County of Bernalillo

State of New Mexico

ONE CIVIC PLAZA N.W.
ALBUQUERQUE, NEW MEXICO 87102

May 5, 1992

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

RE: DRAINAGE REPORT FOR SANDIA HEIGHTS SOUTH UNIT 23
(LAS CASAS DE SAN RAFAEL SUBDIVISION) (D-23/D29)
ENGINEER'S STAMP DATED FEBRUARY 20, 1992

Dear Ms. Hinojos:

Based on the information submitted on March 16, 1992, it is my understanding that the Tramway Road Project diverted the 100-year flows away from this site. The County Public Works Department proposes to submit a request for a Letter of Map Revision from FEMA in the future. Therefore, please secure AMAFCA's and the County's approval.

Until such time that an official Letter of Map Revision from FEMA is secured this property is likely to be subject to flood insurance requirements by the Flood Insurance Agency. Please be advised that FEMA has not reviewed the Letter of Map Revision request so this property could still be encumbered by a 100-year floodplain even with the diversion in place, due to all of FEMA's new criteria. Please add a note on the plat and drainage plan regarding this issue.

If you should have any questions, please do not hesitate to call me at 768-2650.

Cordially,

Gilbert Aldaz

Gilbert Aldaz, P.E. & P.S.
County Floodplain Administrator

xc: Clifford E. Anderson, AMAFCA
Bob Foglesong, County Public Works
Cleve Matthews, Sandia Peak Tram Company

BJM/bjf
(WP+1136)

DRAINAGE INFORMATION SHEET

PROJECT TITLE: Scandia Height Unit 23 ZONE ATLAS/DRNG. FILE #: D-23/D29

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

LEGAL DESCRIPTION: Scandia Heights Unit 23

CITY ADDRESS: _____

ENGINEERING FIRM: Bohannan Huston, Inc CONTACT: Maria Hinojos

ADDRESS: 7500 Jefferson NE PHONE: 823-1000

OWNER: Scandia Peak Tram Company CONTACT: Cleve Matthews

ADDRESS: #10 Tramway Loop NE PHONE: 296-9585

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

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

PRE-DESIGN MEETING:

___ YES
X 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
___ CERTIFICATE OF OCCUPANCY APPROVAL
___ GRADING PERMIT APPROVAL
___ PAVING PERMIT APPROVAL
___ S.A.D. DRAINAGE REPORT
X DRAINAGE REQUIREMENTS
___ OTHER _____ (SPECIFY)

RECEIVED
MAR 16 1992
COUNTY

DATE SUBMITTED: March 16, 1992

BY: Maria A. Hinojos

REVISED
DRAINAGE REPORT
FOR
SANDIA HEIGHTS SOUTH
UNIT 23

February 1992

PREPARED FOR:

SANDIA PEAK TRAM COMPANY
#10 TRAMWAY LOOP N.E.
ALBUQUERQUE, NEW MEXICO 87122

PREPARED BY:

BOHANNAN-HUSTON, INC.
7500 JEFFERSON N.E.
ALBUQUERQUE, NEW MEXICO 87109

JOB NO. 91280.03

MAR 16 1992

This report prepared by:

MARIA A. HINOJOS
NEW MEXICO
7559
REGISTERED PROFESSIONAL ENGINEER

Maria A. Hinojos, P.E.

PURPOSE OF REPORT:

The purpose of this drainage report is to present historic and proposed drainage conditions for the area pertaining to this site, and to obtain preliminary and final plat approval.

METHODOLOGY:

The site will be analyzed for the 10-year and 100-year 6-hour storms in accordance with the City of Albuquerque proposed revisions to Section 22.2, Hydrology of the DPM since the site is small and the Rational Method was used.

SITE DESCRIPTION:

The site, Sandia Heights South, Unit 23, is located on the northwest corner of Tramway Boulevard and San Rafael. It contains approximately 5.18 acres proposed to be developed into 26 lots of single family dwelling units. The main road is oriented north/south through the site and will provide access from San Rafael which bounds the south end of the site. Tramway Boulevard provides the east boundary of the site and is currently in the process of being reconstructed. We have coordinated the grading and drainage concepts of this plan with Tramway's current design. Tennyson Avenue runs adjacent to the west boundary of the site, and 24' paving improvements to it have been made. The area is vacant and it consists of mostly weeds. Site soils are classified by the SCS's "Soil Survey of Bernalillo County" as those within the Embudo-Tijeras Complex, which consists of gravely sandy loam with medium runoff (Class B) and moderate hazard water erosion. The site presently has a small area on the southern portion in the FEMA 100-year Flood Plain Zone.

HISTORIC (UNDEVELOPED) CONDITIONS:

Within the current ongoing construction of the Tramway Blvd. Improvements, a diversion of upstream drainage was made at Tramway Boulevard. Historic conditions are therefore described relative to that event as "pre-diversion" or "post-diversion".

"PRE-DIVERSION" - Prior to development of Sandia Heights Unit 23, runoff from the east side of Tramway Boulevard flowed across the tract of land via a natural arroyo which eventually discharged into a FEMA 100-year floodplain zone downstream. See Preliminary Grading/Drainage Plan Floodmap.

"POST-DIVERSION" - During the design and approval of this Sandia Heights Unit 23 report, Tramway Boulevard improvements are presently being constructed. According to the drainage report for Tramway Boulevard, all east side runoff will be intercepted via a storm drain system and diverted to the South Pino Arroyo. (See Addendum to Drainage Report for Tramway Boulevard from Montgomery Boulevard to Tramway Road). "Post-Diversion" conditions are reflected in the design of proposed improvements and on the Preliminary Grading/Drainage plan enclosed.

DEFINITION OF EXISTING UNDEVELOPED CONDITIONS:

Since the diversion was approved and is presently being constructed to benefit the subdivision of this report (as well as other properties), proposed developed conditions are compared to the "pre-diversion" conditions of the site. Therefore, prior to the diversion , upstream offsite runoff from east of Tramway, 117 cfs, would have discharged across the site to the existing

three 42" CMP culverts and into the existing downstream arroyo. (See Addendum to Drainage Report for Tramway Boulevard from Montgomery Boulevard to Tramway Road).

Presently, on-site flows free discharge to the existing culverts. Basin hydrology data and calculations for the existing conditions can be found in Appendix B of this report. The 5.18 acre undeveloped site generates approximately 12.7 cfs in the 100-year, 6-hour storm.

Off-site flows from the developed area north (Sandia Heights Unit 24) and the area from Tennyson street and western boundaries of Units 23 and 24 do not enter the site but drain via an earth drainage swale on the edge of Tennyson Street. This north area Basin D yields approximately 46 cfs in the 100-year, 6-hour storm and discharge to the existing culverts. Basin F, approximately 2.5 cfs, is a small area between the centerline of San Rafael to the southern boundary of the proposed site. This basin also does not enter the site and discharges to the existing culverts.

Basin E consists of the area between the eastern boundaries of Unit 23 and 24 and the edge of pavement from Tramway Boulevard. The area between Unit 23 and edge of pavement of San Rafael also part of Basin E. The basin yields approximately 3.5 cfs. This basin discharges to the existing culverts through the proposed site.

The existing three 42" cmp culvert yields a capacity of approximately 270 cfs. This was based on the assumption of 1 -42" cmp with inlet control and max headwater depth of 7 feet, invert of pipe to the top of road surface. Chart 5 of the U.S. Transportation Bureau of Roads yields 90 cfs for one culvert (See Appendix B of this report).

PROPOSED DEVELOPED CONDITIONS:

Please refer to the Preliminary Grading/Drainage Plan enclosed with this report. Generally, runoff from the site will be collected within drainage swales and the interior public streets and conveyed in a surface flow manner to storm drain inlets located at the intersection of Street B and A. The proposed streets will be able to carry the proposed runoff. The hydraulic calculations (See Appendix C) indicate the streets can handle from 15 cfs to 34 cfs based on a slope of 1% to 5% and mountable roll-type curb and gutter. A single Type "C" drop inlet will be required on each side of Street A. It will then be conveyed through a 30" RCP pipe under the main street (Street A) and along the floodplain easement to the 42" culverts under Tennyson Street. The 30" RCP pipe will connect to a modified Type "D" inlet which is the length of 3-single Type "D" inlets in series and the width widen to accommodate a 30" pipe. The drop inlet will connect to 1 -42" cmp and with the remaining 2 pipes eliminated by plugging the pipes at both ends. A head of 1.20' will be needed to push 52 cfs (Basins D and F) through the inlet and a head of 2.55' will be required in the the inlet to push a total flow of 74 cfs through the 42" cmp pipe. The rear portion of lots along Tennyson Street (Basin C4) and the developed offsite flows from Sandia Heights South Unit 24 of 46 cfs (north of Unit 23, Basin D) will discharge to Tennyson Street. A 10' bottom, 3:1 side slopes and 1.5 deep earth drainage swale will collect these flows and transfer them to the culvert crossing described above. With the eventual development of Tennyson Street into a 48' wide paved street, future flows will be carried along the east curb.

As mentioned above, the off-site flow of Basin D (46 cfs) and Basin F (2.3 cfs) will discharge into the proposed inlet structure at the existing culvert via a drainage side channel. Basin E runoff flows will be permitted to enter the site and conveyed by the proposed on-site improvement mentioned above.

Accordingly, the 5.18 acre developed site will free discharge approximately 24 cfs to the existing culverts. An erosion control pad will be provided at the downstream end of the culvert. A stilling basin for pipe or channel outlets which is an impact-type energy dissipator will be used. See Final Grading Detail sheet located in the back pocket for details. The following paragraph provides justification for free discharge.

