PLANS/PLATS ON FILE

FILE DESC: E-20/D007

PLANS/PLATS 1

F20/D7

1 Plan

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

RECEIVED BWH OCT 14 1980

September 29, 1980

P20-03

Wylie Brothers Construction
P. O. Box 3921
Albuquerque, New Mexico 87123

Re: Turnkey Agreement - Bear Canyon Estates, Units 2 and 3

Dear Mr. Wylie:

After field review of the storm drainage improvements along the Bear Canyon Arroyo adjacent to the subject project, it has been determined by this office, in consultation with engineers and professionals from the University of New Mexico and New Mexico State University, that the only way the City can with good conscience, accept the improvements in the bear Canyon Arroyo, is to have the banks in the vicinity at the bottom elevation of the drop structures, as designed by Bohannan-Huston, armored a minimum of 20 feet upstream and downstream with concrete or rip rap material. The armoring should be from the freeboard elevation to the depth of the drop structures. This armoring will direct the flow in such a manner so that the banks will not erode between the drop structures (in such a manner) as they are currently doing.

The accomplishment of this work should be under the auspices of an approved design submitted by your engineers. The City of Albuquerque will assist you in any way in obtaining any necessary permits and inspections to do the work after it has been delineated by your engineer.

Should you have any further questions on this project, please feel free to contact me.

Very truly yours,

Richard S. Heller

Richard S. Heller
City Engineer

RSH/fs

xc - City Attorney
Mike Emery - Bohannan-Huston
File

October 17, 1979

Mr. Richard S. Heller
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

#20-83

Re: Bear Canyon Estates, Tract A-2

Dear Mr. Heller:

The undersigned is the owner of the above described property located in the City of Albuquerque. The owner agrees to participate in the protection of the north bank of the channel adjacent to the above premises on the south, to a maximum of concreting the north side slope.

Very truly yours,

McClintic Development Corporation
By: James R. McClintic, President

James R. McClintic Pres.

Wallin & Associates, Inc.
Construction
Post Office Box 13596 • Station E • Albuquerque, New Mexico 87192
Lic. #15388

September 4, 1979

Fred Aguirre
City of Albuquerque
Drainage Dept.

RE: Bear Canyon Estates, Unit 2, Tract A

Dear Mr. Aguirre,

This letter is to confirm that the arroyo along the south side of the above referenced property will be lined along the north side of the arroyo as agreed upon by Mr. Bruno Conegliano and Meurer, Serafini and Meurer, Inc., engineers for the project.

Sincerely,

Rick C. Wallin

Rick C. Wallin, President

RW/cw

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

August 29, 1979

F20-D3

Mr. Jeryl D. Hart, Jr.
Meurer, Serafini and Meurer, Inc.
2601 Wyoming Boulevard, N. E.
Albuquerque, New Mexico 87110

RE: BEAR CANYON ESTATES UNIT 2 TRACT A

Dear Mr. Hart:

I understand that Mr. Heller has expressed his concurrence with the Drainage Report submitted for the referenced subdivision. My understanding is also that the approval of the plat by Mr. Heller for AMAFCA, was based on the concurrence by the developer to protect the property along the south boundary line, against erosion from the Bear Canyon Arroyo. If your understanding differs from the above, please notify me. Approval of the construction plans will be subject to compliance with the indications of the drainage report.

Very truly yours,

Bruno Conegliano
Assistant City Engineer - Hydrology

BC/bm

cc - Richard Leonard, AMAFCA w/attachment
Richard Heller
Fred Aguirre
Drainage File
→ Reading file

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

MAYOR
David Rusk

June 5, 1979

Mr. Michial Emery
Bohannan-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

Ref: Bear Canyon Tributary Channel Construction
Across Bear Canyon Estates

Dear Mr. Emery:

A field inspection of this facility has revealed substantial bank erosion immediately downstream from the drop structures in a pattern not anticipated of the design. The abutments of the drop structures have been exposed in three locations and a garden wall presently under construction has been undermined even before its completion. It is apparent that this method of channel protection is not effective in achieving the intended purpose.

The City will not, therefore, be able to accept the channel as it exists today nor this type of design for future facilities. Bank protection along the east and the west property lines will have to be supplied to protect the integrity of the private properties. Similar protection will have to be provided along the Bear Arroyo wherever drop structures of similar design have been constructed. In particular, and most urgently, along the Bear Canyon Estates Subdivision and the proposed Osuna Townhouses development.

Please note that the City will also require that filter cloth material be provided under all the riprap and cutoff walls that may be installed.

Very truly yours,

Richard S Heller

Richard Heller
City Engineer

BC/RH/ms
cc Bruno Conegliano, Asst. City Eng.-Hydrology (Reading)
Richard Leonard, AMAFCA
Drainage file

- Denver
- Albuquerque
- Tucson
- Casper
- Vicksburg
- Rawlins
- New Orleans

MEURER, SERAFINI AND MEURER, INC.

A Genge Company

2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87110
(505) 292-1936

DRAINAGE REPORT

FOR

BEAR CANYON ESTATES

ALBUQUERQUE, NEW MEXICO

RECEIVED
JUL 23 1979
CITY ENGINEER

Prepared by

Meurer, Serafini and Meurer, Inc.
2601 Wyoming Blvd. N.E.
Albuquerque, New Mexico

87112

(505) 292-1936

July 1979

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RUNOFF UNDEVELOPED STATE	3
ESTIMATED RUNOFF DEVELOPED STATE	4
RECOMMENDATIONS	5
SUMMARY	6

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Figure 2	Intensity Duration
Figure 3	Weir Ponding/Outfall Chart
Figure 4	Flood Hazard Boundary Map - City
Figure 5	Flood Hazard Boundary Map - County
Figure 6	Rice Report - Arroyo Flows
Figure 7	Rice Report - Bear Canyon Arroyo
Figure 8	Rice Report - Bear Canyon Arroyo
Appendix 1	Lot Pond Volume Calculations

DRAINAGE REPORT

Bear Canyon Estates

PURPOSE AND SCOPE

The McClintic Development Corporation, is planning on developing lands located in the northeast sector of metropolitan Albuquerque known as Bear Canyon Estates. The purpose of this report is to present a plan for controlling surface runoff from said subdivision in a manner acceptable to the Albuquerque Arroyo Flood Control Authority and the Albuquerque City Engineer's Office.

SITE LOCATION AND TOPOGRAPHY

Bear Canyon Estates is located in the northeast sector of Albuquerque at Eubank Boulevard and Spain Road. The surrounding terrain is generally developed land on all sides. The Bear Canyon Arroyo is located on the south side of the proposed subdivision.

The soil of the site is generally comprised of disintegrated granite. The natural ground slopes from the east to the west with a few small swales. Ground cover consists mainly of native grasses.

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, Q = CIA is used.

Where:

Q = Runoff quantity in cubic feet/second.

A = Contributing area in acres.

I = Intensity in inches/hour for a duration equal to the time of accumulation (duration) measured in minutes and obtained from Figure II. (Note: Where a Time Concentration [Tc] is less

than 10 minutes from Figure I, the intensity value, derived from a Tc equal to 10 minutes is employed.)

C = Runoff Coefficient (No Unit). This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all affect the time distribution and peak rate of runoff.

ESTIMATED RUNOFF UNDEVELOPED STATE:

Drainage within the boundary of the site is basically overland flow with some small swales. Most of the drainage naturally exits the area at the southwest corner of the property. Drainage flows from the east are designed to be diverted by Eubank Boulevard and flows from the north by Spain Road. There seems to be a possibility of some of these flows riding on into the N.E. corner of the site, so we intend to construct a water block in the form of a small block wall along the property line to prevent this. We intend to analyze the required limits of this block wall when we design the balance of the subdivision, however we presently envision a wall from 8" to 2' high from property P.C. to P.T.; therefore, there are no offsite flows to be carried through the site. In addition, other adjacent improvements to the north and to the east and general topography prohibit offsite flows from entering the subdivision.

The Bear Canyon Arroyo, which abuts the development on the south, is a partially improved drainage channel with concrete drop

structures. Side slope protection in the way of a concrete liner will be added to the north side of the channel with one foot of freeboard over the 100-year storm level.

TABLE 1

Runoff in Undeveloped State Q = CIA

Onsite	Elev.	Length of Flow	Tc Min*	1-100 yr. In./Hr.	C	Area	Q
A-1 and A-2	25ft.	570 L.F.	12.7 min.	5.01	0.40	3.4297Ac	6.87 cfs
Volume Calcs.				$\frac{2.4}{12}$	0.40	149,3[illegible] Ft^2	11,952 ft^3

ESTIMATED RUNOFF DEVELOPED STATE

As development occurs, the area of impervious surfaces increases and thereby the amount of runoff also increases. To offset this increase, onsite restrictions of flows must be incorporated into the development. While this can take different forms, the most practical solution for this type of development is to utilize on-lot ponding. The contributing area to the yard ponding includes all of the lot except the sidewalk, parking areas and streets. The only areas contributing to the developed flows to be discharged into Bear Canyon Arroyo therefore are the streets, sidewalks and parking areas. In addition, the parking lot in the southwest corner of the site will be built and used as a detention pond with a wier opening to allow a rate of flow of only 3.5 c.f.s. into the Arroyo, less than has occured historically. This approach will satisfy A.M.A.F.C.A.'s requirement

* Tc based on Nomograph, Figure I.

that the runoff rate from the developed tract not exceed the runoff rate from the tract in its natural state.

The runoff coefficient factors are as follows:

Streets, Walks and Drives	C = 0.90
Roofs	C = 0.90
Lawns, Sandy Soils (Average 2 to 7%)	C = 0.40

Table 2

Runoff in Developed State

Onsite

A-1 Tc is less than 10 minutes
Q - CIA = (0.90) (5.4) (1.36) = 6.61 c.f.s.

A-2 Tc is less than 10 minutes
Q = CIA = (0.90) (5.4) (0.03) - 0.15 c.f.s.

Total Developed Q = 6.76 c.f.s.

The combined runoff flows for this subdivision are additive due to the total time of concentration being less than 10 minutes.

Total Area Runoff Vol. = CIA = (0.90) $\left(\frac{2.4}{12}\right)$ (60,570 ft^3) = 10,903 $ft.^3$ $\leq$ Historical

Explanation of Results

Undeveloped Runoff

Onsite - Total Flow = 6.87 c.f.s.

Developed Runoff

Onsite - Total Flow = 6.76 c.f.s. $\leq$ Historical

Controled Developed Runoff

Onsite = 3.5 c.f.s. by Wier control

As shown above, the flows from the developed site are less than historical flows.

RECOMMENDATIONS

The following recommendations are made to enable the developer on this site and the local government to complete this project within the design criteria.

1. All lots must be graded such that any rain falling on the lot (except the sidewalk & parking) needs to be retained in grass or dirt ponds. (Per grading plan) In no case should ponded water be allows to stand against wall or house foundations. Required pond volumes and locations are shown on the drainage plat. Maximum depth to be 12".

