KOA ADDITION

TRACT B-1

K22/D24

3 PLANS

INFORMATION SHEET

PROJECT TITLE SANDIA RIDGE APARTMENTS TYPE OF SUBMITTAL CONCEPTUAL DRAINAGE RPT

ZONE ATLAS PAGE NO. K-22 CITY ADDRESS N/A

LEGAL DESCRIPTION TRACT B-1, KOA SUBDIVISION, UNIT 2

ENGINEERING FIRM Andrews, Asbury & Robert CONTACT John Robert

ADDRESS 149 Jackson NE, Albuquerque PHONE 265-6631

OWNER Sumner & Greener, Inc. CONTACT Roland Martinez

ADDRESS 9500 Forest Lane, Dallas, TX PHONE 214/341-9982

ARCHITECT Greener & Sumner CONTACT Roland Martinez

ADDRESS 9400 Forest Lane, Dallas, TX PHONE 214/341-9982

SURVEYOR Tom Mann & Assocites CONTACT Tom Mann

ADDRESS 811 Dallas NE, Albuquerque PHONE 265-5611

CONTRACTOR N/A CONTACT

ADDRESS PHONE

DATE SUBMITTED July 29, 1983

BY Andrews, Asbury & Robert, Inc.

RECEIVED
JUL 29 1983
ENGINEERING

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

July 29, 1983

K22-D24

Mr. Fred Aguire
City Engineering/Hydrology
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

RECEIVED
JUL 29 1983
ENGINEERING

SUBJECT: KOA ADDITION, TRACT B-1

Dear Mr. Aguire:

Transmitted herewith are two copies of the conceptual drainage report for subject project.

We trust the data contained will provide you with the information required to make a timely approval of the Drainage Plan.

If you have any questions, please don't hesitate to contact us.

Very truly yours,

JOHN B. ROBERT, P.E. & L.S.

mt-333

Enclosures

cc: Mr. Roland Martinez, Sumner & Greener (w/enclosure)

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

August 22, 1983

Mr. John Robert
Andrews, Asbury & Robert
149 Jackson NE
Albuquerque, NM 87108

REF: SANDIA RIDGE APARTMENTS CONCEPTUAL DRAINAGE REPORT (K22-D24)

Dear Mr. Robert:

The concept of the above mentioned report is okay with the following exceptions:

1. The controlled discharge is too large, all flows must be routed through ponds with a total discharge of 0.5 cfs per acre maximum.

   a. Larger discharge rates can be accepted only if it can be shown that they will not adversly affect any down stream flooding problems.

2. All flows must be directed to Public Right-of-Way or through a Private drainage easement to Public Right-of-Way.

3. Some means should be addressed to contain nuisance flows from the site.

4. The revised report should be stamped & signed by a New Mexico Registered Professional Engineer.

If you have any questions, please feel free to call me at 766-7644.

Sincerely,

John Armstrong
Civil Engineer/Hydrology

JA:mrk

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

K32
D24

February 24, 1984

Mr. Bob Cole
MDD, Planning Division
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: SANDIA RIDGE APARTMENTS

Dear Mr. Cole:

Transmitted herewith are five (5) prints of the Site Development Plans for subject project for action by the Development Review Board at their March 6, 1984, meeting.

Very truly yours,

John A. Andrews

JOHN A. ANDREWS, P.E.

mt-333

Attachments (5)

cc: Ernest Williams, Greener & Sumner (w/o attachments)

Place in Drawer
file w/ report

INFORMATION SHEET

PROJECT TITLE SANDIA RIDGE APARTMENTS TYPE OF SUBMITTAL DRAINAGE REPORT

ZONE ATLAS PAGE NO. K-22 -D24 CITY ADDRESS N/A

LEGAL DESCRIPTION TRACT B-1 OF TRACT B, KOA SUBDIVISION, UNIT 2

ENGINEERING FIRM ANDREWS, ASBURY & ROBERT, INC. CONTACT Robert S. Foglesong PE & LS

ADDRESS 149 Jackson NE, Albuquerque, NM 87108 PHONE 265-6631

OWNER SANDIA RIDGE PARTNERS LTD. CONTACT Ernest Williams

ADDRESS 9500 Forest Lane #500, Dallas, TX 75243 PHONE 214/341-9982

ARCHITECT GREENER & SUMNER CONTACT Roland Martinez

ADDRESS 9500 Forest Lane #500, Dallas, TX 75243 PHONE 214/341-9982

SURVEYOR ANDREWS, ASBURY & ROBERT, INC. CONTACT Gayle Jewell LS

ADDRESS 149 Jackson NE, Albuquerque, NM 87108 PHONE 265-6631

CONTRACTOR N/A CONTACT

ADDRESS PHONE

PRE-DESIGN MEETING:

___ YES Conceptual Drainage Report dated July, 1983
___ NO
___ COPY OF CONFERENCE RECAP SHEET PROVIDED

PLEASE CHECK TYPE OF APPROVAL EXPECTED WITH THIS SUBMITTAL

___ SKETCH PLAT APPROVAL
___ PRELIMINARY PLAT APPROVAL
___ SITE DEVELOPMENT PLAN APPROVAL
___ FINAL PLAT APPROVAL
X BUILDING PERMIT APPROVAL
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ ROUGH GRADING PERMIT APPROVAL
___ GRADING/PAVING PERMIT APPROVAL
___ OTHER _____ (SPECIFY)

RECEIVED MAR 27 1984 HYDROLOGY SECTION

DATE SUBMITTED: _____

BY: ANDREWS, ASBURY & ROBERT, INC.

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

March 27, 1984

Mr. Fred Aguirre
City Engineering-Hydrology
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: SANDIA RIDGE APARTMENTS

Dear Mr. Aguirre:

Transmitted herewith are two (2) copies of the Drainage Plan for subject project for your review and approval.

This Drainage Plan is prepared for the purposes of the owner to obtain a building permit for subject apartments.

Your early review and approval of this plan will be appreciated. Should any questions arise, please call.

Very truly yours,

John A. Andrews

JOHN A. ANDREWS, P.E.

mt-333

Attachments (2)

RECEIVED
MAR 27 1984
HYDROLOGY SECTION

4/18/84

Revision to show wall and RR ties along W property line. Additional spot elevation around parimeter to clarify interfacing. TC & FL elevations for SKyline Drive. Engineers signature and date.

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S.

RECEIVED
APR 20 1984
HYDROLOGY SECTION

K22-D 2

April 19, 1984

Mr. Billy J. Goolsby
City Engineering - Hydrology
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

SUBJECT: SANDIA RIDGE APARTMENTS, DRAINAGE REPORT

Dear Mr. Goolsby:

As per our telephone conversation of April 18, 1984, with regard to the subject project, we have incorporated the following suggestions.

1. In accordance with the requirements of the Design Procedure Manual regarding the top of curb and flowline elevations for the existing curb and gutter on Skyline Drive and street width will be shown.

2. Additional spot elevations around the perimeter of the property will be shown. The proposed earth retaining structure along the west property line has been shown on the grading plan with reference to the landscaping plan for details.

   In a telephone conversation with the landscape architects (George R. Hunt Associates, Garland, Texas) this morning, I was informed that the final landscape plan for the project is being added to the construction plans and will be added to the "building permit" sets of plans before construction.

3. In accordance with the Design Procedure Manual, the engineer will sign and date the appropriate sheets.

I trust this will provide sufficient data for approval of subject project to be made. Please call if you have any questions.

Very truly yours,

Robert S. Fogleson

ROBERT S. FOGLESONG, P.E. & L.S.

mt-333

Attachments

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

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

April 20, 1984

Robert Foglesong
Andrews, Asbury & Robert, Inc.
149 Jackson NE
Albuquerque, NM 87108

REF: REVISED GRADING AND DRAINAGE PLAN FOR SANDIA RIDGE APARTMENTS
(K22-D24) RECEIVED APRIL 20, 1984

Dear Mr. Foglesong:

The above referenced plan dated 4/18/84 is approved. Building permit has been issued with the condition that the detail for the retaining wall adjacent to the southwest property line will be submitted to this office to update our file.

If you have any questions, please feel free to contact me at 766-7644.

Yours truly,

Billy J. Goolsby

Billy J. Goolsby, PE
City/County Flood Plain Admin.

BJG:mrk

Mike Prey Construction
292-7788 12021 Skyline Superintendant
NE 87123

John Andrews did not make this submittal. I spoke to him on 10/16/85 @ 2:25 p.m. and he suggested I call Mike Prey (above) regarding this submittal.

