ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS

Drainage Analysis
for
Bernalillo County Courthouse
and District Attorney Building

COMPLETE PROFESSIONAL SERVICES

AAR
THE LARKIN GROUP INC

CONSULTING ENGINEERS AND SURVEYORS
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March 24, 1998

Lisa Manwill, P.E.
City Hydrology
Plaza del Sol
P.O.Box 1293
Albuquerque, New Mexico, 87110

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
No. 9350
JOHN A. ANDREWS

SUBJECT: BERNALILLO COUNTY COURTHOUSE AND DISTRICT ATTORNEY OFFICE (J14-D120)

Transmitted herewith is a revised drainage report for the subject project. Items below correspond to Item Numbers 1 through 7 from your letter which was written on November 6, 1997:

1. After further design development of the above project, we are now able to provide a more adequate grading and drainage plan. For your information, we are also submitting an infrastructure list.

2. Inlet and storm drain capacity calculations for proposed storm drains and inlets are shown in the drainage report in Appendix A.

3. The storm drain pipes that take the roof drain flows to the inlets are shown on the Grading and Drainage Plan. They are both on the north side of the buildings.

4. All existing and proposed inlets are designated by the legend on the Grading and Drainage Plan.

5. Fruit Avenue is no longer going to be vacated. Instead, a license agreement will be made between the City of Albuquerque and the County of Bernalillo to allow closure of Fruit Avenue to thru traffic but maintain it as the public right-of-way. Therefore, a one-foot water block is required at the parking garage entrance and is shown on the Grading and Drainage Plan.

   All curb returns shown surrounding the D.A. Building site and the County Courthouse site are in compliance with the Transportation Department's requirements.

6. The method of drainage for this site was discussed at the hydrology predesign meeting. At this meeting, it was determined that detention ponding would not be required since the existing development on this site was very similar to the proposed development relative to land treatment. Therefore, changes in the flows from the site would be insignificant.

   You will note that as requested at the predesign conference, the roof drainage and the parking lot drainage is collected and conveyed underground to the back sides of the street curb inlets in order to minimize surface sheet flow to the streets. It was also discussed that underground discharge to the 72" storm drain would be acceptable.

   To address your capacity concerns, we have made computations of the on-site and off-site flows in the report and have related these flows to the capacity of inlets and capacity of pipes connecting these inlets to the storm drain system. These computations indicate that the inlets and connecting pipes have adequate capacity.

7. After Preliminary Plat approval, we will proceed with Work Order Documents which will be submitted to DRC for review and approval.

If there are any questions, please feel free to contact me at 275-7500.

Sincerely,

Jeanne Wolfenbarger, E.I.

AAR-Larkin

EXHIBIT A
TO SUBDIVISION IMPROVEMENT AGREEMENT
DEVELOPMENT REVIEW BOARD
REQUIRED INFRASTRUCTURE LISTING
BERNALILLO COUNTY COURTHOUSE

DRB Case No.: 97-318
DRC Project No.: _____
Prelim. Plat Approved: _____
Prelim. Plat Expires: _____
Site Plan Approved: _____
Date Submitted: _____

Following is a summary of PUBLIC/PRIVATE Infrastructure required to be constructed or financially guaranteed for the above development. This summary is not necessarily a complete listing. During CPC, BCC, the design process and/or in the preparation of the construction drawings, if the City, County, and/or AMAFCA determines that appurtenant items have not been included in the summary, those items will be included in the listing and related financial guarantee, if the items normally are the Subdivider's responsibility. In addition, any unforeseen items which arise during construction which are necessary to compete the project and which normally are the Subdivider's responsibility are the responsibility of the Subdivider and will be included in the financial guarantee provided to the City, County, and/or AMAFCA.

