HYDROLOGY M16/D11A 2 PLANS

M16/D11A

2 Plans

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

DESIGN HYDROLOGY SECTION
123 Central NW, Albuquerque, NM 87102
(505) 766-7644

March 7, 1985

Jeff Mortensen
Tom Mann & Associates, Inc.
811 Dallas, NE
Albuquerque, New Mexico 87110

RE: REVISED DRAINAGE/GRADING PLAN FOR (M-16/D11A)
NEWPORT EAST BUSINESS PARK RECEIVED FEBRUARY 15, 1985

Dear Jeff:

The referenced plan dated February 14, 1985, is approved.

Please attach a copy of this approved plan to the construction set prior to Hydrology sign-off.

If I can be of further assistance, please call me at 766-7644.

Cordially,

Billy J. Goolsby

Billy J. Goolsby, P.E.
Design Hydrology Section

BJG/bsj

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION/DESIGN HYDROLOGY SECTION

PRE-DESIGN CONFERENCE RECAP

HYDROLOGY SECTION PROJECT NO.: M16-111A DATE: 2/7/85

PLANNING DIVISION NOS. EPC: _____ DRB: _____

SUBJECT: Multiple Flex-7 Warehouse [illegible] Tract 2

LEGAL DESCRIP.: _____

APPROVAL REQUESTED

____ PRELIMINARY PLAT ____ FINAL PLAT

✓ SITE DEVELOPMENT PLAN ✓ BUILDING PERMIT

____ ROUGH GRADING

	WHO:	REPRESENTING:
ATTENDANCE:	Jeff [illegible]	[illegible]
	Fred [illegible]	[illegible]

____ Conceptual Drainage Plan/Report required for Preliminary Plat and/or Site Development Plan sign-off.

____ Approved Drainage Plan/Report required for Final Plat and/or Building Permit sign-off.

____ Subdivision Improvements Agreement or Financial Security required.

FINDINGS: 1. Upon [illegible] (M16-D112) for site development plan [illegible]
2. Site specific drainage for the proposed warehouse development
3. Free discharge [illegible] for the approved DM [illegible] Park Dev. 1/82. It is [illegible] the developed flows be discharged into the [illegible] as [illegible] for the [illegible] review.

The undersigned agrees that the above findings are summarized accurately and are only subject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.

SIGNED: [illegible] SIGNED: [illegible]

TITLE: _____ TITLE: _____

DATE: 2/7/85 DATE: 02/07/85

NOTE PLEASE PROVIDE A COPY OF THIS RECAP WITH THE DRAINAGE SUBMITTAL

RECEIVED
MAR 1 1982
CITY ENGINEER

Craddock
Development Company

2501 Yale Boulevard, South East, Albuquerque, New Mexico 87106

(505) 842-9136

March 10, 1982

Brian G. Burnett
Civil Engineer/Hydrology
Engineering Division
Municipal Development Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Craddock Development Company and Albuquerque International Airport Drainage Concerns

Dear Brian:

Thank you for your letter of February 23, 1982, which summarized our meeting of February 18,1982, with Mr. Bob Gill of the Airport.

I have reviewed my notes of the meeting and the only discrepancy I find is that I noted that Craddock would investigate the expenses of design and construction of a retaining wall as described. Until that investigation is completed I am not in a position to commit to fund the project. At such time as the estimate is complete, and a decision to construct the wall is made I believe a formal agreement between the City and Craddock would be desirable.

I appreciate your cooperation and assistance in resolving these matters and look forward to working with you.

Sincerely,

CRADDOCK DEVELOPMENT COMPANY

By Donald J. Murphy
Donald J. Murphy
Branch Manager

1-110-1

Craddock
Development Company

2501 Yale Boulevard South East, Albuquerque, New Mexico 87106

(505) 842-9136

January 14, 1982

HAND DELIVERED

Mr. Charles M. Easterling, P.E.
Principal Assistant City Engineer-Hydrology
City of Albuquerque
Albuquerque, New Mexico

Re: Proposed Comprehensive Drainage Plan
for Newport East Business Park

Dear Chuck:

This letter will confirm our discussion and agreement reached this morning at a meeting attended by you, Jeff Mortensen, Tom Mann and myself to discuss the completion of the Comprehensive Drainage Plan for Newport East Business Park. The proposed Plan was prepared by Tom Mann & Associates, Inc. on behalf of Craddock Development Company.

It is my understanding that you have approved the Drainage Plan as proposed today and the Site Development Plan may now be filed with the City of Albuquerque.

Craddock Development Company has committed to participate in the construction of a connection for the existing 36" RCP Culvert and the existing 60" RCP Culvert. The City agrees that Craddock and the adjoining developers and the Albuquerque Airport and the City of Albuquerque are all parties affected by such a connection and Craddock and the City have agreed to negotiate in good faith the details of such a connection and the cost allocation among the parties in the next sixty (60) days.

With regard to the drainage problem at the Multiflex VI Building, Craddock and the City acknowledge the existing problems and agree to negotiate a solution to the problems including stabilization of the slope with the City of Albuquerque and the Albuquerque Airport.

Please indicate your acknowledgement of the foregoing as a correct summary of our meeting in the space below. Thank you.

Sincerely,

CRADDOCK DEVELOPMENT COMPANY

By _____
Donald J. Murphy
Vice President/General Manager

DJM/bs
cc: Tom Mann
Craddock C.S.