Barbara,
Send it back and ask where it is.
John Andrews knows better.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: SANDIA RIDGE APTS. ZONE ATLAS/DRNG. FILE #: K22-D24

LEGAL DESCRIPTION: TRACT B-1, KOA. SUBDIVISION UNIT 2

CITY ADDRESS: 12021 SKYLINE NE ALBUQUERQUE

ENGINEERING FIRM: ANDREWS, ASBURY, ROBERTS, INC. CONTACT: JOHN ANDREWS

ADDRESS: 199 JACKSON, NE, ALBUQUERQUE NM. PHONE: (505) 265.6631

OWNER: SANDIA RIDGE PARTNERS LTD CONTACT: DAVID ~~MEYNSKI~~ PIECZYNSKI

ADDRESS: 900 ST. PAUL ST SUITE 200 RICHARDSON, TX 75080 PHONE: (214) 669.7979

ARCHITECT: GREENER & SUMNER ARCHITECTS CONTACT: MIKE BARTLETT

ADDRESS: 900 ST PAUL ST. SUITE 200 RICHARDSON, TX 75080 PHONE: (214) 669.1818

SURVEYOR: CLAUSEN & ASSOCIATES, CONTACT: DAVID CLAUSEN

ADDRESS: PO BOX 16031 ALBUQUERQUE NM 87176 PHONE: (505) 888-0670

CONTRACTOR: GREENER & SUMNER CONSTRUCTION INC. CONTACT: LARRY VISCONTI

ADDRESS: 900 ST PAUL ST. SUITE 280, RICHARDSON, TX 75080 PHONE: (214) 669.0500

RECEIVED OCT 14 1985 HYDROLOGY SECTION

PRE-DESIGN MEETING:

____ YES
____ NO
____ COPY OF CONFERENCE RECAP SHEET PROVIDED

DRB NO. ____
EPC NO. ____
PROJ. NO. ____

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
____ ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ SITE DEVELOPMENT PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ BUILDING PERMIT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ ROUGH GRADING PERMIT APPROVAL
____ GRADING/PAVING PERMIT APPROVAL
X OTHER Phasing (SPECIFY)

DATE SUBMITTED: ____

BY: ____

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

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

October 18, 1985

Mr. Mike Prey
12021 Skyline NE
Albuquerque, NM 87123

REF: PHASING PLAN FOR SANDIA RIDGE APTS. (K22-D24)
RECEIVED 10/14/85

Dear Mr. Prey:

Based on the information submitted on 10/16/85, we are unable to process your request at this time due to the lack of information contained within your submittal. In conversing with John Andrews of Andrews, Asbury and Roberts, Inc. he has indicated to me that he is unaware of any phasing plan prepared by his firm. In order to continue the process, listed you will find certain concerns that will need to be addressed:

1. Phasing plan must be submitted by the Engineer.
2. Underground systems not inspected by my inspector will either have to be exposed so that an inspection can be conducted or your Engineer can certify to their capability of functioning as designed.
3. Each phase must be capable of functioning by themselves in order that permanent certificate of occupation can be issued. If not capable then temporary C.O.'s may be issued with adequate steps taken to control erosion.
4. All construction within City R/W must be inspected by the proper agencies and confirmation submitted to our department in letter form.

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

Sincerely,

Bernie J. Montoya

Bernie J. Montoya CE
Engineering Assistant/Hydrology

BJM:mrk

GREENER & SUMNER CONSTRUCTION, INC.

November 20, 1985

Mr. Bernie A. Montoya
Design Hydrology Section
123 Central N.W.
Albuquerque, N.M. 87102

Dear Mr. Montoya:

This is to inform you that Greener & Sumner Construction, Inc. has engaged Andrew, Ashbury & Roberts, Inc. for the purpose of developing and submitting a permanent drainage phasing plan for your approval and to certify the drainage facilities and all systems pertaining thereto to be constructed to substantially fulfill the requirements of the approved plans.

The certifications for permanent C.O.'s will be submitted for your review as we complete the approved phases.

We appreciate your cooperation and help by issuing temporary C.O.'s to allow us to continue the construction of our project without costly radical changes of sequence. We accept responsibility for any drainage problems that may arise from this procedure.

Sincerely,

GREENER & SUMNER CONSTRUCTION, INC.
SANDIA RIDGE PARTNERS, LTD

cc: Ernest Williams
David Pieczynski

~~10120~~ 5
12021 Skyline NE
30 day temp. released on 11/22/85 for Phase I

900 St. Paul Street, Suite 280
Richardson, TX 75080
214/669-0500

KM-DN4

GREENER & SUMNER
CONSTRUCTION, INC.
12021 Skyline NE
Albuquerque, NM 87123
505/292-7788

December 5, 1985

Design Hydrology Section
123 Central N.W.
Albuquerque, N. M. 87102

Attn: Bernie Montoya

Re: Addendum to previous letter dated 11/20/85

Dear Mr. Montoya

Confirming our conversation of 12/5/85. Because of the original order of completion the engineer has determined that it will be extremely difficult to break the project up into viable phases for drainage at this stage.

We therefore request that we be issued temporary CO's on each of our architectural phases and we will have the engineer certify the entire project upon completion and submit it for your approval.

Once again, as stated in the last letter, we assume liability for any damages from storm drainage resulting from this proceedure. we appreciate your help and cooperation in this manner and apologize for any inconvenience to you

Sincerely,

Michael D. Pray
Greener & Sumner Construction

11500 Manual Blvd.

Shopping Center

Roswell Stoney

292-0900

K22-D24

GREENER & SUMNER
CONSTRUCTION, INC.
12021 Skyline NE
Albuquerque, NM 87123
505/292-7788

February 20, 1986

Design Hydrology Section
123 Central N.W.
Albuquerque, N.M. 87102

Gentlemen,

Due to some contractural problems we are behind schedule on having our manholes raised for the sanitary sewer system. We have solved our problems and the work is progressing in a satisfactory manner. We should be able to have the engineers final certification on the project in 2 to 3 weeks.

We respectfully request your indulgence to continue to allow us to receive temporary approval on our phases until we can provide you with certification and to extend those approvals already given.

We appreciate your help.

Sincerely,

Michael D. Pray

Michael D. Pray
Project Superintendent

PROJECT ADDRESS 12021 SKYLINE NE.

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Sandia Ridge Apartments ZONE ATLAS/DRNG. FILE #: K22-D24

LEGAL DESCRIPTION: Tract B-1 of Tract B, KOA Subdivision, Unit 2

CITY ADDRESS: 12021 Skyline, N.E., Albuquerque, New Mexico

ENGINEERING FIRM: Andrews, Asbury & Robert, Inc. CONTACT: Robert Foglesong

ADDRESS: 149 Jackson St., N.E. PHONE: 265-6631

OWNER: Sandia Ridge Partners, LTD CONTACT: Ernest Williams

ADDRESS 9500 Forest Lane # 500 Dallas, Texas 75243 PHONE: 214/341-9982

ARCHITECT: Greener & Sumner CONTACT: Roland Martinez

ADDRESS: 9500 Forest Lane # 500 Dallas, Texas 75243 PHONE: 214/341-9982

SURVEYOR: Andrews, Asbury & Robert, Inc. CONTACT: Gayle Jewell

ADDRESS: 149 Jackson St., N.E. PHONE: 265-6631

CONTRACTOR: Greener & Sumner CONTACT: Mike Pray

ADDRESS: 12021 Skyline, N.E. PHONE: 292-7788

PRE-DESIGN MEETING:

_____ YES

_____ NO

_____ COPY OF CONFERENCE RECAP SHEET PROVIDED

RECEIVED MAY 07 1986 HYDROLOGY SECTION

DRB NO. _____

EPC NO. _____

PROJECT NO. _____

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAIN. PLAN

_____ GRADING PLAN

_____ EROSION CONTROL PLAN

X ENGINEER'S CERTIFICATION

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAT APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ SITE DEVELOPMENT PLAN APPROVAL

_____ FINAL PLAT APPROVAL

_____ BUILDING PERMIT APPROVAL

_____ FOUNDATION PERMIT APPROVAL

X CERTIFICATE OF OCCUPANCY APPROVAL

_____ ROUGH GRADING PERMIT APPROVAL

_____ GRADING/PAVING PERMIT APPROVAL

OTHER _____ (SPECIFY)

DATE SUBMITTED: May 7, 1986

BY: Robert Foglesong

Rev. 11/84

ANDREWS, ASBURY & ROBERT, INC.
Consulting Engineers
149 Jackson, NE, Albuquerque, New Mexico 87108
(505) 265-6631

John A. Andrews, P.E.
Charles T. Asbury, P.E.
John B. Robert, P.E. & L.S. (1915 - 1984)
James E. Millington, P.E. - V.P.

RECEIVED
MAY 07 1986
HYDROLOGY SECTION

May 7, 1986

Mr. Bernie J. Montoya
Engineering Assistant/Hydrology
Public Works Department - Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

HAND DELIVERED

SUBJECT: SANDIA RIDGE APARTMENTS
(K22-D24)

Dear Mr. Montoya:

Enclosed are two (2) copies of the "As-Built" Drainage Plan (Map No. 4) for the Sandia Ridge Apartment project for your review and approval.

Please call if you have any questions.

Very truly yours,

ROBERT S. FOGLESONG, P.E. L.S.

shj-333-A
Enclosures (2)
cc: Mike Pray, Greener & Sumner
w/o encl.

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

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

May 9, 1986

John Andrews
Andrews, Asbury, & Robert, Inc.
149 Jackson Street, NE
Albuquerque, New Mexico 87108

RE: CERTIFICATION FOR SANDIA RIDGE APARTMENTS (K-22/D24)
ENGINEER'S CERTIFICATION STATEMENT DATED MAY 5, 1986

Dear John:

Based on the information provided on your May 7, 1986 submittal, the above referenced certification is acceptable. Please advise your client to contact Rick Duran, Hydrology Inspector, to make arrangements for the release of the Certificate of Occupancy.

