfs
Full Flow Capacity	80.37	cfs
Full Flow Slope	0.013696	ft/ft
Flow is supercritical.		

Inlets at 14+96
Worksheet for Circular Channel

Project Description	
Project File	c:\haestad\fmw\la cueva.fm2
Worksheet	comps
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.023400	ft/ft
Diameter	36.00	in
Discharge	91.00	cfs

Results		
Depth	2.21	ft
Flow Area	5.58	ft²
Wetted Perimeter	6.19	ft
Top Width	2.64	ft
Critical Depth	2.85	ft
Percent Full	73.61	
Critical Slope	0.016129	ft/ft
Velocity	16.32	ft/s
Velocity Head	4.14	ft
Specific Energy	6.35	ft
Froude Number	1.98	
Maximum Discharge	109.75	cfs
Full Flow Capacity	102.02	cfs
Full Flow Slope	0.018617	ft/ft
Flow is supercritical.		

Inlets at 10+46
Worksheet for Circular Channel

Project Description	
Project File	c:\haestad\fmw\la cueva.fm2
Worksheet	comps
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.020000	ft/ft
Diameter	42.00	in
Discharge	126.00	cfs

Results		
Depth	2.56	ft
Flow Area	7.54	ft^2
Wetted Perimeter	7.19	ft
Top Width	3.10	ft
Critical Depth	3.29	ft
Percent Full	73.18	
Critical Slope	0.013556	ft/ft
Velocity	16.70	ft/s
Velocity Head	4.33	ft
Specific Energy	6.90	ft
Froude Number	1.89	
Maximum Discharge	153.05	cfs
Full Flow Capacity	142.28	cfs
Full Flow Slope	0.015686	ft/ft
Flow is supercritical.		

CITY OF
Albuquerque

March 13, 1998

Donald S. Dixon, P.E.
Resource Technology, Inc.
1720-B Randolph Rd. SE
Albuquerque, New Mexico 87106

RE: Grading and Drainage Certification for La Cueva Oeste Unit 2 (C18/D24A) Submitted for Release of Financial Guarantees, Engineer's Certification Dated 3/4/98.

Dear Mr. Dixon:

Based on the information provided in the submittal of March 4, 1998, the above referenced plan is adequate to satisfy the requirement for Subdivision Certification for release of financial guarantees per the Infrastructure List dated August 12, 1997, revised October 14, 1997.

If you have any questions, or if I may be of further assistance to you, please call me.

Sincerely,

Susan Calongne

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Terry Brown, P.E.
Terri Martin, Work Order #5232.91
File

LA CUEVA OESTE SUBDIVISION
PHASE I

FINAL DRAINAGE REPORT

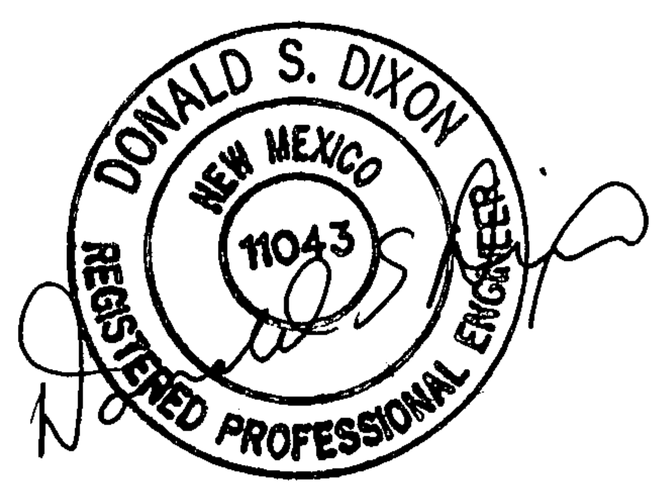
Prepared For:

DEVELOPMENT SERVICES, LTD.

Prepared By:

Resource Technology, Inc.
ENGINEERS AND ENVIRONMENTAL SCIENTISTS
2129 Osuna NE, Suite 200, Albuquerque, NM 87103

September 1, 1995



INTRODUCTION

The proposed La Cueva Oeste Subdivision, Phase 1, is located immediately west of Louisiana Boulevard between Carmel Avenue and Corona Avenue in the North Albuquerque Acres Subdivision. See Exhibit 1. The subdivision is traversed by two branches of the North Domingo Baca Arroyo which have recently been controlled upstream by an AMAFCA facility east of Louisiana Boulevard, the Lower North Domingo Baca Detention Dam. The Letter of Map Revision prepared for this project by AMAFCA's consultant (not yet approved by FEMA) has removed all areas related to the subdivision from floodplain. West of the project are several established commercial sites between Corona and Anaheim and a mobile home park. The site itself is vacant land, zoned R-D. A second tract of land west of the proposed subdivision between Anaheim and Holly Avenues is a proposed Phase 2 of this project. It is currently zoned I-P.

