A MEMBER OF CONSULTING
ENGINEERS COUNCIL OF NEW MEXICO

JEFF MORTENSEN & ASSOCIATES, INC. ☐ ENGINEERS & SURVEYORS ☐ (505) 345-4250
6010-B MIDWAY PARK BLVD. N.E. ☐ ALBUQUERQUE ☐ NEW MEXICO 87109 ☐ FAX (505) 345-4254

92039
July 18, 1996

Mr. Jim Phelps
Ever Ready Oil Company
P. O. Box 25845
Albuquerque, NM 87125-5845

Re: Edith/Candelaria E.R.O. Site (G15/D42)

Dear Jim:

On the evening of July 10, 1996, flooding occurred within Edith Boulevard N.E., north of the above referenced project site. As a result, City Hydrology personnel visited the area to ascertain the extent of the contributing area. Although the Chevron site contributes a relatively small quantity of water to the existing problem area, several deficiencies requiring attention have been noted. These are as follows:

1. The private storm inlet located at the southwest corner of the site is clogged.

2. The existing retention pond which parallels Edith Boulevard N.E. no longer conforms to the approved design grades.

3. The depressed curb and gutter remaining from the pre-existing drivepad has not been closed and therefore allows overflow runoff to exit the pond.

4. Some surface runoff may be exiting the site per the northerly entrance onto Edith Boulevard N.E. Although that is consistent with the approved plan, the construction of an asphalt speed hump, to serve as a waterblock, will serve to detain more runoff onsite.

We suggest that you do the following:

1. Unclog the existing storm inlet as soon as possible.

2. Restore the pond to its "as designed" grades (i.e., grade the pond as deep as possible so as not to exceed 3:1 side slopes.

3. Close the pre-existing curb cut onto Edith Boulevard at the southwest corner of the site at your earliest convenience. This can be done with either asphalt or concrete.

Jeffrey G. Mortensen, P.E.
Juan M. Cala
Charles G. Cala, Jr., P.S.

4. Consider voluntarily constructing an asphalt waterblock at the north entrance/exit onto Edith Boulevard N.E.

Please review this report at your earliest convenience. If you should have any questions or comments regarding this information, or if we can be of further assistance to you, please do not hesitate to call. Your cooperation in this matter will be greatly appreciated.

Sincerely,

JEFF MORTENSEN & ASSOCIATES, INC.

Jeffrey G. Mortensen, P.E.
President

JGM:dsj
xc: Bernie Montoya

9203 99

DRAINAGE INFORMATION SHEET

EVER READY OIL

PROJECT TITLE: EDITH / CANDELARIA ZONE ATLAS/DRNG. FILE #: 915/042

DRB #: 93-297 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: TR B-1-A, SUNDT'S INDUSTRIAL

CITY ADDRESS: NE COR EDITH / CANDELARIA

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

OWNER: EVER READY OIL CONTACT: JIM PHELPS

ADDRESS: PO BOX 25845 PHONE: _____

ARCHITECT: KGA CONTACT: KEVIN GEORGES

ADDRESS: 127 JEFFERSON NE PHONE: 255-4975

SURVEYOR: JEFF MORTENSEN & ASSOC CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: OWNER CONTACT: JIM PHELPS

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

____ OTHER

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ S. DEV. PLAN FOR SUB'D. APPROVAL

____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

____ SECTOR PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ BUILDING PERMIT APPROVAL

X CERTIFICATE OF OCCUPANCY APPROVAL

____ GRADING PERMIT APPROVAL

____ PAVING PERMIT APPROVAL

____ S.A.D. DRAINAGE REPORT

____ DRAINAGE REQUIREMENTS

____ OTHER _____ (SPECIFY)

DATE SUBMITTED: 04-22-94

BY: JEFFREY G. MORTENSEN

RECEIVED
APR 22 1994
HYDROLOGY DIVISION

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 4, 1994

Jeff Mortensen
Jeff Mortensen & Associates
6010-B Midway Park Blvd.
Albuquerque, NM 87109

RE: REVISED ENGINEER CERTIFICATION FOR EVERREADY OIL ON EDITH/CANDELARIA (G15-D42) CERTIFICATION STATEMENT DATED 4/22/94.

Dear Mr. Mortensen:

Based on the information provided on your April 22, 1994 resubmittal, the above referenced site is acceptable for Engineer Certification.

Please be advised that once the improvements are completed on Edith Blvd., an updated plan showing the deletion of the west pond will be required.

If I can be of further help, please feel free to call me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineering Associate

BJM/dl/WPHYD/7921

c: Andrew Garcia
Jim Phelps
File

letter to file Bernie J. Montaño 7/17/96

Ever Ready Oil Editha Candelaria

Met with Jeff Martensen at the site on 7/17/96
Mr. Martensen will prepare a letter for the Ever Ready maintenance department outlining what items need to be brought up to compliance:

1. Pond will be deepened
2. Concrete curb will be extended to close off existing driveped.
3. maintenance will be perbimed on the existing inlet and 2" pipes.

Copy of letter will be routed for our files.

920393

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EVER READY OIL ZONE ATLAS/DRNG. FILE #: G15 / D42

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 1 & 2, TR B, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA NE

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

OWNER: EVER READY OIL CONTACT: ARCHITECT

ADDRESS: _____ PHONE: _____

ARCHITECT: KEVIN GEORGES & ASSOC. CONTACT: KEVIN GEORGES

ADDRESS: 127 JEFFERSON NE PHONE: 255-4975

SURVEYOR: JEFF MORTENSEN CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: NOT SELECTED CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
_X_ DRAINAGE PLAN
___ CONCEPTUAL GRADING & DRAINAGE PLAN
_X_ GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION
___ OTHER

PRE-DESIGN MEETING:

___ YES
_X_ NO
___ COPY PROVIDED

RECEIVED
SEP 17 1993
HYDROLOGY DIVISION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
_X_ BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ S.A.D. DRAINAGE REPORT
___ DRAINAGE REQUIREMENTS
_X_ OTHER SO-19 (SPECIFY)

DATE SUBMITTED: 9/17/93

BY: J. Graeme Means

920399

DRAINAGE INFORMATION SHEET

EVERREADY OIL

PROJECT TITLE: EDITH/CANDELARIA ZONE ATLAS/DRNG. FILE #: G15/D42

DRB #: 93-297 EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: TR B-1-A, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

OWNER: EVERREADY OIL CONTACT: JIM PHELPS

ADDRESS: PO BOX 25845 PHONE: _____

ARCHITECT: KEVIN GEORGES + ASSOC CONTACT: KEVIN GEORGES

ADDRESS: 127 JEFFERSON NE PHONE: 255-4975

SURVEYOR: JEFF MORTENSEN & ASSOC CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: OWNER CONTACT: JIM PHELPS

ADDRESS: PO BOX 25845 PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT

____ DRAINAGE PLAN

____ CONCEPTUAL GRADING & DRAINAGE PLAN

____ GRADING PLAN

____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

____ OTHER

PRE-DESIGN MEETING:

____ YES

____ NO

____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL

____ PRELIMINARY PLAT APPROVAL

____ S. DEV. PLAN FOR SUB'D. APPROVAL

____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

____ SECTOR PLAN APPROVAL

____ FINAL PLAT APPROVAL

____ FOUNDATION PERMIT APPROVAL

____ BUILDING PERMIT APPROVAL

X CERTIFICATE OF OCCUPANCY APPROVAL (TEMP)

____ GRADING PERMIT APPROVAL

____ PAVING PERMIT APPROVAL

____ S.A.D. DRAINAGE REPORT

____ DRAINAGE REQUIREMENTS

____ OTHER (SPECIFY)

RECEIVED
MAR 11 1994
HYDROLOGY DIVISION

DATE SUBMITTED: 03-11-94

BY: JEFFREY G. MORTENSEN

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 15, 1994

Jeff Mortensen
Jeff Mortensen & Associates Inc.
6010-B Midway Park Blvd. NE
Albuquerque, NM 87109

RE: TEMPORARY ENGINEER CERTIFICATION FOR EVER READY OIL @ EDITH & CANDELARIA (G15-D42) CERTIFICATION STATEMENT DATED 3/11/94.