If I can be of further assistance, please feel free to contact me at 766-7644.

Sincerely,

Bernie J. Montoya

Bernie J. Montoya, C.E.
Engineering Assistant

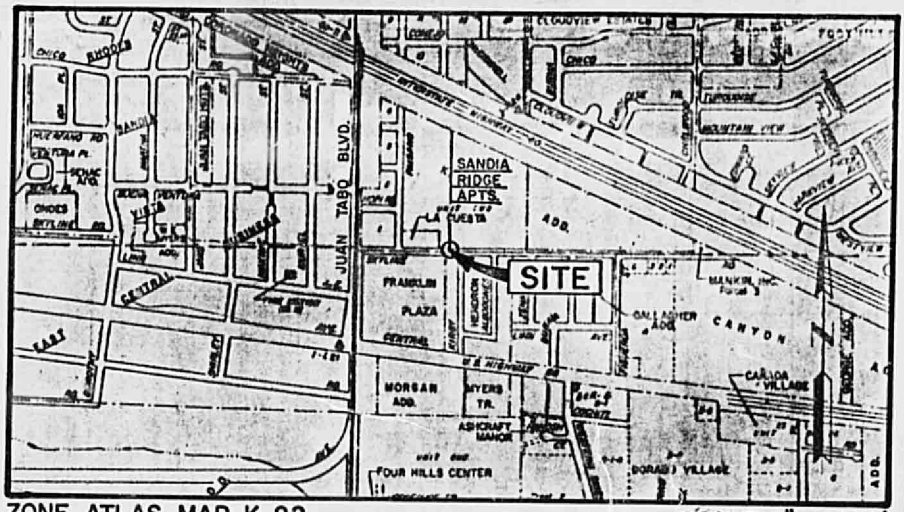
cc: Sandia Ridge Partners, Ltd.

Rick Duran

BJM/bsj

CITY OF ALBUQUERQUE

DRAINAGE FACILITIES WITHIN CITY RIGHT OF WAY



ZONE ATLAS MAP K-22

SCALE: 1" = 1000'

VICINITY MAP

DESCRIPTION OF WORK

MULTIPLE SIDEWALK CULVERT W/STEEL PLATE TOP

LEGAL DESCRIPTION

TRACT B-1 OF TRACT B
KOA SUBDIVISION, UNIT 2

BENCHMARK

ACS STA "1-L21 RESET"
ELEV = 5584.54
STANDARD ACS BRASS TABLET
81' WEST OF JUAN TABO BLVD.
ON MEDIAN IN CENTRAL AVE.

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
No. 9
JOHN A. ANDREWS
11-22-85

NOTICE TO CONTRACTOR

1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY. AN APPROVED COPY OF THESE PLANS MUST BE SUBMITTED AT THE TIME OF APPLICATION FOR THIS PERMIT.

2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985 EDITION.

3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765-1234, FOR LOCATION OF EXISTING UTILITIES.

4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.

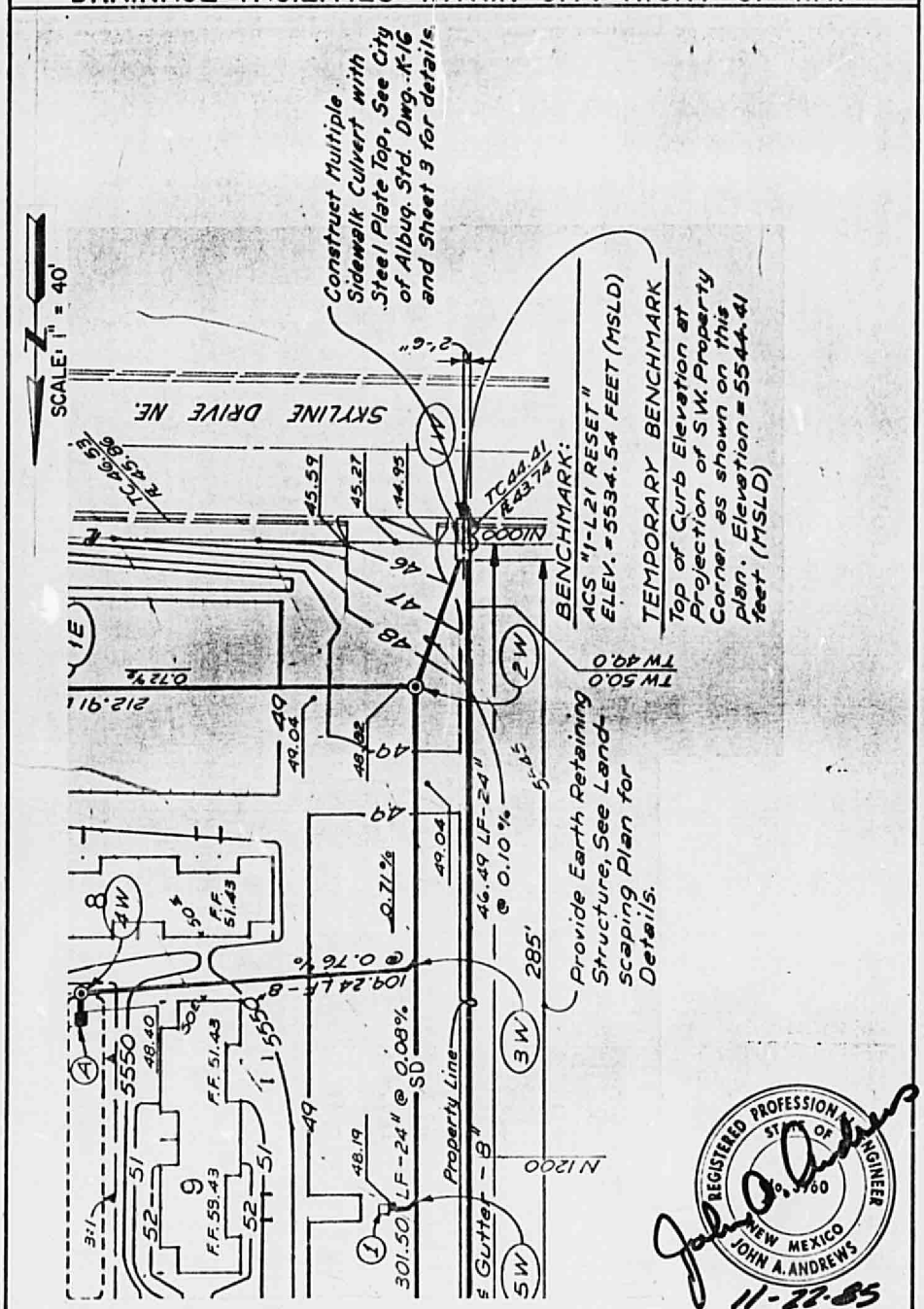
5. BACKFILL COMPACTION SHALL BE ACCORDING TO RESIDENTIAL STREET USE.

UNIVERSAL CONSTRUCTION 672-074 E-137

APPROVALS	ENGINEER	DATE	TITLE: MULTIPLE SIDEWALK CULVERT SANDIA RIDGE APARTMENTS 12021 SKYLINE DRIVE NE	
A.C.E./DESIGN		11/29/85		
INSPECTOR	L.R.		PERMIT NO. 25785 SHEET 1 OF 3	MAP NO. K-22
A.C.E./FIELD		1-2-86		

CITY OF ALBUQUERQUE

DRAINAGE FACILITIES WITHIN CITY RIGHT OF WAY



E-137

UNIVERSAL CONSTRUCTION

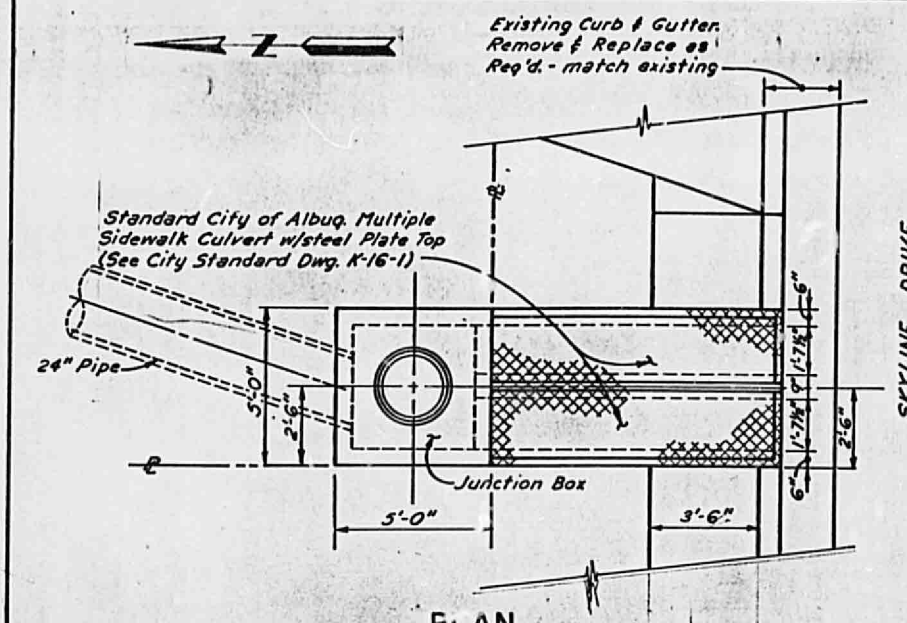
APPROVALS	ENGINEER	DATE	TITLE: MULTIPLE SIDEWALK CULVERT SANDIA RIDGE APARTMENTS 12021 SKYLINE DRIVE NE	
A.C.E./DESIGN		11/29/85		
INSPECTOR	L. R.		PERMIT NO. 25785 SHEET 2 OF 3	MAP NO. K-22
A.C.E./FIELD		4-2-86		