The project area falls within the region covered by the "North and South Domingo Baca Arroyos and Paseo del Norte Corridor Drainage Management Plan" (DMP), (RTI 1991) sponsored by AMAFCA. Several of the facilities proposed by the DMP have either been built, such as the Lower North Domingo Baca Dam, or have been designed with construction pending; the Paseo del Norte (PDN) Storm Drain system. Both of these projects have an impact on La Cueva Oeste Phase 1 drainage issues. In addition, there is a Special Assessment District project (SAD 221) that utilizes the principal spillway pipe in Anaheim as an outfall for local drainage.

The principal spillway for the dam consists of a 48"-54" RC pipe that runs from Louisiana to I-25 in the Anaheim Right-of-Way. It was foreseen in the DMP that this pipe would also serve in a limited capacity as an outfall for local drainage. This was reanalyzed for AMAFCA after the dam was under construction to determine the extent to which this outfall pipe had excess capacity to serve local drainage needs for the southern branch of the North Domingo Baca Arroyo and the potential for basin transferee. These recommendations are in the attached appendix. In general, these recommendations concluded that the overall concept of the DMP should be followed with modification considered where "proposed diversions to the outfall pipe are offset by corresponding diversions [from the approved drainage areas] to other adjacent drainage systems."

A related consideration is the capacity of the drainage facilities west of I-25 that pass through the Coronado Village Mobile Home Park. The LOMR for the Lower North Domingo Baca Detention Dam indicates that even under existing conditions after the completion of the dam there are flooding problems on the northern of the two branches of the arroyo that pass through the mobile home park. This would seem to indicate the desirability of reducing contributing areas to this branch if at all possible. However, as indicated above, these areas cannot be diverted to the southern branch without careful consideration of not only the hydraulic capacity of the existing dam outfall pipe but the downstream facilities as well. This would almost certainly involve diversions from the southern branch contributing areas to the PDN system or extensive on-site ponding.

In addition, COA Hydrology has indicated that it would like to eliminate as many major crossings of the north/south streets, i.e., Louisiana and San Pedro Boulevards, as possible. Wherever practical they would like storm water runoff directed to existing facilities in Anaheim or future facilities in Paseo del Norte if there is sufficient down stream capacity.

METHODOLOGY

The standard hydrological procedures put forth in the City of Albuquerque Development Process Manual were utilized along with the companion AHYMO (1-94) computer program. Basin designations follow those used in the DMP in order to facilitate comparisons. The 24-hour storm was used since this was the design storm for both the dam and the DMP.

HYDROLOGY

Existing Conditions

Existing conditions drainage basins are shown on Exhibit 1 and reflect conditions in the area after completion of the Lower North Domingo Baca Dam and the SAD 221 improvements, due to be constructed in the summer of 1995. The proposed La Cueva Oeste, Phase 1 areas are shown as subbasins for comparative purposes. Table 1 shows basin characteristics, 10 and 100 year runoff flow rates and volumes.

TABLE 1

EXISTING CONDITION DRAINAGE BASIN CHARACTERISTICS AND FLOW RATES

BASIN	AREA	TP HR	LAND TREATMENT				Q_{10}	V_{10}	Q_{100}	V_{100}
			A%	B%	C%	D%	CFS	AC-FT	CFS	AC-FT
939.14	.0112	.13	0	10	30	60	18.5	.71	29.9	1.20
939.16	.0128	.13	70	0	20	10	7.7	.25	19.1	.61
940.10	.0124	.13	80	0	10	10	6.6	.22	17.4	.56
940.20	.0536	.13	60	0	20	20	41.7	1.47	90.7	3.12
943.10	.0120	.13	0	15	20	65	20.0	.79	32.3	1.32
943.20	.0130	.13	80	0	20	0	5.5	.14	16.8	.48
960.00	.0075	.13	0	60	20	20	7.8	.25	15.0	.51
443.10	.0914	.13	80	0	10	10	48.4	1.61	129.2	.51

Future Conditions

Future condition basins are shown on Exhibit 2 along with the proposed Paseo del Norte Storm Drain System. Also shown are the proposed improvements for La Cueva Oeste Phase 1. Table 2 shows basin characteristics, runoff flow rates and volumes.