SIZE	TYPE OF IMPROVEMENT	LOCATION	FROM	TO
35' Radius Curb Return	Standard Curb and Gutter	Southwest Corner of Lomas Boulevard and Fourth Street		
35' Radius Curb Return	Standard Curb and Gutter	Southeast Corner of Lomas Boulevard and Fifth Street		
25' Radius Curb Return	Standard Curb and Gutter	Northeast Corner of Fruit Avenue and Fifth Street		
	Standard Curb and Gutter	West side of 4th Street	Lomas Boulevard	Fruit Avenue
	Standard Curb and Gutter	East and West side of 5th Street	Lomas Boulevard	Fruit Avenue
	Standard Curb and Gutter	East side of 6th Street	Lomas Boulevard	Fruit Avenue
	Standard Curb and Gutter	South side of Lomas Boulevard	4th Street	6th Street
	Standard Curb and Gutter	North side of Fruit Avenue	4th Street	6th Street
8"	PVC Waterline	Fruit Avenue	4th Street	6th Street
10"	PVC Waterline	5th Street	20' South of Lomas Boulevard	North End of Lomas Boulevard
	Fire Hydrants	As approved by Fire Marshall		
24"	RCP Storm Drain and Inlet Relocation	Southwest Corner of the intersection of Lomas Boulevard and 4th Street		
18"	RCP Storm Drain and Inlet Relocation	Northwest Corner of the intersection of Fruit Avenue and 4th Street		

*Improvements to include storm drain appurtenances as determined at DRC.

Signed By: _____

Print Name: Jeanne Wolfenbarger, E.I.

Firm Name: AAR-LARKIN

DEVELOPMENT REVIEW BOARD MEMBER APPROVALS

Date Traffic	Date Utility Dev.	Date Parks & G.S.
Date City Engineer	Date AMAFCA	Date DRB Chairman

d:\forms\ExhibitA.DRB

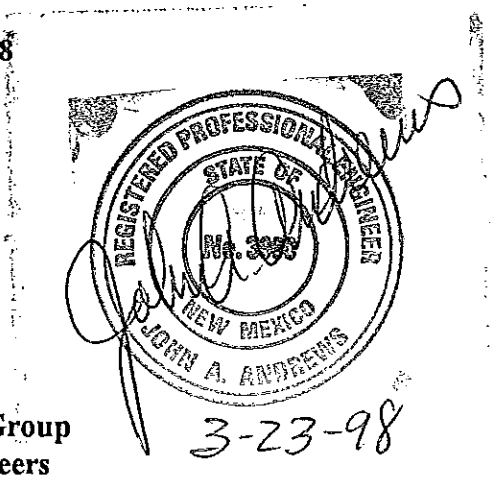
DRAINAGE ANALYSIS

for

BERNALILLO COUNTY COURTHOUSE AND DISTRICT ATTORNEY BUILDING

Albuquerque, New Mexico

March 23, 1998



Prepared by
AAR-The Larkin Group
Consulting Engineers
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Albuquerque, New Mexico 87112