REGISTERED PROFESSIONAL ENGINEER STATE OF NEW MEXICO JOHN A. ANDREWS

11-22-85

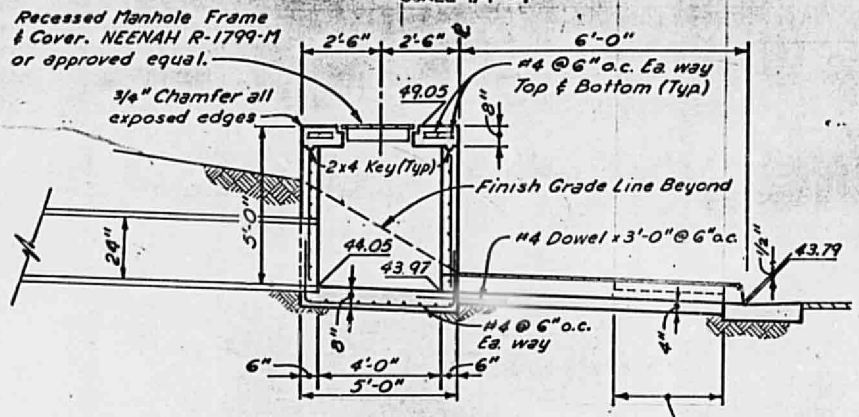
CITY OF ALBUQUERQUE

DRAINAGE FACILITIES WITHIN CITY RIGHT OF WAY



PLAN

SCALE: 1/4" = 1'



SECTION

SCALE: 1/4" = 1'

REGISTERED PROFESSIONAL ENGINEER STATE OF NEW MEXICO JOHN A. ANDREWS No. 7760

Note:
Rub exposed structural concrete with "Thoroseal" to 6" below finish grade.

11-22-85 UNIVERSAL CONSTRUCTION

E-137

APPROVALS	ENGINEER	DATE	TITLE: MULTIPLE SIDEWALK CULVERT SANDIA RIDGE APARTMENTS 12021 SKYLINE DRIVE NE	
A.C.E./DESIGN		11/29/85		
INSPECTOR	L.R.		PERMIT NO. 25785 SHEET 3 OF 3	MAP NO. K-22
A.C.E./FIELD		4-2-86		

Greener & Sumner
Dallas, Texas

DRAINAGE PLAN
FOR
SANDIA RIDGE APARTMENTS

RECEIVED
MAR 27 1984
HYDROLOGY SECTION

March, 1984

REGISTERED PROFESSIONAL ENGINEER
STATE OF
No. 3760
NEW MEXICO
JOHN A. ANDREWS

Prepared by

Andrews, Asbury & Robert, Inc.
Consulting Engineers
Albuquerque, New Mexico 87108

DRAINAGE PLAN
FOR
SANDIA RIDGE APARTMENTS

Table of Contents

		Page
I	Introduction	1
II	Existing Conditions	2
III	Developed Conditions	4
IV	Erosion Control	5
	Map No. 1, Location Map (Zone Atlas Map K-22-Z)	
	Map No. 2, Drainage Analysis-Soils Map	
	Map No. 3, Drainage Analysis (Albuquerque Master Drainage Study)	
V	Drainage Analysis	6
	Computations	1 through 28
Maps and Enclosures		
	Map No. 3, Existing Conditions	
	Map No. 4, Developed Conditions	
	From Contract Drawings titled "Sandia Ridge Apartments"	
	Layout Plan	Sheet C.1
	Grading & Storm Drain Plan	Sheet C.2
	Site Details	Sheet C.3
	Water & Sewer Details	Sheet C.4

I. INTRODUCTION

Greener & Sumner propose to improve an 11.912 acre tract of land to be designated as Sandia Ridge. (See enclosed plat of Sandia Ridge. The tract of land is located within the Northeast Quadrant of Albuquerque, New Mexico, (see enclosed Location Map, Map No. 1, Zone Atlas Map K-22).

The proposed type of development will consist of an apartment complex that will hereinafter be referred to as the Sandia Ridge Apartments. The complex will consist of two and three story buildings of various dimensions. The buildings will have pitched roofs with the ridge located at the center of the structure.

The drainage plan presented herein is based upon a previous report entitled "Conceptual Drainage Plan for Sandia Ridge Apartments" dated July, 1983. The proposed plan incorporates comments received from the City of Albuquerque Hydrology Section. The plan provides for an acceptable method of developing the tract and providing for the development of adjacent lands.

II. EXISTING CONDITIONS

The subject property is presently undeveloped with a slope from east to west of approximately 2.8 percent. The tract is bounded on the south by Skyline Drive NE which is an improved roadway with pavement, curb and gutter, and sidewalks.

KOA Campgrounds, an improved area, bounds the subject property on the east. The tract is bounded on the north by Interstate 40, an improved roadway with pavement. The area to the west is presently under development.

Delineation of the site on Soil Conservation Service soils maps indicates that the soil groups in the area are classified as "gravelly fine sandy loam" of the Tijeras series (TgB) which is classified as hydrologic soil group B. (See enclosed Soil Map, Map No. 2.)

Delineation of the site on the Albuquerque Master Drainage Study indicates that the area is not within any flood zones. (See enclosed Albuquerque Master Drainage Study, Map No. 3.)

Offsite flows impact the subject property from the improved roadway of Interstate 40. The storm water generated from this area crosses the north boundary of the property as sheet flow.

Improvements to the east prevent storm water from impacting the property from that direction.

Presently, the subject property drains to the west and southwest. (See enclosed Map No. 4, Existing Conditions.) The major portion of the tract designated as Drainage Area E-1 drains to the southwest and crosses the south and west boundaries as sheet flow. This area is presently under development.

Drainage Area E-2 drains to the west across presently undeveloped land.

III. DEVELOPED CONDITIONS

The proposed development consists of 26 two story buildings and 2 three story buildings with associated parking and recreational areas. (See enclosed Map No. 5, Developed Conditions.)

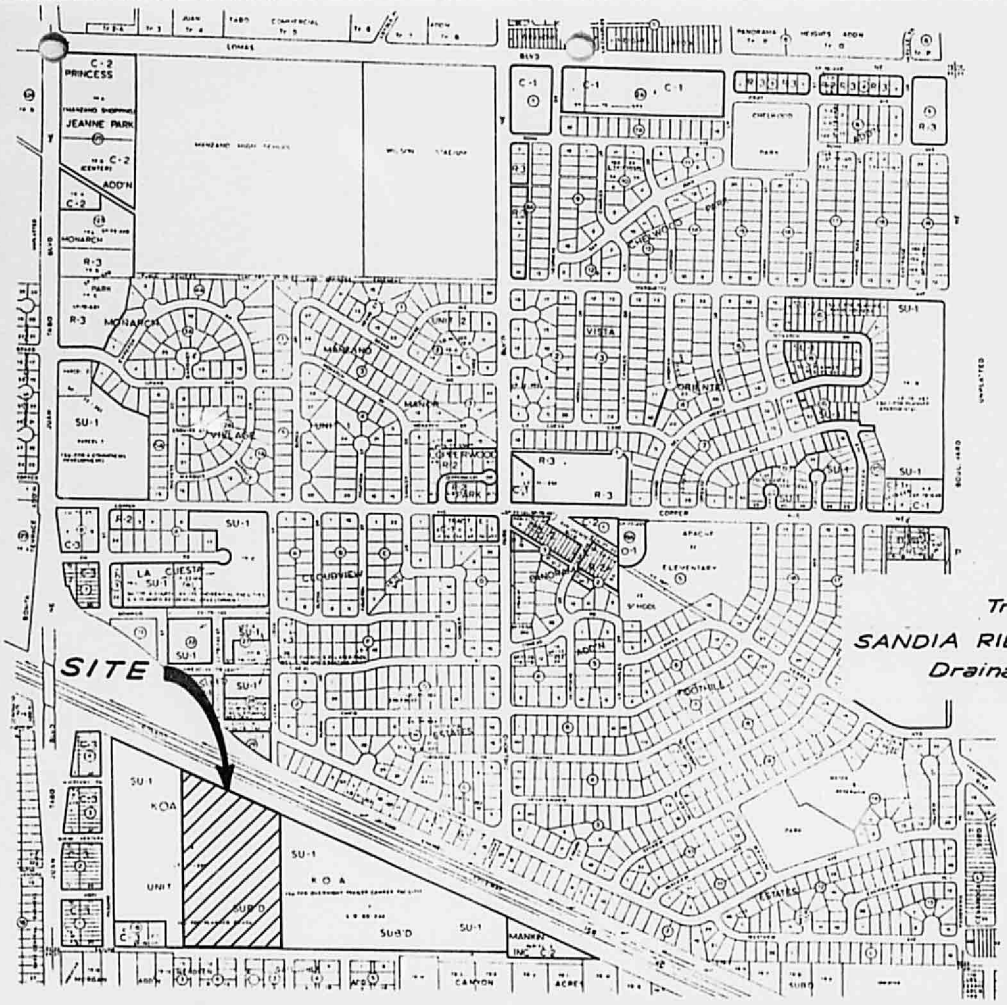
It is proposed to reduce the developed peak rate by construction of on-site detention ponds. The positive discharge of each pond will be sized so that the pond will not overflow. The discharge from each pond will be collected by a storm drain system that will discharge into Skyline Drive. An emergency spillway will be constructed at each of the ponds which will have the capacity to discharge a 100 year developed flow

Original comments received from the City of Albuquerque required that the entire site discharge to the south and into Skyline Drive at a rate not to exceed 0.5 cfs/acre. However, as a result of subsequent meetings and discussions with the Hydrology Section of the City of Albuquerque, the developed discharge rate allowed was established at 12 cfs.