TABLE 2
(Rev. 9/95)

FUTURE CONDITION DRAINAGE BASIN CHARACTERISTICS AND FLOW RATES

BASIN	AREA	TP HR	LAND TREATMENT				Q_{10}	V_{10}	Q_{100}	V_{100}
			A%	B%	C%	D%	CFS	AC-FT	CFS	AC-FT
939.14	.0112	.13	0	10	30	60	18.5	.71	29.9	1.20
939.16	.0128	.13	0	34	16	50	18.4	.70	31.2	1.22
939.18	.0023	.13	0	15	15	70	4.0	.16	6.3	.26
940.10	.0124	.13	0	34	16	50	17.9	.68	30.2	1.18
940.20	.0156	.13	0	34	16	50	22.5	.85	38.0	1.49
940.30	.0145	.13	0	34	16	50	20.9	.79	35.4	1.38
940.40	.0056	.13	0	34	16	50	8.1	.31	13.7	.53
943.10	.0120	.13	0	15	20	65	20.0	.79	32.3	1.32
943.20	.0140	.13	0	34	16	50	21.2	.76	34.1	1.33
960.00	.0075	.13	0	25	25	50	11.1	.42	18.6	.73
443.12	.0702	.13	0	34	16	50	101.0	3.84	171.2	6.69
443.14	.0447	.13	0	34	16	50	64.4	2.4	109.0	4.26
443.16	.0775	.13	0	15	15	70	132.5	5.4	212.2	8.83

PROPOSED IMPROVEMENTS AND SITE DRAINAGE

The proposed Phase 1 of the subdivision will replat 20 existing North Albuquerque Acres lots to provide for 86 new lots, vacate excess Right-of-Way on Carmel and Corona, vacate 800-feet of Anaheim Right-of-Way while providing a 50 foot wide drainage and utility easement with bike trail in its place and provide new street Right-of Way for interior circulation. Access will

be from Louisiana on the east, from Corona on the north, and from Anaheim on the west. The west side of Louisiana Boulevard will be constructed to minor arterial standards with drainage picked up by the Anaheim outfall pipe. The north side of Carmel and south side of Corona will be designed to local street standards with Corona drainage directed to the existing arroyo on the north side of Corona, 800 feet west of Louisiana. Lots will drain to the streets. Low drainage walls with swales will be utilized between common backyard property lines that will direct flows from upstream lots to the streets or the Anaheim drainage easement.

With the exception of approximately one acre at the intersection of Corona and Venus, all of Phase 1 will be drained directly to the Anaheim outfall pipe. This will result in an interbasin transfer from basin 939.16 to basin 940.2 of approximately .0128 square miles, (100 year flow rate of 31 cfs). This will be offset by the diversion of part of existing basin 940.2 (.0127 square miles) to basin 443 and the PDN storm drain at San Pedro. This system outfalls to the South Domingo Baca Arroyo west of I-25. The effects of these proposed interbasin transfers are shown in Table 3.

TABLE 3
(Rev 9/95)

LOCATION	FLOW RATE, Q	
	Existing (cfs)	Future (cfs)
Pipe Flow @ Louisiana	177	204
Pipe Flow @ San Pedro	176	248
Surface Flow @ AP1	97	14
Surface Flow @ AP2	129	280
Pipe Flow @ Ute	177	270
Pipe Flow @ I-25 CBC	261	298
Surface Flow @ AP3	105	48

As can be seen from Table 3, with the proposed drainage plan shown on Exhibit 2, the Anaheim outfall pipe flows at or slightly above capacity for almost its entire length. The only problem area is from San Pedro to Ute where the system flows under pressure but the HGL is still below the surface. HGL computations are in the appendix.

At Analysis Point 1, the existing 2-36" CMP's located on San Pedro between Anaheim and Carmel, the situation has been significantly improved. The post-dam construction 100-year flow rate of 97 cfs. has been reduced to 14 cfs by the proposed drainage plan. This remaining 14 cfs from the 4 developed lots at San Pedro between Anaheim and Carmel can, at some future date, be drained to the Anaheim pipe.

The proposed diversion to the PDN system takes place at Analysis Point 2 at San Pedro and Holly. Here the existing condition flow rate increases from 129 cfs to 280 cfs for the proposed future condition. This includes all currently undeveloped land between Louisiana and San Pedro north of the Paseo del Norte R/W that is not to be served by the Anaheim storm drain.

A preliminary hydraulic analysis of the existing design of the Paseo del Norte (PDN) system has been performed combining the proposed flows per the DMP as well as the additional flows proposed by this project. The total flow rate of 309 cfs for future developed conditions exceeds the 190 cfs non-pressure flow capacity of the 42"-48" storm drain. For free discharge from proposed Phase 2 additional drainage areas this system would have to be upsized to 48"-60".