JUSTIFICATION:

1. Reduction in Flows: Developed condition flows from the site of only 24 cfs are significantly lower than the pre-diversion flows of 130 (117 + 12) cfs.

2. Participation in project: Sandia Peak Tram Company financially participated in the offsite flow diversion construction cost with the County.

3. Land Use: Reducing zone classification from C-1 to Residential classification is presently being reviewed by the County, with approval anticipated. This will decrease the intensity of development and consequently, the impervious area of the subdivision.

4. Drainage Easement: Filed on September 20, 1991 (see Exhibit 1) provides for discharge of flows and installation of an outfall structure for erosion control west of Tennyson.

5. Downstream floodplain: See FEMA Maps or Floodplain Map on Preliminary Grading/Drainage Plan. An existing FEMA floodplain, west of Tennyson, receives the reduced flows from the development.

6. Previous County approval of free discharge: As stated in the Agreement between Sandia Peak Service and County of Bernalillo dated June 6, 1989 in Paragraph 13 which states, "County agrees to permit the discharge of flows to the west from Tract 1, Unit 21, Tract 2, Unit 22 and Tract 3, Unit 23, Sandia Heights South, not to exceed in the aggregate the current water volume and rate, without concern for frequency. The discharge of these flows shall be at a single location or at multiple locations (presently existing under Tennyson Street) as SPS elects".

7. Adjacent owner has expressed no objection with discharge flows since they are less than the previous flows prior to the diversion currently being done by the Tramway Boulevard project.

The justification points presented above leads this report to the finding that the proposed development, that no adverse impact is placed on downstream or adjacent property due to development.

CONCLUSION:

Due to the determinations and findings of this report, concluding no adverse downstream impacts due to development, the development will "free-discharge" developed drainage runoff across Tennyson Street in the manner described above in previous sections and in accordance with the "Developed Conditions" plan enclosed and the reasons stated above for allowing free discharge.

APPENDIX A

EXHIBITS

91080161

0009884

GRANT OF EASEMENT
FLOODWAY AND STORM DRAINAGE WORKS IN NORTH ALBUQUERQUE ACRES

Waterman, Inc., Grantors, for good and valuable consideration, the receipt of which is hereby acknowledged, does grant, bargain, sell and convey unto the ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY, a political subdivision of the State of New Mexico, Grantee, and its successors and assigns, the permanent right and easement for drainage, flood control and conveyance of storm water and the construction, reconstruction, operation and maintainance of, and access to such facilities on, in, under, over and across the following described real estate:

The land in which the foregoing rights and easements are granted is located in the County of Bernalillo and State of New Mexico and is more particularly described in Exhibit "A" attached hereto and incorporated herein by reference.

Except by the written approval of AMAFCA, no fence, wall, building, or other obstruction may be placed or maintained in said easement and there shall be no alteration of the grades or contours in said easement. The granting of this easement shall not obligate the Grantee to maintain natural arroyos, drainage channels, or facilities that do not meet the standards of the Grantee for design and construction, nor shall this granting require the protection of property lying outside of the easement granted. Safe locations for structures built on lands adjacent to the real property described herein may be substantially outside of the area described herein.

TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid, unto the Grantee, its successors and assigns, forever, except that any portion of the easement granted herein shall revert to the Grantor, its successors or assigns, as and to the extent said portion is declared unnecessary for flood control or drainage by the Board of Directors of the Albuquerque Metropolitan Arroyo Flood Control Authority. Any reversion shall be conveyed by quitclaim deed.

THERE IS RESERVED to the Grantor, its successors and assigns, the right to use said lands for open space landscaping and other purposes which will not interfere with the rights and easements hereby granted, provided that Grantor obtains Grantee's written approval for such use, not to be unreasonably withheld.

WITNESS its hand and seal this 20th day of September, 1991 ~~1988~~.

Ted Waterman President
Waterman, Inc.

ACKNOWLEDGMENT FOR NATURAL PERSONS

STATE OF NEW MEXICO)
) SS.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 20th day of September, ~~1989~~ 1991 by Ted Waterman.

My commission expires:
12/11/94

Notary Public

(SEAL)

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD

91 SEP 24 PM 2:11

9416 PG. 9884-9885

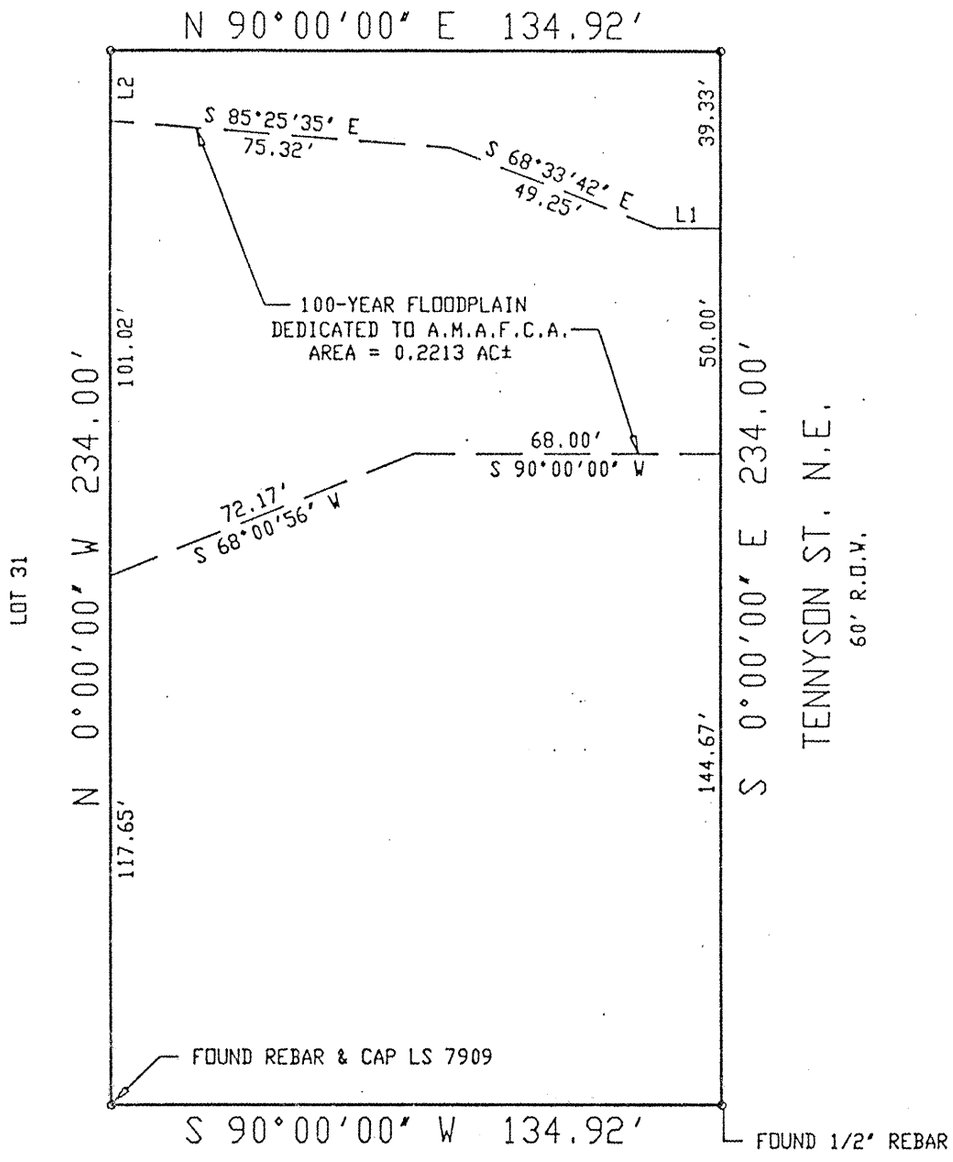
COUNTY CLERK & RECORDER

DEPUTY

Exibit 1

EXHIBIT A

SCALE : 1" = 40'



LINE	BEARING	DISTANCE
L1	N 90°00'00" E	14.00
L2	N 0°00'00" W	15.32

SURVEYOR'S CERTIFICATION

I, Charles G. Cala, Jr., a Professional Surveyor under the laws of the State of New Mexico, do hereby certify that this Floodplain Easement was prepared by me or under my direct supervision, meets the minimum standards for land surveying in the State of New Mexico and is true and correct to the best of my knowledge and belief.