Dear Mr. Mortensen:

Based on the information provided on your March 11, 1994 submittal, a temporary 30 day Certificate of Occupancy release may be issued at this time.

Please be advised that prior to the 30 day temporary terminating we will need the final certification submitted for review. I will also need concurrence for the S.O. 19 construction.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineering Associate

BJM/dl/WPHYD/7921

c: Andrew Garcia
File

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 20, 1993

Jeff Mortensen
Jeff Mortensen & Associates Inc.
6010=-B Midway Park Blvd. NE
Albuquerque, NM 87109

RE: REVISED DRAINAGE PLAN FOR EVEREADY OIL (G15-D42) SHEET 1 OF 2 ENGINEER'S STAMP DATED 9/16/93, SHEET 1A OF 2, 9/8/93, AND SHEET 2 OF 2, 9/16/93.

Dear Mr. Mortensen:

Based on the information provided on your September 17, 1993 resubmittal, the above referenced site is approved for S.O. 19 and Building Permit.

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

Also, a separate permit for construction within City Right-of-Way is required. A copy of this approval letter must be on hand when applying for the excavation permit.

Prior to Certificate of Occupancy release, Engineer Certification per the D.P.M. checklist is required.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya, CE
Engineer Associate

BJM/dl/WPHYD/7921

xc: Alan Martinez
Darlene Saavedra
File

DRAINAGE INFORMATION SHEET

920393

PROJECT TITLE: EVER READY OIL ZONE ATLAS/DRNG. FILE #: G15/D42

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 1 & 2, TRB, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA NE

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

OWNER: EVER READY OIL CONTACT: ARCHITECT

ADDRESS: _____ PHONE: _____

ARCHITECT: KEVIN GEORGES & ASSOC. CONTACT: KEVIN GEORGES

ADDRESS: _____ PHONE: _____

SURVEYOR: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: NOT KNOWN CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
_X_ DRAINAGE PLAN
___ CONCEPTUAL GRADING & DRAINAGE PLAN
_X_ GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION
___ OTHER

PRE-DESIGN MEETING:

___ YES
_X_ NO
___ COPY PROVIDED VERBAL CMTS To Graeme Means 9/9/93

DATE SUBMITTED: 09/08/93

BY: J. GRAEME MEANS

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
_X_ BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ S.A.D. DRAINAGE REPORT
___ DRAINAGE REQUIREMENTS
___ OTHER _____ (SPECIFY)

RECEIVED
SEP - 9 1993
HYDROLOGY DIVISION

DRAINAGE INFORMATION SHEET

920393

PROJECT TITLE: EVEREADY OIL ZONE ATLAS/DRNG. FILE #: G15/D42

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 1 & 2, TR B, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA NE

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD PHONE: 345-4250

OWNER: EVEREADY OIL CONTACT: ARCHITECT

ADDRESS: _____ PHONE: _____

ARCHITECT: KEVIN GEORGES & ASSOC. CONTACT: KEVIN GEORGES

ADDRESS: _____ PHONE: 255-4975

SURVEYOR: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: NOT KNOWN CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
X DRAINAGE PLAN
___ CONCEPTUAL GRADING & DRAINAGE PLAN
X GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION
___ OTHER

PRE-DESIGN MEETING:

___ YES
X NO
___ COPY PROVIDED

RECEIVED
AUG 20 1993
HYDROLOGY DIVISION

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
X BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ S.A.D. DRAINAGE REPORT
___ DRAINAGE REQUIREMENTS
X OTHER SO#19 (SPECIFY)

VERBAL CMTS.

DATE SUBMITTED: 08-02-93

BY: T. Graeme Means

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 26, 1993

Jeff Mortensen
Jeff Mortnesen & Associates Inc.
6010-B Midway Park Blvd. NE
Albuquerque, NM 87109

RE: REVISED DRAINAGE PLAN FOR EVEREADY OIL @ EDITH AND CANDELARIA NE (G15-D42) REVISION DATED 8/20/93.

Dear Mr. Mortensen:

Based on the information provided on your August 20, 1993 resubmittal, listed are some concerns that will need to be addressed prior to final approval:

1. Encroachment agreement will need to be provided if proposed inlet and ponding area is left within the public Right-of-Way.

2. Please provide and compare the proposed grades for the Edith widening project. You may need to provide retaining wills if the grade indicates substantial cuts or fills.

If I can be of further assistance, please feel free to call me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineer Associate

BJM/dl/WPHYD/7921

xc: File

DRAINAGE INFORMATION SHEET

920396

PROJECT TITLE: EVEREADY OIL ZONE ATLAS/DRNG. FILE #: G15 / D42

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 1 & 2, TR B, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA NE

ENGINEERING FIRM: JEFF MORTENSEN & ASSOC. CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

OWNER: EVEREADY OIL CONTACT: ARCHITECT

ADDRESS: _____ PHONE: _____

ARCHITECT: KEVIN GEORGES & ASSOC CONTACT: KEVIN GEORGES

ADDRESS: 127 JEFFERSON NE PHONE: 255-4975

SURVEYOR: JEFF MORTENSEN & ASSOC CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD NE PHONE: 345-4250

CONTRACTOR: NOT KNOWN CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

___ DRAINAGE REPORT
X DRAINAGE PLAN
___ CONCEPTUAL GRADING & DRAINAGE PLAN
X GRADING PLAN
___ EROSION CONTROL PLAN
___ ENGINEER'S CERTIFICATION
___ OTHER

PRE-DESIGN MEETING:

___ YES
X NO
___ COPY PROVIDED

VERBAL CMTS
8/18/93

CHECK TYPE OF APPROVAL SOUGHT:

___ SKETCH PLAT APPROVAL
___ PRELIMINARY PLAT APPROVAL
___ S. DEV. PLAN FOR SUB'D. APPROVAL
___ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
___ SECTOR PLAN APPROVAL
___ FINAL PLAT APPROVAL
___ FOUNDATION PERMIT APPROVAL
X BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ S.A.D. DRAINAGE REPORT
___ DRAINAGE REQUIREMENTS
X OTHER SO #19 (SPECIFY)

DATE SUBMITTED: 08-02-93

BY: JEFFREY G. MORTENSEN

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 18, 1993

Jeff Mortensen
Jeff Mortensen & Associates Inc.
6010-B Midway Park NE
Albuquerque, NM 87109

RE: DRAINAGE PLAN FOR EVEREADY OIL @ EDITH AND CANDELARIA (G15-D42)
ENGINEER'S STAMP DATED 7/30/93.

Dear Mr. Mortensen:

Based on the information provided on your August 3, 1993 submittal, listed are some concerns that will need to be addressed prior to final approval:

1. Without a downstream analysis, the release rate must be held to 1.0 cfs.

2. You must use the Hydrograph method from the new Hydrology D.P.M. Section 22.2, January 1993 to determine the volume to be ponded.

If I can be of further assistance, please feel free to contact me at 768-2667.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, CE
Engineer Associate

BJM/dl/WPHYD/7921

xc: File

County of Bernalillo
State of New Mexico
2400 BROADWAY S.E.
ALBUQUERQUE, NEW MEXICO 87102
ADMINISTRATION (505) 768-4000
COMMISSION (505) 768-4217
FAX (505) 768-4329

September 8, 1993

Graem Means
Jeff Mortensen & Associates, Inc.
6010-B Midway Park Boulevard, NE
Albuquerque, New Mexico 87109

Subject: Edith Boulevard Widening Project

Dear Mr. Means:

In reference to your recent inquiries about the County's Edith Boulevard project, the following information may be of use to your project located at the Edith/Candelaria intersection:

1. Bernalillo County is presently constructing Phase I, from Osuna to Montano, using County bonds as the funding source. The County hopes to use bonds to fund the construction of Phase II, from Montano to Candelaria.