This storm drain discharges to two existing NMSHTD 60-inch CMP/RCP pipes south of PDN at the I-25 east frontage road. The combined capacity of these two pipes is 300 cfs according to figure 6-1 of the DMP. However, this number is based on inlet control conditions for culvert flow. The existing design connection to one of these pipes is at a manhole which will change the hydraulics of the situation considerably. One 60-inch pipe alone (using the higher Mannings "n" for the CMP of .024 and the actual slope of 3.4%) has a capacity of 260 cfs. Depending on NMSHTD policy on pressure flow, downstream tailwater conditions and verification of the 140 cfs flow from drainage areas south of PDN that are also served by the two 60" pipes, details of this connection will be worked out as part of Phase 2, but it appears that there is sufficient capacity at this proposed outfall for free discharge from all of the proposed drainage areas. Any redesign and subsequent additional construction costs will be born by the Phase 2 project.

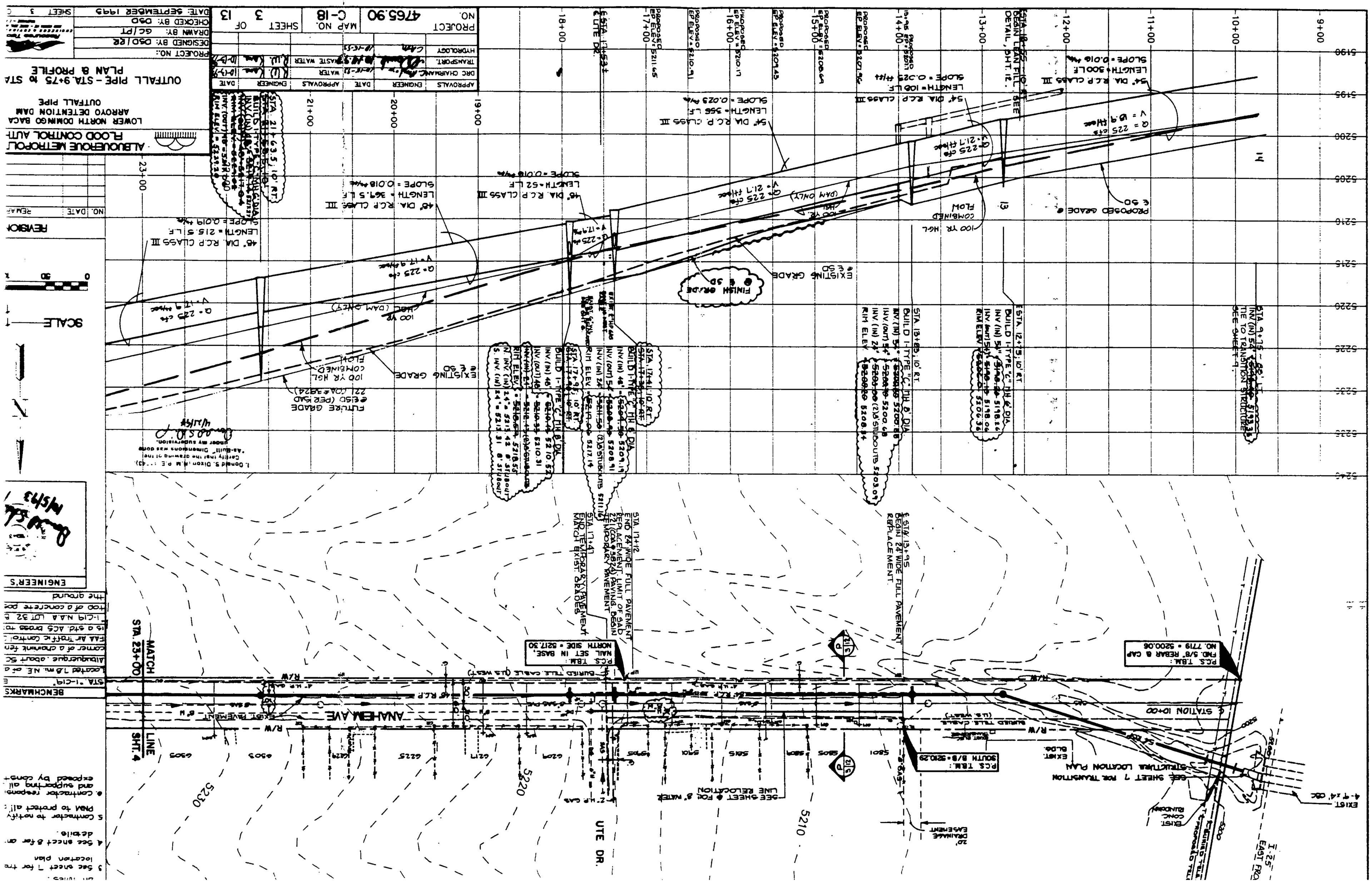
If there are unanticipated hydraulic problems or NMSHTD fails to grant permission for the modified use of the two 60" pipes then on-site ponding will be required for the Phase 2 development and discharge to the PDN system will be prorated based on available capacity among property owners north of PDN and east of San Pedro. In either event, temporary ponding will be required for Phase 2 to control flows until the Paseo del Norte improvements are in place and the necessary connections in San Pedro are constructed.

