HYDROLOGY D23/D14 1 PLAN

D23/D14

1 Plan

PROJECT TITLE: _____ ZONE ATLAS/DRNG. FILE #: D-23/D14

LEGAL DESCRIPTION: LOT 1549, SANDIA HEIGHTS SOUTH

CITY ADDRESS: _____

ENGINEERING FIRM: BOHANNAN-HUSTON CONTACT: JAMES TOPMILLER

ADDRESS: 7500 JEFFERSON NE 87109 PHONE: 823-1000

OWNER: RICHARD RAYS CONTACT: SAME

ADDRESS: _____ PHONE: 265-3461

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

RECEIVED
JUL 06 1987
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
___ OTHER _____ (SPECIFY)

DATE SUBMITTED: 7-6-87

BY: JAMES TOPMILLER

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

July 16, 1987

James Topmiller, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: DRAINAGE PLAN FOR LOT 1549 OF SANDIA HEIGHTS SOUTH
(D-23/D14) RECEIVED JULY 6, 1987

Dear James:

The above referenced site is not located in a 100 year floodzone. Therefore, ANAFCA and the County has jurisdiction over the site.

If you have any questions, call Clyde Vigil, Assistant Building Official of County Zoning at 768-4025.

Cordially,

Carlos A. Montoya, P.E.
City/County Floodplain Administrator

cc: Clyde Vigil

CAM/bsj

ENGINEERS ARCHITECTS PHOTOGRAMMETRISTS

BOHANNAN-HUSTON INC.

COURTYARD I, 7500 JEFFERSON STREET, N.E. ALBUQUERQUE, NEW MEXICO 87109 (505) 823-1000
UNIVERSITY PLAZA, SUITE 104, 330 GARFIELD SANTA FE, NEW MEXICO 87501 (505) 988-7671
6713 VISCOUNT BLVD. EL PASO, TEXAS 79925 (915) 778-4491

July 2, 1987

Mr. Fred Aguirre
City Hydrologist
Hydrology Department
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Drainage Analysis for Lot 1549, Sandia Heights South

Dear Fred,

The enclosed drainage analysis and plan has been prepared for your review and approval prior to platting approval. The analysis provides the supporting narrative and calculations that would permit the owner of the referenced lot to (1) extend two County-owned culverts a small distance into the lot and (2) perform minor lot grading in the vicinity of an existing arroyo such that the existing floodplain easement may be reduced in size (by vacation). The lot is located outside the City limits but within City platting jurisdiction.

We are currently in the process of preparing a replat of the property identifying the vacation of the unneeded portion of floodplain easement and the granting of a maintenance and access easement to the County of Bernalillo. A copy of the replat will be forwarded to the Development Review Board for review and action upon completion. A vacation request will be submitted in the very near future so that the public hearing process may begin. The drainage analysis has also been forwarded to the County Public Works Department and AMAFCA.

If I can answer any questions you may have, please contact me.

Sincerely,

James Topmiller

James Topmiller, P.E.
Project Manager

Enclosure

cc: Richard Rays

JT/da
Job No. 72590

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PRINCIPALS
LARRY W. HUSTON
MICHIAL M. EMERY, P.E.
DANA C. WOOD, P.E.
ANDRES ARAGON VIAMONTE
DARRELL L. WADE, P.E.
JAMES V. DOMENICK, P.E.
BRIAN G. BURNETT, P.E.

SANDIA HEIGHTS SOUTH, UNIT 15, LOT 1536
DRAINAGE ANALYSIS FOR THE EXTENSION
OF TWO EXISTING CULVERTS AND THE RELOCATION OF AN
EXISTING FLOODPLAIN EASEMENT

Purpose

The purpose of this analysis is to outline a proposal to 1) extend two existing CMP culverts under Eagle Ridge Lane, and 2) relocate the northern line of an existing floodplain easement located within the above referenced lot. This movement of the easement will allow greater usable space of the construction of a proposed single family residence and circular driveway on the lot. Included is a topographic map for the lot which identifies the existing arroyo, the existing and proposed easement boundaries and the proposed culvert extensions. Supporting calculations from the previous Sandia Heights drainage report are also provided. A copy of this analysis has been forwarded to the County of Bernalillo Public Works Department.