ACKNOWLEDGED AND AGREED TO:

CITY OF ALBUQUERQUE

By _____ 1/14/82
Charles M. Easterling
Principal Assistant City
Engineer-Hydrology

Tom Mann Associates, Inc.
Engineers
811 DALLAS, N.E. • ALBUQUERQUE • NEW MEXICO • 87110 • 505-265-5611

11101
January 7, 1982

M16-D11a

RECEIVED
JAN 1 1 1982
ENGINEERING

Mr. Brian G. Burnett
Engineering/Hydrology Division
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Newport East Business Park
Drainage Report

Dear Brian:

Transmitted herewith for your review are two (2) copies of the subject drainage report. As I explained to you in our telephone conversation on January 6, 1982, the prompt review of this report is extremely important to the Developer, Craddock Development Company. This is because the review of the Drainage Report goes hand in hand with the signing of a summary plat for Tracts X and Y. I have enclosed a print of this plat for your information.

The Developer intends to sell Tract M on January 15, 1982. In order for this sale to take place, the summary plat must be filed prior to the sale, January 14, 1982, at the latest.

Your prompt attention and your cooperation in this matter will be greatly appreciated. If you have any questions or comments concerning either item, do not hesitate to call.

Sincerely,

TOM MANN & ASSOCIATES, INC.

Jeffrey G. Mortensen
Project Engineer

JGM:bb
Encs.
xc: Donald J. Murphy, Craddock

DRAINAGE REPORT for the NEWPORT EAST BUSINESS PARK

RECEIVED
JAN 1 1 1992
ENGINEERING

Tom Mann Associates, Inc.
811 DALLAS N.E. · ALBUQUERQUE · NEW MEXICO · 87110
ENGINEERS

DRAINAGE REPORT

FOR

NEWPORT EAST BUSINESS PARK

JANUARY 1982

PREPARED FOR: CRADDOCK DEVELOPMENT COMPANY
SUITE 300
2501 YALE BOULEVARD S.E.
ALBUQUERQUE, NEW MEXICO 87106

PREPARED BY: TOM MANN & ASSOCIATES, INC.
811 DALLAS N.E.
ALBUQUERQUE, NEW MEXICO 87110
(505) 265-5611

REGISTERED PROFESSIONAL ENGINEER
STATE OF
THOMAS A.
MANN, JR.
9792
NEW MEXICO
AND LAND SURVEYOR

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PURPOSE AND SCOPE

The purpose of this drainage plan is to establish the criteria for controlling surface runoff from the Newport East Business Park and the contributing drainage basins in a manner which is acceptable to the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). Furthermore, the plan determines the runoff resulting from 10- and 100-year frequency storms falling within the site and contributing basins under existing and developed conditions.

The scope of this plan is to ensure that the project will be protected from storm runoff and that the project will not increase the flooding potential of adjacent properties. In addition, existing drainage problems within the development are identified. Both interim and permanent solutions to these problems are presented. These items are demonstrated in a manner which is acceptable to the City of Albuquerque and AMAFCA.

LOCATION AND DESCRIPTION

The Newport East Business Park is located within the corporate limits of the City of Albuquerque. The site is more particularly described as a parcel of land situated in Section 34, Township 10 North, Range 3 East, N.M.P.M., and comprising Tracts A-1, C-1, X, Y and Z, Airport Park. Figure 1, the Vicinity Map, depicts the location of the site.

The parcel is 29.36 acres in size and will be fully developed as a business park. The site slopes from east to west. Average slopes are approximately four (4) percent.

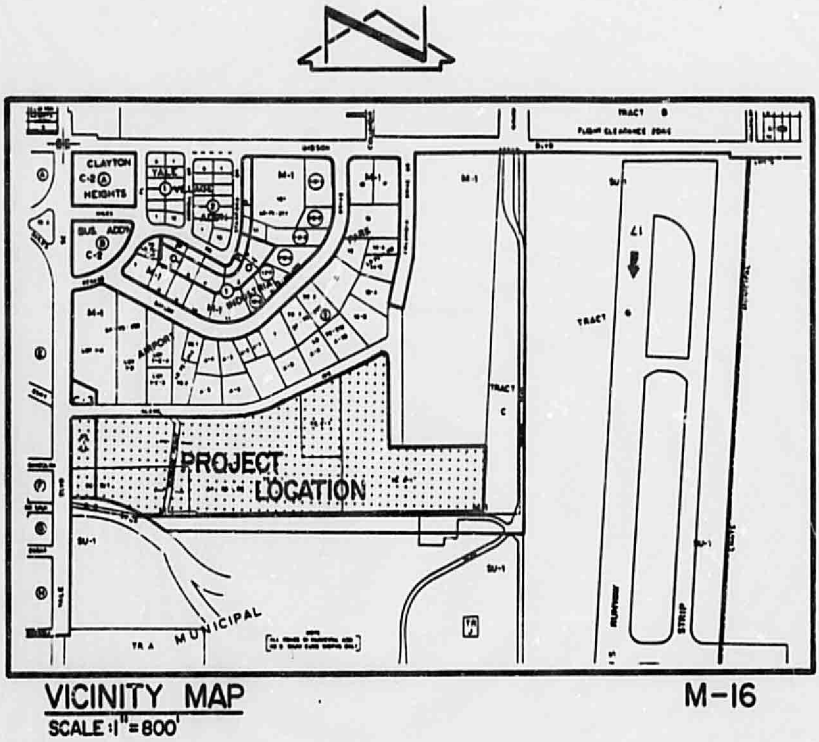


FIGURE 1: VICINITY MAP

HYDROLOGIC ANALYSIS:

Storm runoff is determined by the Soil Conservation Service (SCS) Curve Number Method for small watersheds (less than 2,000 acres). This method determines the peak discharge and associated volume of runoff for a given frequency storm falling within the study area. The following criteria were used to quantify runoff:

Watershed Curve Numbers: The runoff curve numbers for the various watershed conditions are listed in Table 2. Using these values, a composite curve number (CN) is computed for an entire watershed.