SUMMARY

The proposed drainage plan for the La Cueva Oeste Subdivision, Phase 1 makes maximum use of the existing Anaheim outfall pipe. It makes minor modifications to the recommendation adopted by AMAFCA for use of this pipe but compensates for this by proposing to utilize the PDN system at San Pedro and Holly as part of Phase 2. The tract of land east of Louisiana that comprises basin 940.1 may be developed under the same criteria as the current project and could be diverted to the PDN system at Louisiana and Holly. However, Phase 2 will be designed to intercept these existing conditions offsite flows at Carmel, 600 feet west of Louisiana. The proposed plan has the following benefits:

1. A reduction in 100-year flows to the north branch of the North Domingo Baca Arroyo at Coronado Mobile Home Park of approximately 30 cfs and flows to the south branch by 60 cfs.

2. The virtual elimination of any major north/south street drainage crossings on San Pedro.
3. The maximum utilization of the existing facility in Anaheim Avenue as well as enhanced use of proposed facilities in Paseo del Norte.


ALBUQUERQUE METROPOLITAN FLOOD CONTROL AUTH.
LOWER NORTH DOMINGO BACA ARROYO DETENTION DAM
OUTFALL PIPE
OUTFALL PIPE - STA. 9+75 to STA. 23+00
PLAN & PROFILE
PROJECT NO.:
DESIGNED BY: DSD/RR
DRAWN BY: GC/PT
CHECKED BY: DSD
DATE: SEPTEMBER 1993
SHEET 3 OF 13
MAP NO. C-18
PROJECT NO. 4765.90
APPROVALS
ENGINEER
DATE
HYDROLOGY
TRANSPORT.
DRC CHAIRMAN
WATER
WASTE WATER
REVISION
NO. DATE
BENCHMARKS
STA. "I-C19" Located 1.8 mi. NE of a aluminum cap about 50 comer of a chainlink fen EAA Air Traffic Control I-C19 N.A.A. LOT 32 is a std. ACS brass to top of a concrete po the ground
ENGINEER'S
SCALE
0 50
MATCH LINE SHT. 4
STA. 23+00
MATCH EXIST. GRADES
END TEMPORARY PAVEMENT
STA. 17+41
STA. 17+12 END 24' WIDE FULL PAVEMENT REPLACEMENT. LIMIT OF SAD 221 (CDA 3824) TEMPORARY PAVING. BEGIN
STA. 13+95 BEGIN 24' WIDE FULL PAVEMENT REPLACEMENT.
PCS TBM: NAIL SET IN BASE, NORTH SIDE = 5217.30
PCS TBM: SOUTH B/B = 5210.29
PCS TBM: FND. 5/8" REBAR & CAP NO. 7719 = 5200.06
ANAHEIM AVE
EXIST. PAVEMENT
R/W
BURIED TELE. CABLE (U.S. WEST)
℄ STATION 10+00
SEE SHEET 7 FOR TRANSITION STRUCTURE LOCATION PLAN
SEE SHEET 4 FOR 8" WATER LINE RELOCATION
UTE DR.
I-25 EAST FRG.
EXIST. 4'-4' x 4' CBC
EXIST. CONC. BLUNDOWN
EXIST. BLDG.
20' DRAINAGE EASEMENT
5230
5220
5210
6205
6225
6229
6215
6205
5905
5915
5901
5801
6300
6305
6305
6305

NOTE:
CONTRACTOR TO VERIFY GAS LINE LOCATION IN THIS AREA.

ACADEMY NORTH MOBILE HOME PARK

SAN PEDRO DR.

P.C.S. T.B.M.:
EAST B/B - 5236.48

ANAHEIM AVE.

T.B.M. = 5257.53
P.C.S. TRAV. PT. NO. 11

MATCH LINE SHT. 3
STA. 23+00

MATCH LINE SHT. 3
STA. 37+00

EXISTING CURB
EXISTING CONC. CURB
PAVED DRIVE
EDGE OF PAVED
4" H.P. GAS
BURIED TELE. CABLE (U.S. WEST)
UNDERGROUND CABLE (JONES INTERCABLE)
R/W
6401 6413 6415 6417 6419 6501 6503 6507 6509 6511 6515 6565 6601 6603

5270 5260 5250 5240

SECTION 1-1
SCALE 1" = 10' H & V

EXISTING GRADE @ ℄ SD

100 YR HGL COMBINED FLOW

100 YR HGL (DAM ONLY)

FUTURE ℄ GRADE (PER SAD 221 COA #3824)