2. The parking lot in the southwest corner of the site will be constructed and utilized as a detention pond (Pond #1). It will be sized to hold the dynamic difference between the developed flow minus the 3.5 c.f.s. controled out flow. Pond #1 Vol. = 3168 ft.^{3} *.

3. Flows within the streets of the development are distributed so that no one street assumes the critical burden in carrying capacities.

4. Valley gutters and water blocks should be constructed at locations shown on the drainage plan in order to properly take care of the storm runoff.

*See Figure III

SUMMARY

The subject property, by utilizing lot retention, a detention pond and a controlled weir outlet will contribute no greater rate or volume of flow than that which existed prior to development, and the drainage will be handled in such a manner as to provide safety with no harm to life or property.

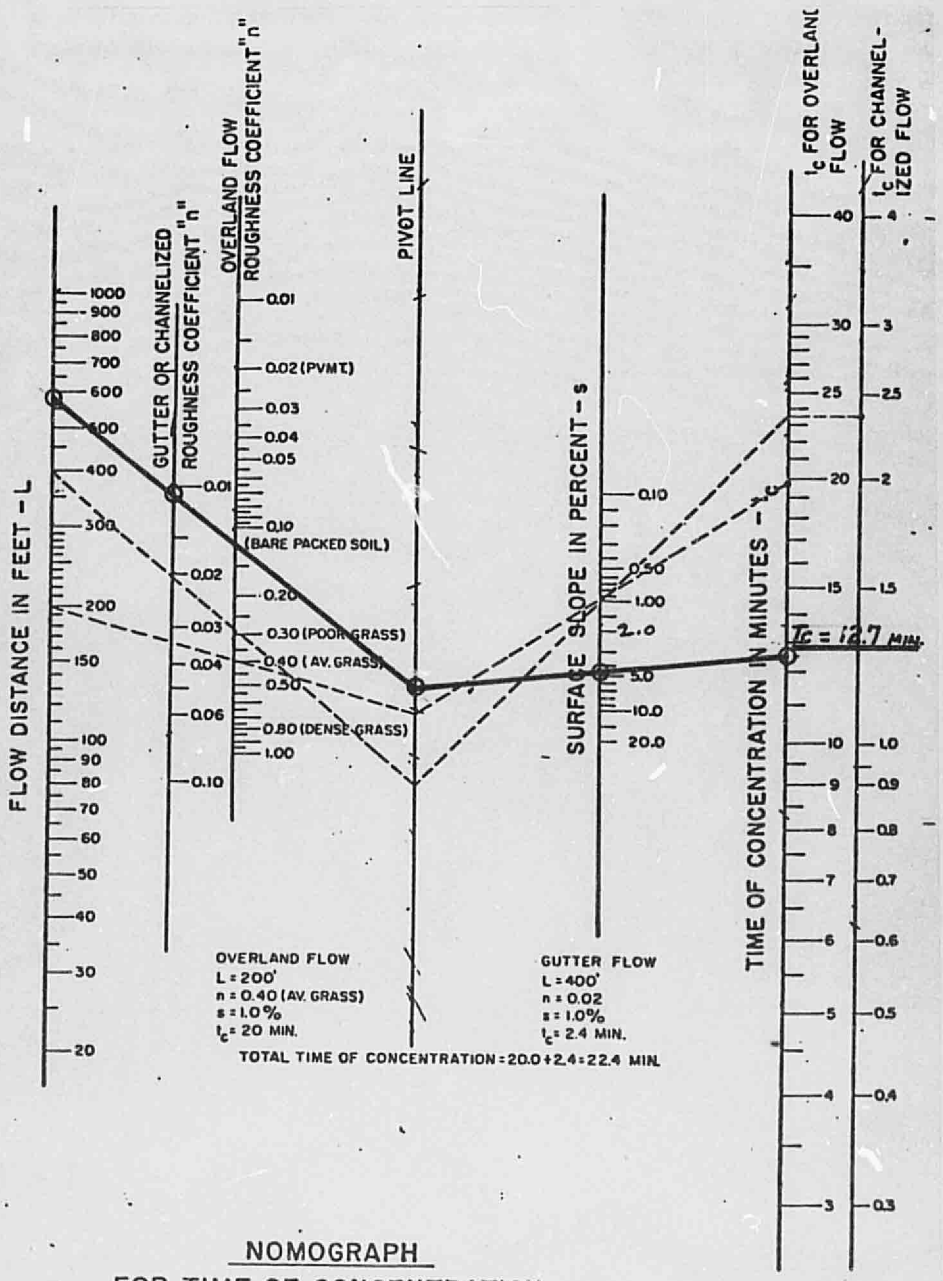
Prepared by:

Michael Whitney
Michael Whitney
Engineering Intern

Approved by:

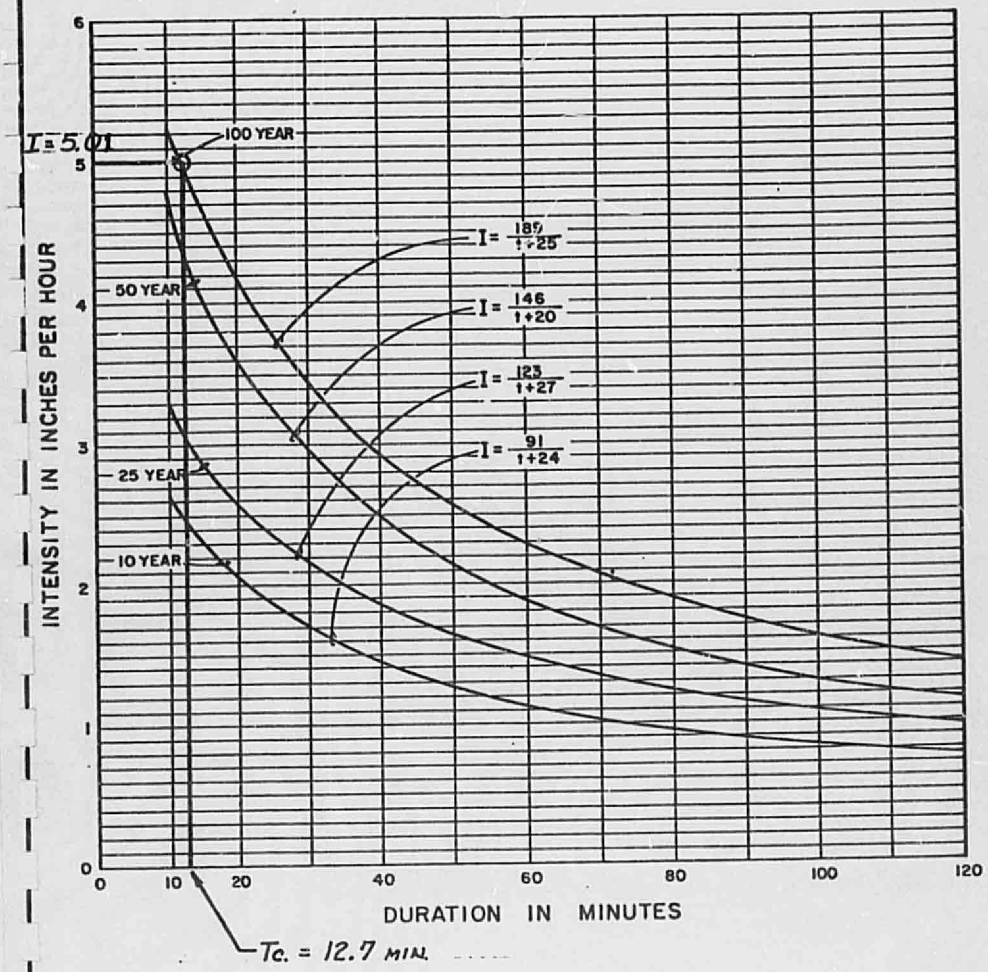
Jeryl D. Hart Jr.
Jeryl D. Hart, Jr.
N.M.P.E. No. 6877

JERYL D. HART, JR.
NEW MEXICO
6788
REGISTERED PROFESSIONAL ENGINEER



NOMOGRAPH
FOR TIME OF CONCENTRATION

FIGURE 1



MASTER PLAN OF DRAINAGE
PREPARED BY:
GORDON HERKENHOFF & ASSOCIATES
ALBUQUERQUE, NEW MEXICO

INTENSITY DURATION FREQUENCY CURVES
(ALBUQUERQUE AREA, 1961)