Time of Concentration: The time of concentration (T_c) is the time it takes for runoff to travel from the most distant part of the watershed area to the point of discharge. Time of concentration is estimated by the Kirpich equation:

$$T_c = 0.00013 \frac{L^{0.77}}{s^{0.385}}$$

where L = hydraulic length of the watershed, in feet,

and s = average slope of the watershed in feet/feet.

Rainfall: The depth of rainfall is determined from the NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume IV - New Mexico. The 100-year, 6-hour precipitation = 2.3", and the 10-year, 6-hour precipitation = 1.55" for the study area.

Direct Runoff: The SCS runoff equation is used to determine the amount of runoff:

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

where Q = accumulated volume of runoff in inches over the drainage area.

P = accumulated rainfall in inches over the drainage area.

S = Potential maximum retention of water in equivalent inches over the drainage area.

CN = Watershed Curve Number.

Distribution Curve: The distribution curve (DC) is based on the percent of one hour versus 24 hours precipitation and is dependent upon the geographic location of the drainage basin. Based upon Figure 2, the SCS Peak Rates of Discharge for Small Watersheds, DC = 75.

Peak Discharge: The peak discharge is obtained from Figure 3 which plots the cfs/ac/inch of runoff versus T_c for various distribution curves. This is multiplied by the drainage area in acres and the direct runoff in inches to obtain the peak discharge in cfs.

Volume of Runoff: The volume of runoff in acre-feet from a watershed is expressed as the direct runoff in feet multiplied by the watershed area.

The SCS Curve Number Method was computerized for ease of calculation and convenience in the presentation of results.

The results of the analysis appear in Appendix A.

HYDRAULIC ANALYSIS

Culvert flows are obtained by comparing pipe capacity and contributing flow, and selecting the lower value. Pipe capacity, flow depth and flow velocity are determined by the Hazen-Williams equation for uniform culvert flow. The Hazen-Williams equation for uniform flow is as follows:

$$Q = 1.318\ ACR^{0.63}s^{0.54}$$

where Q = flow in cfs,

A = flow cross-sectional area in square feet

C = Hazen-Williams friction coefficient, dimensionless

R = hydraulic radius, in feet, which is the ratio of the flow cross-sectional area to the wetted perimeter of the flow cross section

s = energy grade line slope (which is assumed equal to the slope of the pipe) expressed as a decimal

Values of 'C' used for this project are 120 for reinforced concrete pipe (RCP) and 80 for corrugated metal pipe (CMP). These 'C' values assume that all culverts are 50 years in age.

The determination of the capacity of streets and channels is accomplished by using the Manning equation:

$$Q = \frac{1.49}{n}\ AR^{2/3}s^{1/2}$$

where Q = flow in cfs

n = Manning roughness coefficient (assumed to be 0.020 for this study), dimensionless.

A = Flow cross-sectional area in square feet.

R = Hydraulic radius, in feet, which is the ratio of the flow cross-sectional area to the wetted perimeter of the flow cross section.

s = Energy grade line slope (which is assumed equal to the slope of the street) expressed as a decimal.

EXISTING DRAINAGE CONDITIONS

The site and adjoining sites are currently partially developed. The surrounding streets, Yale Boulevard S.E. and Alamo Avenue S.E., are improved streets with asphaltic concrete paving and standard curb and gutter. The topography of the site slopes from east to west at approximately four (4) percent.

The existing drainage basins and existing drainage facilities in the study area are shown by Figure 2. The drainage basin boundaries were determined from the existing topographic information provided by Koogle & Pouls Engineering and supplemented by several field visits. The existing storm drainage facilities, such as catch basins, manholes and culverts, were researched from City records, located and identified in the field, and plotted on Figure 2. The existing catch basins and storm drains have been inventoried in the "Albuquerque International Airport Drainage and Traffic Circulation Study", November 1981, prepared for the Aviation Department, City of Albuquerque, by Tom Mann & Associates, Inc.

The existing drainage conditions for the study area were analyzed by the Soil Conservation Service (SCS) Curve Number Method. For convenience in analysis and in presentation of results, the method was computerized. The output appears in Appendix A. Table 1 presents a summary of the ground cover conditions and corresponding curve numbers for the study area. Figure 3 is the soil map which supports Table 1.

Each drainage basin was analyzed individually to determine the 10- and 100-year peak flows and runoff volumes associated with the basin. A summary of these results appear on Figure 2. Figure 2 also summarizes the existing pond volumes for the drainage basins. The determination of the pond volumes was determined by the combination of field inspection and the review of the mapped topography.