2. The Phase II plans are near completion. Both the City of Albuquerque and Bernalillo County will review these plans.

3. The County anticipates that Phase II will be bid by the Spring of 1994 and that construction will be complete by the Fall of 1995.

If you have any questions or need additional information regarding this project, please do not hesitate to call.

Sincerely,

Susan M. Calongne

Susan M. Calongne, P.E.
Project Engineer

xc: Boleslo A. Romero, Director of Public Works

920393

DRAINAGE INFORMATION SHEET

PROJECT TITLE: EVER READY OIL ZONE ATLAS/DRNG. FILE #: 615-D42

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 1 & 2, TR. B, SUNDT'S INDUSTRIAL

CITY ADDRESS: EDITH & CANDELARIA NE

ENGINEERING FIRM: JMA CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD PHONE: 345-4250

OWNER: EVER READY OIL CONTACT: ARCHITECT

ADDRESS: _____ PHONE: _____

ARCHITECT: KEVIN GEORGES & ASSOC. CONTACT: KEVIN GEORGES

ADDRESS: 127 JEFFERSON NE, SUITE A PHONE: 255-4975

SURVEYOR: JMA CONTACT: JEFF MORTENSEN

ADDRESS: 6010-B MIDWAY PARK BLVD PHONE: 345-4250

CONTRACTOR: NOT KNOWN CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION
__X__ OTHER ADDITIONAL INFO.

PRE-DESIGN MEETING:

____ YES
____ NO
____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
__X__ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
__X__ DRAINAGE REQUIREMENTS
____ OTHER _____ (SPECIFY)

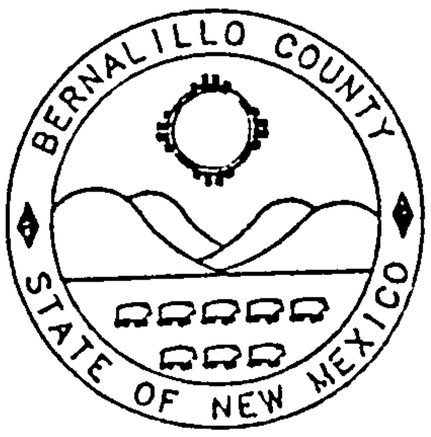
NOT Logged IN
Additional Info only

DATE SUBMITTED: 9/14/93

BY: J. GRAEME MEANS

COUNTY OF BERNALILLO
PUBLIC WORKS DEPARTMENT

EDITH BOULEVARD
DRAINAGE ANALYSIS



NOVEMBER 1990

Boyle Engineering Corporation
consulting engineers
Suite 600-E
6400 Uptown Boulevard, N.E.
Albuquerque, New Mexico 87110
Telephone: 505 / 883-7700
Telecopier: 505 / 881-9328

EDITH BOULEVARD
DRAINAGE ANALYSIS

I. INTRODUCTION

The County of Bernalillo, Public Works Department authorized Boyle Engineering Corporation to analyze the drainage problems associated with improvements to Edith Blvd. from Candelaria Road north to Osuna Road, and to develop a drainage plan presenting proposed solutions.

The watershed contributing to the drainage problem along Edith Blvd. in the upland area bounded by Bear Canyon Arroyo on the north, Candelaria Road on the South, the AMAFCA North Diversion Channel on the east and Edith Blvd. on the west.

This report examines the drainage basin development, runoff development and analysis, existing drainage facilities, related drainage studies and presents an effective storm drainage network compatible with existing facilities and with storm drainage facilities to be constructed in the future.

II. RELATED STUDIES

Plate I shows the watershed contributing storm runoff to Edith Boulevard Drainage Study area. The watershed is bounded on the north by the Bear Canyon Arroyo (a natural arroyo north of Osuna Road), and on the south by Candelaria Road. The eastern boundary is the Albuquerque Metropolitan Area Flood Control Authority (AMAFCA) North Diversion Channel, while the Atchison Topeka and Santa Fe (AT & SF) railway creates a dam that acts as the western boundary. Within study Area are study areas analyzed by other consulting engineering firms. These other drainage studies are briefly discussed below.

A. Montano Road Drainage Study

As part of the Montano Road improvement project, in 1985 Scanlon and Associates analyzed the area that contributes storm water to the Montano Road Storm drainage system. The study area extends from the Alameda

Drain at Second Street to the North Diversion Channel, and includes the entire area known as the Renaissance Development. The key elements of this drainage plan are two detention basins west of the Renaissance Development, which collect and detain the runoff from this area and release it at a controlled rate into the Montano Road drainage system.

Included in the Montano study were areas north and south of Montano Road that will contribute to the Edith Boulevard storm drainage system. Storm water runoff rates for the 100-year and the 10-year, 6-hour storms were determined using The City of Albuquerque approved Hydrology Model(HYMO) computer program. The curve numbers (CN's) used in the hydrologic analysis were 72, 88 and 92, corresponding to residential housing on 1/3 acre lots, industrial development, and commercial use, respectively.

After analysis of the hydrology from the Montano Study and based on current criteria in use, it was concluded the computed peak discharges were unacceptably low and the existing Montano drainage system is inadequate to accept runoff from the Edith system. Therefore, the hydrologic analysis of this area contributing to the Edith drainage system was not used in this study.

Restrictions in the Montano drainage system include the size of the existing storm drain pipe and discharge restrictions imposed at the Alameda Drain. At the present time, the Middle Rio Grande Conservancy District (MRGCD) has limited the discharge from the Montano Road drainage system into the Alameda Drain to about 15 cfs. An additional 10 cfs discharge will be allowed after improvements to the Alameda Drain have been made. Because of this restriction, the Edith Boulevard drainage system is allowed to discharge a maximum of 19 cfs into the Montano system.

B. <u>Comanche - Griegos Drainage Study</u>

The City of Albuquerque Public Works Department and The County of Bernalillo Public Works Department are jointly planning improvements to the Comanche - Griegos Extension. The drainage analysis of the area was prepared by Andrews, Asbury and Roberts, Inc. in 1989. The Comanche - Griegos study area is bounded by the North Diversion Channel on the east,

the AT & SF railway on the west, and natural drainage boundaries on the north and south. The proposed drainage system within this area includes a storm drain Carmony Lane and a storm drain in Comanche - Griegos Road.

The Carmony storm drainage system will accept runoff from the existing drainage system on Yale Boulevard as well as runoff from Basin 3 (see Plate I). The area west of Yale Boulevard and north of Carmony Lane (Basin E1 on Plate I) will be collected by the Edith drainage system. This portion of the Edith system will drain into the Carmony storm drainage system.

The Comanche - Griegos Road drainage system will collect runoff from the industrial areas adjacent to Comanche Road and South of Carmony Lane. Both the Comanche and Carmony systems will drain into the planned Griegos Detention Basin which is located east of the AT & SF railway and north of Griegos Road. The Griegos Detention Basin then discharges into the Alameda Drain through an existing storm drainage system.

All of the storm drainage systems within the Comanche - Griegos study area, with the exception of the system on Edith Boulevard will be designed by AAR. The drainage area that contributes to the Edith System was evaluated in this study and the peak flows obtained are within two percent of those calculated by AAR.

C. <u>Osuna Road Drainage Report</u>

The Osuna Road roadway widening project included major storm drainage system improvements. These improvements were designed to only carry a 10-year, 6-hour storm flow. Therefore, the excess runoff from the 100-year storm (approximately 50 cfs) would cause flooding at the intersection of Edith Boulevard and Osuna Road. The County of Bernalillo Public Works Department this excess runoff be accepted into the Edith drainage system.

In addition to the 50 cfs from Osuna Road, runoff from sub-basins 12A & 12B which is part of the Osuna Road study area (See plate 1A) will be accepted into the Edith system. A short segment, approximately 200 feet of the proposed Edith Boulevard drainage system was constructed as part of the

Osuna roadway project. However, it was later determined this segment of pipe did not have sufficient capacity to handle the peak flows from sub-basins 12A and 12B (approximately 90 cfs) in addition to the 50 cfs from Osuna Road. Therefore, flow restriction plates are required to limit the discharge from these sub-basins into the Edith drainage system.