IV. EROSION CONTROL

Retention ponds on-site will reduce the amount of erosion due to development in the rough grading and construction phase. The project will not be constructed in phases. The contractor for the project will be held responsible for soil migration during the construction phase.

After development, erosion will be controlled by landscaping the few open areas that remain.



Tract B-1
SANDIA RIDGE APARTMENTS
Drainage Analysis

LOCATION MAP

K-22-Z

MAP No. 1

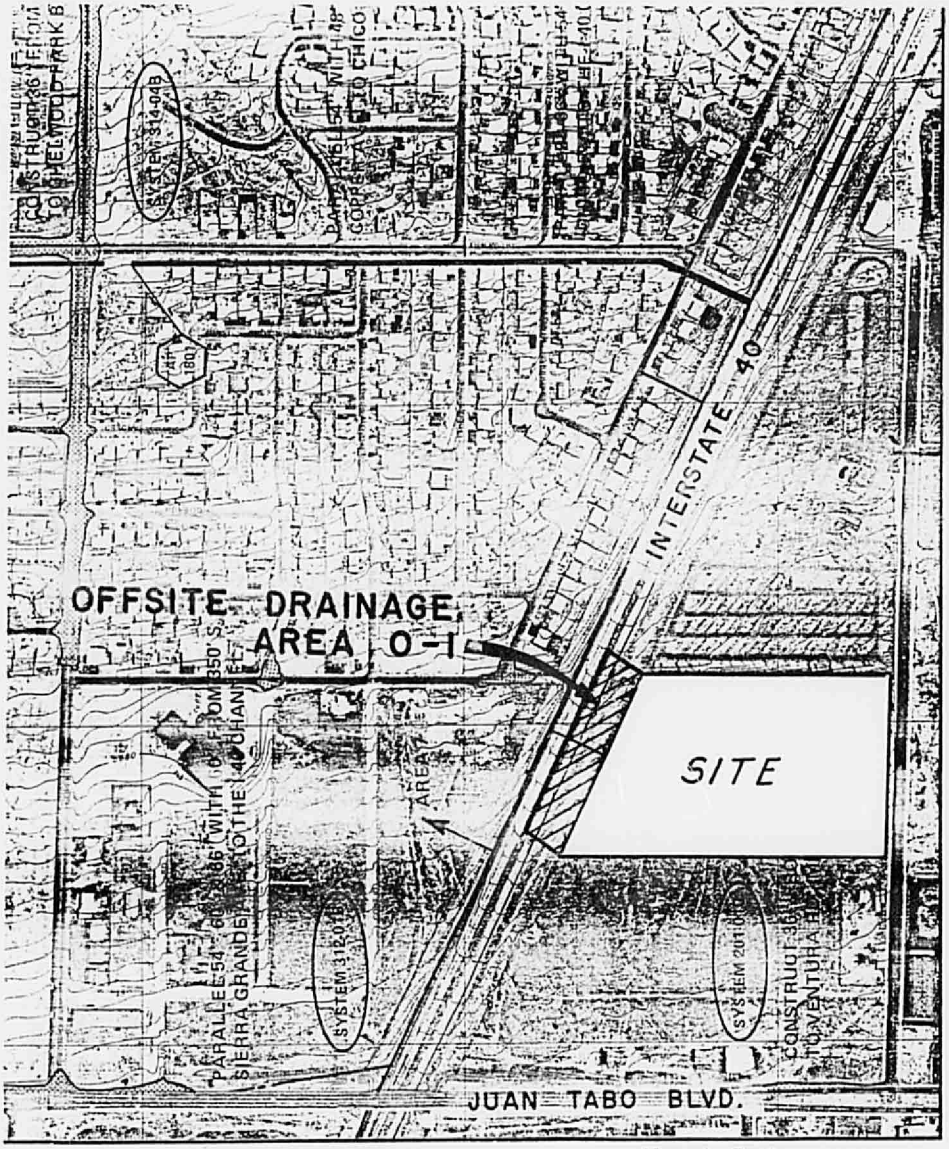
Tract B-1

SANDIA RIDGE APARTMENTS

Drainage Analysis

SOILS MAP

Map No. 2



Scale: 1" = 400'

Tract B-1

SANDIA RIDGE APARTMENTS

Drainage Analysis

Albuquerque
Master Drainage Study

Map No. 3

V. DRAINAGE ANALYSIS

Following is the Drainage Analysis (computations) for the subject property under both the existing and the developed conditions.

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

Drainage Analysis

Criteria

City of Albuquerque Drainage Ord.

Design Parameters

Peak runoff rate - Rational Formula, $Q = CIA$

Runoff coefficients - from Plate 22.2 C-1, D.P.M.

SCS Soil Group B

$$I_{100} = (2.5)\,6.84 \times t_c^{-0.51}$$

$$I_{10} = 0.657\, I_{100}$$

Travel time determined from

Plates 22.2 B-1 & 22.2 B-2, D.P.M.

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

Existing Conditions

Offsite

Drainage Area O-1 (See Map No 3 for location)

$A = 1.8$ ac.

% impervious $\cong 32 \Rightarrow C = 0.49$

$t_c < 10$ mins, $\Rightarrow I_{100} = 5.28$ in/hr.

$I_{10} = 3.47$ in/hr.

$Q_{100} = 0.49 \times 5.28 \times 1.8 = 4.66$ cfs

$Q_{10} = 0.49 \times 3.47 \times 1.8 = 3.06$ cfs.

Discharge occurs as sheet flow across the north boundary of the subject property.

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

EXISTING CONDITIONS (CONT.)

ONSITE

DRAINAGE AREA E-1 See Map No 4

Area = 8.076 ac.

Length of travel = 825 ft

Slope = 0.0275 ft/ft

∴ V = 1 ft/sec

$T_c = 825/1 = 825$ sec = 13.75 mins.

$I_{100} = 4.47$ in/hr

$C = 0.34$

$Q_{100} = 0.34 \times 4.47 \times 8.076 = 12.33$ cfs

$V_{100} = 0.34 \times 2.5/12 \times 8.076 = 0.5721$ ac-ft

= 24918 ft³

Existing Conditions (cont.)

Onsite (cont.)

Drainage Area E-2

Area = 3.837 ac.

Length = 600 ft

Slope = 2.83%

$\therefore V = 1$ ft/sec

$T_c = 600/1 = 600$ sec = 10 min.

$I_{100} = 5.28$ in/hr.

$C = 0.34$

$Q_{100} = 0.34 \times 5.28 \times 3.837 = 6.89$ cfs

$V_{100} = 0.34 \times 2.5/12 \times 3.837 = 0.2718$ ac-ft

$= 11,839$ ft^3

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

Developed Conditions

Offsite

Same as existing Conditions
See Sheet 2

Onsite

See Map No 5, Developed Conditions for location of Drainage Areas.
Table 1 (see sheet 6) is a summary of the areas for each Drainage Area

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

Project: Sandia Ridge — Sheet 6 of 28
Drainage Analysis — Job No. 333
By: AF — Chk'd: JA — Date: 3/9/84

TABLE 1 - Summary of Areas

Drainage Area Designation	Total Area (Ac.)	Paved Area (Ac)	Roof Area (Ac)	Open Area (Ac.)	% Impervious	Runoff Coefficient C
1	0.361	0.271	0	0.090	75.0	0.73
2	0.386	0.324	0	0.062	83.9	0.81
3	0.930	0.061	0.475	0.394	57.6	0.61
4	1.095	0.540	.256	0.299	72.7	0.71
5	0.532	0.023	0.278	0.231	56.6	0.61
6	1.111	0.612	0.238	0.261	76.5	0.74
7	0.420	0.378	0	0.042	90.0	0.86
8	1.720	0.548	0.622	0.550	68.4	0.68
9	0.518	0.002	0.315	0.201	61.2	0.63
10	1.280	0.308	0.305	0.667	47.9	0.56
11	0.520	0.274	0.179	0.067	87.1	0.83
12	0.963	0.035	0.350	0.578	40.0	0.52
13	0.427	0.385	0	0.042	90.2	0.86
14	0.710	0.207	0.271	0.232	67.3	0.67
15	0.690	0.367	0.121	0.202	70.7	0.69
16	0.110	0.087	0	0.023	79.1	0.74
17	0.140	0.027	0	0.113	19.3	0.42