As previously stated, an inventory of existing catch basins and storm drains is presented in the "Albuquerque International Airport Drainage and Traffic Circulation Study". These inventories are accompanied in that report by analyses which determine that the existing drainage facilities are adequate to accept and convey the anticipated 100-year peak flows.

The majority of storm water runoff generated in and around the area, if not intercepted by the existing storm drainage systems, flows in the streets. Because of this, the existing streets were analyzed at several locations to see if the anticipated flows were contained within the street. This was investigated in the "Albuquerque International Airport Drainage and Traffic Circulation Study". The results of the analysis are summarized in Table 2. In all cases the anticipated flows stay well within the paved street.

As stated in the "Albuquerque International Airport Drainage and Traffic Circulation Study", the study area drains to an existing AMAFCA channel. The dimensions and capacity of this channel are shown by Figure 4. Figure 4 demonstrates

that the channel has the capacity to receive upstream runoff without fear of overload.

The Flood Hazard Map is shown by Figure 5. Figure 5 demonstrates that the project site does not lie within a designated flood hazard zone as defined by the U. S. Department of H. U. D. Federal Insurance Administration. There are, however, several existing drainage easements on the property. These are shown on Figure 2.

There are several problem areas with respect to the existing drainage conditions. These problem areas are summarized as follows:

1. Approximately 50 LF of existing sidewalk along the south side of Alamo Avenue has been undermined by runoff generated in Basin 13.
2. A portion of the runoff generated in Basin 6 does not leave the site via a driveway cut, but rather flows over the sidewalk along the south side of Alamo Avenue just west of Building 2430.
3. A portion of the runoff generated in Basin 10 does not leave the site via a driveway cut, but rather flows over the sidewalk along the south side of Alamo Avenue in front of Building 2340.
4. The slope on the south boundary of the project adjacent to Buildings 2420, 2440 and 2460 is eroding. This is apparently due to the undercutting of the slope in the vicinity of the three (3) buildings referenced above. The problem has been compounded

at the southeast corner of Building 2540, however, by apparent fill operations at the top of the slope by development to the south.

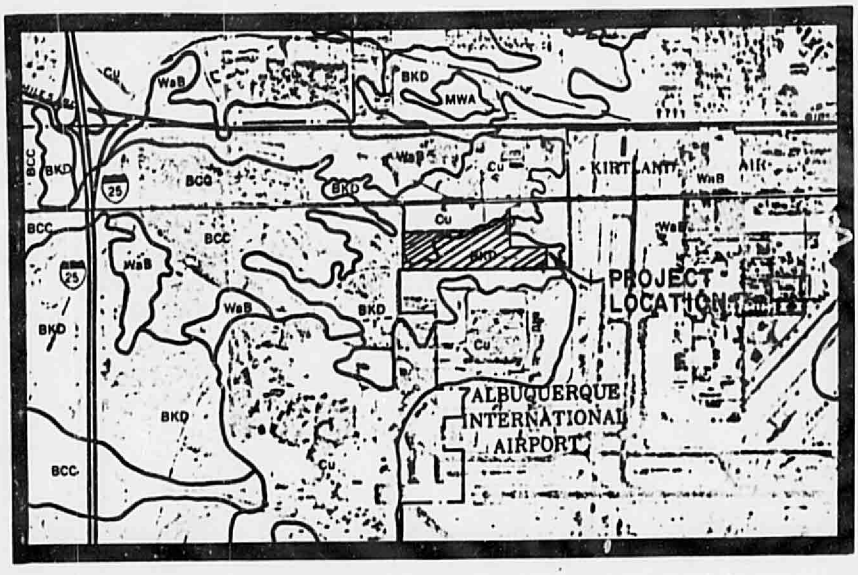
5. An existing storm drain manhole has apparently been buried beneath the asphalt parking lot paving at the northwest corner of Building 2350.

6. Offsite flows enter the site at the southeast corner of the site via two (2) existing 24" RCP culverts. The offsite contribution is approximately 2.5 cfs for a 100-year frequency storm.

7. Offsite flows enter the site from the existing 36" RCP culvert located along the south boundary of the site. The 100-year peak flows, as determined by the "Albuquerque International Airport Drainage and Traffic Circulation Study", are 96 cfs for the existing condition and 147 cfs (projected) for the developed condition.

8. The existing 36" RCP culvert mentioned above drains into an existing 35' Drainage and Public Utility Easement. Although the easement is intended to serve as a drainage channel or swale between the outlet of the 36-inch RCP and the inlet to the 60-inch RCP, the area is really a pond which must fill to a depth of approximately two feet (2') before it will spill into the 60-inch pipe. Because of this, the water which lies below the invert of the 60-inch pipe will not drain, but rather will be left to infiltrate and/or evaporate. In addition, oil has been discharged through the 36" RCP recently rendering the area an eyesore.