TABLE OF CONTENTS

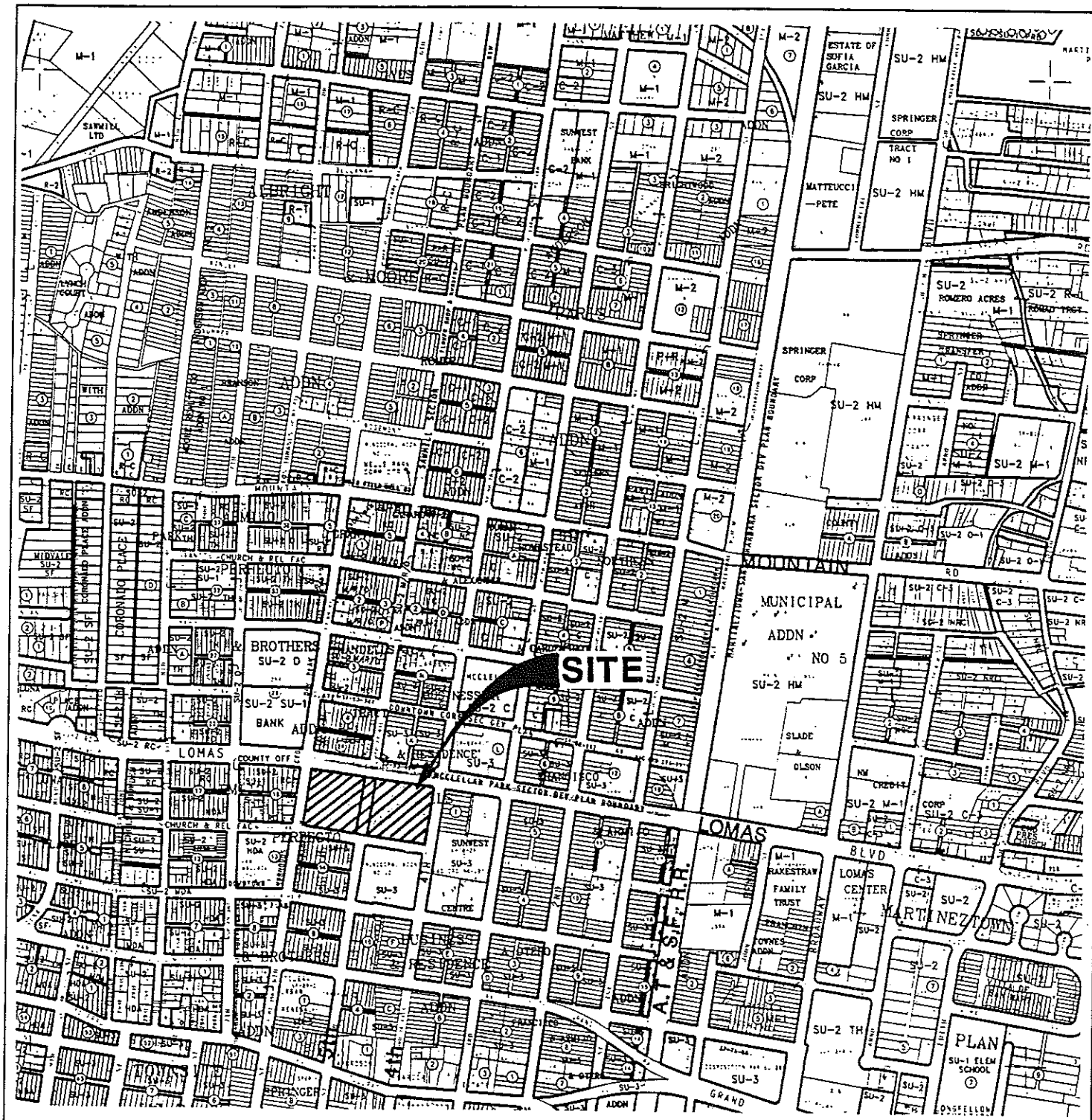
I. INTRODUCTION

It is proposed to construct a new Bernalillo County Courthouse and District Attorney Building in downtown Albuquerque on land that is currently developed and is primarily used for parking. The purpose of this report is to analyze the drainage for this new development and to propose a grading and drainage plan based on that analysis.

The entire on-site area is bounded by Lomas Boulevard on the north, Fruit Avenue on the south, Fourth Street on the east, and Sixth Street on the west (See Vicinity Map, Map No.1). Fifth Street will separate the Bernalillo County Courthouse site on the east side from the District Attorney Building site on the west side. As shown by FIRM on Panel 35001C0334 D, neither of the two sites or the streets adjacent to the sites are located within the floodplain.

Drainage for the proposed development is analyzed for existing and developed conditions. Existing land usage and drainage conditions was determined from site visits and topographic site information. Proposed drainage areas are shown on Map No. 2.

The drainage analysis was based on Section 22.2 of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico, January 1993. The drainage calculations and basin areas may be found in Tables 1 through 4.