Flow Characteristics of the Existing Arroyo

Enclosed is a Xeroxed plan and calculation sheets from the 1983 Unit 15, Sandia Heights South drainage report which are pertinent to Lot 1549. The following information is thereby obtained:

Manning's "N" value = 0.035
100-year storm run-off flow = 87.1 cfs
Depth of flow = 0.95' approx.
Velocity = 6 fps

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Checks of the above information show it to be reasonably accurate and further indicate that moderate changes to the arroyo's bottom and side slopes do not significantly alter the depth of flow. The flood plain, as indicated on the enclosed map, is not designated on FEMA maps.

Arroyo flows are discharged from the lot through 2-36" culverts under Eagle Ridge Lane. The enclosed calculations show the culverts to be undersized for the 100-year storm arroyo flow of 87.1 cfs with less than 2 feet of head provided by the road above the culvert. With only this low head available, much of the arroyo flows tend to bypass the culverts and migrate northerly across the road.

Proposed Relocation of Floodplain Easement

This analysis proposes to relocate, or "shift", the existing northern floodway easement line south to allow additional space for residential development and a circular drive in the front of the property. This is accomplished by "reshaping", confining the arroyo to an alignment more consistent with the location of the downstream culverts under Eagle Ridge Lane. As shown on the enclosed plan, an earth berm will be constructed such that side slopes and bottom slopes (or cross-section) of the arroyo will more closely match the existing upstream slopes. By doing this, flow depths and velocities will remain approximately the same throughout this reach of arroyo. The required head of 4' plus 1' freeboard is available at the road to pass the flow through the culverts. With this confinement of the arroyo flows, the portion of easement determined to be unnecessary will be formally vacated and the new easement line established by plat.

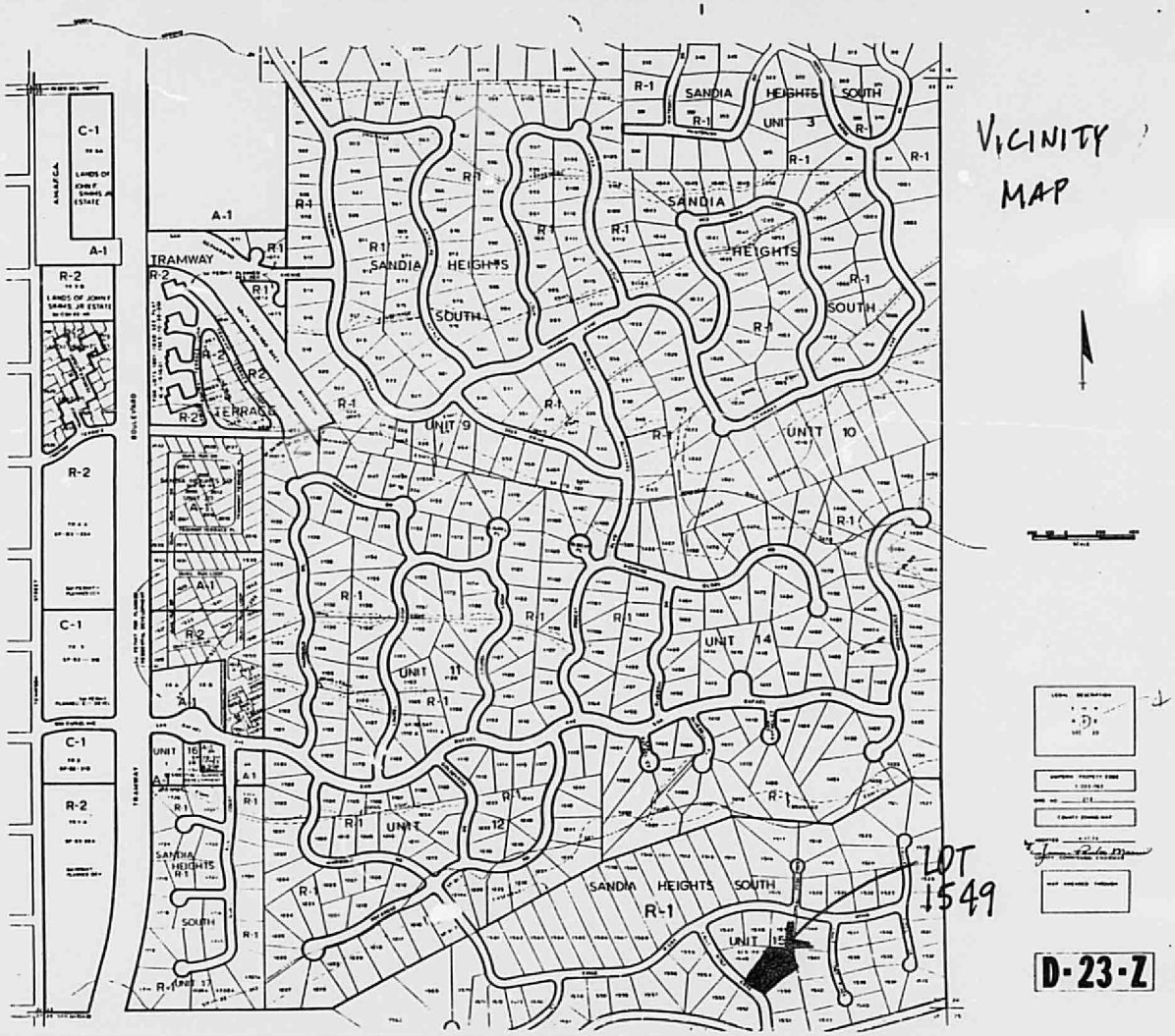
However, as additional protection to the roadway and proposed circular drive, the plan calls for riprap protection adjacent to the culverts and roadway.