FIGURE - 2

$V_s = 3{,}168$
$V_r = 10{,}903$
$= 0.29$

FIGURE 3

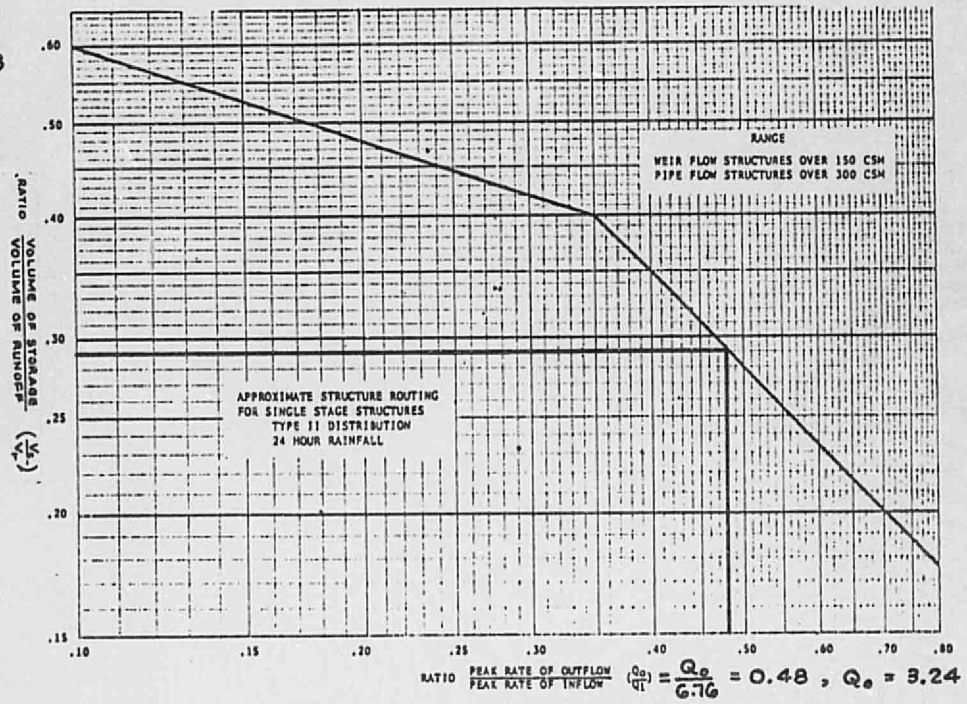
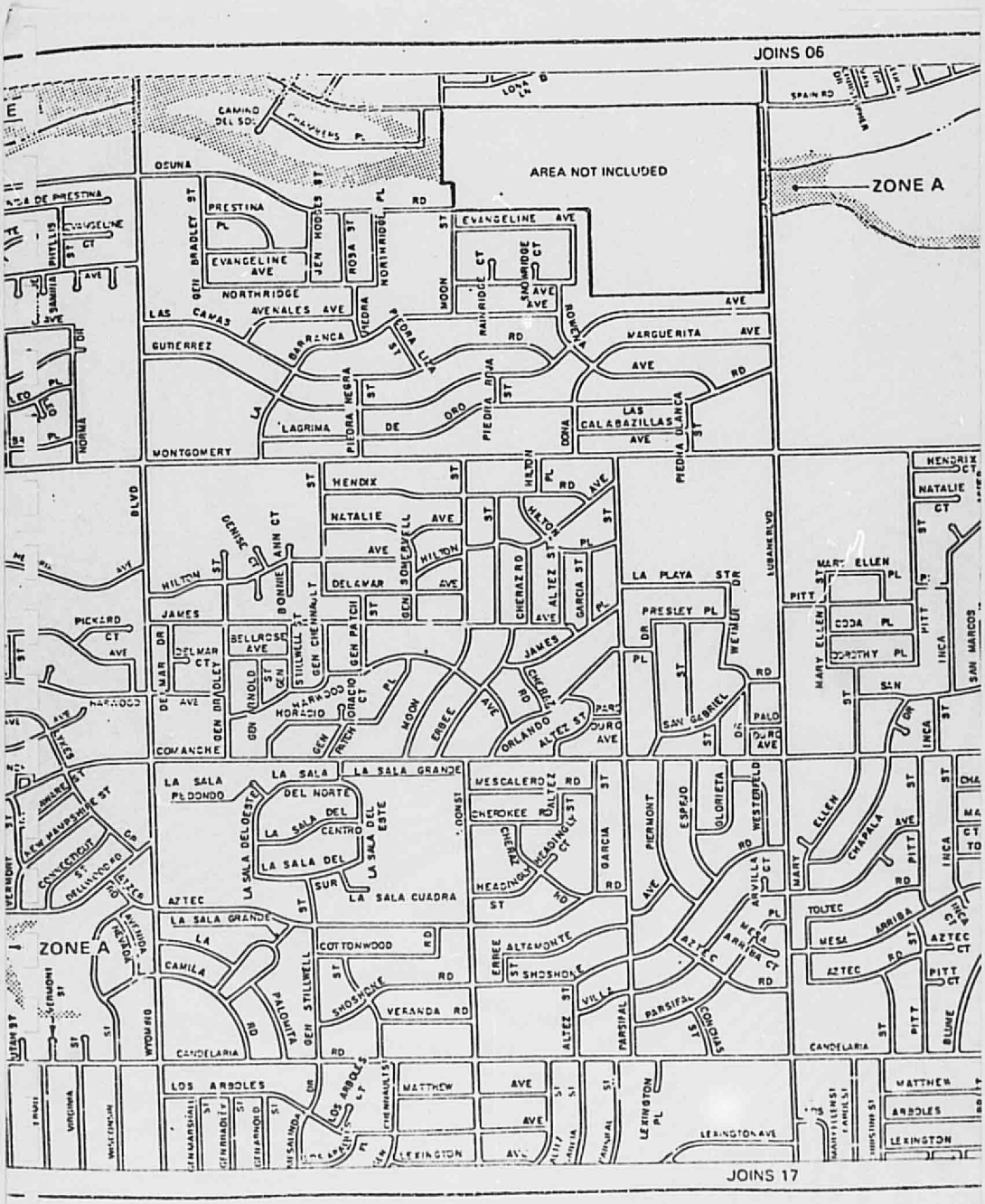


Figure 7-2.--Approximate single-stage structure routing for weir flow structures over 150 csm release rate and pipe flow structures over 300 csm release rate.



Scale : 1" = 1000'

FIGURE 4

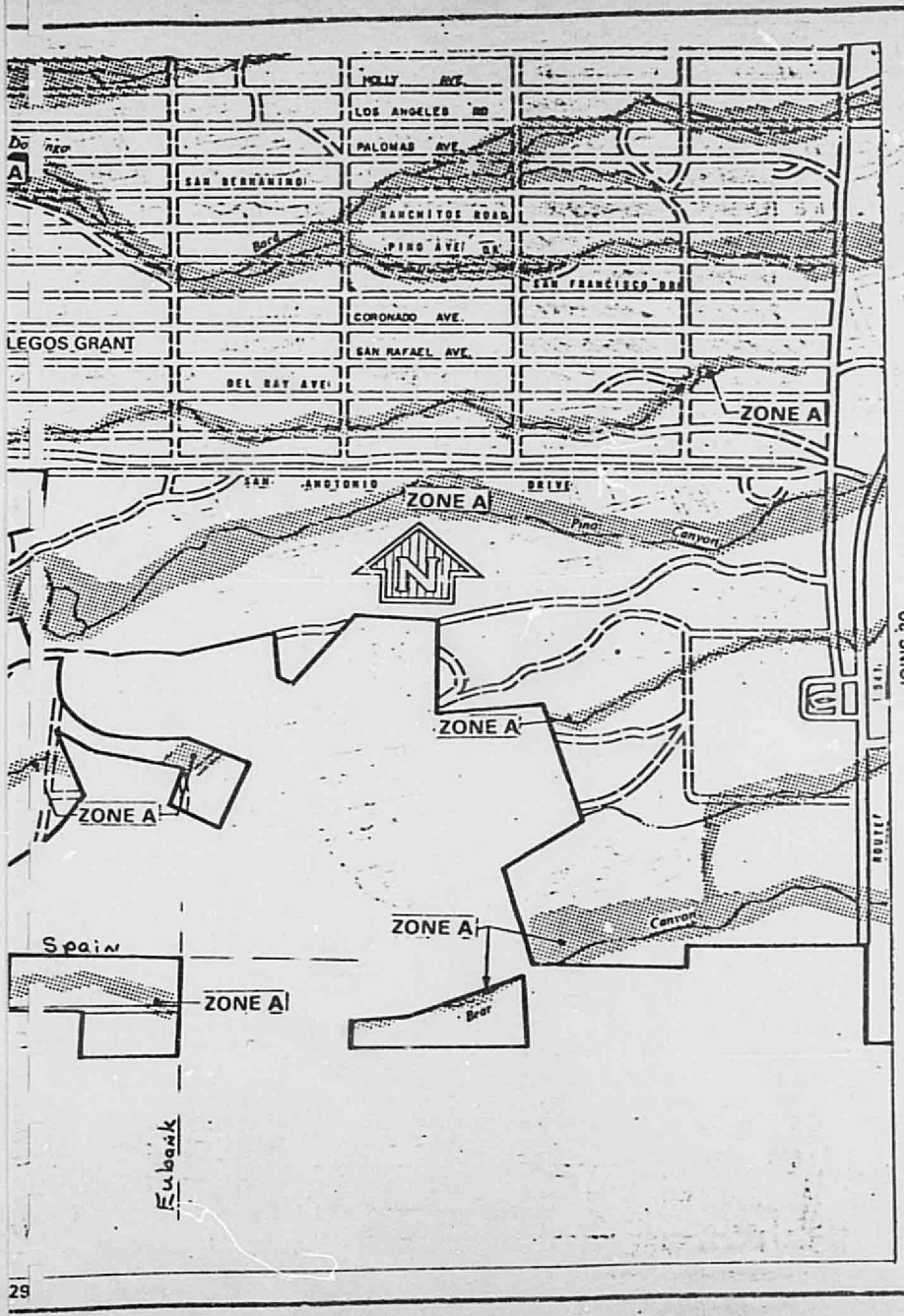

MOLLY AVE.
LOS ANGELES RD
PALOMAS AVE.
SAN BERNANDINO
RANCHITOS ROAD
PINO AVE. DR.
SAN FRANCISCO RD
CORONADO AVE.
SAN RAFAEL AVE.
DEL RAY AVE.
LEGOS GRANT
SAN ANTONIO DRIVE
ZONE A
Pino Canyon
Canyon
Bear
Spain
Eubank
JOINS 20
ROUTE 1
APPROXIMATE SCALE
0
2000
4000
6000 FEET
MAP REVISED 9/6/77
FLOOD HAZARD BOUNDARY MAP
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
BERNALILLO CO., NM
(UNINC. AREA)
19