ZONE ATLAS MAP J-14

SCALE: 1"=750'

COUNTY OF BERNALILLO, NEW MEXICO

BERNALILLO COUNTY COURTHOUSE

VICINITY MAP

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
ALBUQUERQUE NEW MEXICO

FILE No.	DRAWN	CHECKED	DATE	
97-782	TL	JW	OCT. 1997	MAP 1

EXISTING CONDITIONS

The existing site is completely developed. Gravel and paved parking lots cover the majority of the site, and two commercial buildings are located on the far east side. Because of the proposed new County Courthouse and District Attorney Building, the existing buildings and parking lots on-site are currently undergoing demolition.

The existing on-site area is divided into Basins A and B where Basin A covers the site for the District Attorney Building and Basin B covers the site for the Bernalillo County Courthouse (See Map No.2). Generally, on-site runoff is directed to all surrounding streets by sheet flow at very minimal slopes. 4th, 5th, and 6th Street convey on-site runoff to the south where the runoff is then collected by existing inlets at Fruit Avenue along each of the north-south street intersections. As shown on the Grading and Drainage Plan (Map No. 2), the inlets discharge to separate storm drains located under 4th, 5th, and 6th Street. Existing on-site drainage calculations may be found in Tables 1 and 2.

On-site runoff that discharges to Lomas Boulevard is collected by a series of inlets that are located along the south side of Lomas Boulevard. These inlets discharge to an existing 72" storm drain under Lomas Boulevard which has recently been built in accordance with the Albuquerque Master Drainage Study. An existing 24" storm drain under Lomas Boulevard is directly tied to the 72" storm drain.

All runoff is generated on-site. Streets surrounding the site have curb and gutter on each side, preventing any off-site street runoff from entering the on-site area.

100-YEAR PEAK DISCHARGE FOR EXISTING CONDITIONS
(Section 22.2 of the DPM)
TABLE 1

Basin	Land Treatment Area (acres)					Land Treatment Peak Discharge (cfs/acre)				Total Area (acres)	Peak Discharge (cfs)
	A	B	C	D		A	B	C	D		
A		0.13		2.22		1.56	2.28	3.14	4.70	2.35	10.73
B		0.11		2.02		1.56	2.28	3.14	4.70	2.13	9.74
TOTAL										4.48	20.48

100-YEAR PEAK RUNOFF FOR EXISTING CONDITIONS
(Section 22.2 of the DPM)
TABLE 2

Basin	Land Treatment Area (Acres)					Land Treatment Excess Precipitation (in)				Total Area (acres)	Excess Precipitation (inches)	Runoff Volume V360(acre-ft)
	A	B	C	D		A	B	C	D			
A		0.13		2.22		0.53	0.78	1.13	2.12	2.35	2.05	0.40
B		0.11		2.02		0.53	0.78	1.13	2.12	2.13	2.05	0.36
TOTAL										4.48		0.76

III. PROPOSED SITE CONDITIONS

A. General Drainage Pattern

At the Hydrology Pre-design Conference, it was discussed that it was acceptable to release historical runoff into the public right-of-way. Drainage by sheet flow to the streets will be minimized by discharging runoff from the parking lot and buildings directly to the back of the existing catch basins that surround the site. Hydraulic analysis for the existing connector pipes downstream of these catch basins was performed to ensure that these pipes have the capacity to convey flows from on-site as well as off-site street runoff at a street flow depth of 0.67 feet.

B. Bernalillo County Courthouse

The new Bernalillo County Courthouse Building is proposed to be built between Fourth and Fifth Street, and most of the surrounding area will be paved with concrete. A proposed underground parking garage for this building will be accessed off of the existing Fruit Avenue.

The finalization of a License Agreement between the City of Albuquerque and the County of Bernalillo to minimize public access to Fruit Avenue between 4th and 5th Street is currently in process. However, Fruit Avenue will still remain as the public right-of-way.