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

Project: Sandia Ridge Drainage Analysis
Sheet 7 of 28
Job No. 333
By RF Chk'd [illegible] Date 3/9/84

TABLE 2 - PEAK RATES & VOLUMES

$Q_{100} = CIA$, assume $t_c < 10 \Rightarrow I = 5.28$ in/hr

$V_{100} = 2.5/12 \times CA$

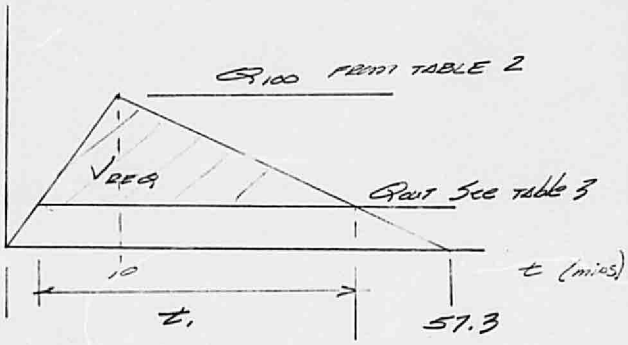
Drainage Area Designation	Runoff Coefficient C	Intensity I (in/hr.)	Total Area (AC)	V_{100} (FT³)	Q_{100} (CFS)
1	0.73	5.28	0.361	2392	1.39
2	0.81	"	0.386	2537	1.65
3	0.61	"	0.930	5148	3.00
4	0.71	"	1.075	7055	4.10
5	0.61	"	0.532	2945	1.71
6	0.74	"	1.111	7461	4.34
7	0.86	"	0.420	3278	1.91
8	0.68	"	1.720	10614	6.18
9	0.63	"	0.518	2962	1.72
10	0.56	"	1.280	6505	3.78
11	0.83	"	0.520	3917	2.28
12	0.52	"	0.963	4544	2.64
13	0.86	"	0.427	3333	1.94
14	0.67	"	0.710	4317	2.51
15	0.69	"	0.690	4321	2.51
16	0.74	"	0.110	739	0.43
17	0.42	5.28	0.140	534	0.31

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

Pond Volumes & Allowable Discharge

The required detention volumes for each Drainage area were determined as follows:

Assume $T_c < 10$ use 10 mins



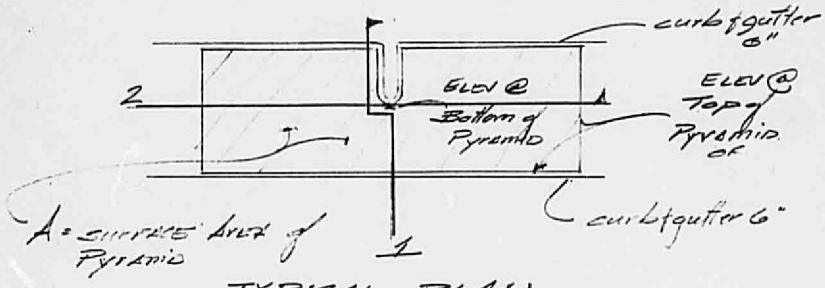
$$V = \frac{1}{2}(Q_{100} - Q_{out}) \times t_1 \times 60$$

The volumes of the ponds were determined assuming that the ponds are shaped as inverted pyramids, or

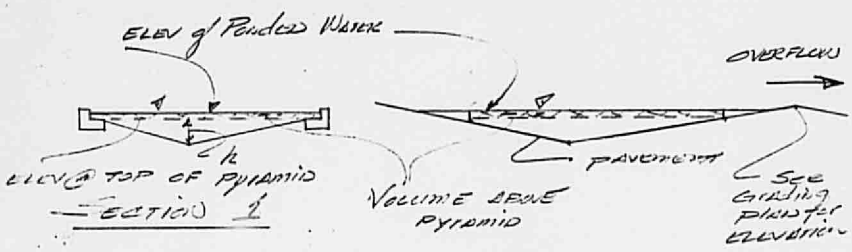
$$V = \frac{1}{3} h A$$

Where A = Surface Area of Pyramid, from Table 3
(Surface Area determined
enclosed Site Plan)

h = Elev @ Top of Pyramid
- Elev @ Bottom of Pyramid, Table 3
(See Enclosed Grading Plan)



TYPICAL PLAN



Section 1

Section 2

Table 3 - Pond Volumes of Allowable Controlled Discharge

D.A.	V_{100} (FT³)	Q_{IN} (CFS)	Q_{OUT} (CFS)	$V_{REQ.}$ (FT³)	Surface Area of Pyramid (FT²)	Elev. @ Bottom of Pyramid	Elev. @ Top of Pyramid	Elev. of Pooled Storm Water	Vol. of Pyramid (FT³)	Vol. Above Pyramid (FT³)	Total Vol. of Pond (FT³)
1	2392	1.39	0.36	1313	4708.5	61.70	62.0	62.20	470.8	941.7	1412.5
2	2837	1.65	0.28	1956	8593.5	58.31	59.00	59.00	1971.9	0	1971.9
3	5148	3.00	1.30	1653	1062 (AVG)	53.40	54.9	54.9	1593	–	1593
4	7055	4.10	0.90	4297	14730	53.13	54.00	54.00	4271.7	0	4271.7
5	2945	1.71	0.32	1946	1310 AVG	50.40	51.90	51.90	1963.6	–	1963.6
6	7461	4.34	1.40	3424	11364.7	48.19	49.00	49.04	3068.5	454.6	3523.1
7	3278	1.91	0.20	2628	10147.0	64.44	65.00	65.07	1894.5	710.4	2604.5
8	10614	6.18	1.71	5553	14663	54.16	55.0	55.10	4105.6	1466.3	5571.9
9	2962	1.72	0.62	1139	1068	61.4	62.9	62.9	1068	–	1602.6
10	6505	3.78	0.60	4608	19024	58.26	59.0	59.0	4692.6	0	4692.6
11	3917	2.28	1.15	962	8028	54.62	55.0	55.12	1016.9	963.4	1980.3
12	4544	2.64	0.84	2156.6	16916.5 (AVG)	48.40	49.90	49.90	2537.2	–	2537.2
13	3333	1.94	0.20	2631.5	13960	58.28	59.00	58.81	3350.4	0	3350.4

ANDREWS, ASBURY & ROBERT, INC.
CONSULTING ENGINEERS
149 Jackson, N.E., Albuquerque, N.M. 87108
Telephone (505) 265-6831

Project: Sandia Base Tract J
Sheet 10 of 26
By: [illegible]
Chk'd: [illegible]
Job No. 333
Date 3/19/84

TABLE 3 (CONT.)

D.A.	V_{100} (FT³)	Q_{100} (CFS)	Q_{OUT} (CFS)	V_{REQ} (FT³)	SURFACE AREA OF PYRAMID (FT²)	ELEV. @ BOTTOM OF PYRAMID	ELEV. @ TOP OF PYRAMID	ELEV. OF PONDED STORM WATER	VOL. OF PYRAMID (FT³)	VOL. ABOVE PYRAMID (FT³)	TOTAL VOL. OF POND (FT³)
14	4317	2.51	0.70	2244.8	4610	53.32	54.00	54.27	1044.9	1244.7	2289.6
15	4321	2.51	0.68	2296.5	10772	48.36	49.00	49.04	2298.0	430.9	2728.9
		TOTAL	11.26								

Q_{OUT} = 11.26 CFS FROM TABLE 3

D.A.'S 16 & 17 discharge directly to SKYLINE @ 0.43 & 0.31 CFS RESP.