Charles G. Cala, Jr., NMPS 11184

CHARLES G. CALA, JR. NEW MEXICO 11184 REGISTERED PROFESSIONAL SURVEYOR

9-18-1991
Date

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

EASEMENT SURVEY
LOT 32, BLOCK 13,
TRACT 2, UNIT 2

JOB NO. 910534

SHEET 1 OF 1

APPENDIX B

HYDROLOGY AND HYDRAULIC CALCULATIONS

DPM Section 22.2 Hydrology for City of Albuquerque
Aug 1991 (Proposed DPM Revisions)

Percipitation Zone p. 2

Site located on Zone 4

Land treatment p. 5

B - Pervious Area

D = Impervious Area

= Percent Treatment (D) Impervious p-le

Single Family Residential

N = Units/Acre

Total Site 5.819 Acres

26 lots

$$\frac{26}{5.819} = 4.47 \text{ Units/Acre}$$

$$D/O = 7\sqrt{(D \times N) + (5 \times N)} = 7\sqrt{(4.47)^2 + (5)(4.47)}$$

$$D/O = 45.54\%$$

Use 46%

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights SHEET 1 OF 7

PROJECT NO. BY MH DATE 1-13-92

SUBJECT Hydrology - on site Flows CH'D DATE

PROPOSED CONDITIONS

Total Area 5.919 Acres

Peak Intensity Table 10 p. 12

$I_{100} = 5.61$ in/hr
$I_{10} = 3.83$ in/hr
} Zone 4

Rational Coefficient Table 11 p. 12

C_{100} for Treatment B
0.52

C_{10} for treatment B
0.38

C_{100} for treatment D
0.84

C_{10} for treatment D
0.93

Area Impervious = $5.919(.46) = 2.677$ Acre
Area Pervious = 3.1420

$Q_{100} = (0.52)(5.61)(3.1420) + (.84)(5.61)(2.677)$

$\boxed{Q_{100} = 23.28 \text{ cfs}}$

$Q_{10} = (0.38)(3.83)(3.1420) + (.93)(3.83)(2.677)$

$\boxed{Q_{10} = 14.11 \text{ cfs}}$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights SHEET 2 OF 7
PROJECT NO. BY MH DATE 1-13-92
SUBJECT Hydrology on site CH'D DATE

Existing Conditions

Land treatment - A

Assume bare soil uncompacted minimal disturbance to grading.

$C_{100} = 0.39$

$C_{10} = 0.23$

$Q_{100} = (0.39)(5.61)(5.819) = \boxed{12.73 \text{ cfs}}$

$Q_{10} = (0.23)(3.03)(5.819) = \boxed{5.1260 \text{ cfs}}$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights SHEET 3 OF 7

PROJECT NO. BY MH DATE 1-13-92

SUBJECT Hydrology onsite Existing conditions CH'D DATE

ON-Site Developed Flows

Basin A

Area = 3.72 Acres

Area Impervious = 3.72(.46) = 1.71 Acres

Area Pervious = 3.72 - 1.71 = 2.01 Acres

$Q_{100} = (0.52)(5.61)(2.01) + (0.94)(5.61)(1.71)$

$Q_{100} = 14.88$ cfs 15 cfs

$Q_{10} = (0.39)(3.83)(2.01) + (0.93)(3.83)(1.71)$

$Q_{10} = 9.02$ cfs 9 cfs

BASIN B

Area = 1.1903

Area Impervious = (4.19)(.46) = 0.55 Acres

Area pervious = 1.19 - 0.55 = 0.64 Acres

$Q_{100} = (0.52)(5.61)(.64) + (0.93)(5.61)(.55)$

$Q_{100} = 4.73$ cfs 5 cfs

$Q_{10} = (0.36)(3.83)(0.64) + (0.93)(3.83)(.55)$

$Q_{10} = 2.89$ cfs 3 cfs

BASIN C

Area = 0.9056 Acres

Area Impervious = (0.9056)(.46) = 0.42 Acres

Area pervious = 0.9056 − 0.42 = 0.49 Acres

$Q_{100} = (0.52)(5.61)(0.49) + (0.93)(5.61)(.42)$

$Q_{100} = 3.62$ cfs

$Q_{10} = (.38)(3.83)(.49) + (0.93)(3.83)(.42)$

$Q_{10} = 2.21$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights unit 23 SHEET 5 OF 7

PROJECT NO. _____ BY MH DATE 2-6-92

SUBJECT Hydrology CH'D _____ DATE _____

Offsite Flows:

Using the revised hydrology method presently proposed by the City of Alb.

Percipitation Zone: Zone 4

Land treatment

B-Pervious

D-Impervious.

Unit 24 onsite Developed Contributes to exist. 3-42" under Tennyson via swale to Unit 23.

Area = 9.07 } take from plans
Units = 54 }

$$\frac{54}{9.07} = 5.95 \text{ units/Acres}$$

$$\% = 7\sqrt{(N)(N) + 5(N)} = 7\sqrt{(5.95)^2 + (5)(5.95)} = 56.50\%$$

Use = 57% Impervious

Peak Intensity $I_{100} = 5.61$ in/hr $I_{10} = 3.83$ in/hr.

Rational Coefficient: $C_{100} = .52$ $C_{10} = .36$ For treatment B

$C_{100} = .94$ $C_{10} = .93$ for treatment D

BOHANNAN-HUSTON INC.

PROJECT NAME Scenic Heights SHEET 6 OF

PROJECT NO. 91280.03 BY MH DATE 2-10-92

SUBJECT Offsite Flows CH'D DATE

Basin D
Unit 24

Area = 9.07 Ac.

Area Impervious = (0.57)(9.07) = 5.17 Ac

Area Pervious = 9.07 − 5.17 = 3.90 Acres.

Q_{100} = (.52)(5.61)(3.90) + .94(5.61)(5.17)

Q_{100} = 38.6 cfs

Q_{10} = (.38)(3.83)(3.90) + (.93)(3.83)(5.17)

Q_{10} = 24.1 cfs

Q_{100} = 38.6 cfs flows to 3-42" Via Drainage Swale

Area from northern boundary Unit 24 to San Rafael & ℄ Tennyson & Western Boundary (

Area = 1.47 Ac

% impervious = 35/45 = 78%

Area Impervious = (0.78)(1.47) = 1.15 Ac

Area Pervious 1.47 − 1.15 = .32 Ac

Q_{100} = (.52)(5.61)(.32) + (.94)(5.61)(1.15)

Q_{100} = 7. cfs

Q_{10} = (.38)(3.83)(.32) + (0.93)(3.83)(1.15) =

Q_{10} = 4.5 cfs

Total Q_{100} = 45.6 cfs.

BOHANNAN-HUSTON INC.

PROJECT NAME Scenic Height SHEET 7 OF

PROJECT NO. 91280.03 BY MH DATE 2-10-92

SUBJECT Offsite flows CH'D DATE

Basin E':
Area from Northern Boundary Of Unit 24 to San Rafael from Edge Pavement to Eastern Boundary Unit 23.
Tramway

Area = 0.72 + .22 + .25 = 1.19 Ac

Total Area pervious

$Q_{100} = (.52)(5.61)(1.19) = \boxed{3.5 \text{ cfs}}$

$Q_{10} = (.38)(3.83)(1.19) = 1.7 \text{ cfs}$

Basin F':
Area 1/2 of San Rafael Pavent

A = .22 Ac All Impervious

Area between San Rafael + South Boundary

A = .39 All pervious

$Q_{100} = (.52)(5.61)(.39) + (.94)(5.61)(.22)$

$\boxed{Q_{100} = 2.3 \text{ cfs}}$

$Q_{10} = (.38)(3.83)(.39) + (.93)(3.83)(.22)$

$Q_{10} = 1.4 \text{ cfs}$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights SHEET 8 OF
PROJECT NO. 91290.03 BY MT DATE 2-10-92
SUBJECT Offsite Flows. CH'D DATE

Inlet Capacity of Storm Inlet grate in a sag condition

Type 'C' grate Single.

Area of Opening

$A_B = \frac{(.5)(25)}{144} = 0.0868\ ft^2$

2 Bars of this size.

$A = 2(.0868) = .1736\ ft^2$

$A_C = \frac{(.5)(24)^2}{4(144)} = 0.0833\ ft^2$

7 bars $7(.0833) = 0.5833\ ft^2$

$A_A = \frac{(.5)(355)}{144} = 0.1233\ ft^2$

13 bars $13(.1233) = 1.602\ ft^2$

Total Bar Area = $2.36\ ft^2$

Area total of grate.

$A = \frac{40(25)}{144} = 6.94\ ft^2$

Effective Area = $6.94 - 2.36 = 4.58\ ft^2$

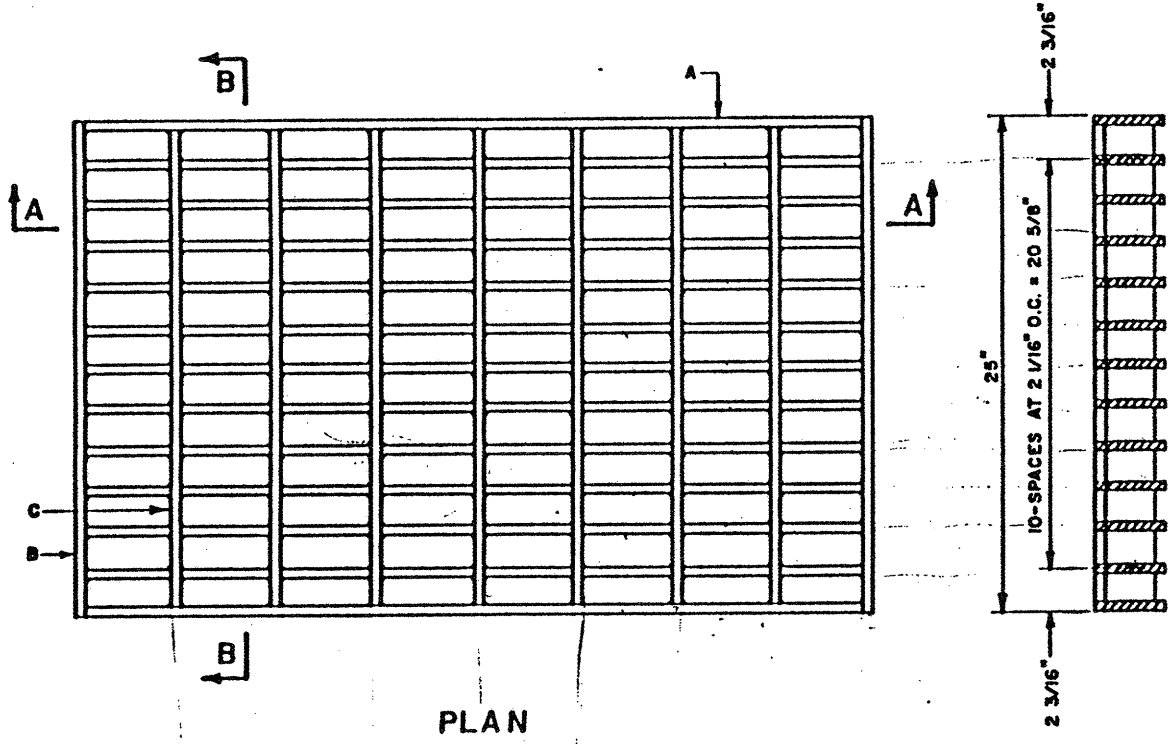
BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights Unit 23 SHEET 1 OF 2