Runoff from Basin 13 (Plate 1A), also within the Osuna Road study area, will drain into a detention basin located north of Osuna Road and west of Edith Boulevard. This detention basin will not be constructed as part of the Edith Boulevard Widening Project.

III. RUNOFF PATTERNS AND EXISTING CONDITIONS

A. Existing Runoff Patterns

The area within the Edith Boulevard drainage study has frequent flooding problems. The terrain within the study area generally slopes from east to west with a significant grade break near Edith Boulevard. Relatively steep slopes exist east of Edith Boulevard. From Edith Boulevard west to the AT & SF railway, there is a very slight east to west slope, with the railroad embankment acting as a dam. As can be seen on Plate II, the existing flood plains generally lie between Edith Boulevard and the railway. In addition to the flood plains shown in Plate II, there is significant local ponding along Edith Boulevard.

B. Existing Drainage Facilities

Existing drainage facilities play an important role in any drainage study. The location of existing facilities may establish watershed sub-basin boundaries which, in turn, affects the hydrologic modeling of the area. The capacity and location of existing facilities are often controlling factors in designing new drainage systems. The following two paragraphs discuss the existing structures found in the study area and their effects on the Edith Boulevard drainage system.

1. The Alameda Drain

The Alameda Drain is the principal drain for the east side of the "North Valley" of Bernalillo County. The drain is an earthen open channel with a bottom width of about 12 feet, approximate 2H on 1V side slopes and a depth of about 9.5 feet. The drain is owned by the Bureau of Reclamation and is managed by MRGCD. A permit is required for any discharge into the Alameda Drain.

Future improvements to the Alameda Drain are currently being studied by The City of Albuquerque and others. A plan to increase the capacity of the drain has been proposed, and discharge policies are being reevaluated, as well. However, the capacity of the drain is limited and the area to be drained is immense. Therefore, at the present, detention and controlled release of storm runoff are required components of virtually all storm drain systems in the North Valley.

2. Miscellaneous Existing Drainage Facilities

Runoff from the majority of the commercially developed area north of Candelaria Road, between the North Diversion Channel and Interstate 25, is in the form of street flows that eventually reach a network of drop inlets near the intersection of Aztec Road and the East Frontage Road. The drop inlets were recently constructed as part of the New Mexico State Highway and Transportation Department's (NMSH&TD) Candelaria Road-Freeway renovation project.

The drop inlets connect to two 36-inch reinforced concrete pipe culverts that pass beneath the freeway. A field investigation could not confirm the outlet location of one of these pipes, and the freeway renovation construction plans did not show the continuance of the culverts. Apparently, a piecemeal approach has been taken with regard to the extension of the culverts on Industrial Avenue. Each time more land was developed, the culverts were extended. Finally, when Industrial Avenue was constructed, one of the storm drains was extended to a detention basin located south of Industrial Avenue, adjacent to the New Mexico Youth Diagnostic and Development Center.

This detention basin discharges directly into the Alameda Lateral which, at this particular location, is a 48-inch corrugated metal pipe.

In an effort to verify the culverts outlet location, dye was added to the water entering the drop inlet at Aztec Road and the East Frontage Road. The test confirmed that at least one of 36-inch RCP's connects to a 36-inch CMP on Industrial Avenue which discharges into the previously mentioned detention basin. There is a drop inlet on the south side of Industrial Avenue approximately 20 feet east of the Alameda Lateral. This drop inlet discharges directly into the Lateral. On the north side of Industrial Avenue, there is a manhole where a 36-inch CMP runs up the north side of Industrial Avenue but it's origin is unknown.

Storm runoff from Basin 4 currently flows beneath Interstate 25 by means of a 48-inch RCP. This runoff flows into a small detention basin (Upland Pond) near the American Furniture warehouse and then flows into the Hahn Arroyo. At approximately 400 feet east of Edith Boulevard, the flow in the Hahn Arroyo enters a buried 48-inch diameter pipe. This 48-inch pipe connects to three 24-inch CMP's at an unknown point east of Edith Boulevard. The three CMP's discharge into a triple 6-foot by 6-foot concrete box culvert (CBC) which crosses under Edith Boulevard. Downstream of the CBC, a 36-inch CMP has been installed which carries flow for about one hundred feet, at which point the flow continues overland.

There is a 24-foot by 4-foot CBC crossing beneath Edith Boulevard just south of Vineyard Road. Upstream development has long since destroyed the arroyo that carried runoff to the culvert. The Vineyard Development, which was constructed over the arroyo, developed it's own drainage facilities. These facilities basically consist of roads with inverted crowns that act as a collection system. The entire network of roads discharges into a small detention pond near the west end of the property. Although the storm water collection system is excellent, the detention facility is not large enough to store the entire runoff volume. The small concrete dam (approximately 3 feet high and 45 feet across) forming the detention basin is easily overtopped by moderate rainfall events. The detention basin discharges into the remnants of the aforementioned arroyo by means of a 4-inch orifice in the

concrete dam (and over the top of the dam). The discharge then flows beneath a concrete masonry (CMU) wall and through the 24-foot by 4-foot CBC mentioned above. Since the arroyo downstream of the CBC has been obliterated, this flow travels overland from this point on, ponding near the AT & SF railway.

The Montano Road storm drainage system consists of two detention basins and a network of inlets and storm drain in Montano Road itself. The AGC-Montbell Detention Basin is located south of Montano Road and east of the Alameda Lateral, and is designed to discharge 7.3 cfs. The Renaissance Detention Basin is north of Montano Road and east of the Alameda Lateral. It is designed to discharge 24.3 cfs. Both basins discharge into the Montano Road storm drainage system.

Drop inlets are spaced throughout the Montano roadway from the Alameda Lateral to the Alameda Drain. The drain pipe varies in size from 24-inches to 54-inches in diameter and discharges into the Alameda Drain. However, due to the limited capacity of the drain, discharge is limited to 25 cfs, which creates the need for flow restriction. A flow restriction plate has been installed in the Montano system just east of the AT & SF railway, limiting the discharge to about 15 cfs at that point.

The existing facilities will remain as they are, with the exception of the two CBC structures crossing Edith Boulevard - they will be removed as part of the Edith Boulevard Widening Project.

IV. HYDROLOGY

The Rational Method was used to compute peak runoff rates for all sub-basins draining directly into the Edith Boulevard storm drain system. All sub-basins that drain into detention basins before reaching the Edith system were analyzed using HYMO. In some cases, sub-basins were analyzed with both the Rational Method and HYMO. Both methods require essentially the same input information, namely rainfall-time relationships, abstractions, and times of concentration.

The Rational Formula, Q = CIA, was introduced in the United States by Emil Kuichling in 1889, and has become one of the most widely used methods for designing drainage facilities for small urban areas and highways where:

Q = peak flow, in cfs
C = the runoff coefficient (dimensionless)
I = the maximum average intensity, in inches per hour, over the time of concentration.
A = the size of the drainage area, in acres.

The HYMO computer model was developed by the United States Department of Agriculture. Sub-basins not draining directly into the Edith system were analyzed using a HYMO model modified to reflect the rainfall-runoff relationships specific to the Albuquerque area. The HYMO procedure used to check sub-basins draining directly into the Edith system was based on the proposed revision to the City of Albuquerque DPM, Section 22, March, 1989.

A. Rainfall

1. The 100-year storm.

A 100-year, 6-hour storm was developed for this study area using the National Oceanic and Atmospheric Administration (NOAA) Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume IV - New Mexico.

The 100-year cumulative precipitation depths are:

5 minute	-	0.52"	30 minute	-	1.42"
10 minute	-	0.81"	60 minute	-	1.80"
15 minute	-	1.03"	360 minute	-	2.20"

These depths are plotted to form the mass rainfall curve (See Figure 1).