THEN TOTAL DISCHARGE from project = 12.0 CFS

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

Project: Sandia Estates DRAINAGE ANALYSIS Sheet 11 of 23
By: RH Chk'd: RL Date: 3/19/84 Job No. 333

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

Controlled Discharge of Ponds

Controlled discharge of ponds will be thru either a) Curb Inlet

or

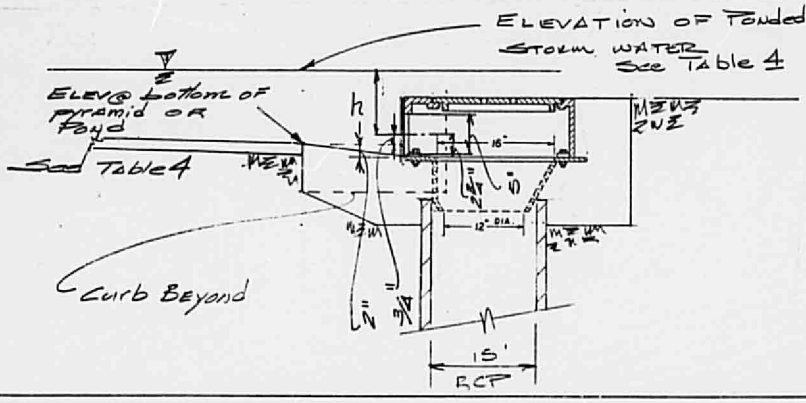
b) Surface Inlet

∴ For Curb Inlets discharge will be controlled by varying the no. of 1/4" x 5 1/2" milled slots the

$$Q = c a \sqrt{2gh} \Rightarrow a = \frac{Q_{out}}{c\sqrt{2gh}}$$

where Q_{out} = discharge rate of pond, See Table 4

c = 0.60 from Table 4-6, p 4.32 Brater & King, 6th



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

For SURFACE INLETS:

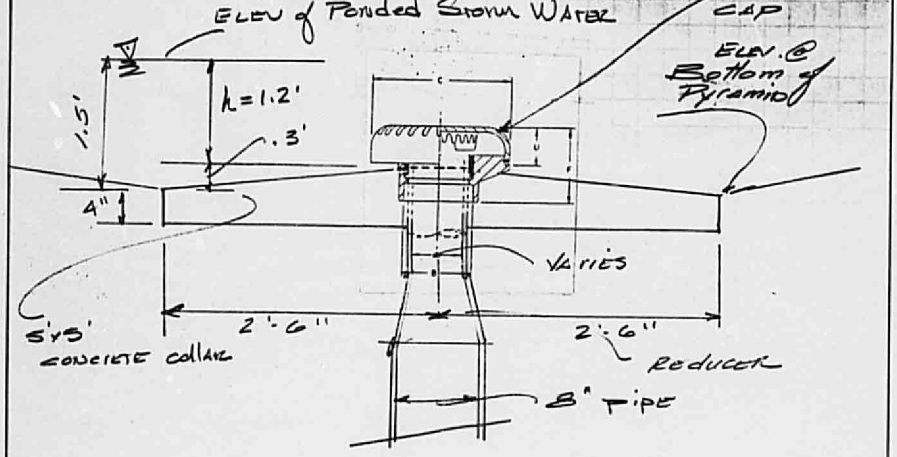


TABLE 4 - CONTROLLED DISCHARGE OF POND'S

Pond	Type of Inlet	No. of Inlets/Pond	Q_{out} (cfs)	Elev. of Pond's Spill Weir	Elev at Bottom of Pyramid	h (ft)	Z in²	Remarks
1	curb	1	0.36	62.20	61.70	0.44	16.23	USE 12 SLOTS PER INLET (16.50 in²)
2	curb	1	0.28	59.00	58.31	0.63	10.55	8 SLOTS/INLET (11.00)
3	SURFACE	1	1.30	54.9	53.40	1.2	35.49	USE 6", 2-193 (28.27)
4	curb	2	0.90	54.00	53.13	0.81	29.91	11 SLOTS/INLET (30.25)
5	SURFACE	1	0.32	51.9	50.40	1.2	8.74	USE 4", 2-193 (12.56)
6	curb	1	1.40	49.04	48.19	0.79	47.11	USE 1½"x5½" SLOTS 17 SLOTS/INLET (46.75)
7	"	2	0.20	65.07	64.44	0.57	7.92	3 SLOTS/INLET (8.25 in²)
8	curb	2	1.71	55.10	54.16	0.88	54.52	20 SLOTS/INLET (55.00)
9	SURFACE	1	0.62	62.9	61.4	1.2	16.93	USE 5", 2-193 (19.65)
10	curb	2	0.60	59.0	58.26	0.68	21.76	8 SLOTS/INLET (22.00)
11	curb	2	1.15	55.12	54.62	0.44	51.85	19 SLOTS/INLET (52.25)
12	SURFACE	1	0.84	49.9	48.40	1.2	22.93	USE 6", 2-193 (28.27)
13	curb	2	0.20	58.8	58.28	0.46	8.82	3 SLOTS/INLET (8.25)

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

Project: Sandia Pointe
By: [illegible]
Chk'd: [illegible]
Date: 3/9/94
Job No. 333

Table 4 - (cont.)

DA # Pond	Type of Inlet	No. of Inlets/Pond	Q_{out} (cfs)	Elev. of Ponded Storm Water	Elev. at Bottom of Pyramid	h (ft)	Z (ft^2)	Remarks
14	curb	1	0.70	54.27	53.32	0.89	22.19	16 slots/inlet (22.00)
15	curb	1	0.68	47.04	48.36	0.62	25.83	19 slots/inlet (26.13)

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

Project: Sandia Ridge Deadwater Analysis
Sheet: 15 of 28
Job No.: 333
By: RRE
Ch'd: [illegible]
Date: 3/9/84

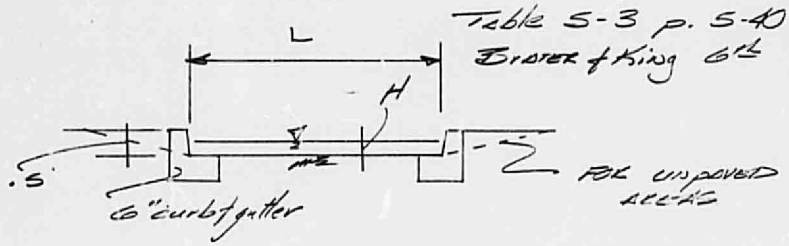
100 yr. Overflow Spillways

The location of the 100yr Overflow Spillways for each Drainage Area or Pond Ponding Area are shown on Map No 5 Developed Conditions (enclosed) together with the 100yr developed discharge rate Q_{100} that each spillway will be required to discharge. Assume total t_c < 15 min.

$$\therefore \quad Q = C L H^{3/2}$$

$$\Rightarrow H = \sqrt[3/2]{\frac{Q}{CL}}$$

where $C = 2.70$ from Table 5-3 p. 5-40 Brater & King 6th



TYPICAL SPILLWAY

L = varies see Layout Plan sheet & Table enclosed

determine depth of Flow H ∴

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

Project: Sandia Ridge — Sheet 17 of 28
Drainage Analysis — Job No. 333
By: BF — Chk'd: JA — Date: 3/9/84

TABLE 5 - 100yr Overflow Spillways

Spillway @ P.A.	Q_{100} (cfs)	L (ft)	H (ft)	Remarks
1	3.46	23.0	0.15	ok
2	6.65	23.0	0.23	ok
3	3.00	10	0.23	ok
4	14.80	23.0	0.35	ok
5	1.71	10	0.16	ok
6	39.36	23.0	0.74	use 8" curb on West side of pond
7	1.91	23.0	0.10	ok
8	8.07	10	0.45	ok
9	1.72	10	0.16	ok
10	5.50	38.0	0.14	ok
11	15.87	43.0	0.27	ok
12	2.64			
13	1.94	23.0	0.10	ok
14	4.45	23.0	0.17	ok
15	6.96	23.0	0.23	ok

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

Hydraulic Analysis - Storm Drain

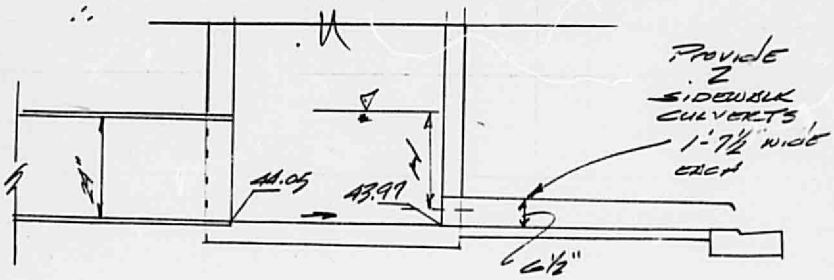
(See Map No 5 Developed Conditions for location, size, slope & invert data)

Assume that travel time in storm drain is < 10 mins, then design discharge is equal to the accumulated controlled discharge (Q_{out}) from each drainage area.

Then determine required head @ Junction Box to discharge Q = 11.26 cfs

See enclosed Detail sheet for Junction Box detail.

∴



THEN,

$$H = \left(\frac{Q}{CA}\right)^2 \Big/ 2g$$

where $Q = 11.26\,cfs$

$A = (1'\,7\tfrac{1}{2}'' \times 6\tfrac{1}{2}'') \times 2 = 1.76\,ft^2$

$C = 0.60$

$$H = \left(\frac{11.26}{0.60 \times 1.76}\right)^2 \Big/ 2g = 1.77\,ft.$$

THEN

$$HGL_{OUT} = 1.77 + .27 + 43.97 = 46.01$$

LOSSES @ JUNCTION BOX (IN)

ASSUME 24" pipe FULL & surcharged

$$\therefore V = Q/A = \frac{11.26}{\pi} = 3.58\,ft/sec.$$

$$h_{MH} = 0.05\left(\frac{V^2}{2g}\right)$$

$$h_{BEND} = 0.08\left(V^2/2g\right) \qquad \theta = 15°$$

$$h_T = 0.13\,V^2/2g = 0.03$$

$$\therefore HGL_{IN} = 46.01 + .03 = 46.04$$

SOFFIT of 24" pipe @ 46.05

$\therefore$ PIPE FLOWING FULL.