Proposed Extension of the Existing Culverts

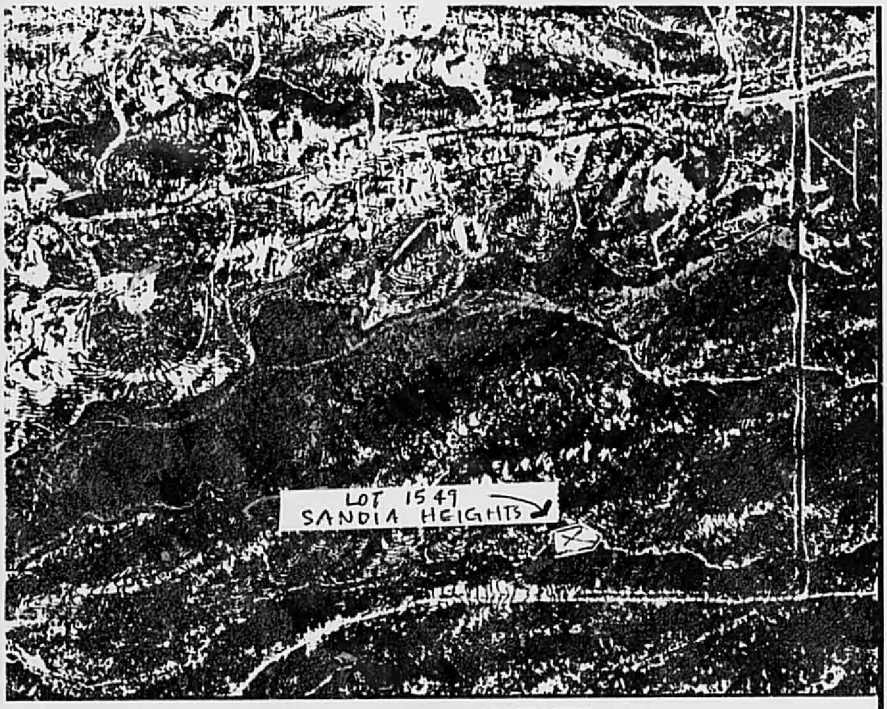
To provide sufficient space for the proposed circular drive, the extension of the two existing 36" diameter culverts is required. The culverts will be extended at the slope of the existing culverts and mitered at their ends. Since the culverts are County-owned and -maintained, an easement for maintenance and access purposes will be dedicated to the County by plat. The enclosed plan identifies the extent of the proposed 36" culvert extension and easement.