Q = 225 cfs
V = 21.7 ft/sec

48" DIA. R.C.P. CLASS III
LENGTH = 425 L.F.
SLOPE = 0.029 ft/ft

Q = 225 cfs
V = 22.3 ft/sec

48" DIA. R.C.P. CLASS III
LENGTH = 425 L.F.
SLOPE = 0.030 ft/ft

Q = 225 cfs
V = 22.6 ft/sec

48" DIA. R.C.P. CLASS III
LENGTH = 425 L.F.
SLOPE = 0.031 ft/ft

STA. 23+78; 7' RT
STA. 23+78; 10' RT
BUILD I-TYPE "C" TH & DIA
INV. (IN) 48" = 5221.16 5221.36
INV. (OUT) 48" = 5221.04 5221.11
INV. (IN) 24" = 5229.50 5229.11
RIM ELEV. = 5239.11
S. INV. (IN) 24" = 5223.63
N. INV. (IN) 24" = 5223.67
RIM ELEV. = 6233.84

STA. 28+01; 7' RT
STA. 28+01; 15' RT
BUILD I-TYPE "C" TH & DIA
INV. (OUT) 48" = 5234.50
INV. (IN) 48" = 5234.03
INV. (IN) 48" = 5234.50
RIM ELEV. = 5249.50

STA. 32+28; 7' RT
STA. 32+28; 15' RT
BUILD I-TYPE "C" TH & DIA
INV. (OUT) 48" = 5247.04
INV. (IN) 48" = 5246.88
RIM ELEV. = 5255.95

STA. 36+45; 7' RT
STA. 36+45; 10' RT
BUILD I-TYPE "C" TH & DIA
INV. (IN) 48" = 5259.71
INV. (OUT) 48" = 5259.60
INV. (IN) 24" = 5261.82
RIM ELEV. = 5267.41
N. INV. (IN) 24" = 5261.82 8" STUB OUT
S. INV. (IN) 24" = 5260.66 8" STUB OUT

EXIST. U.S. WEST TEL. CABLE
EXIST. 8" WL
EXIST. 12" WL
EXIST. 4" HP GAS
EXIST. CATV
PROP. TEL. CONDUIT
EXIST. 2" HP GAS

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00

5270 5265 5260 5255 5250 5245 5240 5235 5230 5225 5220

3. Contractor to notify PNM to protect all
4. Contractor reopens and supports all exposed by co

BENCHMARKS
STA. "I-C19" E
Located 7.8 mi. N.E. of a
Albuquerque, about 50
corner of a chainlink fen
FAA Air Traffic Control
is a std. ACS brass to
"I-C19 N.A.A. LOT 32 B
top of a concrete pos
the ground.

ENGINEER'S

Donald S. Dixon
4/21/94

SCALE
0 50

REVISIO
NO. DATE REMA

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
DRC CHAIRMAN		10-15-93	WATER	N/A	10-13-93
TRANSPORT.		10-15-93	WASTE WATER	N/A	10-13-93
HYDROLOGY		10-15-93			