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

Project HGL to (2W)

$Q = 11.26$ cfs, 24" pipe, $n = 0.013$

$L = 46.49$ LF $S_o = 0.10\%$

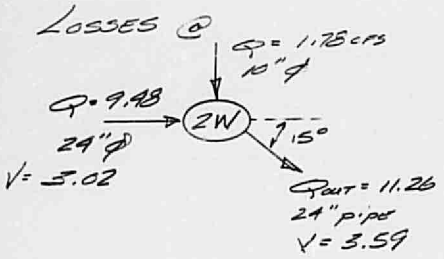
$$S_f = \sqrt{\frac{n\,Q}{1.486\,R^{2/3}S^{1/2}}} = \sqrt{\frac{0.013 \times 11.26}{1.486 \times .5^{2/3} \times \pi}}$$

$= 2.48 \times 10^{-3}$, $V = 3.59$ ft/sec

$h_f = L \times S_f = 0.12$ ft

$HGL_{out} = 46.05 + 0.12 = 46.17$

Losses @



$h_{MH} = .05\left(\frac{3.59^2}{2g}\right)$

$h_{BEND} = .08($ " $)$

$h_{junctions} = \frac{3.59^2}{2g} - \frac{3.02^2}{2g}$

$h_T = 0.01 + 0.02 + .06 = 0.09$ FT

$HGL_{in} = 46.17 + .09 = 46.26$

INVERT IN/OUT = 44.14, COMFIT = 46.14 ft

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

Project HGL to wye @ (3W)

$Q = 9.48\,cfs$, $24''\phi$, $n = 0.013$

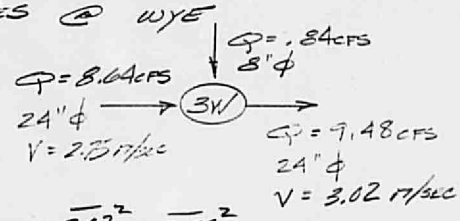
$S_o = 0.10\%$, $L = 93.20\,LF$

$$S_f = \frac{\sqrt{0.013 \times 9.48}}{1.486 \times .5^{2/3} \times \pi} = 1.76 \times 10^{-3}$$

$h_f = L \times S_f = 0.16$, $V = 3.02$

$HGL_{OUT} = 46.26 + 0.16 = 46.42$

Losses @ wye



$$h_j = \frac{\overline{3.02}^2}{2g} - \frac{\overline{2.75}^2}{2g} = 0.14 - .12 = 0.02$$

$HGL_{in} = 46.42 + 0.02 = 46.44$

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

Project HGL to WYE @ (5W)

$Q = 8.64$ cfs, 24"ϕ, $n = 0.013$

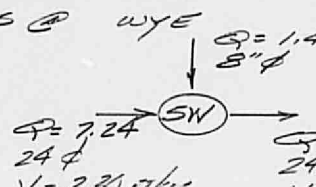
$S_o = 0.10\%$, $L = 66.26$ LF

$$S_f = \frac{\sqrt{0.013 \times 8.64}}{1.486 \times .5^{2/3} \times \pi} = 1.46 \times 10^{-3}$$

$h_f = L \times S_f = 0.10$

$HGL_{OUT} = 46.44 + .10 = 46.54$

Losses @ WYE



$$h_j = \frac{\overline{2.75}^2}{2g} - \frac{\overline{2.30}^2}{2g} = .12 - 0.08 = .04$$

$HGL_{IN} = 46.54 + .04 = 46.58$

Project HGL to MH @ (6W)

$Q = 7.24$ cfs, 24"ϕ, $n = .013$

$S_o = 0.10\%$ $L = 142.04$ FT

$S_f = 1.06 \times 10^{-3}$

$h_f = L \times S_f = 0.15$ FT

$HGL_{OUT} = 46.58 + 0.15 = 46.73$ Soffit @ 46.5[illegible]

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

Losses @ MH

Q = 4.08
12" ϕ
V = 5.19

↓

Q = 3.16 → (6W) → Q = 7.24 cfs
12" ϕ 24" ϕ
V = 4.02 V = 2.3

$h_{mH} = .05\ V^2/2g, = .05 \times \frac{\overline{4.02}^2}{2g} = .01$

$h_j = \frac{\overline{4.02}^2}{2g} - \frac{\overline{2.3}^2}{2g} = 0.17$

$h_T = .01 + .17 = .18$

$HGL_{in} = 46.73 + .18 = 46.91$

INVERT of 12" @ 44.89
SOFFIT = 45.89
FULL CIC

Project HGL to MH @ (7W)

Q = 3.16 cfs, S_o = 0.78%, 12" pipe
L = 153.21 LF n = 0.013
S_f = 7.86×10^{-3} V = 4.02 ft/sec

$h_f = L \times S_f = 1.20$ FT

$HGL_{out} = 46.91 + 1.20 = 48.11$

INVERT @ 46.09, soffit @ 47.09

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

Losses @ MH

Q = .32
8"ϕ

→ (7W) →

Q = 2.84
12" ϕ
V = 3.62 m/sec

Q = 3.16
12" ϕ
V = 4.02 ft/sec

$$h_{MH} = 0.5 \times \frac{4.02^2}{2g} = 0.01$$

$$h_j = \frac{4.02^2}{2g} - \frac{3.62^2}{2g} = 0.05$$

$$h_T = 0.06$$

$$HGL_{in} = 48.11 + .05 = 48.16$$

Project HGL to wye @ (7W)

Q = 2.84 cfs, S_o = 0.78%, n = 0.013

12" pipe, L = 189.50 LF.

$$S_f = 6.35 \times 10^{-3}$$

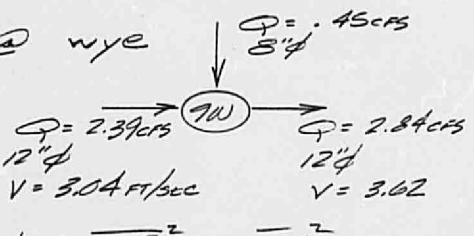
$$h_f = L \times S_f = 1.20 \text{ ft}$$

$$HGL_{OUT} = 48.16 + 1.20 = 49.36$$

INVERT @ 47.67
SOFFIT 48.67 ~~SF~~

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

Losses @ wye



$$h_j = \frac{3.62^2}{2g} - \frac{3.04^2}{2g} = 0.06$$

$$HGL_{in} = 49.36 + 0.06 = 49.42$$

Project HGL to MH @ 10W

$Q = 2.39$ CFS, $S_o = 0.78\%$, $n = 0.013$

12" pipe, $L = 116.50$ LF

$S_f = 4.50 \times 10^{-3}$

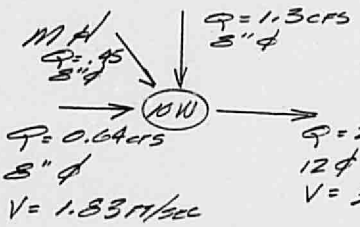
$h_f = L \times S_f = 0.52$ FT

$$HGL_{out} = 49.42 + 0.52 = 49.94$$

INV = 48.58
SOFFIT @ 49.58
FULL

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

LOSSES @ MH



$$h_{MH} = 0.05 \times \frac{\overline{3.04}^2}{2g} = 0.01$$

$$h_j = \frac{\overline{3.04}^2}{2g} - \frac{\overline{1.83}^2}{2g} = .14 - .05$$

$$h_T = 0.10$$

$$HGL_{in} = 49.94 + .10 = 50.04$$

INVERT = 48.75
SOFFIT = 49.42

Project HGL to MH @ 12W

$Q = 0.64$ cfs, $S_o = 0.78\%$, 8" ϕ

$n = 0.013$, $L = 141.79$ LF

$$S_f = 2.80 \times 10^{-3}$$

$$h_f = S_f \times L = 0.40$$

$$HGL_{out} = 50.04 + .4 = 50.44$$

INVERT = 49.86
SOFFIT = 50.53

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

DETERMINE LOCATION WHERE FLOW UNSEALS FROM SOFFIT

$\therefore$ 8" pipe, $S_o = 0.78\%$, $n = 0.013$

$$Q_{FULL} = \frac{1.486}{.013} \times .3129 \times .0078^{1/2} \times .549$$

$$= 1.06 \text{ cfs}$$

$$V_{FULL} = 3.06 \text{ ft/sec}$$

$$\frac{Q_P}{Q_F} = \frac{0.64}{1.06} = 0.604$$

$$\therefore \frac{D_P}{D_F} = .55 \Rightarrow D_P = 0.37 \text{ ft}$$

$$\frac{V_P}{V_F} = 1.04 \Rightarrow V_P = 3.18 \text{ ft/sec}$$

$$\therefore L = \frac{E_2 - E_1}{S_o - S_f} \qquad E_2 = 1.342 \text{ ft} \quad E_1 = 0.527 \text{ ft}$$

$$= \frac{1.342 - 0.527}{.0078 - .0025} = 163 \text{ LF}$$

$\therefore$ FLOW BECOMES UNSEALED BETWEEN (12W) & (10W)

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

The HGL calculations presented are for the critical section of the storm drain system. The remainder of the HGL for the rest of the system is below the bottom of the proposed ponds, therefore the ponds will discharge at the controlled rates previously determined.