To minimize sheet flow to the street, all roof runoff from the Bernalillo County Courthouse will be discharged through an underground roof/storm drain which will be connected to a new inlet on the south side of Lomas Boulevard just west of Fourth Street. Then, as shown on Map 2, the inlet will discharge through a new 24" storm drain connecting to an existing junction box. Calculations on Tables A-1 and A-2 in Appendix A show that the storm drain connector has sufficient capacity to convey an on-site runoff of 5.64 cfs and an off-site runoff of 12.50 cfs (AP1 and AP2). The Courthouse Building area is designated as Basin B1.

Basin B2 only includes the entrance to an underground parking garage for the County Courthouse which is located to the south of the building off of Fruit Avenue. Runoff from Basin B2 will be collected by a trench grate at the bottom of the drive and discharged to the County Courthouse roof drain system by a pumping system. A one-foot water block will be constructed at the entrance to the parking garage.

Basin B3 will surface discharge to surrounding streets. Similar to existing conditions, the runoff from this basin will be collected by catch basins on the streets surrounding the site.

Basin B4 only includes the existing Fruit Avenue. Runoff from this street will drain west and be collected by inlets at 5th Street and 6th Street, the same as under existing conditions. Refer to Tables 3 and 4 for drainage calculations.

B. District Attorney Building

The District Attorney Building and parking lot are proposed to be built between 5th Street and 6th Street. Areas surrounding the building and parking lot will be mostly landscaped.

The drainage concept used for the District Attorney Building will be similar to the concept used for the Bernalillo County Courthouse. The drainage from the District Attorney Building, which is designated as Basin A1, will be collected by roof drains and discharged to an underground storm drain system which will be connected to the back of the inlet on the southeast corner of Lomas Boulevard and 6th Street. The landscaped area around the building, which is designated as Basin A4, will surface discharge to surrounding streets.

The parking lot for the District Attorney's Office is separated into Basins A2 and A3. Basin A2 will drain to the south side of the parking lot, where the runoff will be collected by two proposed "D" inlets and discharged to the back of the existing inlet on the northwest corner of 5th Street and Fruit Avenue (AP5). Basin A3 will drain to the north side of the parking lot where the runoff is collected by two proposed "D" inlets and discharged to the back of the existing inlet on the northeast corner of 5th Street and Lomas Boulevard (AP3). Calculated headwater depths are below 0.180 feet at each of the proposed catch basins which indicate that they have ample capacity to collect the 100-year storm water runoff (See Page A-2 of Appendix A).

Hydraulic calculations for proposed and existing storm drain connector pipes are shown on Tables A-1 and A-2. These calculations demonstrate that the connector pipes immediately downstream of the District Attorney Building have sufficient capacity to convey on-site runoff as well as the off-site runoff from the contributing catch basins. The capacity calculations are conservative since pressure flow was not taken into consideration (See Page A-1).

C. OFF-SITE

All curb and sidewalk surrounding the Courthouse Building site will be removed and replaced. Curb radius adjustments are required at the northeast and southeast corners of the Courthouse Building site so all existing catch basins at these locations will need to be removed and replaced. The inlet at the northeast corner is a single "A" inlet, and the inlets at the southeast corner of the site are old cast iron grated inlets with smaller grates than what the current city standard calls for. Therefore, each one of these existing inlets will be replaced with a single "A" inlet in order to match or exceed existing inlet capacity.

Due to inlet relocation, the downstream collector pipes will also need to be removed and replaced as shown on the Grading and Drainage Plan (Map No.2). A 24" RCP will be installed to replace the existing 18" pipe upstream of the junction box at the northeast corner of the Courthouse Building Site to convey the added runoff from the County Courthouse, and two 18" RCPs at the southeast corner of the property will replace the existing 12" storm drain inlet connector pipes.

It is proposed to install new curb, gutter, and sidewalk around the D.A. site. However, no curb radius adjustments are required by the C.O.A. Transportation Department on this site. Also, all existing inlets are in good condition. Therefore, none of these inlets will be replaced.