PROJECT NO. 9280.03 BY MH DATE 2-11-92

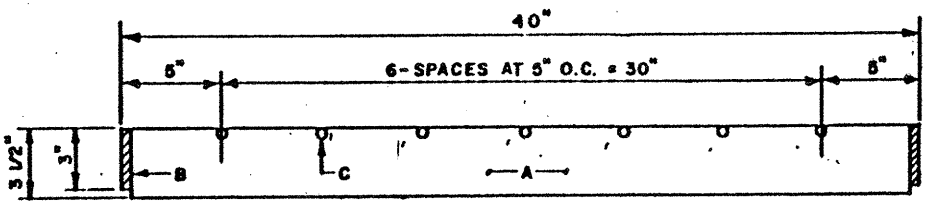
SUBJECT Inlet Capacity CHKD DATE

SHT 2 of



PLAN

SECTION B-B



SECTION A-A

GENERAL NOTES:

1. ALL BARS SHALL BE STRUCTURAL GRADE STEEL, GRADE A36.
2. THE GRATE SHALL BE WELDED WITH 1/8" FILLET WELD AROUND BOTH SIDES OF CROSS BARS, 1/4". FILLET WELD BOTH SIDES OF BEARING BARS TO END BARS.
3. AFTER CLEANING SURFACE OF SCALE, RUST, OILS, ETC., PAINT GRATE WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. TOP OF CROSS BARS SHALL BE FLUSH WITH TOP OF GRATE.
5. GRIND WELDS FLUSH WITH BEARING BARS.
6. WHEN INSTALLED IN FRAME, PUSH TIGHT TO ONE SIDE, OTHER SIDE SHALL HAVE 1/2" MAX. OPENING. SPACERS WELDED TO FRAME MAY BE USED IF REQUIRED TO KEEP 1/2" SPACE OR LESS.

CONSTRUCTION NOTES:

A. BEARING BARS, (13) 1/2" X 3 1/2" X 39".

B. END BARS, (2) 1/2" X 3" X 25".

C. CROSS BARS, (7) 1/2" DIA. X 24.

#Bars:

2 $A_{End}^{B} = \frac{(.5)(25)}{144} = 0.0868\ ft^2$

9 $A_C = \frac{\pi(.5)}{4\ 144} = 0.0014\ ft^2$

(13) $A_A = 1\ \frac{(.5)(35.5^{*})}{144} = 0.\cancel{1354}\ .1233\ ft^2$

* $39" - 3\frac{1}{2} = 35.5"$

CITY OF ALBUQUERQUE

REVISIONS

DRAINAGE
STORM INLET
ALBUQUERQUE GRATE

DWG. 2220

AUG 1986

Orifice Equation

$Q = CA\sqrt{2gh}$

C = discharge coefficient by King + Brater.

C = 0.60

A = 4.58 ft²

Q = ~~17~~ 23.5 cfs total flow on site.

To find water h

Street is normal crown @ 2%
∴ 1/2 street will handle .32' of water

$Q = (.6)(4.58)\sqrt{64(.32)}$

Q = 12.44 cfs

Assume no clogging + that curb opening will take more water.

Each single Inlet will take 12.4 cfs

2(12.4) = 24.8 < 23.5 cfs OK.

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights Unit 23 SHEET 2 OF
PROJECT NO. 91230.03 BY MA DATE 2-11-92

Inlet capcity for storm Inlet grate in Sag condition @ Tennyson.

Type 'D' grate Double

Area opening

$A_B = \frac{(.5)(25")}{144} = .0868\ ft^2$

2 bars $= 2(.0868) = .1736\ ft^2$

$A_C \frac{(.5)(24)}{144} = 0.0833\ ft^2$

Double $\frac{7}{14}$ bars $\frac{7}{14}(.0833) = .1662\ ft^2$

$A_A = \frac{(.5)(755)}{144} = 0.2622\ ft^2$

$13\ (.2622) = 3.407\ ft^2$

Total Area = 4.75 ft

Total Area $= \frac{(80)(25)}{144} = 13.89\ ft^2$

Effective Area = 13.89 - 4.75 = 9.14 ft^2

Assume 30% clog Factor

Eff Area = 9.14 - (30)(9.14) = 6.40 ft^2

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights Unit 23 SHEET 1 OF 2

PROJECT NO. 91280.03 BY [illegible] DATE 2-11-92

SUBJECT Inlet capacity CH'D _____ DATE _____

Orifice Equation

$Q = CA\sqrt{2gh}$

$C = 0.6$ by King & Brater

$A_{eff} = 6.40\ ft^2$ $\quad Q = 52\ cfs$

Water Height

$52 = (.6)(6.40)\sqrt{64h}$

$h = \left(\frac{52}{(.6)(6.40)\sqrt{64}}\right)^2 = 2.85'$ to much head.

go to bigger size.

Try an extra single 'O' inlet

∴ 1 Double plus 1 single

$A_B = .0868$

Still 2 Bars. $\quad 2(.0868) = .1736\ ft^2$

$A_C = .0833\ ft^2$

Single + Double 21 Bars $(.0833) = 1.749\ ft^2$

$A_A = \frac{(6.5)(120 - 3(45))}{144} \cdot = 0.3698$

13 bars $(0.3698) = 4.807\ ft^2$

Total $6.73\ ft^2$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Height Unit 23 SHEET 2 OF 2

PROJECT NO. 91290.03 BY MH DATE 2-11-92

SUBJECT Inlet Capacity CH'D _____ DATE _____

Total Area $\frac{(120)(25)}{144} = 20.83 \text{ ft}^2$

Effective Area = $20.83 - 6.73 = 14.10 \text{ ft}^2$

Assume 30% clogg factor

Eff. Area = $14.10 - .30(14.10) = 9.87 \text{ ft}^2$

$Q = CA\sqrt{2gh}$

$52 = (.6)(9.87)\sqrt{64.4(h)}$

$h = \left(\frac{52}{(.6)(9.87)\sqrt{64.4}}\right)^2 = 1.20'$ OK.

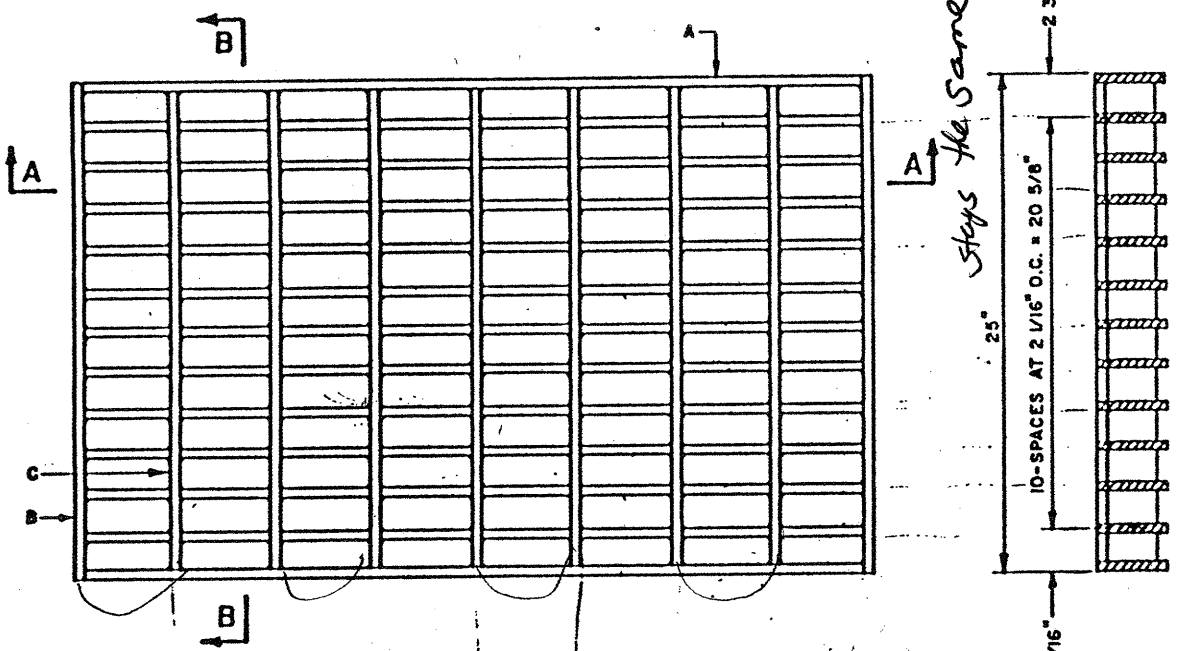
∴ Double Plus Single 'D' Inlet w/ 1.20' Head will force 52 cfs in grate. This assumes 30% clog factor.