Summary

The above discussion and the enclosed plan and calculations indicate that there are no adverse impacts to drainage characteristics of the arroyo by the proposed culvert extensions and floodplain reduction. A revised plat of the lot is now being prepared to reflect the proposals. Once complete, the plat will be submitted for City of Albuquerque Development Review Board, County of Bernalillo Public Works Department and AMAFCA review and sign-off.


VICINITY MAP
LOT 1549
D-23-Z
SANDIA HEIGHTS SOUTH
UNIT 3
UNIT 9
UNIT 10
UNIT 11
UNIT 12
UNIT 14
UNIT 15
UNIT 16
TRAMWAY
TERRACE
BOULEVARD
R-1
R-2
A-1
C-1

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



REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM 18	5829.04	City of Albuquerque (ACS) standard brass tablet, stamped "1 C22", set in top of concrete post projecting 0.5', located 15' north of Los Angeles Avenue and 20' east of Browning Street.
RM 19	6062.97	A 1" diameter iron pipe anchored in a mound of concrete, with no stampings, projecting about 0.2' located 105' east of the centerline of Tramway Boulevard, 800' south of Live Oak Road, and 1' west of a 7' tall sawed off powerline pole.

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY

FLOOD BOUNDARY AND FLOODWAY MAP

CITY OF

ALBUQUERQUE, NEW MEXICO

BERNALILLO COUNTY

PANEL 11 OF 50

COMMUNITY-PANEL NUMBER
350002 0011

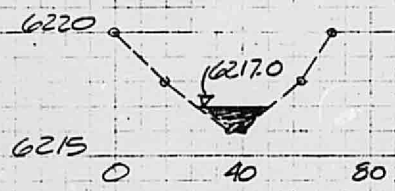
EFFECTIVE DATE:
SEPTEMBER 15, 1983

Federal Emergency Management Agency

Flow Depths and Velocities in Existing Arroyos - 100 yr Storm

(Refer to Plate 3 for Cross Section Locations)

Section D-3



Q = 74.1 cfs
BW = 4'
SS1 = 10:1
SS2 = 9:1
S = .040
n = .035

D = 0.97'
V = 5.8 fps
f = 1.37

Section G1

Q = 87.1 cfs
BW = 0
SS1 = 14:1
SS2 = 14:1
S = .057
n = .035

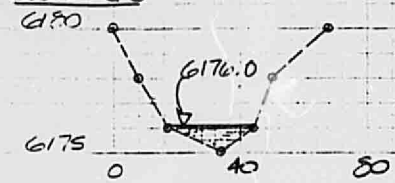
D = 0.99'
V = 6.4 fps
f = 1.60

Section G-2

Q = 87.1 cfs
BW = 0
SS1 = 20:1
SS2 = 12:1
S = .055
n = .035

D = 0.95'
V = 6.1 fps
f = 1.56

Section G3



Q = 88.5 cfs
BW = 0
SS1 = 18:1
SS2 = 10:1
S = .067
n = .035

D = 0.97'
V = 6.80 fps
f = 1.73

PROJECT NAME Sandia Heights S Unit 15	SHEET 12	OF 16	
PROJECT NO. 31122	BY RPB	DATE 12/7/93	
SUBJECT Drainage Report Computations	CH'D RPB	DATE 12/15/93	

Required Culvert Sizes at Arroyo Crossings

(Refer to Plate 3)

Eagle Ridge Place @ Lot 1538

Q = 17.3 cfs
Assume 2' head

→ Use 24" Dia RCP with 2.31' head invert to water surface & min. pipe slope 1%.

Eagle Ridge Lane @ Lot 1547

Q = 13.1 cfs
Assume 4' head

Try 18" RCP
C = 0.6
Q = 13.1
Head = 3.12' invert to surface

→ Use 18" RCP with 3.12' head invert to water surface & min. pipe slope of 2%

Eagle Ridge Lane @ Lot 1545

Q = 9.3 cfs
Assume 3' head

Try 15" RCP
C = 0.6
Q = 9.3
Head = 3.10' invert to surface

→ Use 15" Dia RCP with 3.10' head invert to water surface & min pipe slope of 3%.