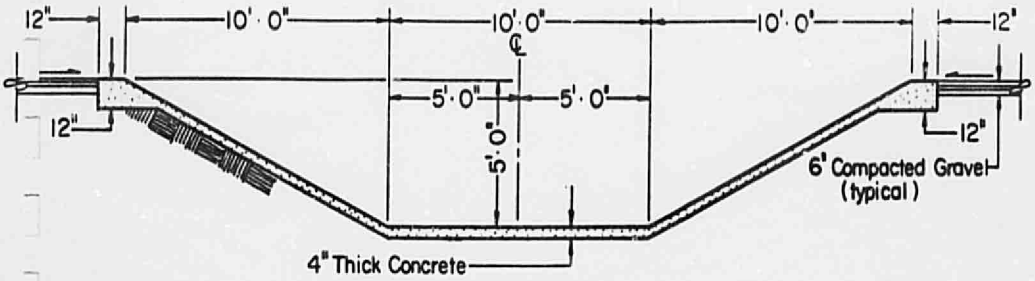
9. Sheetflow originating offsite enters the site along the easterly boundaries. The basins affected are Basins 2 and 3.



Scale: 1" = 2,000'

Reference: Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico, Soil Conservation Service, June 1977.

FIGURE 3: SOIL MAP OF STUDY AREA



SECTION

CHANNEL ANALYSIS:

By Manning Equation, $Q = \frac{1.49}{n} AR^{2/3}s^{1/2}$,

where $n = 0.015$

$A = 100$ sf

$P = 32.36'$

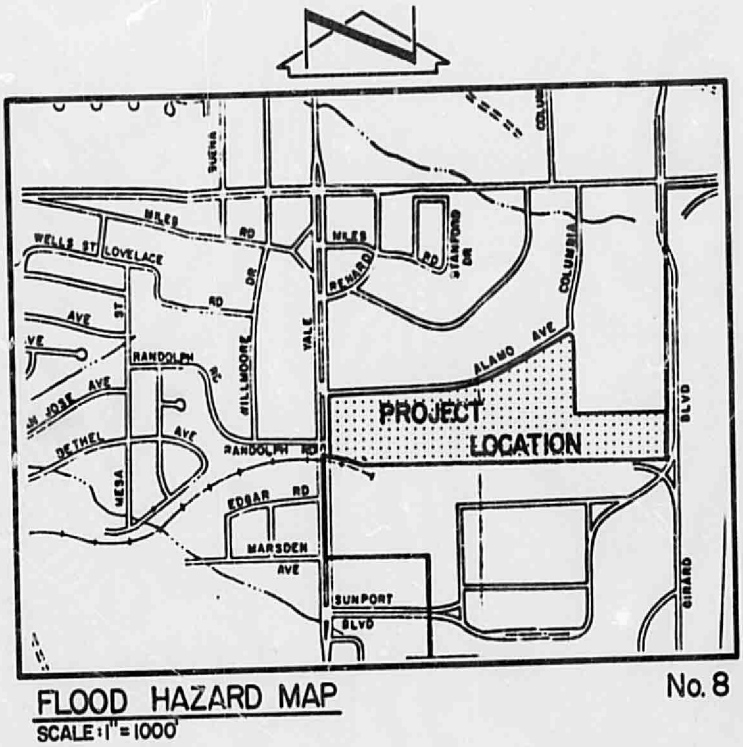
$R = \frac{A}{P} = 3.09'$

$s = 0.0144$ (min.)

$Q_{Max} = \frac{1.49}{0.015}(100)(3.09)^{2/3}(0.0144)^{1/2} = 2522$ cfs

$Q_{100,\ dev.} = 330.8$ cfs => $d = 1.73'$

FIGURE 4: AMAFCA CHANNEL SECTION AND ANALYSIS



FLOOD HAZARD MAP

SCALE: 1" = 1000'

No. 8

Reference: "City of Albuquerque, New Mexico, Bernalillo County Flood Hazard Boundary Map", U. S. Department of H. U. D., Federal Insurance Administration, December 4, 1979, Page 8.

FIGURE 5: FLOOD HAZARD MAP

DESCRIPTION	SOIL UNIT	HYDROLOGIC SOIL GROUP	CONDITION	CURVE NUMBER (CN)
Native Grass	WaB	B	Poor	79
Native Grass	BKD; Cu	A	Poor	68
S. W. Landscaping	BKD; Cu	A	Fair	65
Landscaping	BKD; Cu	A	Good	65
Impervious Area	N/A	N/A	N/A	95

TABLE 1: SUMMARY OF GROUND COVER CONDITIONS

STREET	TYPE	ANALYSIS	CROWN (IN)	WIDTH (FT)	CURB HEIGHT (IN)	MINIMUM SLOPE (FT/FT)	CAPACITY (CFS)	ACTUAL FLOW		DEPTH @ FLOW LINE	
								Q_{10} (CFS)	Q_{100} (CFS)	Q_{10} (CF)	Q_{100} (CF)
Yale	Median	1/2 width	8	36	8	0.035	78	10.6	22.1	0.3	0.5
Alamo	No Median	Full width	6	44	8	0.04	145	20.4	52.5	0.35	0.50

TABLE 2: STREET CAPACITY ANALYSIS - EXISTING CONDITION

Reference: "Albuquerque International Airport Drainage and Traffic Circulation Study", Tom Mann & Associates, Inc., November, 1981.

PROPOSED DRAINAGE PLANS

The proposed drainage plan shall be implemented in two (2) phases. Phase I constitutes the recognition and treatment of those drainage related problems presented in the preceding section. Phase II of the drainage plan discusses future plans for development.

a. PHASE I

The following items are presented in response to the existing drainage problems listed in the preceding section. The topics discussed below appear in the same sequence in which the existing drainage problems are presented in the preceding section.