BOHANNAN-HUSTON INC.

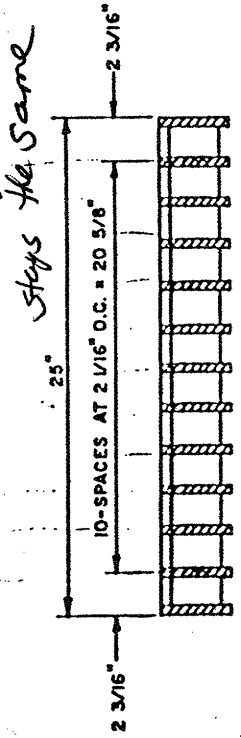
PROJECT NAME Sandia Heights SHEET ____ OF ____

PROJECT NO. 9280.02 BY MH DATE 2-12-92

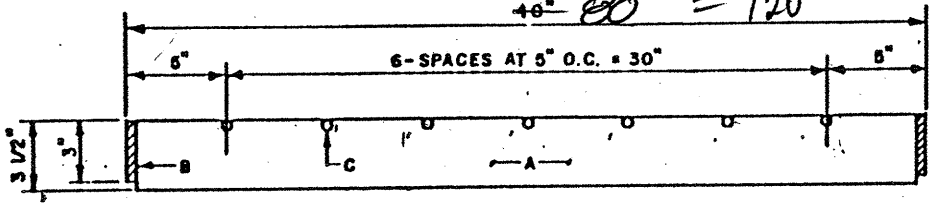
SUBJECT Inlet Capacity CH'D ____ DATE ____



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. ALL BARS SHALL BE STRUCTURAL GRADE STEEL, GRADE A36.
2. THE GRATE SHALL BE WELDED WITH 1/8" FILLET WELD AROUND BOTH SIDES OF CROSS BARS, 1/4". FILLET WELD BOTH SIDES OF BEARING BARS TO END BARS.
3. AFTER CLEANING SURFACE OF SCALE, RUST, OILS, ETC., PAINT GRATE WITH ONE SHOP COAT RED OXIDE, TWO FINISH COATS ALUMINUM PAINT (AASHTO M 69).
4. TOP OF CROSS BARS SHALL BE FLUSH WITH TOP OF GRATE.
5. GRIND WELDS FLUSH WITH BEARING BARS.
6. WHEN INSTALLED IN FRAME, PUSH TIGHT TO ONE SIDE, OTHER SIDE SHALL HAVE 1/2" MAX. OPENING. SPACERS WELDED TO FRAME MAY BE USED IF REQUIRED TO KEEP 1/2" SPACE OR LESS.

CONSTRUCTION NOTES:

A. BEARING BARS, (13) 1/2" X 3 1/2" X ~~20"~~ 79"

B. END BARS, (2) 1/2" X 3" X 25"

C. CROSS BARS, (7) 1/2" DIA. X 24.

#bars:

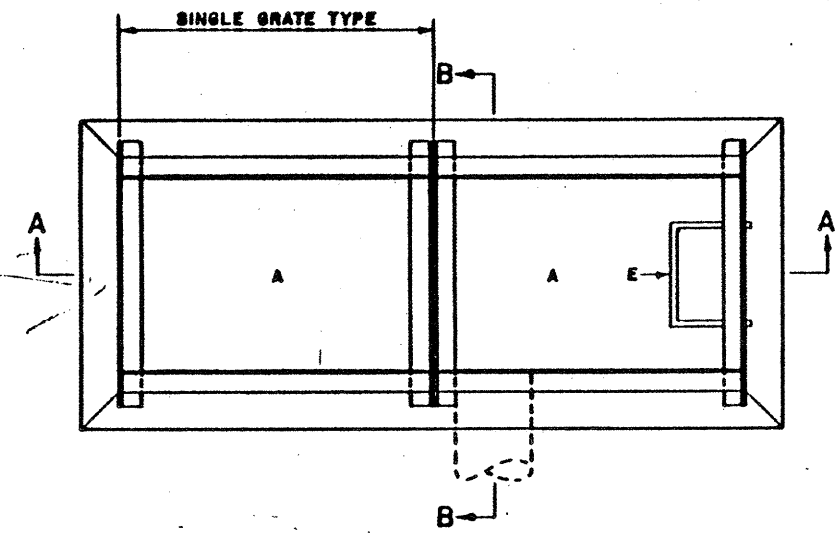
(2) $A_{End}^{B} = \frac{(.5)(25)}{144} = 0.0868\ ft^2$

$A_C = \frac{(24)(.5)}{144} = 0.0833\ ft^2$

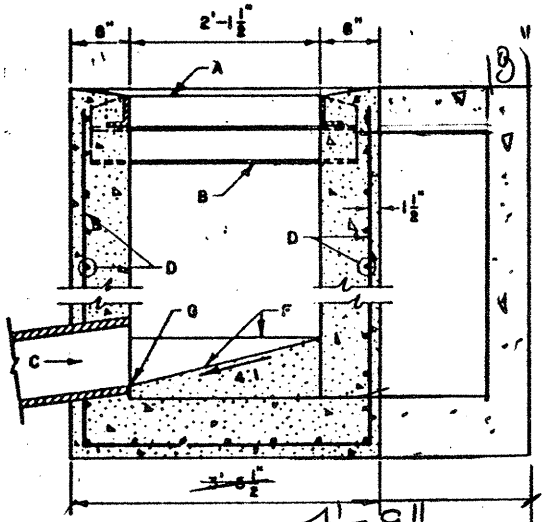
(13) $A_A = \frac{(.5)(25.5)}{144} = 0.2622\ ft^2$

79 - 35 = 75.5

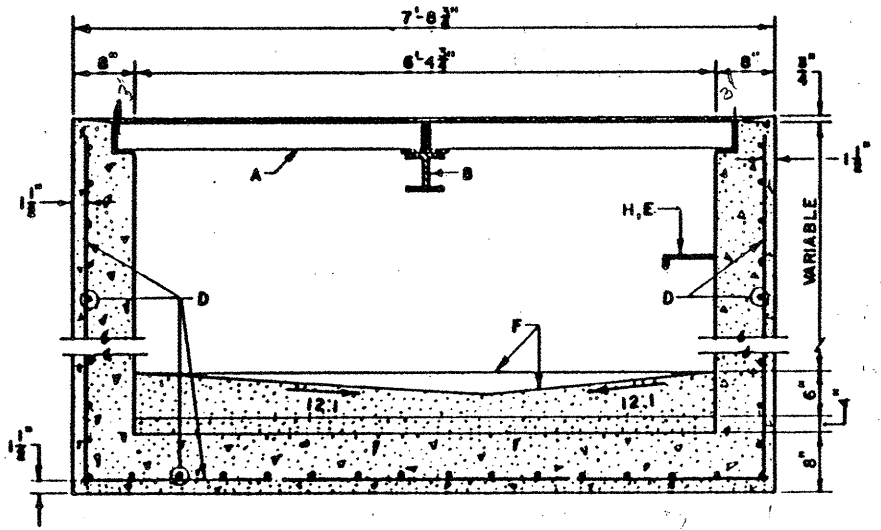
CITY OF ALBUQUERQUE	
REVISIONS	DRAINAGE STORM INLET ALBUQUERQUE GRATE
	DWG. 2220 AUG. 1986



PLAN



SECTION B-B



SECTION A-A

GENERAL NOTES:

1. FOR SINGLE GRATE TYPE STORM INLET, DELETE CENTER SUPPORT AND MOVE ONE END WALL TO FORM NEW SINGLE GRATE INLET.
2. STORM INLET GUTTER TRANSITION WILL BE SHOWN ON THE CONSTRUCTION PLANS.
3. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.
4. FOR FRAME & GRATING, SEE DWG 2216, 2220 & 2221.
5. FOR CENTER SUPPORT ASSEMBLY, SEE DWG 2215.

CONSTRUCTION NOTES:

A. FRAME & GRATE

B. CENTER SUPPORT ASSEMBLY.

C. CUT ONE HORIZONTAL AND ONE VERTICAL BAR MAX. AT PIPE OPENING.

D. NO. 4 BARS A 6" O.C. EACH WAY.

E. USE STANDARD STEPS, SEE DWG 2229.

F. CONC. FILL, SEE NOTE C DWG 2201.

G. INVERT PER DESIGN.

H. INSTALL STEPS ON UPSTREAM FACE.

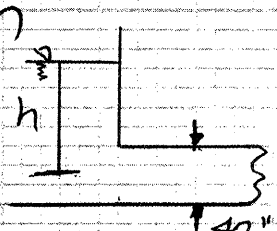
37"
6
6
49" Total inside to inside

Additional 1.29' needs be added

REVISIONS	CITY OF ALBUQUERQUE
	DRAINAGE
	STORM INLET DOUBLE "D"
	DWG. 2206 AUG 1986

Capacity of 42" CMP pipe

Assume Orifice Equation



$$\text{Area} = \frac{\pi D^2}{4} = \frac{\pi (3.5)^2}{4} = 9.62 \text{ ft}^2$$

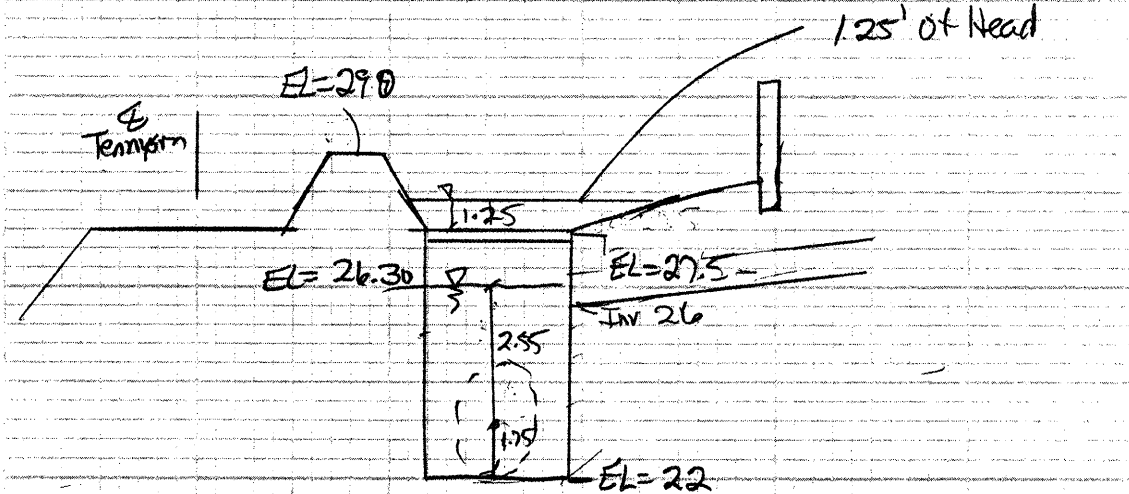
$C = 0.6$

$Q = 74$ cfs

$$Q = CA\sqrt{2gh}$$

$$74 = (.6)(9.62)\sqrt{32.2(2)h}$$

$$h = 2.55'$$



BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

Using Bureau of Rec. Section 6
Stilling Basin (6) for pipe

$D = 42" = 3.5'$

$Q = 75 cfs$

$V = 7.8$ fps. Assume full $\frac{75}{9.62} = 7.8$ fps.

Table 11 on footnote for discharges less than 21 fps
Obtain width from curve 42. Other dimensions proportional to W.

$W = 3.7'$ Assume lower limit. Use $W = 4'$

$H = \frac{3W}{4} = (.75)(4) = 3'$ use $4'$ cause pipe is $3.5'$

$L = \frac{4}{3}W = \frac{4}{3}(4) = 5.33'$ use $5'-6"$

$d = \frac{W}{6} = \frac{4}{6} = .67 = 8"$

$a = (.57)(4) = 2.29' = 2'-4"$

$b = (.75)(4) = 3'-0'$

$c = (0.43)(4) = 1.71' = 1'-8\frac{1}{2}"$

$e = (0.79)(4) = .317' = 0'-3"$

$f = (0.285)(4) = 1.14' = 1'-2"$

$g = (.373)(4) = 1.49' = 1'-6"$

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights Unit 23 SHEET 1 OF
PROJECT NO. 91280.04 BY MH DATE 2-13-92
SUBJECT Erosion control Pad CH'D DATE
Stilling basin

Riprap Determination (continue to proportion w/ 'w')

W = 4'

$t_W = (.06349)(4) = 0.25'$ use 3"

$t_F = (0.0675)(4) = 0.27'$ use 3½"

$t_b = (0.0714)(4) = 0.29'$ use 3½"

$t_p = (.06349)(4) = 0.25'$ use = 3"

$t = (0.03175)(4) = 0.127'$ use 1½"

riprap Size Table II

	Q = 59 cfs	8.5"
Project discharge	Q = 75	
	Q = 95 cfs	9.0"

Use 9" riprap rock

BOHANNAN-HUSTON INC.

PROJECT NAME Sandia Heights Unit 23 SHEET 2 OF

PROJECT NO. 91290.04 BY MH DATE 2-13-92

SUBJECT Erosion Control Pad CH'D DATE

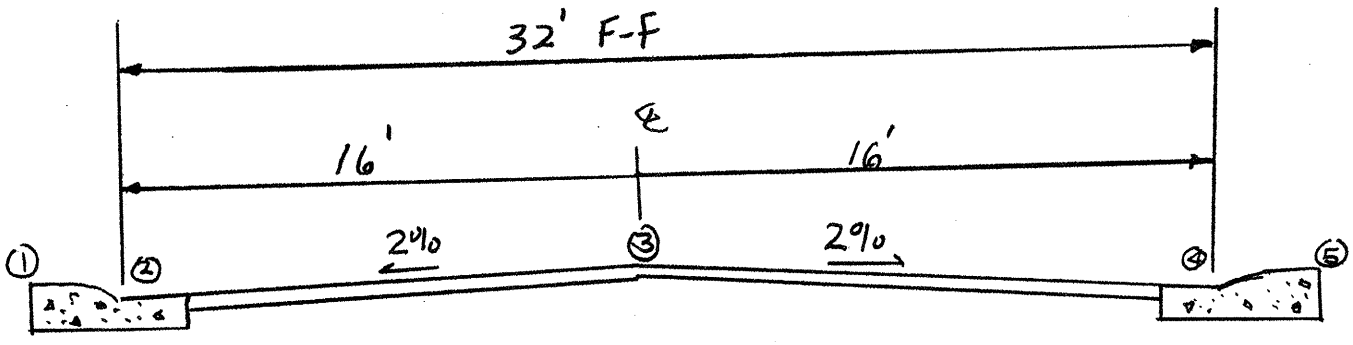
Stilling Basin

SANDIA HEIGHTS UNIT 23

MANNING'S N = .0170 SLOPE = .0100

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	-16.63	0.33	3	0.00	0.32	5	16.63	0.33
2	-16.00	0.00	4	16.00	0.00			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.1	0.1	0.5	0.6	10.4	1.2	10.4
0.2	0.2	2.1	3.9	20.9	1.9	20.8
0.3	0.3	4.7	11.5	31.3	2.5	31.1
0.3	0.3	5.6	15.1	33.4	2.7	33.3



SANDIA HEIGHTS SOUTH UNIT 23

MANNING'S N = .0170 SLOPE = .0500

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	-16.63	0.33	3	0.00	0.32	5	16.63	0.33
2	-16.00	0.00	4	16.00	0.00			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.1	0.1	0.5	1.4	10.4	2.6	10.4
0.2	0.2	2.1	8.7	20.9	4.2	20.8
0.3	0.3	4.7	25.7	31.3	5.5	31.1
0.3	0.3	5.6	33.7	33.4	6.0	33.3

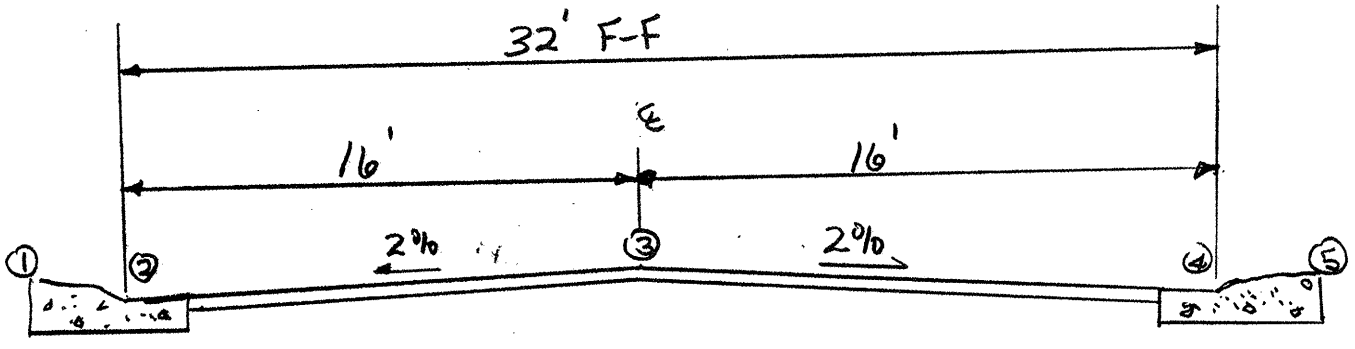
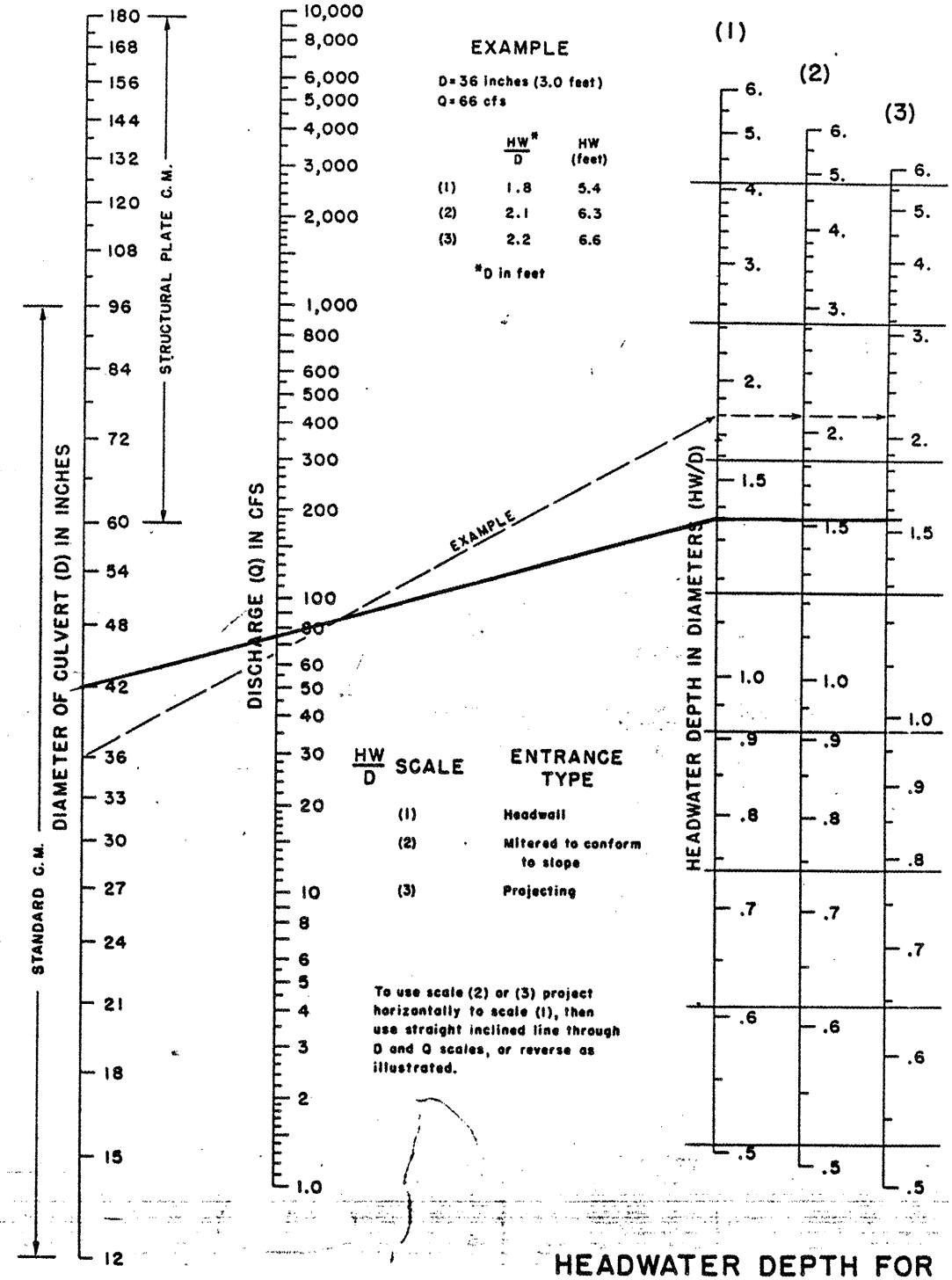