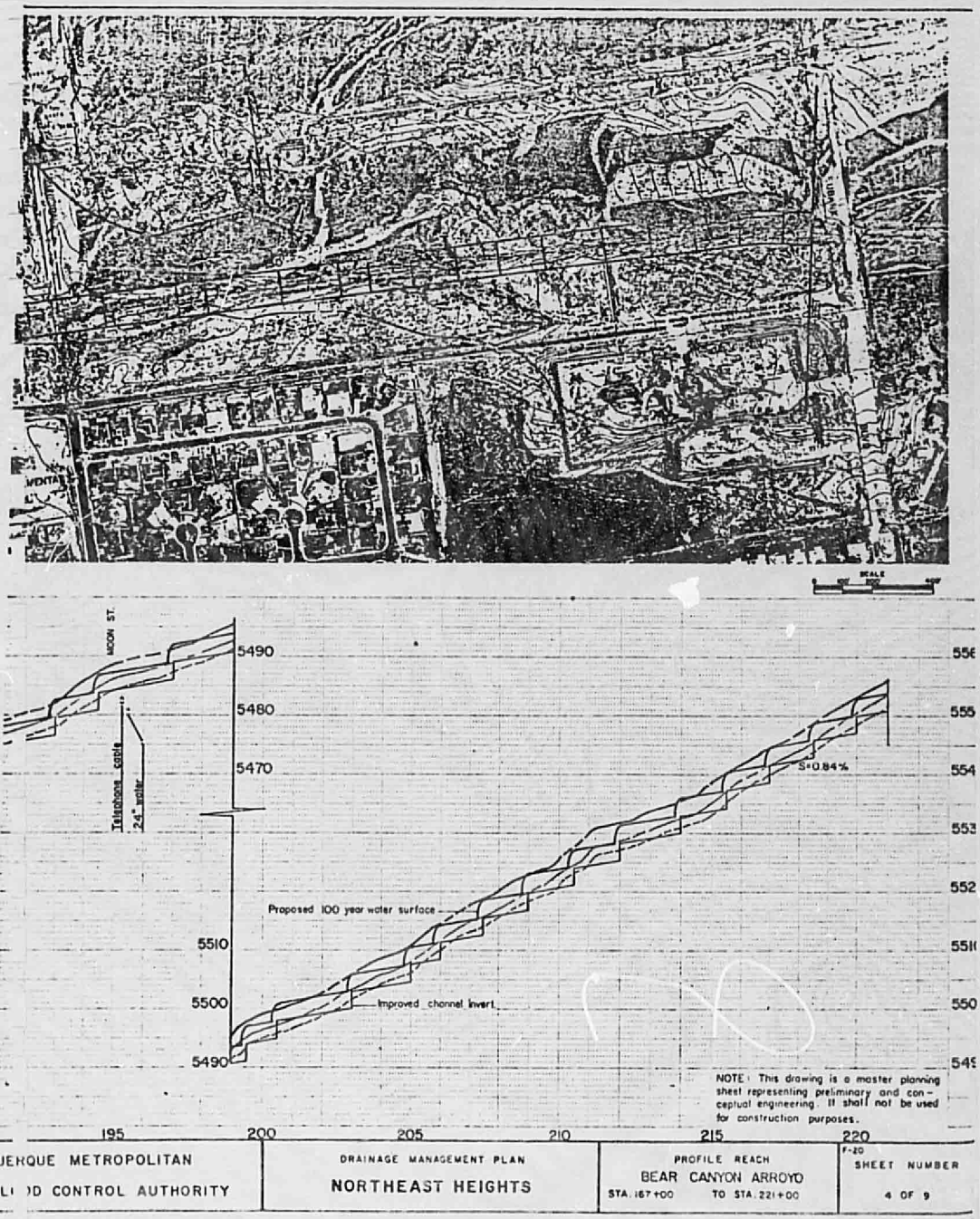
FIGURE 5

BASIN AREA AND PEAK RUNOFF IMPLEMENTED DRAINAGE MANAGEMENT PLAN

ARROYO/LOCATION	AREA (acres)	100-YEAR FLOWS (cfs)	10-YEAR FLOWS (cfs)
EMBUDITO ARROYO			
Diversion to Bear Canyon Arroyo	1914	2496	934
BEAR CANYON ARROYO			
Tramway Boulevard	4171	4704	1753
Total including Embudito Diversion	6085	7200	2687
At confluence Bear Arroyo Diversion	615[illegible]	7250	2705
Total including Bear Arroyo Diversion	6411	7840	2881
Juan Tabo Dam inflow	6502	7840	2888
Juan Tabo Dam outflow	6502	1875	783
Eubank Blvd., at conf. Bear Arroyo	6705	1866	783
Total including Bear Arroyo	7005	1924	797
Wyoming Boulevard	7736	2005	818
At conf. of Bear Arroyo Tributary	7803	2010	821
Total including Bear Arroyo Tributary	9361	3209	1364
Arroyo del Oso Dam inflow	9603	3232	1381
Arroyo del Oso Dam outflow	9603	1295	763
San Mateo Boulevard	10148	1297	768
Interstate 25	10170	1297	768
North Diversion Channel	10233	1297	768
BEAR ARROYO			
Tramway Boulevard	194	410	195
Diversion at Bear Canyon Arroyo	303	608	226
Juan Tabo Boulevard	169	210	141
Confluence at Bear Canyon Arroyo	256	295	198
BEAR ARROYO TRIBUTARY			
Tramway Boulevard	814	1206	575
Eubank-Juan Tabo intersection	1195	1400	705
Wyoming Boulevard	1517	1519	760
Confluence at Bear Canyon Arroyo	1558	1449	725
ARROYO DEL PINO			
Tramway Dam inflow	3235	4990	975
Tramway Dam outflow	3235	384	211
At confluence North Pino Diversion	3319	628	318
Total including North Pino Diversion	3669	1202	673
Hamilton Boulevard (extended)	3896	1205	675
Pino Dam inflow	4120	1250	697
Pino Dam outflow	4120	269	192
Wyoming Boulevard	4448	541	281
Interstate 25	4516	623	321
At confluence Tributary nr. Jefferson	4525	626	323
Tributary near Jefferson Street	867	933	467
Total including Trib. nr. Jefferson	5392	1295	657
North Diversion Channel	5456	1405	771

FIGURE 6

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT.



UERQUE METROPOLITAN FLOOD CONTROL AUTHORITY	DRAINAGE MANAGEMENT PLAN NORTHEAST HEIGHTS	PROFILE REACH BEAR CANYON ARROYO STA. 167+00 TO STA. 221+00	F-20 SHEET NUMBER 4 OF 9

FIGURE 7

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT.

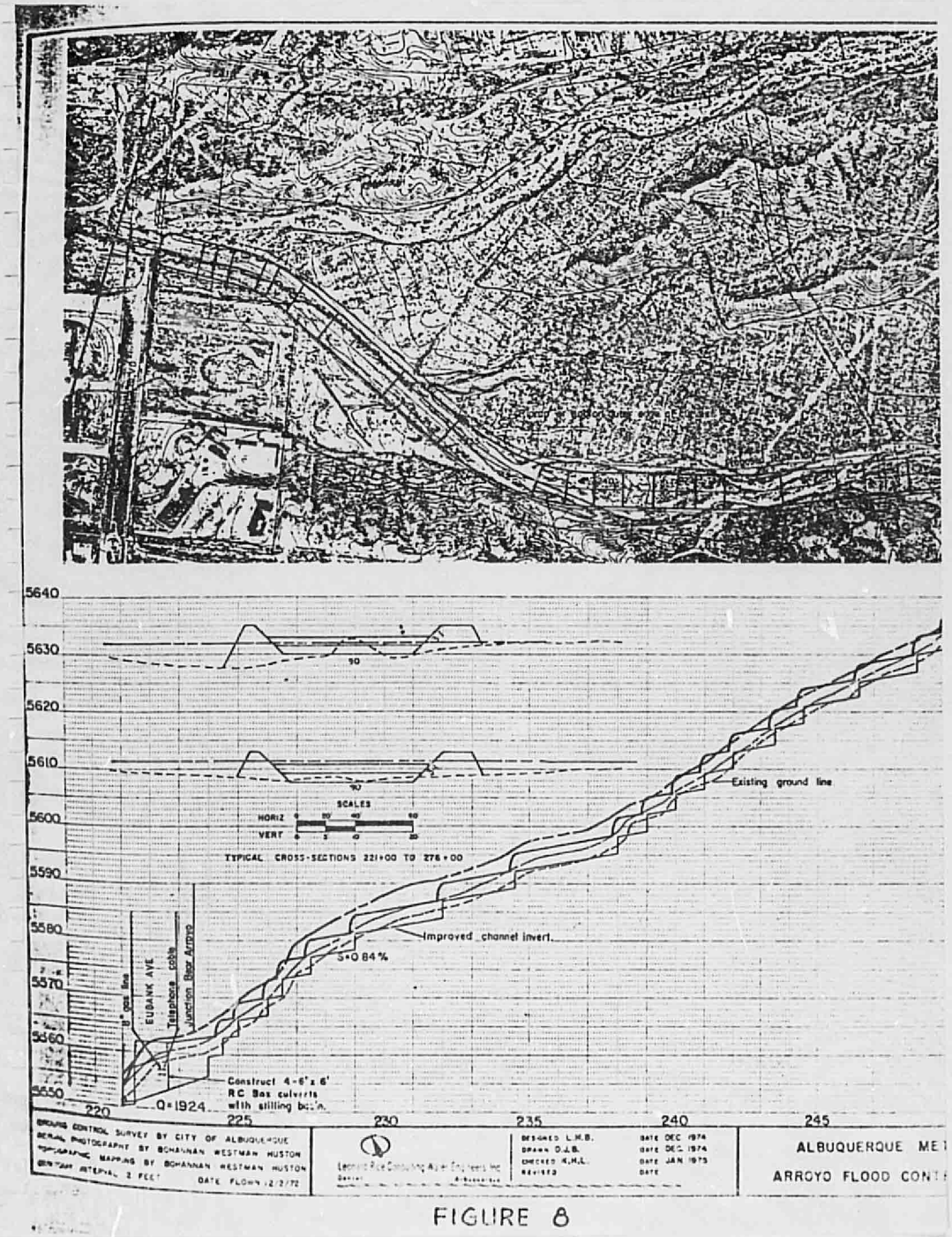


FIGURE 8

APPENDIX 1

LOT POND VOLUME

CALCULATIONS

MEURER · SERAFINI · MEURER, INC.

ALBUQUERQUE N.M.

By R.C. Date 7/21/79 PROJECT Bear Canyon Estates

sheet No. ____ of ____

Job No. 5990792031.3

Checked By ____ Date ____

LOT #	TOTAL AREA	TOT. AREA PERVIOUS	TOT. AREA IMPERVIOUS	% AREA PERV. (0.40)	% AREA IMPERV. (0.90)	COMPOSITE C' (%P)(.08)+(%IMP)(.09)
1	6004	2524	3480	42	58	.690
2	6444	2804	3640	44	56	.680
3	7884	3476	4408	44	56	.680
4	8865	4363	4502	49	51	.655
5	6588	3098	3490	47	53	.665
6	6320	2740	3580	43	57	.685
7	5987	2707	3280	45	55	.675
8	6408	2652	3756	41	59	.695
9	8163	4143	4020	51	49	.645
10	7200	2593	4607	36	64	.720
11	7038	2945	4093	42	58	.690
12	6030	2254	3776	37	63	.715
13	8757	4409	4348	50	50	.650
14	9630	5170	4460	54	46	.630
15	6189	1773	4416	29	71	.755
16	7105	3317	3788	47	53	.665
17	7016	3228	3788	46	54	.670

MEURER - SERAFINI - MEURER, I. ALBUQUERQUE N.M.

By RJC Date 7/21/79 PROJECT BEAR CANYON ESTATES sheet No.____ of____

Checked By____ Date____ Job No. 99907920317

V = C.I.A.

LOT #	'C' (%P)(0.9)+(%IMP)(0.9)	I = 2.4 / 12 = 0.20	A (TOTAL)	V (REQUIRED)	REMARKS
1	.690	0.20	6004	829	
2	.680	"	6444	876	
3	.680	"	7884	1072	
4	.655	"	8865	1161	
5	.665	"	6588	876	
6	.685	"	6320	866	
7	.675	"	5987	808	
8	.695	"	6408	691	
9	.695	"	8163	1053	
10	.720	"	7200.	1037	
11	.690	"	7038	971	
12	.715	"	6030	862	SUMP LOT
13	.650	"	8757	1138	
14	.630	"	9630	1213	
15	.755	"	6189	935	
16	.665	"	7105	945	
17	.670	"	7016	940	

PLAN/PLATS

ON

FILE

HYDROLOGY F20/D7 1 PLAN

F20/D7

1 Plan

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

RECEIVED BWH OCT 14 1980

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F20-03

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P. O. Box 3921
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The accomplishment of this work should be under the auspices of an approved design submitted by your engineers. The City of Albuquerque will assist you in any way in obtaining any necessary permits and inspections to do the work after it has been delineated by your engineer.

Should you have any further questions on this project, please feel free to contact me.

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City Engineer

RSH/fs

xc - City Attorney
Mike Emery - Bohannan-Huston
File

October 17, 1979

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City Engineer
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F-20-D3

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By: James R. McClintic, President

Wallin & Associates, Inc.
Construction
Post Office Box 13596 • Station E • Albuquerque, New Mexico 87192
Lic. #15388

September 4, 1979

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City of Albuquerque
Drainage Dept.