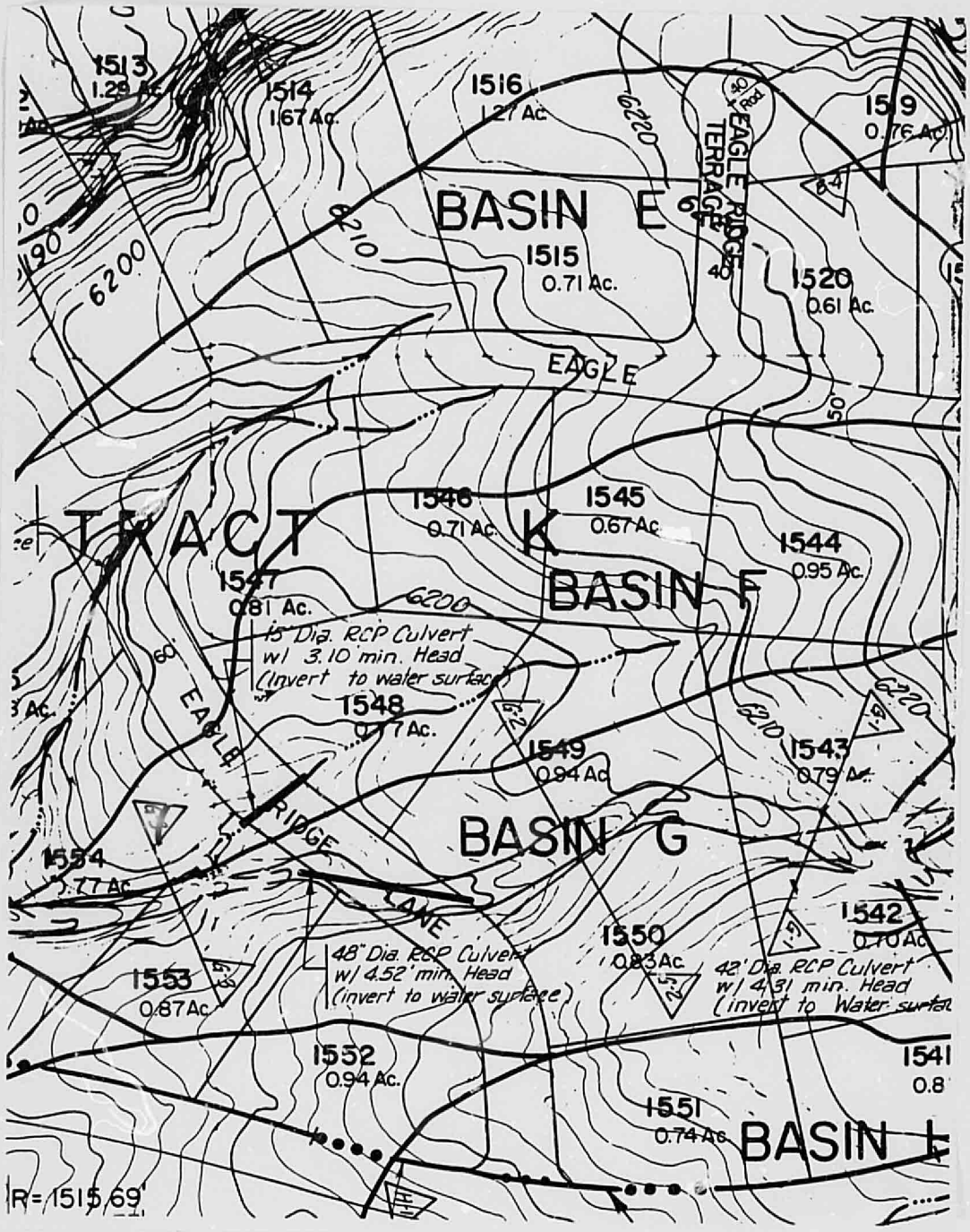
Eagle Ridge Lane @ Lots 1549 & 1550

Q = 96.0 cfs
Assume 4' Head

Try 45" RCP
C = 0.6
Q = 96.0
Head = 4.52' invert to surface

→ Use 45" Dia RCP with 4.52' head invert to water surface & min pipe slope of 1%.