CHART 5



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

BUREAU OF PUBLIC ROADS JAN. 1963

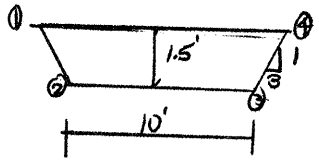
Channel by Tennyson St.

SANDIA HEIGHTS UNIT 23

MANNING'S N = .0300 SLOPE = .0150

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.50	3	14.50	0.00			
2	4.50	0.00	4	19.00	1.50			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.1	0.1	1.0	1.3	10.6	1.3	10.6
0.2	0.2	2.1	4.2	11.3	2.0	11.2
0.3	0.3	3.3	8.4	11.9	2.6	11.8
0.4	0.4	4.5	13.7	12.5	3.1	12.4
0.5	0.5	5.8	20.1	13.2	3.5	13.0
0.6	0.6	7.1	27.5	13.8	3.9	13.6
0.7	0.7	8.5	36.0	14.4	4.3	14.2
0.8	0.8	9.9	45.6	15.1	4.6	14.8
0.9	0.9	11.4	56.1	15.7	4.9	15.4
1.0	1.0	13.0	67.8	16.3	5.2	16.0
1.1	1.1	14.6	80.4	17.0	5.5	16.6
1.2	1.2	16.3	94.2	17.6	5.8	17.2
1.3	1.3	18.1	109.0	18.2	6.0	17.8
1.4	1.4	19.9	124.9	18.9	6.3	18.4
1.5	1.5	21.8	142.0	19.5	6.5	19.0



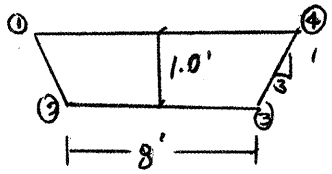
Channel by SE section of property.

SANDIA HEIGHTS UNIT 23

MANNING'S N = .0300 SLOPE = .0150

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	1.00	3	11.00	0.00			
2	3.00	0.00	4	14.00	1.00			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.1	0.1	0.8	1.1	8.6	1.3	8.6
0.2	0.2	1.7	3.4	9.3	2.0	9.2
0.3	0.3	2.7	6.8	9.9	2.5	9.8
0.4	0.4	3.7	11.1	10.5	3.0	10.4
0.5	0.5	4.8	16.3	11.2	3.4	11.0
0.6	0.6	5.9	22.4	11.8	3.8	11.6
0.7	0.7	7.1	29.4	12.4	4.2	12.2
0.8	0.8	8.3	37.4	13.1	4.5	12.8
0.9	0.9	9.6	46.2	13.7	4.8	13.4
1.0	1.0	11.0	56.0	14.3	5.1	14.0



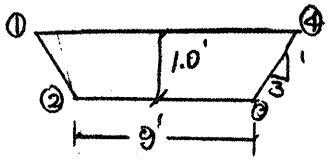
Channel by SE section of property.

SANDIA HEIGHTS UNIT 23

MANNING'S N = .0300 SLOPE = .0075

POINT	DIST	ELEV	POINT	DIST	ELEV	, POINT	DIST	ELEV
1	0.00	1.00	3	11.00	0.00			
2	3.00	0.00	4	14.00	1.00			

WSEL (FT)	DEPTH INC	FLOW AREA (SQ FT)	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOP WID
0.1	0.1	0.8	0.7	8.6	0.9	8.6
0.2	0.2	1.7	2.4	9.3	1.4	9.2
0.3	0.3	2.7	4.8	9.9	1.8	9.8
0.4	0.4	3.7	7.8	10.5	2.1	10.4
0.5	0.5	4.8	11.5	11.2	2.4	11.0
0.6	0.6	5.9	15.9	11.8	2.7	11.6
0.7	0.7	7.1	20.9	12.4	2.9	12.2
0.8	0.8	8.3	26.5	13.1	3.2	12.8
0.9	0.9	9.6	32.7	13.7	3.4	13.4
1.0	1.0	11.0	39.6	14.3	3.6	14.0