NOAA 100-YR STORM
FOR ALBUQUERQUE, NM

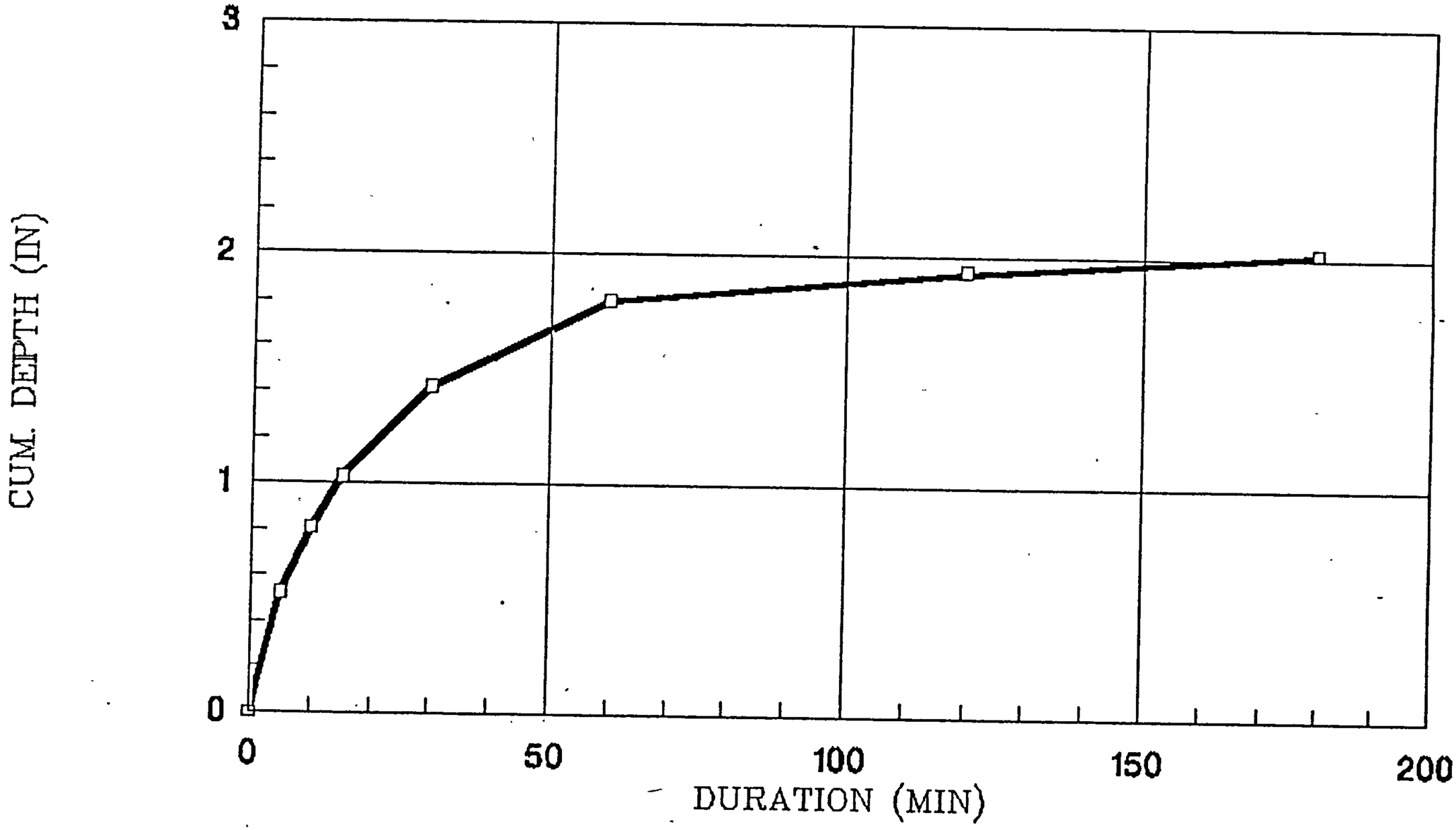
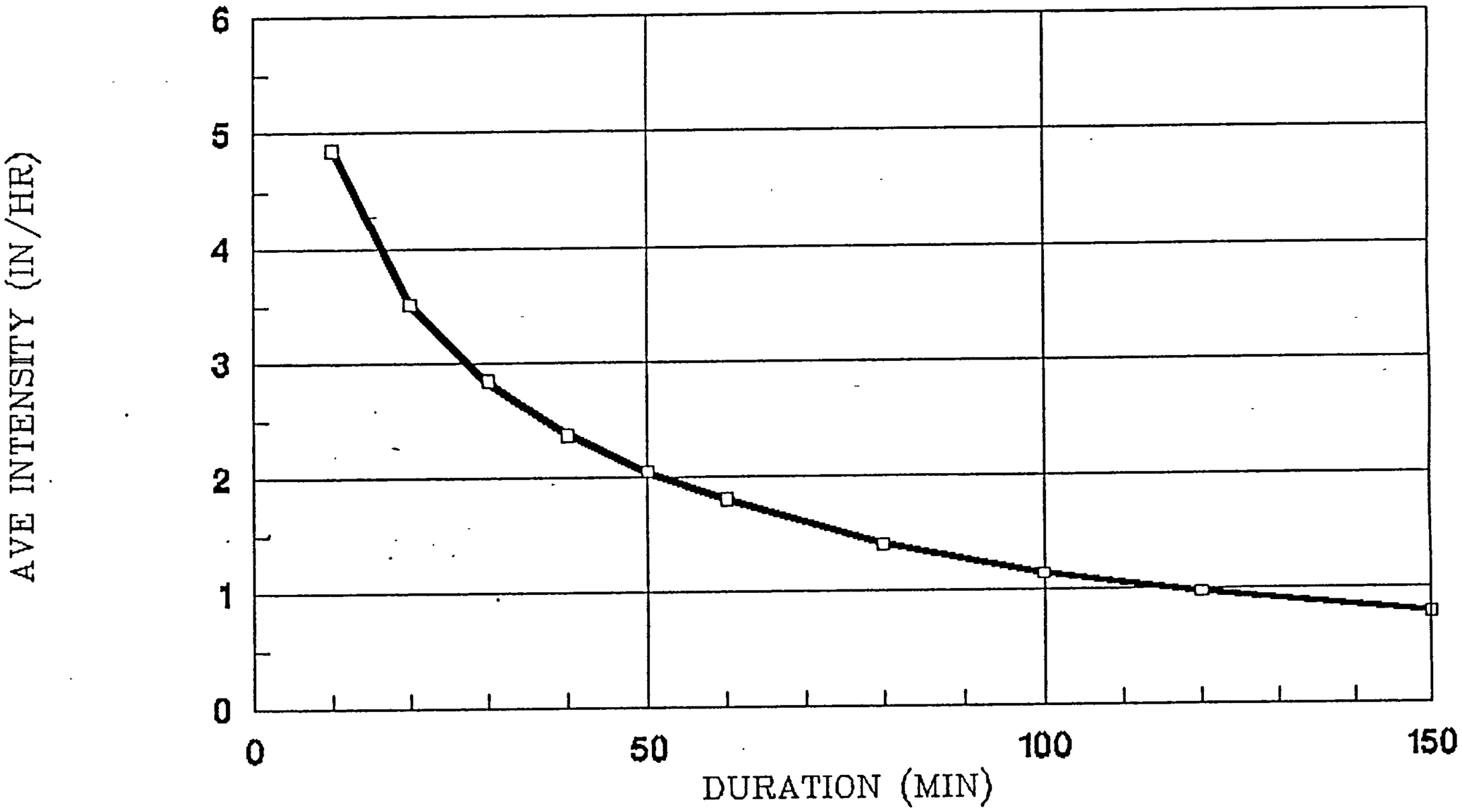