RE: Bear Canyon Estates, Unit 2, Tract A

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Sincerely,

Nick L. Wallin

Nick L. Wallin, President

NW/cw

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

August 29, 1979

F20-D3

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Meurer, Serafini and Meurer, Inc.
2601 Wyoming Boulevard, N. E.
Albuquerque, New Mexico 87110

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Assistant City Engineer - Hydrology

BC/bm

cc - Richard Leonard, AMAFCA w/attachment
Richard Heller
Fred Aguirre
Drainage File
→ Reading file

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

MAYOR
David Rusk

June 5, 1979

Mr. Michial Emery
Bohannan-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

Ref: Bear Canyon Tributary Channel Construction
Across Bear Canyon Estates

Dear Mr. Emery:

A field inspection of this facility has revealed substantial bank erosion immediately downstream from the drop structures in a pattern not anticipated of the design. The abutments of the drop structures have been exposed in three locations and a garden wall presently under construction has been undermined even before its completion. It is apparent that this method of channel protection is not effective in achieving the intended purpose.

The City will not, therefore, be able to accept the channel as it exists today nor this type of design for future facilities. Bank protection along the east and the west property lines will have to be supplied to protect the integrity of the private properties. Similar protection will have to be provided along the Bear Arroyo wherever drop structures of similar design have been constructed. In particular, and most urgently, along the Bear Canyon Estates Subdivision and the proposed Osuna Townhouses development.

Please note that the City will also require that filter cloth material be provided under all the riprap and cutoff walls that may be installed.

Very truly yours,

Richard S Heller

Richard Heller
City Engineer

BC/RH/ms
cc Bruno Conegliano, Asst. City Eng.-Hydrology (Reading)
Richard Leonard, AMAFCA
Drainage file

DRAINAGE REPORT

FOR

BEAR CANYON ESTATES

ALBUQUERQUE, NEW MEXICO

DRAINAGE REPORT

FOR

BEAR CANYON ESTATES

ALBUQUERQUE, NEW MEXICO

RECEIVED
JUL 23 1979
CITY ENGINEER

Prepared by

Meurer, Serafini and Meurer, Inc.
2601 Wyoming Blvd. N.E.
Albuquerque, New Mexico

87112

(505) 292-1936

July 1979

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Figure 5	Flood Hazard Boundary Map - County
Figure 6	Rice Report - Arroyo Flows
Figure 7	Rice Report - Bear Canyon Arroyo
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DRAINAGE REPORT

Bear Canyon Estates

PURPOSE AND SCOPE

The McClintic Development Corporation, is planning on developing lands located in the northeast sector of metropolitan Albuquerque known as Bear Canyon Estates. The purpose of this report is to present a plan for controlling surface runoff from said subdivision in a manner acceptable to the Albuquerque Arroyo Flood Control Authority and the Albuquerque City Engineer's Office.

SITE LOCATION AND TOPOGRAPHY

Bear Canyon Estates is located in the northeast sector of Albuquerque at Eubank Boulevard and Spain Road. The surrounding terrain is generally developed land on all sides. The Bear Canyon Arroyo is located on the south side of the proposed subdivision.

The soil of the site is generally comprised of disintegrated granite. The natural ground slopes from the east to the west with a few small swales. Ground cover consists mainly of native grasses.

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, Q = CIA is used.

Where:

Q = Runoff quantity in cubic feet/second.

A = Contributing area in acres.

I = Intensity in inches/hour for a duration equal to the time of accumulation (duration) measured in minutes and obtained from Figure II. (Note: Where a Time Concentration [Tc] is less

than 10 minutes from Figure I, the intensity value, derived from a Tc equal to 10 minutes is employed.)

C = Runoff Coefficient (No Unit). This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all affect the time distribution and peak rate of runoff.

ESTIMATED RUNOFF UNDEVELOPED STATE:

Drainage within the boundary of the site is basically overland flow with some small swales. Most of the drainage naturally exits the area at the southwest corner of the property. Drainage flows from the east are designed to be diverted by Eubank Boulevard and flows from the north by Spain Road. There seems to be a possibility of some of these flows riding on into the N.E. corner of the site, so we intend to construct a water block in the form of a small block wall along the property line to prevent this. We intend to analyze the required limits of this block wall when we design the balance of the subdivision, however we presently envision a wall from 8" to 2' high from property P.C. to P.T.; therefore, there are no offsite flows to be carried through the site. In addition, other adjacent improvements to the north and to the east and general topography prohibit offsite flows from entering the subdivision.

The Bear Canyon Arroyo, which abuts the development on the south, is a partially improved drainage channel with concrete drop

structures. Side slope protection in the way of a concrete liner will be added to the north side of the channel with one foot of freeboard over the 100-year storm level.

TABLE 1

Runoff in Undeveloped State Q = CIA

Onsite	Elev.	Length of Flow	Tc Min*	1-100 yr. In./Hr.	C	Area	Q
A-1 and A-2	25ft.	570 L.F.	12.7 min.	5.01	0.40	3.4297Ac	6.87 cfs
Volume Calcs.				$\frac{2.4}{12}$	0.40	149,398 Ft^2	11,952 ft^3

ESTIMATED RUNOFF DEVELOPED STATE

As development occurs, the area of impervious surfaces increases and thereby the amount of runoff also increases. To offset this increase, onsite restrictions of flows must be incorporated into the development. While this can take different forms, the most practical solution for this type of development is to utilize on-lot ponding. The contributing area to the yard ponding includes all of the lot except the sidewalk, parking areas and streets. The only areas contributing to the developed flows to be discharged into Bear Canyon Arroyo therefore are the streets, sidewalks and parking areas. In addition, the parking lot in the southwest corner of the site will be built and used as a detention pond with a wier opening to allow a rate of flow of only 3.5 c.f.s. into the Arroyo, less than has occured historically. This approach will satisfy A.M.A.F.C.A.'s requirement

* Tc based on Nomograph, Figure I.

that the runoff rate from the developed tract not exceed the runoff rate from the tract in its natural state.

The runoff coefficient factors are as follows:

Streets, Walks and Drives	C = 0.90
Roofs	C = 0.90
Lawns, Sandy Soils (Average 2 to 7%)	C = 0.40

Table 2

Runoff in Developed State

Onsite

A-1 Tc is less than 10 minutes
Q - CIA = (0.90) (5.4) (1.36) = 6.61 c.f.s.

A-2 Tc is less than 10 minutes
Q = CIA = (0.90) (5.4) (0.03) - 0.15 c.f.s.

Total Developed Q = 6.76 c.f.s.

The combined runoff flows for this subdivision are additive due to the total time of concentration being less than 10 minutes.

Total Area Runoff Vol. = CIA = (0.90) $\left(\frac{2.4}{12}\right)$ (60,570 ft^3) = 10,90[illegible] $ft.^3$ $\leq$ Historical

Explanation of Results

Undeveloped Runoff

Onsite - Total Flow = 6.87 c.f.s.

Developed Runoff

Onsite - Total Flow = 6.76 c.f.s. $\leq$ Historical

Controled Developed Runoff

Onsite = 3.5 c.f.s. by Weir control

As shown above, the flows from the developed site are less than historical flows.

RECOMMENDATIONS

The following recommendations are made to enable the developer on this site and the local government to complete this project within the design criteria.

1. All lots must be graded such that any rain falling on the lot (except the sidewalk & parking) needs to be retained in grass or dirt ponds. (Per grading plan) In no case should ponded water be allows to stand against wall or house foundations. Required pond volumes and locations are shown on the drainage plat. Maximum depth to be 12".

2. The parking lot in the southwest corner of the site will be constructed and utilized as a detention pond (Pond #1). It will be sized to hold the dynamic difference between the developed flow minus the 3.5 c.f.s. controled out flow. Pond #1 Vol. = 3168 $ft.^3$ *.

3. Flows within the streets of the development are distributed so that no one street assumes the critical burden in carrying capacities.

4. Valley gutters and water blocks should be constructed at locations shown on the drainage plan in order to properly take care of the storm runoff.

*See Figure III

SUMMARY

The subject property, by utilizing lot retention, a detention pond and a controlled weir outlet will contribute no greater rate or volume of flow than that which existed prior to development, and the drainage will be handled in such a manner as to provide safety with no harm to life or property.

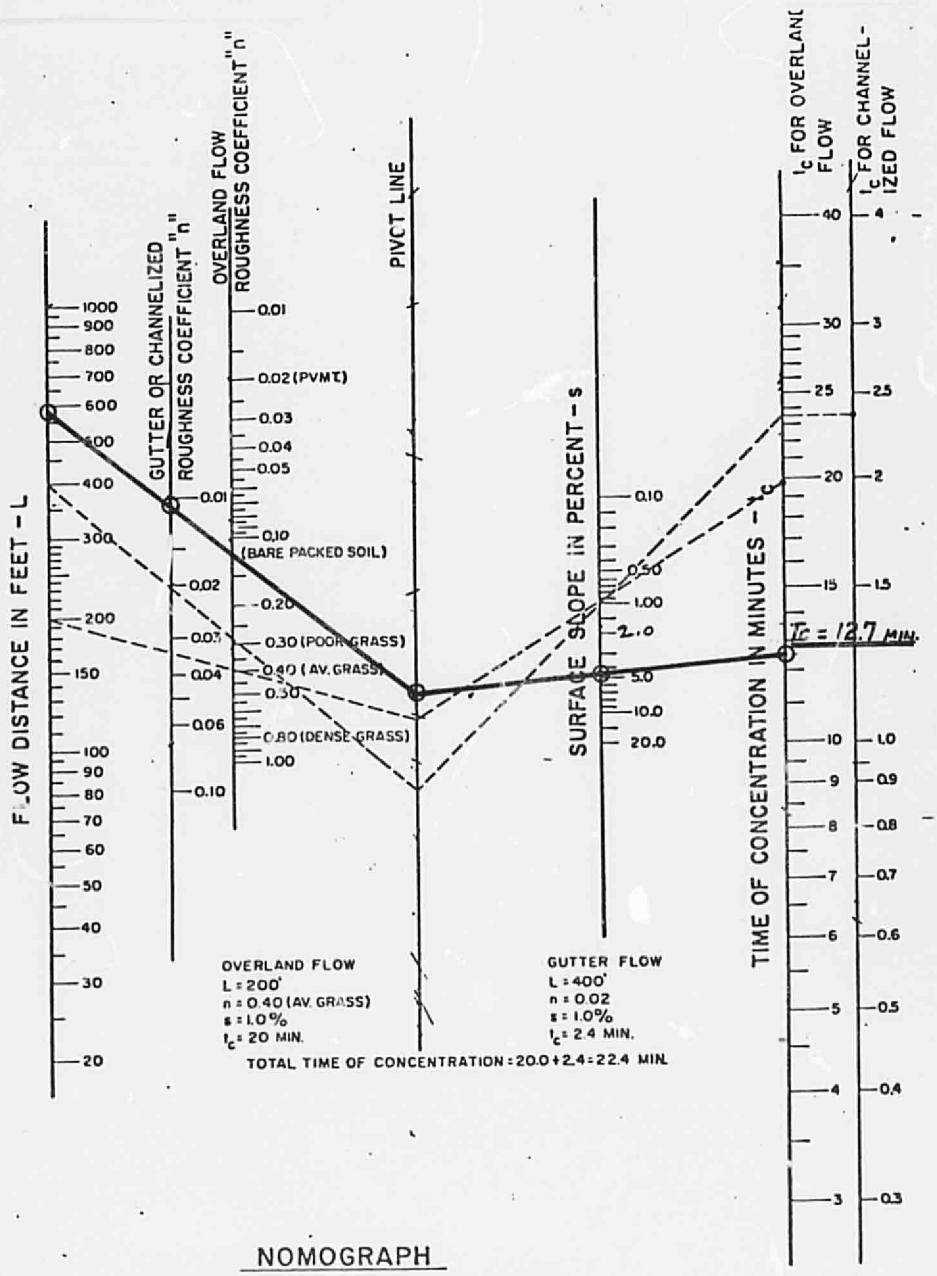
Prepared by:

Michael Whitney
Engineering Intern

Approved by:

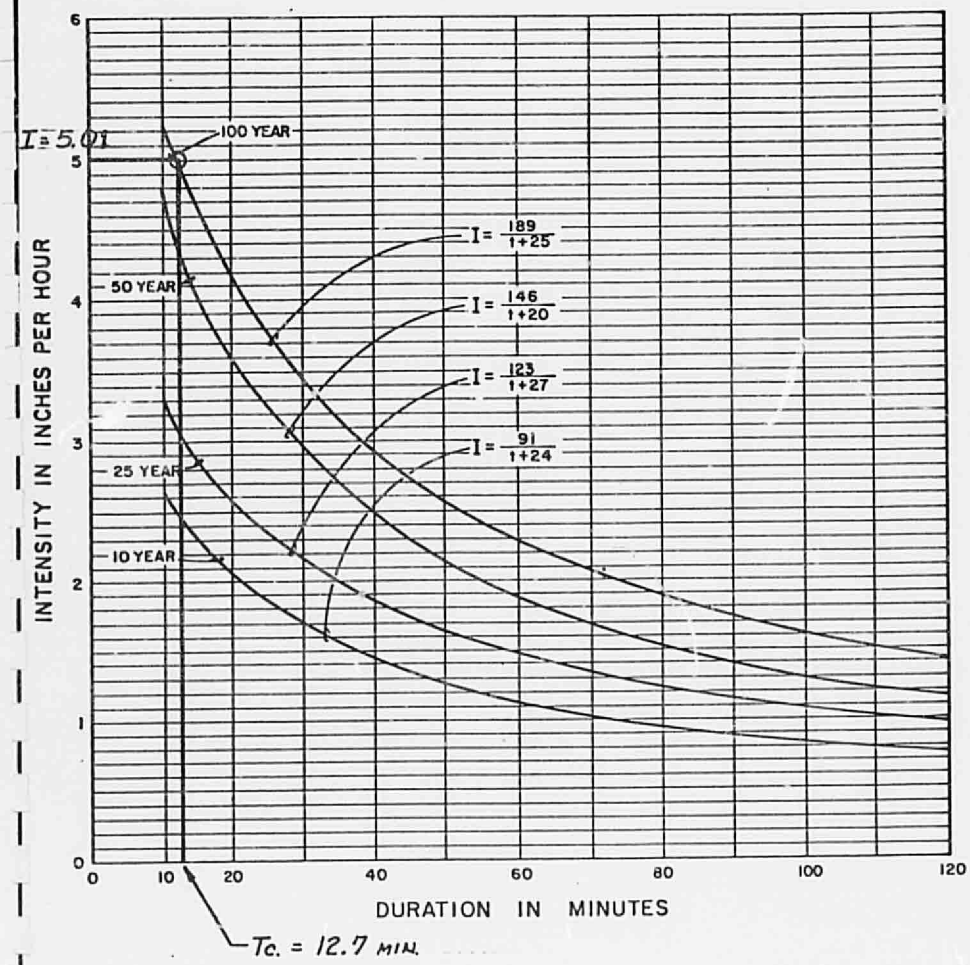
Jeryl D. Hart, Jr.
N.M.P.E. No. 6877

JERYL D. HART, JR.
NEW MEXICO
6788
REGISTERED PROFESSIONAL ENGINEER



NOMOGRAPH
FOR TIME OF CONCENTRATION

FIGURE 1



MASTER PLAN OF DRAINAGE
PREPARED BY:
GORDON HERKENHOFF & ASSOCIATES
ALBUQUERQUE, NEW MEXICO

INTENSITY DURATION FREQUENCY CURVES
(ALBUQUERQUE AREA, 1961)

FIGURE - 2

$V_s = 3{,}168$
$V_r = 10{,}903$
$= 0.29$

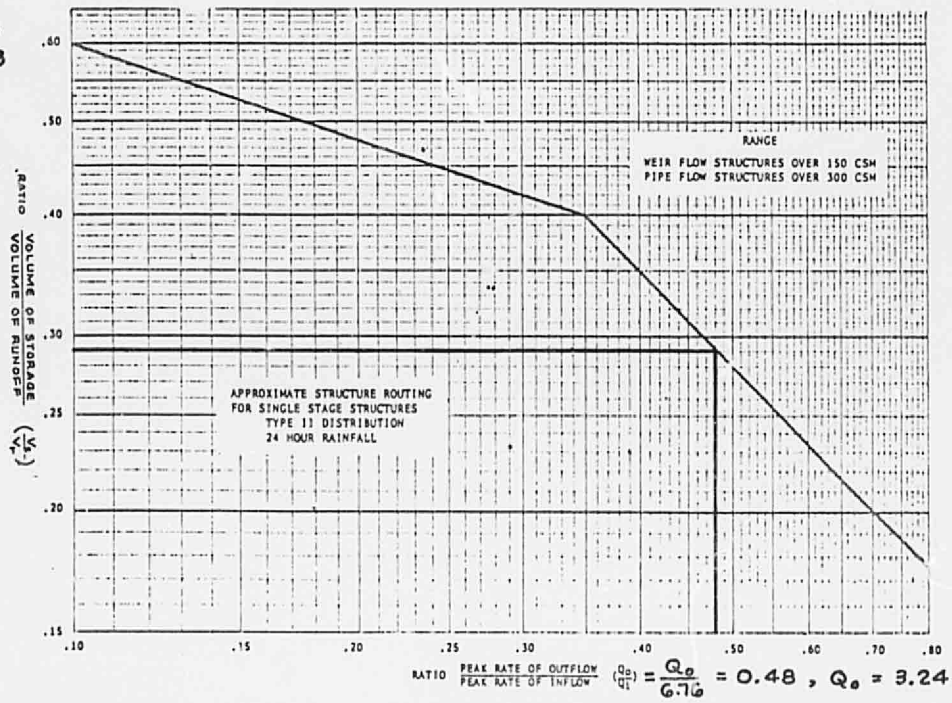
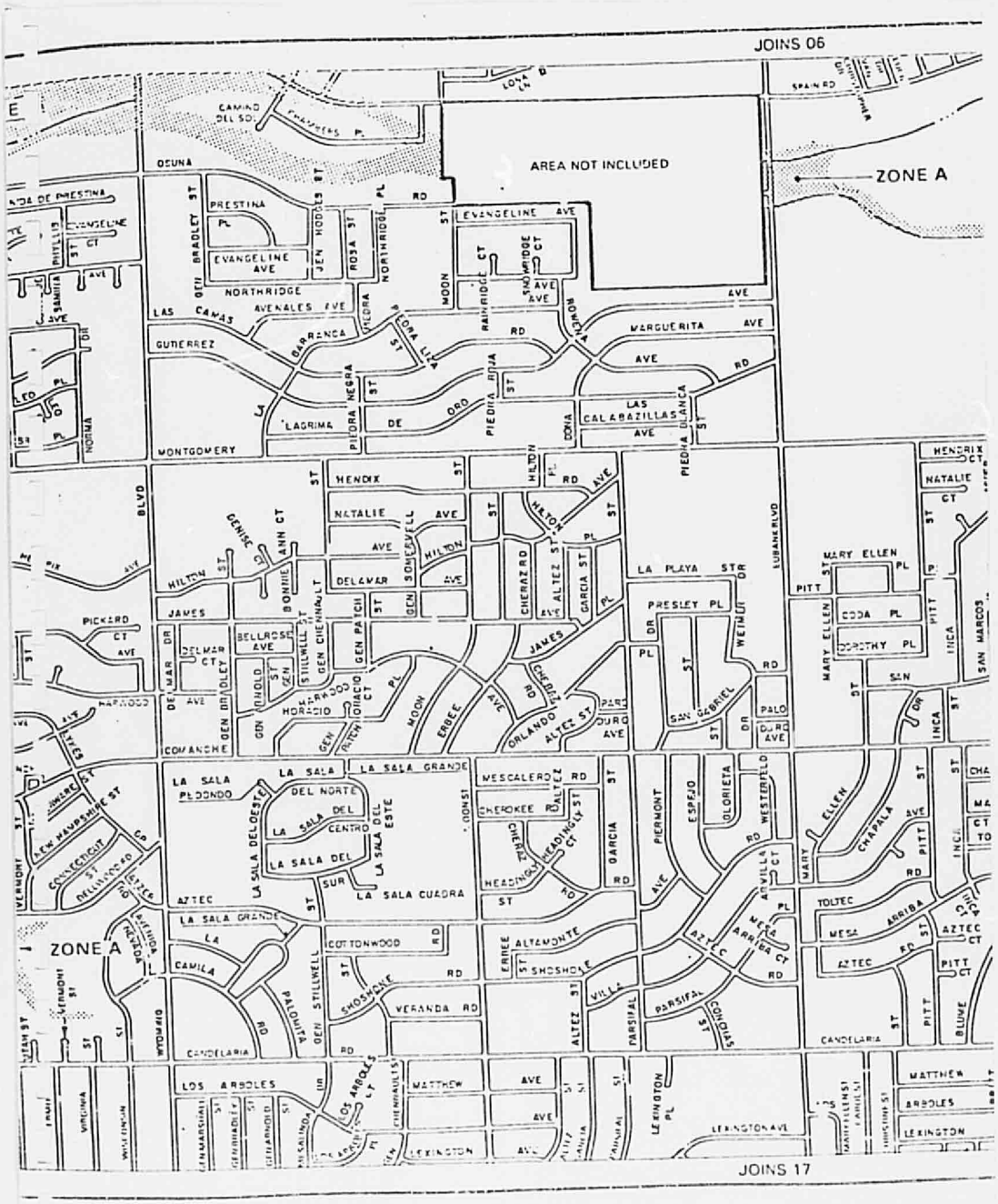


FIGURE 3

Figure 7-2.--Approximate single-stage structure routing for weir flow structures over 150 csm release rate and pipe flow structures over 300 csm release rate.