PROJECT NO.	MAP NO.	SHEET	OF
4765.90	C-18	4	13

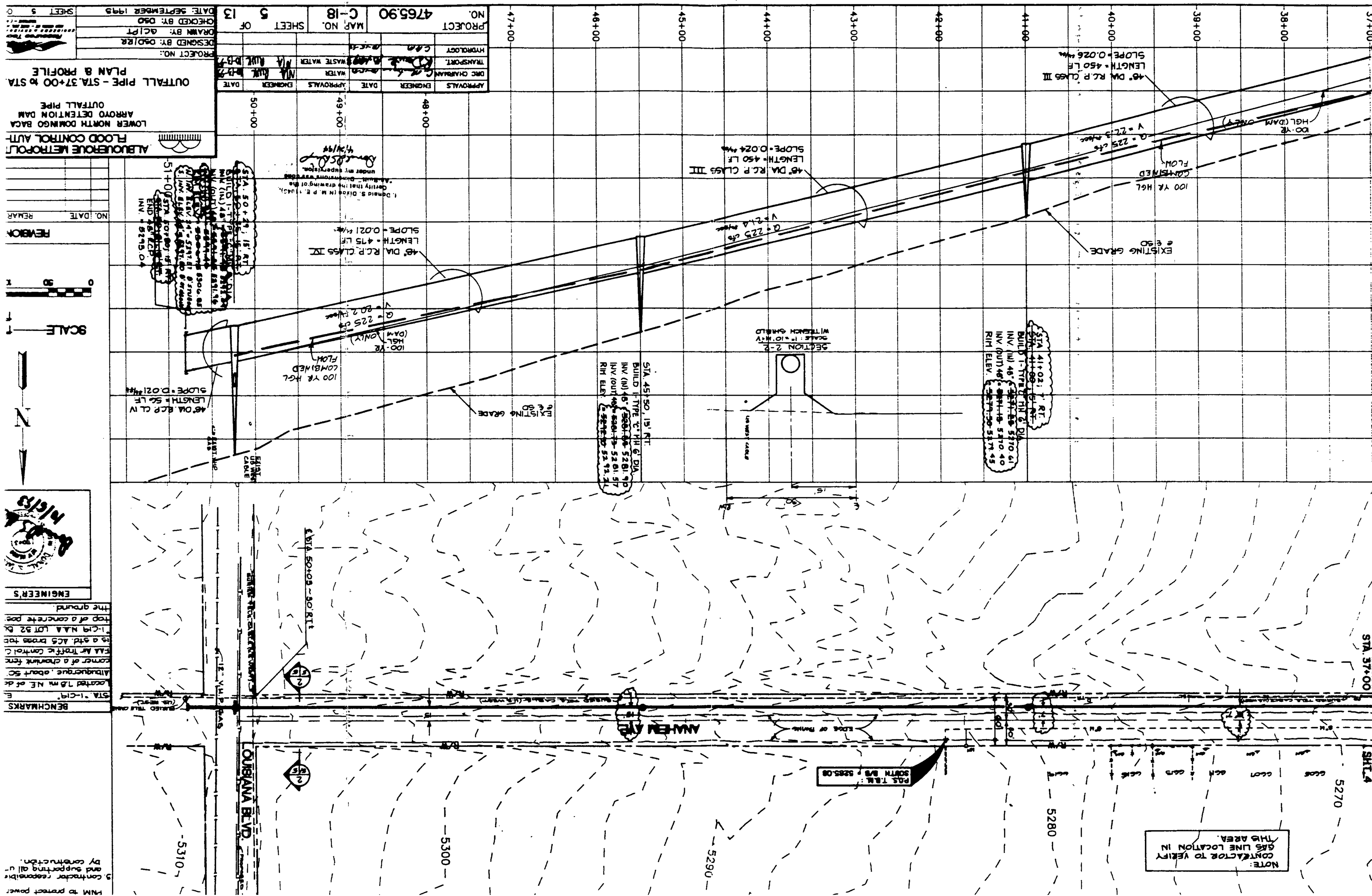
ALBUQUERQUE METROPOL
FLOOD CONTROL AUT

LOWER NORTH DOMINGO BACA
ARROYO DETENTION DAM
OUTFALL PIPE

OUTFALL PIPE - STA.23+00 to ST
PLAN & PROFILE

PROJECT NO.:
DESIGNED BY: DSD/RR
DRAWN BY: GC/PT
CHECKED BY: DSD
DATE: SEPTEMBER 1993

SHEET 4


ALBUQUERQUE METROPOLITAN
FLOOD CONTROL AUTH.
LOWER NORTH DOMINGO BACA
ARROYO DETENTION DAM
OUTFALL PIPE
OUTFALL PIPE - STA. 37+00 to STA.
PLAN & PROFILE
PROJECT NO.:
DESIGNED BY: DSD/RR
DRAWN BY: GCIPT
CHECKED BY: DSD
DATE: SEPTEMBER 1995
SHEET 5 OF 13
MAP NO. C-18
PROJECT NO. 4765.90
APPROVALS
ENGINEER
DATE
DRC CHAIRMAN
TRANSPORT.
HYDROLOGY
WATER
WASTE WATER
NM 4th AVE
BENCHMARKS
ENGINEER'S
SCALE
N
REVISION
NO. DATE REMARKS
SECTION 2-2
SCALE: 1" = 10' H & V
WITTENBERG SHIELD
EXISTING GRADE
@ @ 50
48" DIA. R.C.P. CLASS III
LENGTH = 450 LF
SLOPE = 0.024 ft/ft
48" DIA. R.C.P. CLASS IV
LENGTH = 475 LF
SLOPE = 0.021 ft/ft
48" DIA. R.C.P. CL IV
LENGTH = 56 LF
SLOPE = 0.021 ft/ft
100 YR HGL
100 YR HGL (DAM ONLY)
CONFINED FLOW
Q = 225 cfs
V = 22.3 ft/sec
V = 21.4 ft/sec
V = 20.2 ft/sec
STA. 41+02, 7' RT.
STA. 41+00, 15' RT.
BUILD 1-TYPE 'C' HH 6' DIA.
INV. (IN) 48" 5271.66 5270.61
INV. (OUT) 48" 5271.19 5270.40
RIM ELEV. 5273.50 5273.45
STA. 45+50, 15' RT.
BUILD 1-TYPE 'C' HH 6' DIA.
INV. (IN) 48" 5261.90 5261.57
INV. (OUT) 48" 5261.73 5261.37
RIM ELEV. 5272.37
STA. 50+29, 15' RT.
BUILD 1-TYPE 'C' HH 6' DIA.
INV. (IN) 48" 5261.98
INV. (OUT) 48" 5261.81
RIM ELEV. 5272.80
END 48" RCP
INV. = 5275.04
EXISTING CABLE
LOUISIANA BLVD.
ANAHEIM AVE.
EDGE OF PAVING
STA. 50+00 ~ 30' RT.
STA. 37+00
SHT. 4
5310
5300
5290
5280
5270
NOTE:
CONTRACTOR TO VERIFY
GAS LINE LOCATION IN
THIS AREA.
P.O.S. T.B.M.:
SOUTH B/S P 5285.08