1. The Developer shall remove and replace the undermined sidewalk along the south side of Alamo Avenue. The Developer shall also construct a 16,000 cubic feet pond due south of the damaged sidewalk to detain the 10-year frequency storm runoff generated by Basin 13. The pond shall have a positive discharge as shown by Figure 2. The construction of this pond will serve as an interim measure to prevent the reoccurrence of the sidewalk undermining.
2. The Developer shall construct a swale to divert and intercept the runoff which currently leaves Basin 6 by flowing over the sidewalk along the south side of Alamo Avenue. The runoff shall be diverted into Basin 13 as shown by Figure 2.

3. The Developer shall construct a 6-inch high header curb along the back side of the sidewalk along the south side of Alamo Avenue between the existing drivepads in front of Building 2340. This will force the runoff which currently flows over the sidewalk to exit via drivepads.
4. The Developer recognizes the existing soil erosion problem along the south boundary of the site. The slope material which has eroded onto the existing asphalt paving does not hamper operations within the business park, therefore the Developer has elected to do nothing to the slope at this time.
5. The Developer shall uncover and expose the existing storm drain manhole cover at the northwest corner of Building 2350.
6. The Developer shall accept and convey the offsite flows which enter the site at the southeast corner of the site.
7. The Developer recognizes the offsite flows which emanate from the existing 36-inch RCP culvert and originate from the Albuquerque International Airport.
8. Because of the recent discharges of oil from the 36-inch RCP culvert, it would be desirable to the Developer to connect the existing 36-inch RCP and the existing 60-inch RCP culverts. The Developer, however, is not capable of financing such a connection at this time, especially when the connection would convey mostly

offsite flows. A peak 100-year discharge of only approximately 10 cfs enters the 35' easement from the Developer's site.

9. The Developer recognizes and will accept the offsite sheetflow which enters Basins 2 and 3.

b. PHASE II

Phase II of the drainage plan for the Newport East Business Park involves the contruction of two (2) more office buildings and three (3) more warehouses. The site of the two (2) office buildings will be graded so that the majority of the runoff will be collected by a catch basin or series of catch basins which will drain into the existing storm drain system in Alamo Avenue. All other runoff generated by this proposed development will drain directly onto Alamo Avenue via driveway cuts.

Most of the runoff from the two (2) warehouse sites will be routed through the site and drain essentially as Basin 13 drains now. The runoff from the future warehouse development will discharge from the site in the same manner as the runoff generated by the two (2) future office buildings. Because of this, the collection system in and around the future office buildings should be sized to adequately handle the fully developed flow anticipated. This flow as shown in Appendix A as "Future Basin", will be approximately 34 cfs.

As demonstrated by the "Albuquerque International Airport Drainage and Traffic Circulation Study", the existing 24-inch RCP storm drain in Alamo Avenue has the capacity to carry

60 cfs. Adding the existing 100-year flow in the storm drain to the 100-year peak flow for the "Future Basin" yields 54 cfs which is less than the storm drain capacity of 60 cfs. Therefore, since downstream storm drain capacity exists, the direct discharge of runoff is possible thus eliminating the interim ponding provided in Phase I. Calculations sizing the collection system appear in a following section.

RECOMMENDATIONS AND CONCLUSIONS:

The following recommendations and conclusions are presented for the Newport East Business Park:

1. The Developer shall implement Items 1, 2, 3, 5, 6 and 9 of Phase I.
2. The Developer acknowledges Items 4, 7 and 8 of Phase I.
3. The Developer shall construct Phase II in accordance with the criteria set forth in the preceding section.
4. The development of Phase II shall comply with the City of Albuquerque 1979 Interim Drainage Guidelines which permit free discharge of runoff "if downstream facilities are adequate". It has been demonstrated that downstream facilities are adequate, therefore no interim ponding will be provided for the proposed future development. In other words, the ponds located in Basins 2, 3 and 13 will be eliminated at the time of Phase II development within each basin.
5. The existing ponds in Basins 5, 8, 9, 10, 11 and 12 shall remain.

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5. The existing ponds in Basins 5, 8, 9, 10, 11 and 12 shall remain.

CALCULATIONS

Existing Pond Volumes:

$V = \bar{A} \times d$
where V = volume
$\bar{A}$ = average pond surface area
d = pond depth

a. Basin 2
$\bar{A}$ = 3,500 sf, d = 2'
V = 7,000 cf

b. Basin 3
$\bar{A}$ = 6,500 sf, d = 1'
V = 6,500 cf

c. Basin 5
$\bar{A}$ = 2,250, d = 0.67'
V = 1,500 cf

d. Basin B
$\bar{A}$ = 1,000 sf, d = 0.67'
V = 670 cf

e. Basin 9
$\bar{A}$ = 3,500 sf, d = 2'
V = 7,000 cf

f. Basin 10a
$\bar{A}$ = 3,000 sf, d = 1'
V = 3,000 cf

g. Basin 11
$\bar{A}$ = 2,200 sf, d = 1'
V = 2,200 cf

h. Basin 12
$\bar{A}$ = 2,000 sf, d = 1'
V = 2,000 cf

Storm Drain Collection System for Future Basin:

a. Inlet Condition (Single 'D' Catch Basin)

$Q = vA = C_v \sqrt{2gh}\ A = 14.4$ cfs

where $C_v = 0.67$

$g = 32.2$ ft/sec^2

$h = 0.5'$

$A = (15\ 1/2")(35\ 3/8") = 548$ in^2 = 3.8 sf

$\frac{Q_{100}}{Q} = \frac{33.8}{14.4} = 2.35 \approx \underline{3}$

Install 3 single 'D' catch basins to collect surface runoff.

b. Drain Line Sizing

By Hazen-Williams Equation,

Let dia = 24"

C = 150 (new RCP)

s = 0.02 (min.)