PROJECT NAME	Sandia Heights S Unit 15	SHEET 16	OF 16
PROJECT NO.	31122	BY KPB	DATE 12/7/83
SUBJECT	Drainage Report Computations	CH'D RPB	DATE 12/15/83


1513
1.29 Ac.
1514
1.67 Ac.
1516
1.27 Ac.
1519
0.76 Ac.
BASIN E
1515
0.71 Ac.
1520
0.61 Ac.
EAGLE RIDGE TERRACE
EAGLE
TRACT K
1546
0.71 Ac.
1545
0.67 Ac.
1544
0.95 Ac.
BASIN F
1547
0.81 Ac.
15" Dia. RCP Culvert
w/ 3.10' min. Head
(Invert to water surface)
1548
0.77 Ac.
1549
0.94 Ac.
1543
0.79 Ac.
EAGLE RIDGE LANE
BASIN G
1554
0.77 Ac.
1542
0.70 Ac.
1550
0.83 Ac.
48" Dia. RCP Culvert
w/ 4.52' min. Head
(Invert to water surface)
42" Dia. RCP Culvert
w/ 4.31' min. Head
(Invert to Water surface)
1553
0.87 Ac.
1552
0.94 Ac.
1541
0.8
1551
0.74 Ac.
BASIN L
R=1515.69'

LOT 1549, SANDIA HEIGHTS SOUTH

CALCULATIONS

A. Required Headwater for Proper Culvert Operation

From Chart 5 (Bureau of Public Roads Manual attached)

@ $Q = 87.1/2 = 43.5$ cfs (total arroyo flow divided by 2 for 2 culverts)

@ culvert dia. = 36"

@ culvert projection mitered to conform to slope

$H_w/D = 1.3$

Then required head (from bottom of culvert) = 3.9'

Add 1' for freeboard.

B. Riprap Sizing @ Culvert Inlets

based on Table 5-5 of the AMAFCA drainage criteria manual (enclosed)

Velocity of channel, V = 6.7 fps

Hydraulic Radius, $R = \frac{A}{P} = 0.80$

use side slope 3:1

bottom width 10'