RESOURCE TECHNOLOGY, INC.
ENGINEERS & ENVIRONMENTAL SCIENTISTS
2129 Osuna Road, NE Suite 200
Albuquerque, NM 87113
Phone: (505) 345-3115
Fax: (505) 345-4132

CHECKED _____ DATE _____ PROJECT NO. 95-040

APPROVED _____ DATE _____ SHEET _____ OF _____

TITLE Hydraulic Analysis BY DA DATE 9/4

PDN system as designed by Wilson & Co.

48" Trunk line, min slope = 1.75%

Max non pressure Q (by Mannings) n = .013

Q max = 190 cfs

60" Trunk line, min slope = 1.75%

Qmax = 345 cfs

Max Q to pipe from: PDN (442.1) 29 cfs

443.12
443.14) 280 cfs

309 cfs

* 309 < 345 ∴ 60" SD will work.

Culvert @ I-25 2-60" part RCP part CMP

S = 3.4% (field measurement)

Qmax (n = .024) = 260 cfs

TABLE 1

HYDROLOGIC CHARACTERISTICS

Basin	Area (sq mi)	Land Treatment A (%)	B (%)	C (%)	D (%)	100 Yr Peak Discharge (cfs)	Time to Peak (hr.)
939.15	.014	0	34	16	50	34	1.50
940.1	.028	0	34	16	50	68	1.50
940.2	.047	0	34	16	50	116	1.50
943.1	.012	0	15	15	70	33	1.50
943.2	.013	0	34	16	50	32	1.50

TABLE 2

100-YEAR FLOW RATES

At Selected Locations

Location	Q (cfs)	Time to Peak (Hrs.)	Capacity (cfs)
Dam Only	204	3.20	220
Anaheim and San Pedro (w/local)	299	1.55	220
Anaheim and Ute (w/local)	357	1.55	295
I-25 CBC	385	1.55	1160

AHYMO SUMMARY TABLE (AHYMO993) - AMAFCA VERSION OF HYMO - SEPTEMBER, 1993 RUN DATE (MON/DAY/YR) =02/06/1995
INPUT FILE = ANAHEIM.REV USER NO.= RSTECHNM.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
*S DAM DISCHARGE AT LOUISIANA										
RECALL HYD	340.87	-	2	4.29270	203.55	338.388	1.74011	3.200	.074	
RAINFALL TYPE= 2										RAIN24= 2.850
COMPUTE NM HYD	340.10	-	1	.02800	58.27	2.667	1.78583	1.500	3.810	PER IMP= 50.00
*S SUB-BASIN 340.1										
COMPUTE NM HYD	340.20	-	3	.04700	114.59	4.476	1.78583	1.500	3.309	PER IMP= 50.00
*S SUB-BASIN 340.2										
COMPUTE NM HYD	339.15	-	5	.01400	34.14	1.333	1.78582	1.500	3.811	PER IMP= 50.00
*S SUB-BASIN 339.15										
COMPUTE NM HYD	343.10	-	6	.01200	32.86	1.368	2.13689	1.500	4.278	PER IMP= 70.00
*S SUB-BASIN 343.1										
ADD HYD	201.00	2& 1	1	4.32070	208.33	401.055	1.74041	1.600	.076	
ROUTE	202.00	1	4	4.32070	206.30	401.025	1.74028	2.050	.075	
*S ADD IN SAN PEDRO Q										
ADD HYD	203.00	4& 3	2	4.36770	238.57	405.501	1.74077	1.550	.107	
*S ROUTE TO UTE										
ROUTE	204.00	2	4	4.36770	238.39	405.481	1.74068	1.550	.107	
*S ADD IN UTE Q										
ADD HYD	205.00	4& 5	1	4.37370	325.30	406.349	1.74177	1.550	.117	
ADD HYD	206.00	1& 5	1	4.39370	356.32	408.182	1.74131	1.550	.127	
COMPUTE NM HYD	343.20	-	2	.01300	31.71	1.238	1.78583	1.500	3.811	PER IMP= 50.00
*S SUB-BASIN 343.2										
ADD HYD	207.00	1& 2	1	4.40670	384.79	409.420	1.74204	1.550	.136	
*S TOTAL Q AT I-35 D3C										
FINISH										