Then $Q_{capacity} = 52$ cfs

$Q_{capacity} < Q_{100} = 33.8 \therefore$ OK

BASIN 13 INTERIM POND (PHASE I):

a. Volume

By planimeter $V = 16{,}000$ cf $< V_{10} \therefore$ OK

$V_{10} = V_{10,\ 13} + V_{10,\ 6} = 9{,}900 + 800 = 10{,}700$ cf

b. Outflow

$Q = C_v\sqrt{2gh}\ A = 2.25$ cfs

where $C_v = 0.7$

$g = 32.2$ ft/sec^2

$h = 5136 - 5132 = 4'$

$A = \pi r^2 = 0.20$ sf (i.e. 6" dia. pipe)

APPENDIX A:

RUNOFF CALCUATIONS

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: EXISTING

DESCRIPTION	AREA (ac)	Q-100 (cfs)	V-100 (cf.)	Q-10 (cfs)	V-10 (cf.)
BASIN 1	4.10	2.0	4,800	0.4	1,100
BASIN 2	3.00	2.5	5,900	0.6	2,000
BASIN 3	9.50	6.0	14,300	1.7	4,200
BASIN 3a	2.00	2.5	5,900	1.0	2,500
BASIN 4	0.10	0.1	300	0.0	100
BASIN 5	1.40	3.4	8,100	1.9	4,600
BASIN 6	0.45	0.7	1,700	0.3	800
BASIN 7	4.70	9.9	23,600	5.3	12,700
BASIN 8	0.40	0.7	1,700	0.3	900
BASIN 9	0.50	0.7	1,700	0.3	800
BASIN 10	7.50	17.3	40,500	9.6	22,500
BASIN 10a	0.55	1.0	2,300	0.5	1,100
BASIN 11	0.70	1.0	2,300	0.4	1,000
BASIN 12	0.10	0.0	100	0.0	0
BASIN 13	7.20	9.6	22,600	4.2	9,900

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 1
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	4.00	68	98 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.10	95	2 %
	COMPOSITE:	4.10	69	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 900 ft.

DROP: 27 ft.
SLOPE: 3.0 %

TIME OF CONCENTRATION: 0.09 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.32 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 2.0 c.f.s.

VOLUME: 4,800 c.f. 0.11ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.00 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 1,100 c.f. 0.03ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 2
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Co	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	2.20	68	73 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.80	95	27 %
	COMPOSITE:	3.00	75	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 700 ft.

DROP: 42 ft.
SLOPE: 6.0 %

TIME OF CONCENTRATION: 0.06 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.54 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 2.5 c.f.s.

VOLUME: 5,900 c.f. 0.14ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.19 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.8 c.f.s.

VOLUME: 2,000 c.f. 0.05ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 3
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS	B	1.70	79	18 %
NATIVE GRASS/LANDSCAPING	A	7.20	68	76 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.60	95	6 %
	COMPOSITE:	9.50	72	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1380 ft.

DROP: 30 ft.
SLOPE: 2.1 %

TIME OF CONCENTRATION: 0.15 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.42 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.52 cfs/ac/in
PEAK DISCHARGE (Q): 6.0 c.f.s.

VOLUME: 14,300 c.f. 0.33ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.12 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.52 cfs/ac/in
PEAK DISCHARGE (Q): 1.7 c.f.s.

VOLUME: 4,200 c.f. 0.10ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 3a
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS	B	1.70	79	85 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.30	95	15 %
COMPOSITE:		2.00	81	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 700 ft.

DROP: 7 ft.
SLOPE: 1.0 %

TIME OF CONCENTRATION: 0.12 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.: 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.82 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 2.5 c.f.s.

VOLUME: 5,900 c.f. 0.14ac.ft.

FREQUENCY: 10 yr.: 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.35 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.0 c.f.s.

VOLUME: 2,500 c.f. 0.06ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 4
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.04	68	40 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.06	95	60 %
	COMPOSITE:	0.10	84	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 140 ft.

DROP: 3 ft.
SLOPE: 2.1 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.97 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.1 c.f.s.

VOLUME: 300 c.f. 0.01ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.45 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.0 c.f.s.

VOLUME: 100 c.f. 0.00ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 5
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.10	68	7 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		1.30	95	93 %
COMPOSITE:		1.40	93	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 400 ft.

DROP: 8 ft.
SLOPE: 2.0 %

TIME OF CONCENTRATION: 0.06 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.3 in.	RAINFALL: 1.6 in.
RUNOFF: 1.60 in.	RUNOFF: 0.91 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 3.4 c.f.s.	PEAK DISCHARGE (Q): 1.9 c.f.s.
VOLUME: 8,100 c.f. 0.19ac.ft.	VOLUME: 4,600 c.f. 0.11ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 6
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.15	68	33 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.30	95	67 %
	COMPOSITE:	0.45	86	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 190 ft.