Figure 1

100-YR PDI CURVE
ALBUQUERQUE, NM

FOR USE WITH RATIONAL FORMULA



BASED ON NOAA STORM

Figure 2

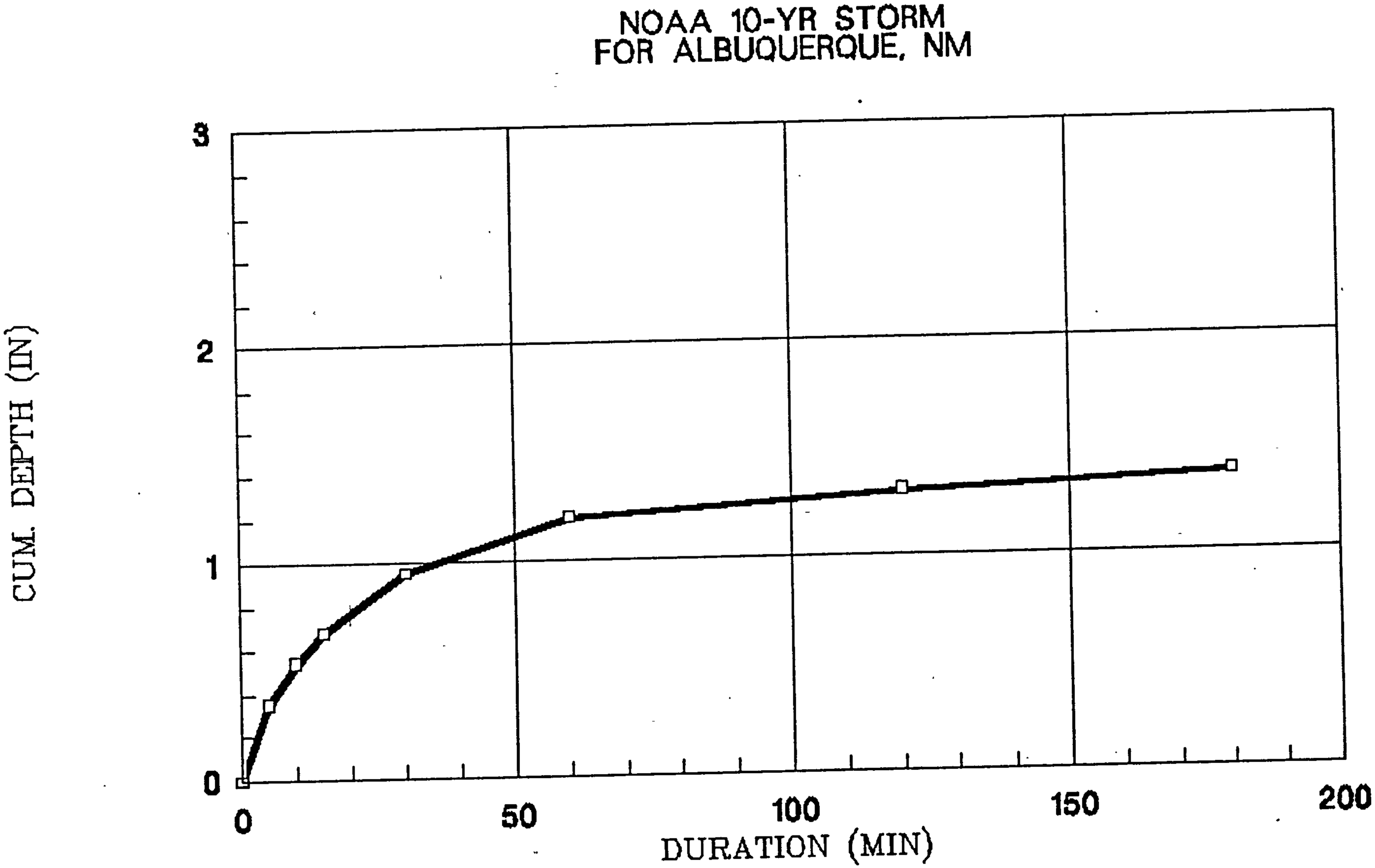
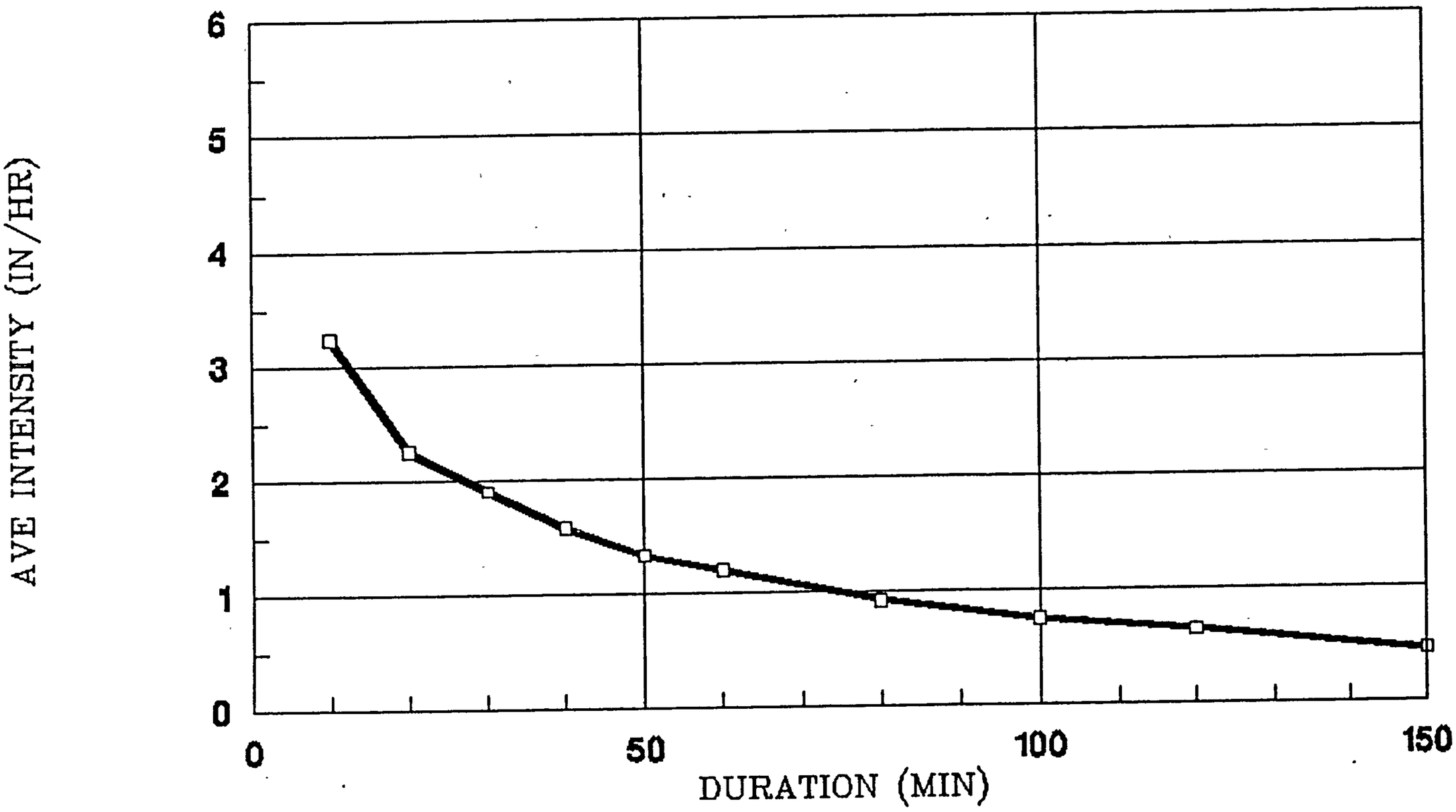

NOAA 10-YR STORM
FOR ALBUQUERQUE, NM
CUM. DEPTH (IN)
3
2
1
0
0
50
100
150
200
DURATION (MIN)

Figure 3

10-YR PDI CURVE
ALBUQUERQUE, NM

FOR USE WITH RATIONAL FORMULA



BASED ON NOAA STORM

Figure 4

The 100-year Precipitation - Duration - average Intensity (PDI) curve (See Figure 2) was developed from the above data. The average intensity - duration relationship is as follows:

Duration (minutes)	Ave. Intensity (inches per hour)
10	4.86
20	3.51
30	2.84
40	2.37
50	2.05
60	1.80
80	1.40
100	1.14
120	0.97
150	0.79

2. The 10-year Storm

The same procedure was used to compute the 10-year Precipitation - Depth - Duration curve, and the 10-year PDI curve. See Figures 3 and 4.