100-YEAR PEAK DISCHARGE FOR PROPOSED CONDITIONS
(Section 22.2 of the DPM)
TABLE 3

Basin	Land Treatment Area (acres)				Land Treatment Peak Discharge (cfs/acre)				Total Area	Peak Discharge
	A	B	C	D	A	B	C	D	(acres)	(cfs)
A1				0.52	1.56	2.28	3.14	4.70	0.52	2.43
A2		0.04		0.74	1.56	2.28	3.14	4.70	0.78	3.57
A3		0.58		0.21	1.56	2.28	3.14	4.70	0.79	2.31
A4		0.19		0.07	1.56	2.28	3.14	4.70	0.26	0.76
Subtotal										**9.07**
B1				1.17	1.56	2.28	3.14	4.70	1.17	5.50
B2				0.03	1.56	2.28	3.14	4.70	0.03	0.14
B3				0.93	1.56	2.28	3.14	4.70	0.93	4.37
Subtotal										**10.01**
TOTAL									**4.48**	**19.08**

100-YEAR PEAK RUNOFF FOR PROPOSED CONDITIONS
(Section 22.2 of the DPM)
TABLE 4

Basin	Land Treatment Area (Acres)				Land Treatment Excess Precipitation (in)				Total Area	Excess Precipitation	Runoff Volume
	A	B	C	D	A	B	C	D	(acres)	(inches)	V360(acre-ft)
A1				0.52	0.53	0.78	1.13	2.12	0.52	2.12	0.09
A2		0.04		0.74	0.53	0.78	1.13	2.12	0.78	2.05	0.13
A3		0.58		0.21	0.53	0.78	1.13	2.12	0.79	1.14	0.07
A4		0.19		0.07	0.53	0.78	1.13	2.12	0.26	1.14	0.02
Subtotal											**0.32**
B1				1.17	0.53	0.78	1.13	2.12	1.17	2.12	0.21
B2				0.03	0.53	0.78	1.13	2.12	0.03	2.12	0.01
B3				0.93	0.53	0.78	1.13	2.12	0.93	2.12	0.16
Subtotal											**0.38**
TOTAL									**4.48**		**0.70**

IV. CONCLUSION

Drainage under developed conditions will remain basically the same as under existing conditions as shown by comparing total 100-year runoff flows between Tables 1 and 3. The combination of the existing 24" storm drain and 72" storm drain in Lomas Boulevard provide ample capacity to carry the runoff that is discharging from the proposed buildings. Surface runoff from on-site is minimized, and therefore will have little impact on downstream conditions.

V. REFERENCES

1. Albuquerque Master Drainage Study Volume II, Bohannan-Huston, Inc., January 1981

2. Section 22.2, Hydrology, of the Development Process Manual, Volume 2, Design Criteria for the City of Albuquerque, New Mexico in Cooperation with Bernalillo County, New Mexico and the Albuquerque Metropolitan Arroyo Flood Control Authority, January 1993.

APPENDIX A

Hydraulics

PROPOSED ON-SITE STORM DRAIN CAPACITIES
TABLE A-1
(Manning Equation : $Q = (1.49/n) R^{2/3} S^{1/2} A$; n=0.013)

ANALYSIS POINT	PROPOSED STORM DRAIN SIZE	STORM DRAIN SLOPE	100-YEAR STORM RUNOFF (CFS)	STORM DRAIN CAPACITY (CFS)
AP1	18"	0.004	5.64	6.64
AP3	12"	0.006	2.31	2.76
AP5	18"	0.004	3.57	6.64
AP7	12"	0.004	2.43	2.47

OFF-SITE STORM DRAIN CAPACITIES
TABLE A-2
(Manning Equation : $Q = (1.49/n) R^{2/3} S^{1/2} A$; n=0.013)

ANALYSIS POINT	STORM DRAIN SIZE	SLOPE	100-YEAR ON-SITE STORM WATER RUNOFF	*OFF-SITE RUNOFF (INLET CAPACITY AT 0.67' CURB DEPTH)	TOTAL RUNOFF (CFS)	STORM DRAIN CAPACITY (CFS)
AP2	24"(PROP.)	0.007	5.64	12.50	18.14	18.93
AP4	24"(EX.)	0.055	2.31	12.50	14.81	53.05
AP6	18"(EX.)	0.032	3.57	12.50	16.07	18.79
AP8	24"(EX.)	0.010	2.43	12.50	14.93	22.62

* Conservative estimate of off-site runoff.