Scale : 1" = 1000'

FIGURE 4

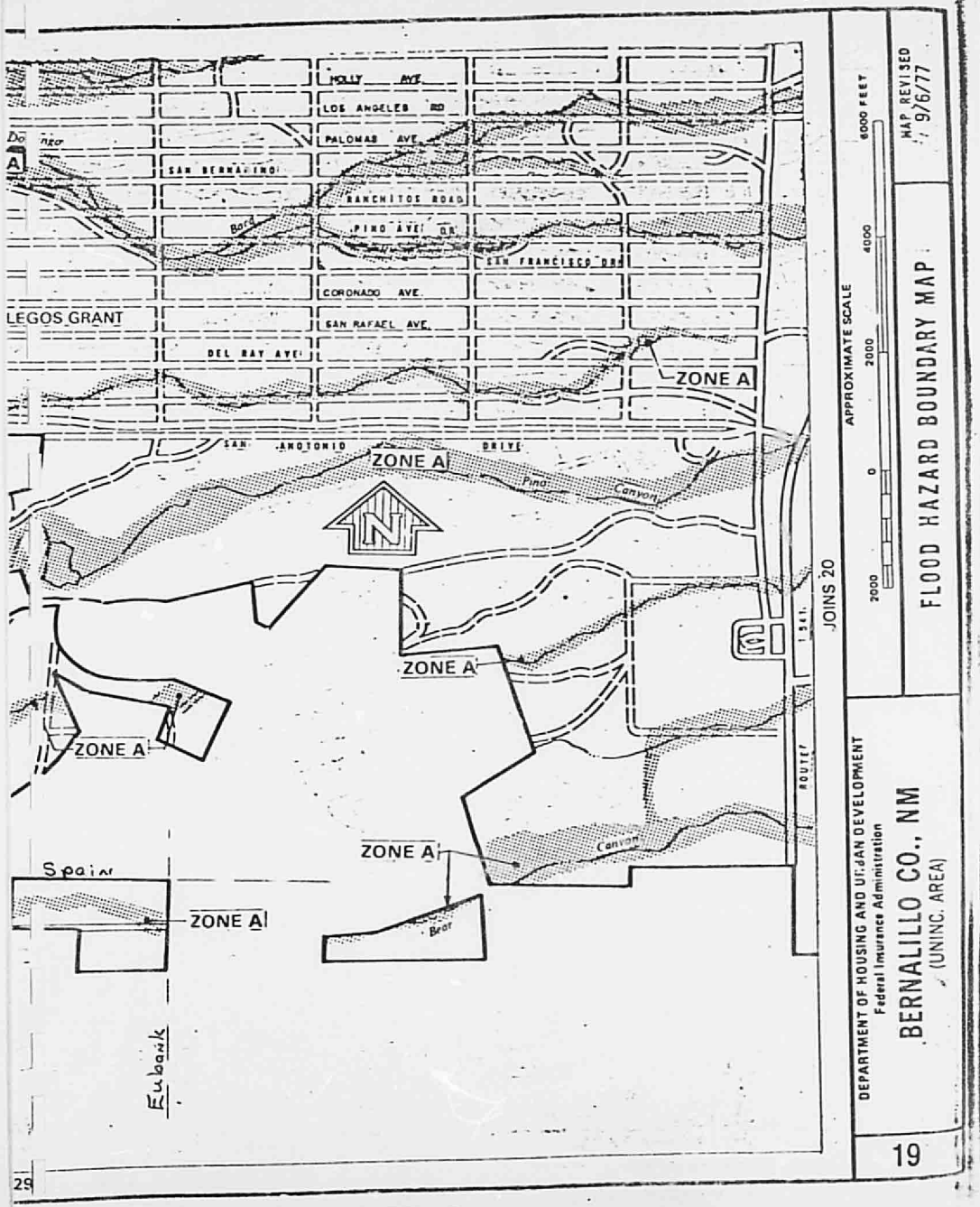
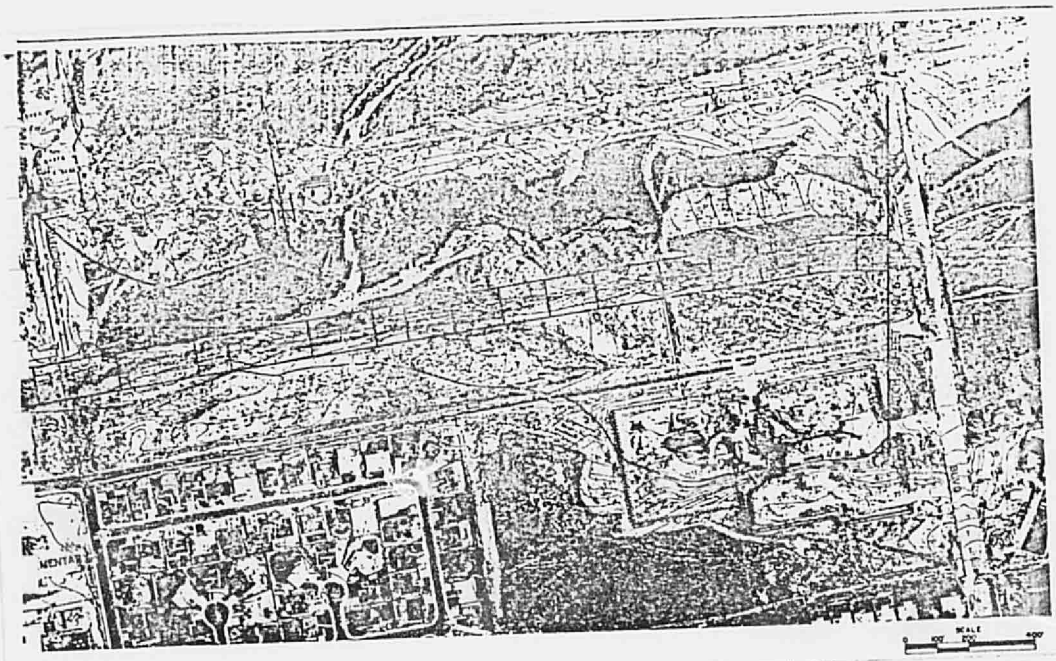

HOLLY AVE.
LOS ANGELES RD
PALOMAS AVE.
SAN BERNALINO
RANCHITOS ROAD
PINO AVE. DR.
SAN FRANCISCO DR.
CORONADO AVE.
SAN RAFAEL AVE.
DEL RAY AVE.
LEGOS GRANT
SAN ANTONIO DRIVE
ZONE A
Pino Canyon
Bear
Spain
Eubank
JOINS 20
ROUTE 7
APPROXIMATE SCALE
2000 0 2000 4000 6000 FEET
MAP REVISED 9/6/77
FLOOD HAZARD BOUNDARY MAP
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
BERNALILLO CO., NM
(UNINC. AREA)
19

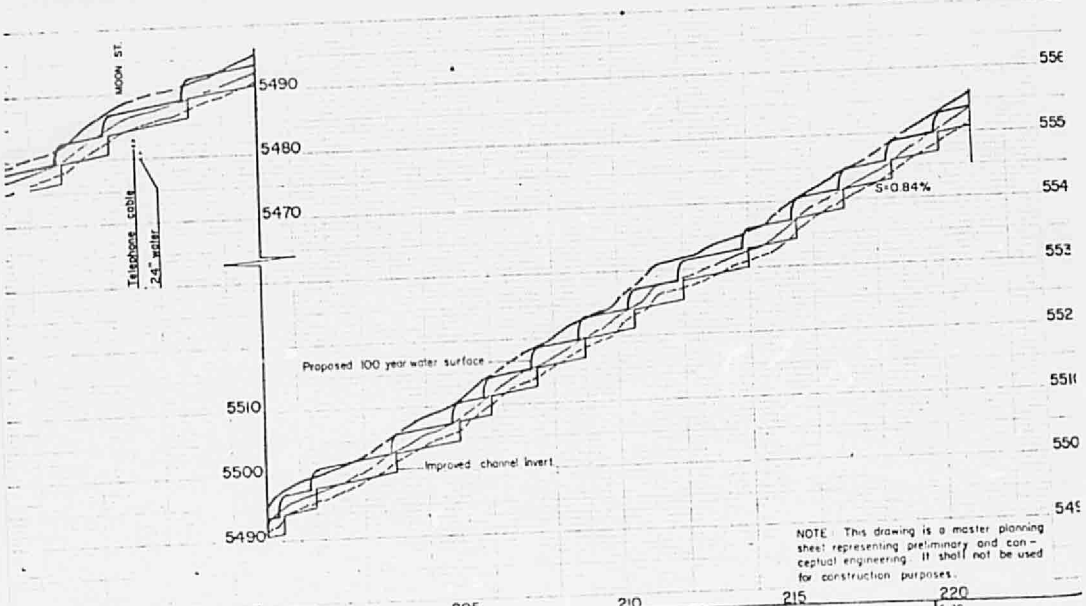
FIGURE 5

BASIN AREA AND PEAK RUNOFF IMPLEMENTED DRAINAGE MANAGEMENT PLAN

ARROYO/LOCATION	AREA (acres)	100-YEAR FLOWS (cfs)	10-YEAR FLOWS (cfs)
EMBUDITO ARROYO			
Diversion to Bear Canyon Arroyo	1914	2496	934
BEAR CANYON ARROYO			
Tramway Boulevard	4171	4704	1753
Total including Embudito Diversion	6085	7200	2687
At confluence Bear Arroyo Diversion	6152	7250	2705
Total including Bear Arroyo Diversion	6411	7840	2881
Juan Tabo Dam inflow	6502	7840	2888
Juan Tabo Dam outflow	6502	1875	783
Eubank Blvd., at conf. Bear Arroyo	6705	1866	783
Total including Bear Arroyo	7005	1924	797
Wyoming Boulevard	7736	2005	818
At conf. of Bear Arroyo Tributary	7803	2010	821
Total including Bear Arroyo Tributary	9361	3209	1364
Arroyo del Oso Dam inflow	9603	3232	1381
Arroyo del Oso Dam outflow	9603	1295	763
San Mateo Boulevard	10148	1297	768
Interstate 25	10170	1297	768
North Diversion Channel	10233	1297	768
BEAR ARROYO			
Tramway Boulevard	194	410	195
Diversion at Bear Canyon Arroyo	303	608	226
Juan Tabo Boulevard	169	210	141
Confluence at Bear Canyon Arroyo	256	295	198
BEAR ARROYO TRIBUTARY			
Tramway Boulevard	814	1206	575
Eubank-Juan Tabo intersection	1195	1400	705
Wyoming Boulevard	1517	1519	760
Confluence at Bear Canyon Arroyo	1558	1449	725
ARROYO DEL PINO			
Tramway Dam inflow	3235	4990	975
Tramway Dam outflow	3235	384	211
At confluence North Pino Diversion	3319	628	318
Total including North Pino Diversion	3669	1202	673
Hamilton Boulevard (extended)	3896	1205	675
Pino Dam inflow	4120	1250	697
Pino Dam outflow	4120	269	192
Wyoming Boulevard	4448	541	281
Interstate 25	4516	623	321
At confluence Tributary nr. Jefferson	4525	626	323
Tributary near Jefferson Street	867	933	467
Total including Trib. nr. Jefferson	5392	1295	657
North Diversion Channel	5496	1405	771