B. Abstractions

1. The Rational Method

The runoff coefficient, C, in the Rational Formula is a dimensionless term that accounts for initial abstractions, as well as infiltration. A coefficient C of 1.0 represents an ideally impervious surface, where all of the precipitation falling on the surface becomes runoff. A coefficient C of 0.0 represents a completely pervious surface where no runoff occurs.

The runoff coefficients used in this analysis were taken from the Denver Regional Council of Governments' Urban Storm Drainage Criteria Manual, prepared by Wright McLaughlin Engineers, Denver, Colorado. Table 1

RECOMMENDED RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY 2	5	10	100
Business:					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	70	.60	.65	.70	.80
Residential:					
Single-Family	-	.40	.45	.50	.60
Multi-Unit (detached)	50	.45	.50	.60	.70
Multi-Unit (attached)	70	.60	.65	.70	.80
1/2 Acre Lot or Larger	-	.30	.35	.40	.60
Apartments	70	.65	.70	.70	.80
Industrial:					
Light Areas	80	.71	.72	.76	.82
Heavy ~~Acres~~ Areas	90	.80	.80	.85	.90
Parks, Cemetaries:	7	.10	.10	.35	.60
Playgrounds:	13	.15	.25	.35	.65
Schools:	50	.45	.50	.60	.70
Railroad Yard Areas	40	.40	.45	.50	.60
Undeveloped Areas:					
Historic Flow Analysis- Greenbelts, Agricultural	2	(See "Lawns")			
Offsite Flow Analysis (when land use not defined)	45	.43	.47	.55	.65
Streets:					
Paved	100	.87	.88	.90	.93
Gravel	13	.15	.25	.35	.65
Drive and Walks:	96	.87	.87	.88	.89
Roofs:	90	.80	.85	.90	.90
Lawns, Sandy Soil	0	.00	.01	.05	.20
Lawns, Clayey Soil	0	.05	.10	.20	.40

NOTE: These Rational Formula coefficients may not be valid for large basins.

Table 1 "C" Values

shows the various C values used in this analysis. As required by the City of Albuquerque Hydrology Department, a C of not less than 0.4 was used for undeveloped land.

2. The HYMO Method

When using HYMO, the SCS curve number (CN) method of abstractions was used. In this method, a curve number is selected based on antecedent conditions, soil type, and types of cover. Soils are classified as A, B, C, or D. Type A soils have the lowest runoff potential and high rates of infiltration. Type D soils have a high runoff potential with low infiltration rates. Table 2 shows the various soil groups found within the study area.

Table 2 - Hydrologic Soil Groups

Soil Series	Symbols	Soil Group
Blue Point	BKD	A
Cut & Fill Land	CU	A
Embudo	EMB	B
Gila	GF, GB	B
VintonVA, VBA	B	
Wink	WEB	B

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

Although a portion of the study area contains type A soils, type B soils dominate in the area and thus type B soils were used for determining the curve number values. When analyzing the sub-basins that do not drain directly into the Edith Boulevard drainage system, CN values were obtained from The City of Albuquerque DPM, Plate 22.2 C.2.

Some sub-basins were analyzed by the Rational Formula and then checked with HYMO. For this HYMO analysis, guidelines set forth in the proposed revision of the City of Albuquerque DPM, Section 22 were used along with the SCS curve number method of abstractions.

C. Land Use

Land use has a direct effect on the amount of runoff "released" from a given area. This analysis was performed assuming fully developed conditions throughout the entire study area. This assumption was made in order to obtain the maximum runoff rates for the given storm, sub-basin, etc.

The area contributing to the Edith Boulevard drainage system was divided into 67 sub-basins. Land use, natural topography, and proposed drainage facility locations were the primary basis for selecting the sub-basin boundaries. With a few exceptions, land use within each sub-basin is assumed to be homogeneous. Weighted C values were used to depict the various types of development within each sub-basin.

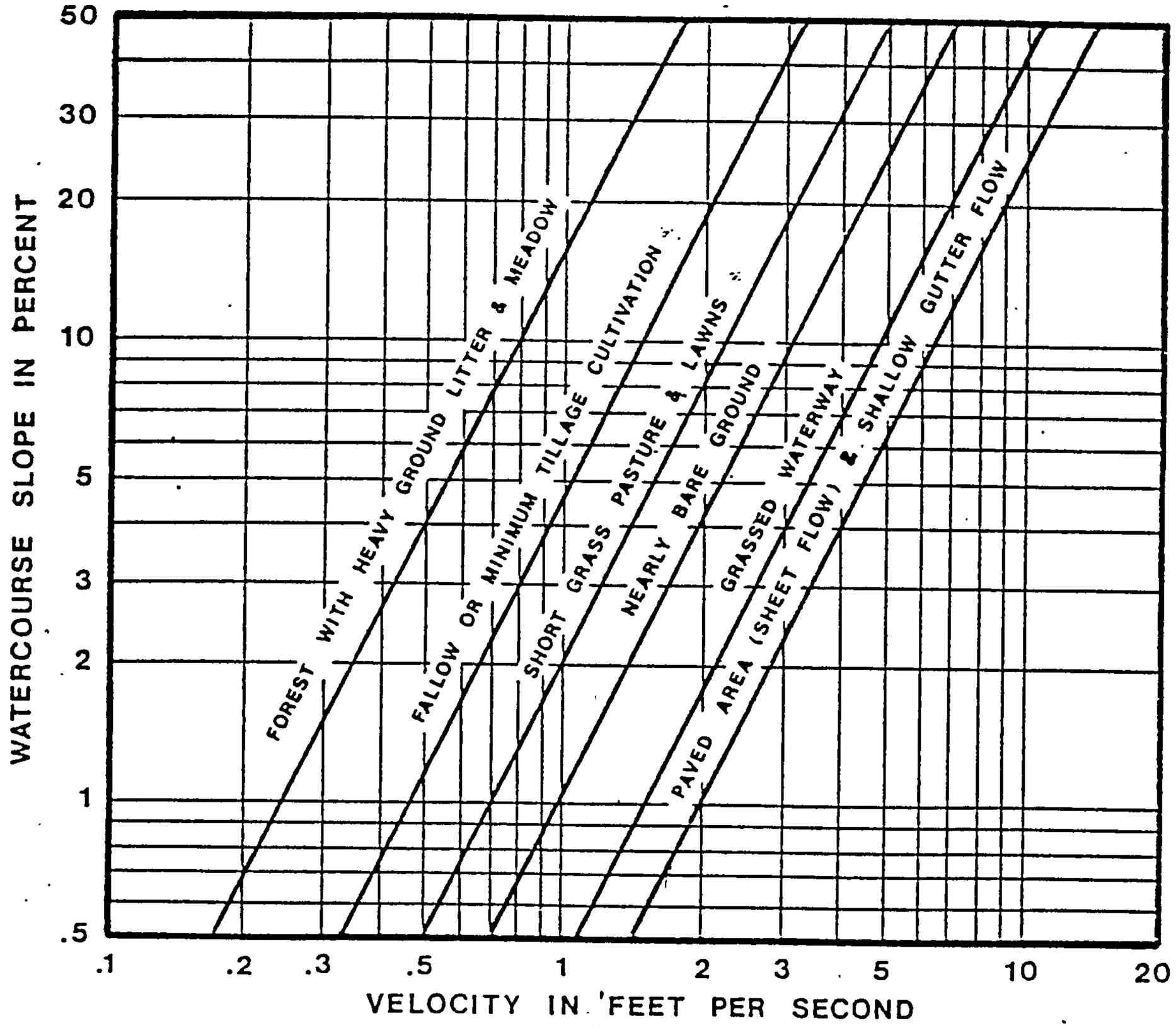
D. Time of Concentration

Times of concentration were determined by the Upland Method ($t_c = L_1/V_1 + L_2/V_2 + ...$), where V_1 = velocity, in feet per minute for reach 1, and L_1 = hydraulic length of reach 1, in feet, etc. The velocities used in this analysis were taken from Figure 5, which is reproduced from "Urban Hydrology For Small Watersheds" Technical Release No. 55, USDA, SCS, January 1975. A minimum time of concentration of 10 minutes was used in this study.