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6631

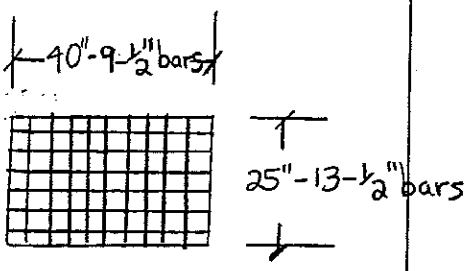
Project County Courthouse Sheet ____ of ____

Job No. ____

By JAW Chk'd ____ Date ____

DISTRICT ATTORNEY PARKING LOT DRAINAGE

"D" INLET CAPACITY CALCULATIONS



Weir Equation: $LCH^{1.5} = Q$

L = Perimeter of Inlet
C = 3.087
H = Headwater Depth
Q = 100-year runoff

Q_{100} for Basin A2 = 2.43 cfs
2 inlets in Basin A2, each carry $(\frac{1}{2})Q_{100} = 1.215$ cfs

Q = 1.215 cfs
C = 3.087
L = 9.03' inlet perimeter - bar widths

H = 0.125' ✓ OK

Q_{100} for Basin A3 = 3.57 cfs
2 inlets in Basin A3, each carry $(\frac{1}{2})Q_{100} = 1.785$ cfs

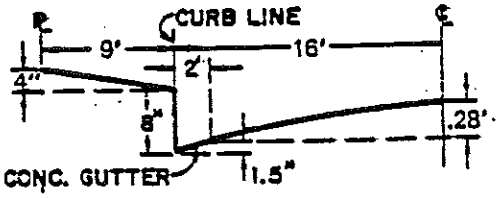
Q = 1.785 cfs
C = 3.087
L = 9.03' inlet perimeter - bar widths

H = 0.160' ✓ OK

INLET CAPACITY AT CURB DEPTH

GRATING CAPACITIES FOR TYPE "A" , "C" and "D"

GRATING & GUTTER PLAN



TYPICAL HALF STREET SECTION
(ABOVE BASIN)

APPENDIX B

Hydrology Pre-design Conference Minutes

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
DEVELOPMENT SERVICE / HYDROLOGY SECTION

CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO. J14 DATE: 10-2-97
PLANNING DIVISION NO'S: EPC: _____ DRB: 97-318
SUBJECT: County Courthouse And District Attorneys Office
STREET ADDRESS (IF KNOWN): _____
SUBDIVISIONNAME: _____

APPROVAL REQUESTED:

- ✓ PRELIMINARY PLAT
- ✓ SITE PLAN FOR BP
- _____ GRADING PERMIT
- _____ BUILDING PERMIT
- _____ SECTOR PLAN
- ✓ FINAL PLAT
- _____ SITE PLAN FOR SUB
- _____ PAVING PERMIT
- _____ FOUNDATION PERMIT
- _____ OTHER: _____

	WHO	REPRESENTING
ATTENDANCE:	John Andrews	AAR
	Jeanne Wolfenbarger	AAR
	Fred J. Aguirre	City

FINDINGS:

- An approved drainage plan is required for site plan and/or subdivision (ie variation of Print #)
- The drainage concept will be to drain directly to the storm drain on the back of catch basins.

THE UNDERSIGNED AGREES THAT THE ABOVE FINDINGS ARE SUMMERIZED ACCURATELY AND ARE SUBJECT TO CHANGE IF FURTHER INVESTIGATION REVEALS THAT THEY ARE NOT REASONABLE OR THAT THEY ARE BASED ON INACCURATE INFORMATION.

SIGNED: [signature] SIGNED: [signature]
TITLE : _____ TITLE _____
DATE : 10/2/97 DATE _____