DROP: 8 ft.
SLOPE: 4.2 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 1.08 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.7 c.f.s.

VOLUME: 1,700 c.f. 0.04ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.53 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.3 c.f.s.

VOLUME: 800 c.f. 0.02ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 7
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	CN	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.80	68	17 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		3.90	95	83 %
	COMPOSITE:	4.70	90	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1400 ft.

DROP: 34 ft.
SLOPE: 2.4 %

TIME OF CONCENTRATION: 0.14 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.: 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 1.38 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 9.9 c.f.s.

VOLUME: 23,600 c.f. 0.54ac.ft.

FREQUENCY: 10 yr.: 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.75 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.53 cfs/ac/in
PEAK DISCHARGE (Q): 5.3 c.f.s.

VOLUME: 12,700 c.f. 0.29ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 8
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.10	68	25 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.30	95	75 %
	COMPOSITE:	0.40	88	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 190 ft.

DROP: 5 ft.
SLOPE: 2.6 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.	FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 2.3 in.	RAINFALL: 1.6 in.
RUNOFF: 1.23 in.	RUNOFF: 0.63 in.
DISTRIBUTION CURVE: 75	DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in	DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.7 c.f.s.	PEAK DISCHARGE (Q): 0.3 c.f.s.
VOLUME: 1,700 c.f. 0.04ac.ft.	VOLUME: 900 c.f. 0.02ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 9
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.20	68	40 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.30	95	60 %
	COMPOSITE:	0.50	84	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 220 ft.

DROP: 9 ft.
SLOPE: 4.0 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.97 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.7 c.f.s.

VOLUME: 1,700 c.f. 0.04ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.45 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.3 c.f.s.

VOLUME: 800 c.f. 0.02ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 10
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS LANDSCAPING	A	0.90	68	12 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		6.60	95	88 %
COMPOSITE:		7.50	92	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 960 ft.

DROP: 28 ft.
SLOPE: 2.9 %

TIME OF CONCENTRATION: 0.10 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 1.49 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 17.3 c.f.s.

VOLUME: 40,500 c.f. 0.93ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.82 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 9.6 c.f.s.

VOLUME: 22,500 c.f. 0.52ac.ft

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 10a
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.15	68	27 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.40	95	73 %
	COMPOSITE:	0.55	88	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 210 ft.

DROP: 5 ft.
SLOPE: 2.3 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 1.19 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.0 c.f.s.

VOLUME: 2,300 c.f. 0.05ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.40 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.5 c.f.s.

VOLUME: 1,100 c.f. 0.03ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 11
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.30	68	43 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		0.40	95	57 %
	COMPOSITE:	0.70	83	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 200 ft.

DROP: 4 ft.
SLOPE: 2.0 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.: 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.93 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 1.0 c.f.s.

VOLUME: 2,300 c.f. 0.05ac.ft.

FREQUENCY: 10 yr.: 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.42 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.4 c.f.s.

VOLUME: 1,000 c.f. 0.02ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 12
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	0.10	68	100 %
	COMPOSITE:	0.10	68	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 100 ft.

DROP: 4 ft.
SLOPE: 4.0 %

TIME OF CONCENTRATION: 0.03 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.5 in.
RUNOFF: 0.30 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.0 c.f.s.

VOLUME: 100 c.f. 0.00ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.07 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 0.0 c.f.s.

VOLUME: 0 c.f. 0.00ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN: BASIN 13
CONDITION: EXISTING

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
NATIVE GRASS/LANDSCAPING	A	3.40	68	47 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		3.80	95	53 %
	COMPOSITE:	7.20	82	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1540 ft.

DROP: 50 ft.
SLOPE: 3.2 %

TIME OF CONCENTRATION: 0.14 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 0.87 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 9.6 c.f.s.

VOLUME: 22,600 c.f. 0.52ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.38 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.55 cfs/ac/in
PEAK DISCHARGE (Q): 4.2 c.f.s.

VOLUME: 9,900 c.f. 0.23ac.ft.

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11101

DRAINAGE BASIN RUNOFF SUMMARY
CONDITION: DEVELOPED

DESCRIPTION	C*CA (acr)	Q-100 (cfs)	V-100 (cf.)	Q-10 (cfs	V-10 (cf.)
FUTURE BASIN	19.70	33.8	81,400	16.8	40,400

PROJECT: NEWPORT EAST BUSINESS PARK
PROJECT NO.: 11171

DRAINAGE BASIN: FUTURE BASIN
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	CN	% OF TOTAL
NATIVE GRASS	B	1.70	79	9 %
NATIVE GRASS/LANDSCAPING	A	4.90	68	25 %
IMPERVIOUS (STREETS & ROOFS & DRIVEWAYS)		13.10	95	66 %
	COMPOSITE:	19.70	87	100 %

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1900 ft.

DROP: 70 ft.
SLOPE: 3.6 %

TIME OF CONCENTRATION: 0.16 hr.

STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.3 in.
RUNOFF: 1.14 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.51 cfs/ac/in
PEAK DISCHARGE (Q): 33.8 c.f.s.

VOLUME: 81,400 c.f. 1.87ac.ft.

FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.6 in.
RUNOFF: 0.57 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.51 cfs/ac/in
PEAK DISCHARGE (Q): 16.8 c.f.s.

VOLUME: 40,400 c.f. 0.93ac.ft.