V. RUNOFF DEVELOPMENT AND ANALYSIS

A. Assumptions

There are several existing drainage systems and some currently proposed drainage improvements within the Edith Boulevard drainage study area. Therefore, assumptions must be made regarding the usage and maintenance of these facilities.



Overland Velocities

Figure 5

Sub-basins 18, 19 and 20 are assumed to drain into a detention basin to be constructed in the gravel pit area (see plate I) at a future date. Discharge from this detention basin must be limited to approximately 5 cfs and the basin must be equipped with a sluice gate to shut off the outflow. Discharge will be by means of a storm drain system in Vineyard Road (also to be constructed at a later date) which will connect to the Edith Boulevard drainage system.

The two existing detention basins (Renaissance and AGP-Montbel) are assumed to continue to collect storm water from the entire upstream area within the Montano study area. Discharge from the detention basins must continue to be limited to rates similar to those existing at this time.

The Osuna Road storm drainage system east of Edith Boulevard is assumed to have sufficient capacity to accept all of the 10-year storm runoff. The drainage facilities in Osuna Road that connect to the Edith system are assumed to be placed in such a manner as to collect only the flows greater than those generated in the 10-year event.

It is assumed that storm drainage systems will be constructed in the future on side streets east of the Alameda Lateral and that these systems will be connected to the Edith drainage system. These drainage systems are to be constructed so that the sub-basin boundaries shown in Plate I will be observed.

All of the sub-basins that lie east of Edith Boulevard and west of the Alameda Lateral are assumed to drain directly to the Edith Boulevard roadway. No flows are assumed to pass over Edith Boulevard (east to west).

Runoff from sub-basins 21 through 25 are assumed to be collected and conveyed to the appropriate detention basins by means of storm drainage facilities to be constructed at a later date.

Future development within the New Mexico Youth Diagnostic & Development Center is assumed to proceed in a way that does not significantly change the general drainage paths of the runoff from those paths presently existing.

Runoff generated within the Comanche - Griegos Study Area, with the exception of sub-basin E-1, is assumed to be collected by storm drainage systems other than the Edith Boulevard drainage system. It is further assumed that the storm drainage system on Carmony Lane will be constructed along with the Griegos Pond and it's outlet.

For assumptions dealing with land use, See Appendix B.

B. The Rational Method

As mentioned previously, the Rational Formula was the primary method of hydrologic analysis. Each sub-basin was evaluated to determine composite runoff coefficient, area, slope, velocity of runoff, and time of concentration. After the time of concentration was calculated, the average intensity was read from Figure 2 or 4. With the appropriate C value, the peak flow for each basin was obtained.

The Edith Boulevard drainage system is divided into eight distinct sub-systems, with several sub-basins contributing to each sub-system. For each sub-system, the analysis was started at the furthest upstream sub-basin. The next analysis point was chosen, and the flow time was computed between the two points. At this second analysis point, and subsequent analysis points, the entire contributing area was reevaluated.

A new C value was computed based on all sub-basins contributing to the new analysis point. A new time of concentration was computed by adding the above mentioned flow time to the previous time of concentration. If a sub-basin of significant size had a time of concentration greater than the routed time of concentration, then the greater time was used to compute the new average intensity. The peak flow at each analysis point represents a complete, composite analysis of the entire area contributing flow to the

drainage system at that point. This represents a lesser, but more realistic, flow than would be computed by adding peak flows from each sub-basin.

C. The 10-Year Event

The 10-year flow rates were computed in order to evaluate flooding conditions within the Edith Boulevard roadway during a 10-year rainfall event. The City of Albuquerque criteria requires that for a four lane roadway one driving lane in each direction be clear of standing water throughout the 10-year storm. This requires that curb inlets be located properly to prevent excessive ponding in the roadway. The 10-year runoff volume was also computed so that the 10-year water surface elevation in the detention basins could be calculated for the purpose of hydraulic grade line control. Refer to Table 12 for 10-year water surface elevations.

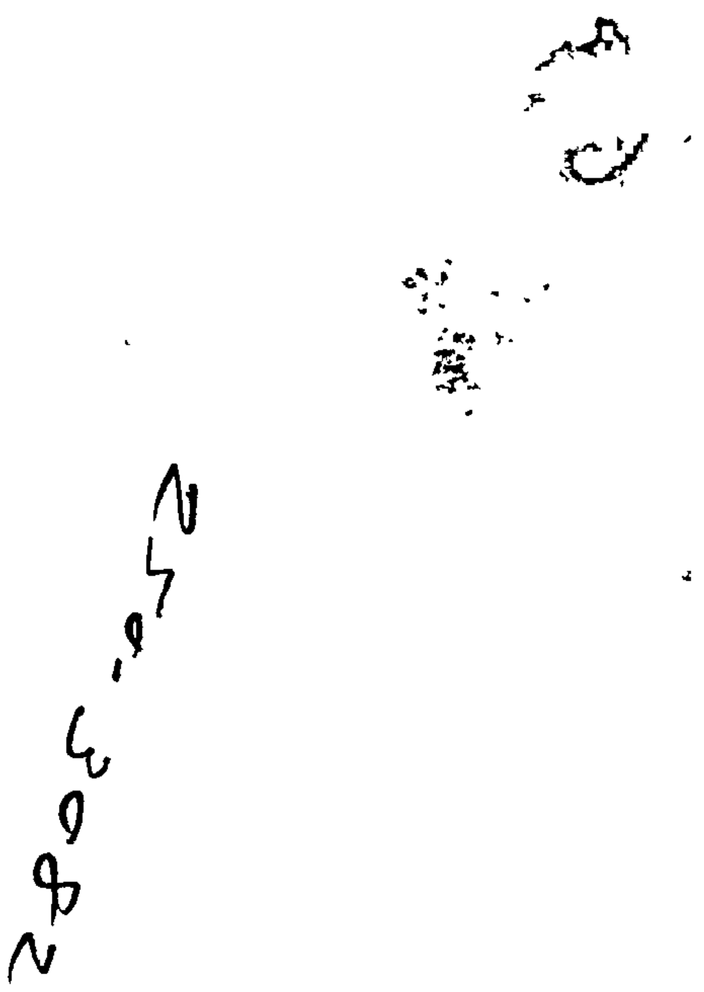
D. The 100-Year Event

The 100-year rainfall event governed the design of the conveyance facilities, as well as the capacity requirements of the detention basins.

Pipes were designed to convey the 100-year, 6-hour peak flows. RCP was used exclusively throughout the Edith Boulevard drainage system. Pipes were initially sized for full-flow conditions using Mannings Equation. Final pipe sizes were selected based on the hydraulic grade line elevation. A pipe diameter of 24 inches was the minimum size for any main line, while the minimum size of inlet connector pipes was 18 inches.

Roadway inlet structures were designed so that the free water surface on Edith Boulevard does not exceed the elevation of the back of the sidewalk during the 100-year storm.

Detention basins were designed to store the runoff generated by the 100-year, 24-hour storm. Two feet of freeboard was used on all detention basins and discharge was controlled in order to meet downstream constraints. The SCS method was used to compute runoff volumes. See Table 12 for a summary of the detention basin hydraulic characteristics.

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