Area, A = 13.06 ft²

$V^2/R^{1/3} = \frac{44.9}{0.93} = 48.4$

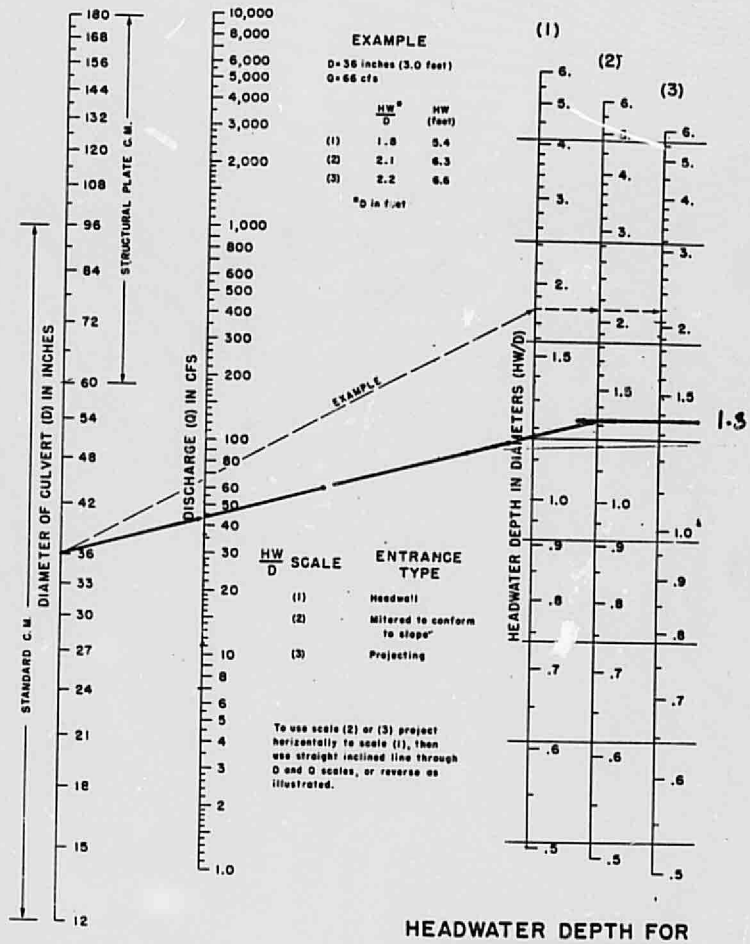
wetted Perimeter, P = 16.35

from Table, use Type L riprap, $D_{50} = 9"$

BOHANNAN-HUSTON INC.

PROJECT NAME	LOT 1549, SANDIA HEIGHTS	SHEET 1 OF 1	
PROJECT NO.	72590	BY James T.	DATE 7-1
SUBJECT	DRAINAGE ANALYSIS	CH'D ✓	DATE

CHART 5



HEADWATER DEPTH FOR
C. M. PIPE CULVERTS
WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN. 1963

LOT 1549
SANDIA HEIGHTS SOUTH
DRAINAGE ANALYSIS

72590

Table 5-1
CLASSIFICATION AND GRADATION OF ORDINARY RIPRAP

Riprap Designation	% Smaller Than Given Size By Weight	Minimum Dimension Inches	K_m* Inches
Type VL	100 35-55 10	9** 6 2	6***
Type L	100 35-55 10	12** 9 2	9***
Type M	100 35-55 10	18** 12 3	12
Type H	100 35-55 10	24** 18 6	18
Type VH	100 35-55 10	36** 24 6	24

*K_m = mean particle size
**At least 30% of all stones by weight shall be this dimension.
***Bury types VL and L with native soil to protect from vandalism damage.

broom. Grouted riprap should meet all the requirements for ordinary riprap except that the smallest rock fraction should be eliminated from the gradation and a reduction of riprap size by one designation is also permitted. As with ordianry riprap, grouted riprap should be founded on an adequate bedding. The grout should contain air entrainment, have a 28-day strength of at least 2400 psi and should have a high slump (5 to 7 inches) in order to penetrate either full depth of the riprap layer or at least 2 feet where the riprap layer is thicker than 2-feet. Grout penetration may be accomplished by rodding, vibrating, or pumping of the grout into the riprap voids. Concrete having maximum aggregate size of 2/4-inches may be substituted for grout when using riprap designation type M or larger. Weep holes should be

5.4.2 Rock Size and Lining Dimensions

Table 5-5 summarizes riprap requirements for a stable channel lining in terms of the channel side slope and the parameter $V^2 / R^{0.33}$, where V = mean channel velocity and R = channel hydraulic radius. Proper bedding is required both along the side slopes and the channel bottom for a stable lining. The riprap blanket thickness should be at least 1.75 times K_m, or 2.0 times K_m in sandy soils, and should extend up the side slopes at least one foot above the design water surface. At the upstream and downstream termination of a riprap lining, the thickness should be doubled for at least 3 feet to prevent under cutting.

Table 5-5
RIPRAP REQUIREMENTS FOR CHANNEL LININGS

$V^2 / R^{.33}$	Channel Side Slope			
	4:1	3:1	2.5:1	2:1
20- 70	Type L	Type L	Type L	Type L
70- 90	Type L	Type L	Type L	Type M
90- 95	Type L	Type L	Type L	Type M
95-100	Type L	Type L	Type L	Type H
100-105	Type L	Type L	Type M	Type H
105-110	Type L	Type M	Type M	Type H
110-115	Type M	Type M	Type M	Type H
115-120	Type M	Type M	Type M	Type VH
120-125	Type M	Type M	Type M	Type VH
125-130	Type M	Type M	Type H	Type VH

Type L riprap should be buried to reduce vandalism.
Side slopes steeper than 2:1 should be designed as retaining walls.
SM9 slope mattress may be substituted for Type L riprap.
G12 gabion may be substituted for Type M and Type H riprap.
Table valid for Froude numbers less than 0.8.

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