FIGURE 6





UERQUE METROPOLITAN LI D CONTROL AUTHORITY	DRAINAGE MANAGEMENT PLAN NORTHEAST HEIGHTS	PROFILE REACH BEAR CANYON ARROYO STA 167+00 TO STA 221+00	F-20 SHEET NUMBER 4 OF 9

FIGURE 7

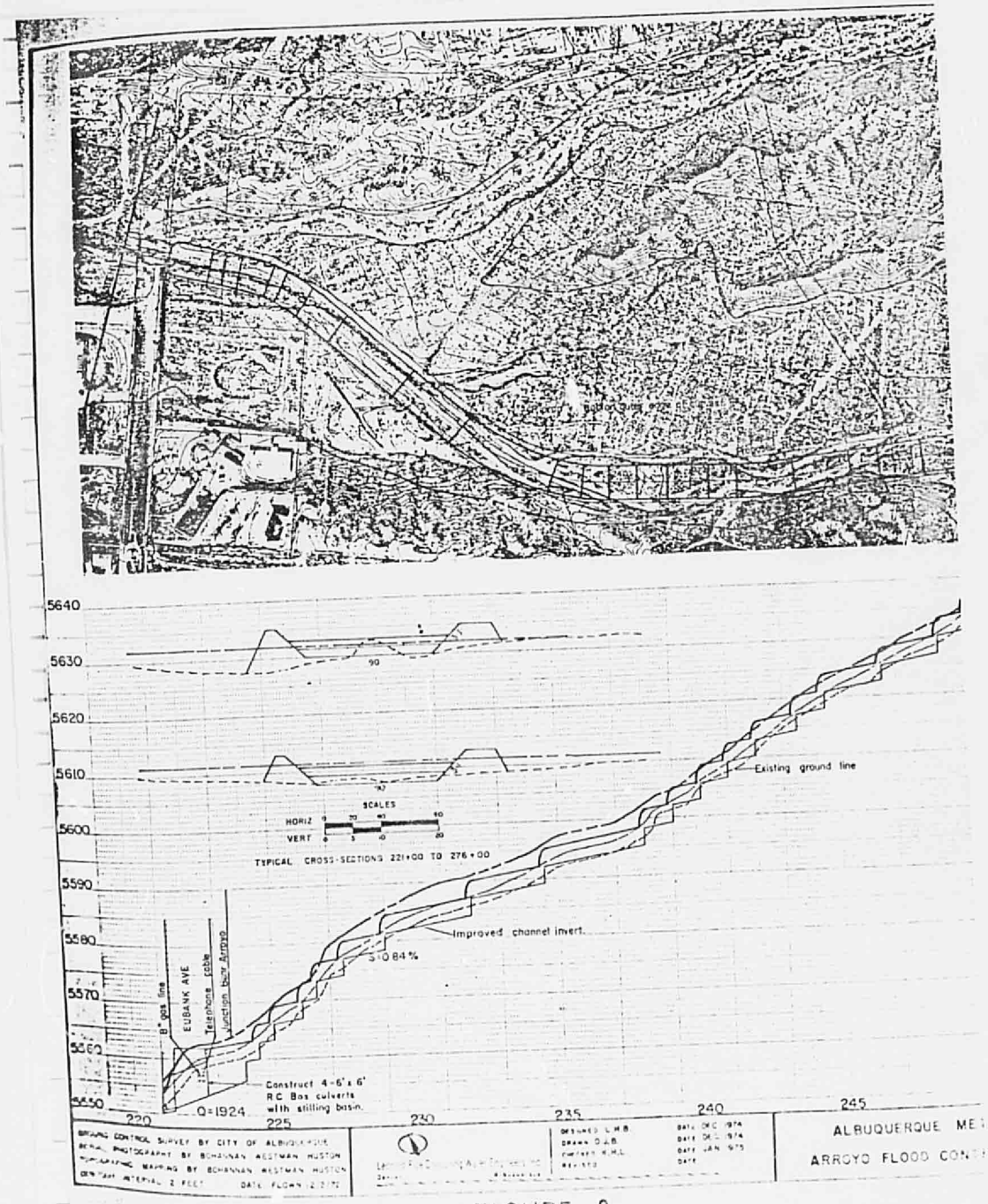

5640
5630
5620
5610
5600
5590
5580
5570
5560
5550
90
87
SCALES
HORIZ
VERT
TYPICAL CROSS-SECTIONS 221+00 TO 276+00
Existing ground line
Improved channel invert
S=0.84%
8" gas line
EUBANK AVE
Telephone cable
Junction box Arroyo
Construct 4-6' x 6' R.C. Box culverts with stilling basin.
Q=1924
220
225
230
235
240
245
ALBUQUERQUE ME
ARROYO FLOOD CON

FIGURE 8

APPENDIX 1

LOT POND VOLUME

CALCULATIONS

MEURER - SERAFINI - MEURER, INC. ALBUQUERQUE N.M.

By RJC Date 7/21/79 PROJECT Bear Canyon Estates sheet No. ____ of ____

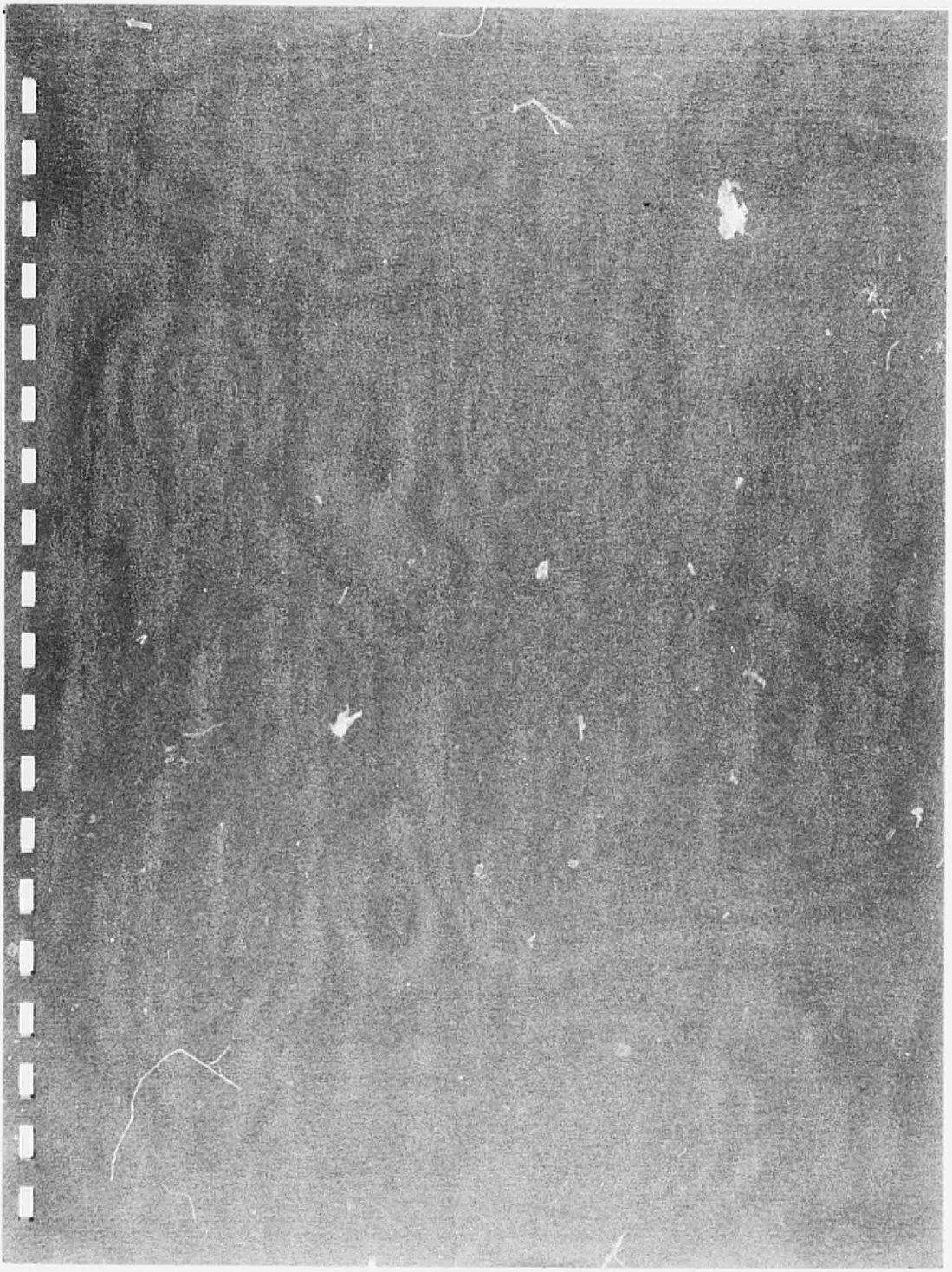
Checked By ____ Date ____ Job No. 99907920313

LOT #	TOTAL AREA	TOT. AREA PERVIOUS	TOT. AREA IMPERVIOUS	% AREA PERV. (0.40)	% AREA IMPERV. (0.90)	COMPOSITE "C" (% P.)(.08)+(% IMP.)(.9)
1	6004	2524	3480	42	58	.690
2	6444	2804	3640	44	56	.680
3	7884	3476	4408	44	56	.680
4	8865	4363	4502	49	51	.655
5	6588	3098	3490	47	53	.665
6	6320	2740	3580	43	57	.685
7	5987	2707	3280	45	55	.675
8	6408	2652	3756	41	59	.695
9	8163	4143	4020	51	49	.645
10	7200	2593	4607	36	64	.720
11	7038	2945	4093	42	58	.690
12	6030	2254	3776	37	63	.715
13	8757	4409	4348	50	50	.650
14	9630	5170	4460	54	46	.630
15	6189	1773	4416	29	71	.755
16	7105	3317	3788	47	53	.665
17	7016	3228	3788	46	54	.670

MEURER · SERAFINI · MEURER, INC. ALBUQUERQUE N.M.

By RJC Date 7/21/79 PROJECT BEAR CANYON ESTATES sheet No. ___ of ___

Checked By ___ Date ___ Job No. 99907920317

V = C I A.

LOT #	'C' (%P)(0.9)+(%UNP)(0.8)	I $I = \frac{2.4}{12} \rightarrow 0.20$	A (TOTAL)	V (REQUIRED)	REMARKS
1	.690	0.20	6004	829	
2	.680	"	6444	876	
3	.680	"	7884	1072	
4	.655	"	8865	1161	
5	.665	"	6588	876	
6	.685	"	6320	866	
7	.675	"	5987	808	
8	.695	"	6408	691	
9	.695	"	8163	1053	
10	.720	"	7200.	1037	
11	.690	"	7038	971	
12	.715	"	6030	862	SUMP LOT
13	.650	"	8757	1138	
14	.630	"	9630	1213	
15	.755	"	6189	935	
16	.665	"	7105	945	
17	.670	"	7016	940