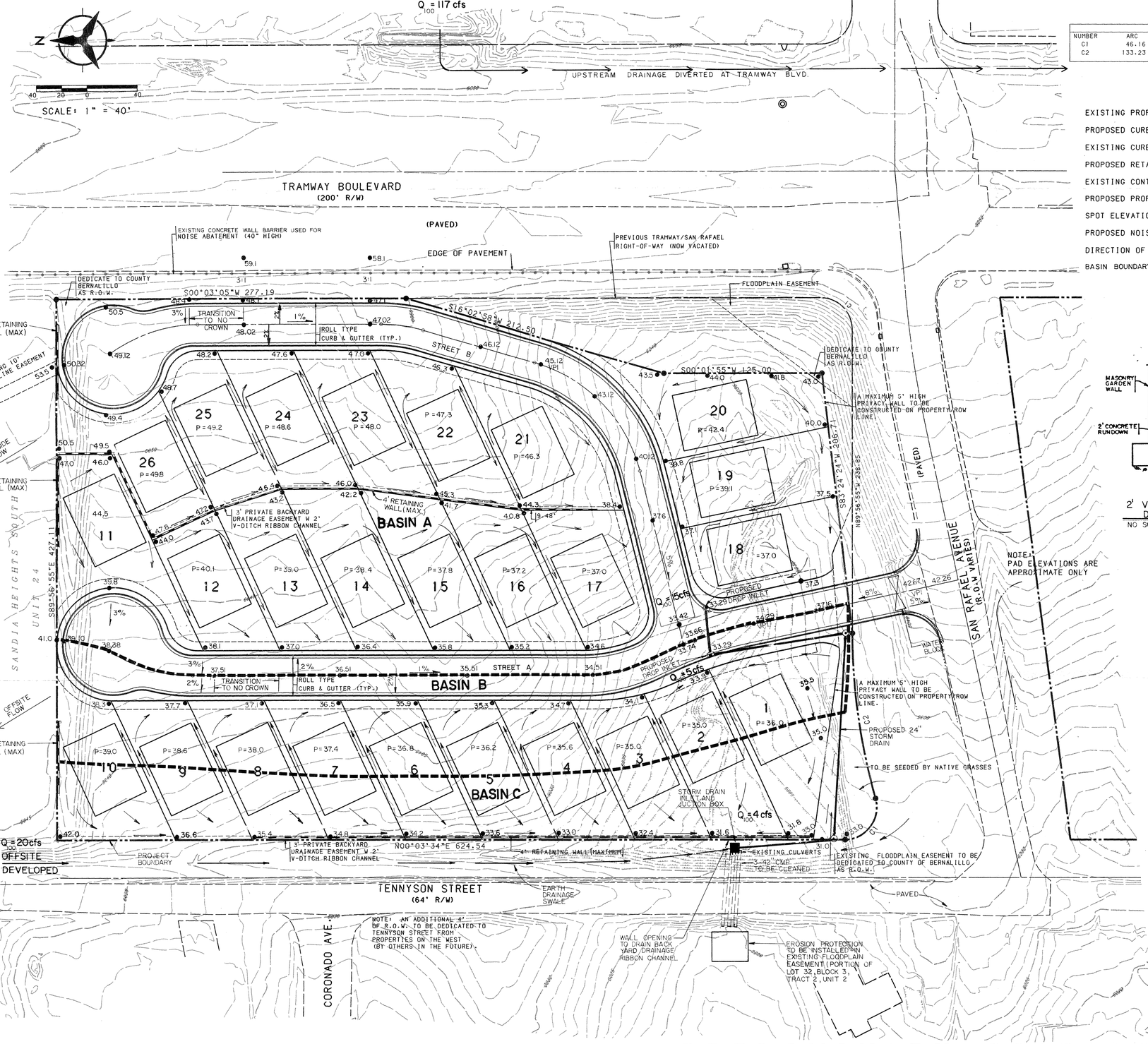
SANDIA HEIGHTS UNUT 23

CULVERT RATING TABLE

30. INCH DIAMETER PIPE

N = 0.01300 INCREMENT = 1.00 SLOPE = 0.00300

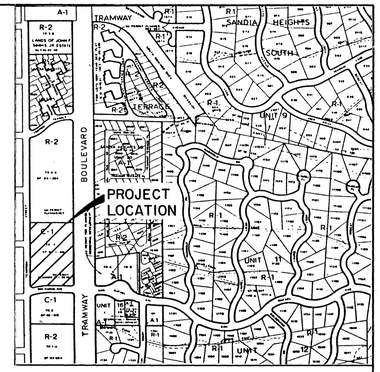
FLOW DEPTH (IN)	FLOW AREA (SQ FT)	DISCHARGE (CFS)	VELOCITY (FPS)
1.00000	0.05020	0.04529	0.90203
2.00000	0.14054	0.19909	1.41661
3.00000	0.25547	0.46903	1.83598
4.00000	0.38908	0.85567	2.19919
5.00000	0.53776	1.35653	2.52258
6.00000	0.69890	1.96737	2.81496
7.00000	0.87048	2.68264	3.08178
8.00000	1.05085	3.49580	3.32666
9.00000	1.23855	4.39953	3.55216
10.00000	1.43233	5.38580	3.76018
11.00000	1.63102	6.44594	3.95210
12.00000	1.83356	7.57076	4.12899
13.00000	2.03894	8.75048	4.29169
14.00000	2.24619	9.97483	4.44078
15.00000	2.45437	11.23299	4.57674
16.00000	2.66255	12.51358	4.69985
17.00000	2.86980	13.80464	4.81032
18.00000	3.07518	15.09356	4.90819
19.00000	3.27772	16.36698	4.99341
20.00000	3.47641	17.61068	5.06577
21.00000	3.67019	18.80938	5.12491
22.00000	3.85789	19.94646	5.17030
23.00000	4.03825	21.00355	5.20115
24.00000	4.20984	21.95977	5.21630
25.00000	4.37098	22.79062	5.21408
26.00000	4.51965	23.46573	5.19193
27.00000	4.65327	23.94420	5.14568
28.00000	4.76820	24.16269	5.06747
29.00000	4.85853	23.99238	4.93820
30.00000	4.90874	22.46600	4.57674



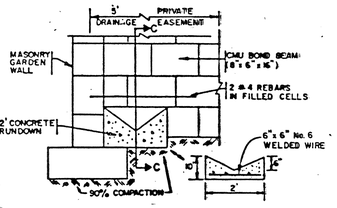
CURVE TABLE						
NUMBER	ARC	RADIUS	DELTA	CHORD	CHORD BEARING	TANGENT
C1	46.16	25.00	105°46'47"	39.87	N52°49'50"W	33.04
C2	133.23	484.00	15°46'19"	132.81	S82°09'56"W	67.04

LEGEND

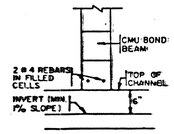
- EXISTING PROPERTY BOUNDARY
- PROPOSED CURB & GUTTER
- EXISTING CURB & GUTTER
- PROPOSED RETAINING WALL
- EXISTING CONTOUR
- PROPOSED PROPERTY LINE
- SPOT ELEVATION ● 35.8
- PROPOSED NOISE ABATEMENT WALL
- DIRECTION OF FLOW ARROW
- BASIN BOUNDARY



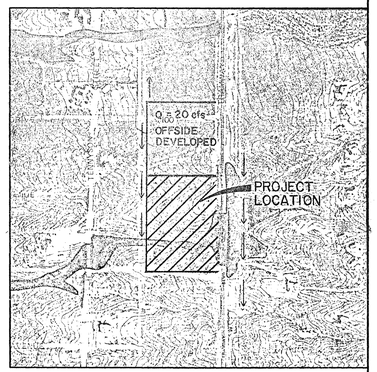
LOCATION MAP
ZONE ATLAS MAP NO. D-23
NO SCALE



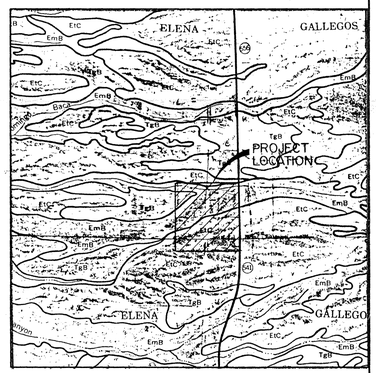
2' V-DITCH CONCRETE RIBBON CHANNEL DETAIL
NO SCALE



SECTION C-C
NO SCALE



FLOOD INSURANCE MAP
REFERENCE: FLOOD INSURANCE STUDY
PANEL NO. 350002 0011



SOILS MAP
REFERENCE: SOIL CONSERVATION SERVICE
MAP NO. 12 & 22

Maria Hinojos
2-20-92

RECEIVED
MAR 16 1992

TERRAIN MANAGEMENT & PRELIMINARY GRADING/DRAINAGE PLAN
SANDIA HEIGHTS SOUTH UNIT 23, TRACT 3A

ALBUQUERQUE, NEW MEXICO

FEBRUARY 1992

SHEET 3 of 4

USERNAME=C9128002.PAD
FILENAME=GRADE.GRF

LEGEND

EXISTING PROPERTY BOUNDARY	
PROPOSED CURB & GUTTER	
EXISTING CURB & GUTTER	
PROPOSED RETAINING WALL	
EXISTING CONTOUR	
PROPOSED PROPERTY LINE	
SPOT ELEVATION	•35.8
PROPOSED NOISE ABATEMENT WALL	
DIRECTION OF FLOW ARROW	
DRAINAGE BASIN BOUNDARY	
STORM DRAIN MANHOLE	
PROPOSED STORM DRAIN	SD

GRADING CONSTRUCTION NOTES:

1. ALL GRADING AND CONSTRUCTION UNDER THIS PLAN SHALL BE IN ACCORDANCE WITH THE "NEW MEXICO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".
2. CONSTRUCTION ACTIVITY SHALL BE LIMITED TO THE PROPERTY AND/OR PROJECT LIMITS. THE CONTRACTOR SHALL NOT DISTURB THE AREAS IN WHICH NO GRADING IS INDICATED. ANY DAMAGE TO ADJACENT PROPERTIES RESULTING FROM THE CONSTRUCTION PROCESS IS THE RESPONSIBILITY OF THE CONTRACTOR. ANY COSTS INCURRED FOR REPAIRS SHALL BE THE COST OF THE CONTRACTOR.
3. EXCEPT AS PROVIDED HEREIN, GRADING SHALL BE PERFORMED TO THE ELEVATIONS AND IN ACCORDANCE WITH THE TYPICAL SECTIONS SHOWN ON THIS PLAN.
4. THIS PLAN IS FOR THE EXCAVATION, PLACEMENT, AND COMPACTION OF NATURAL EARTH MATERIALS AND THE CONSTRUCTION OF PRIVATE RETAINING WALLS ONLY.
5. ALL ELEVATIONS SHOWN FOR HOUSE/BUILDING FOOTPRINTS ARE PAD ELEVATIONS. ADD SLAB THICKNESS FOR FINISH FLOOR ELEVATIONS.
6. TOP OF CURB AND STREET ELEVATIONS SHOWN ON THIS PLAN ARE SUFFICIENT FOR ROUGH GRADING ONLY.
7. PADS SHALL NOT VARY FROM A TRUE HORIZONTAL PLANE BY MORE THAN +/- 0.1 FT. AT ANY POINT. THIS TRUE PLANE SHALL NOT VARY FROM THE SHOWN PAD ELEVATION BY +/- 0.2 FT., UNLESS PERMITTED BY THE OWNER.
8. THE CONTRACTOR SHALL ABIDE BY ALL LOCAL, STATE, AND FEDERAL REGULATIONS WHICH APPLY TO THE CONSTRUCTION OF THESE IMPROVEMENTS AND GRADING OPERATIONS.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL CONSTRUCTION PERMITS AND INSPECTION APPROVALS NECESSARY FOR THE CONSTRUCTION OF THESE FACILITIES AND ALL GRADING OPERATIONS.
10. THE COST FOR REQUIRED CONSTRUCTION DUST AND EROSION CONTROL MEASURES SHALL BE INCIDENTAL TO THE PROJECT COST.
11. MAXIMUM SLOPES OUTSIDE THE BUILDING PAD ENVELOPES SHALL BE 3:1.
12. UNLESS OTHERWISE SHOWN, DRAINAGE SWALES SHALL HAVE A MINIMUM 1% SLOPE IN THE DIRECTION OF FLOW.
13. BOULDERS, GREATER THAN 3 FT IN DIAMETER, EXCAVATED DURING GRADING ACTIVITIES SHALL BE STOCKPILED AND DISPOSED OF AT THE DISCRETION OF THE OWNER.
14. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING CONSTRUCTION OF PUBLIC AND PRIVATE IMPROVEMENTS.
15. THE CONSTRUCTION OF WALLS OR FENCE ACROSS DRAINAGE PATHS INDICATED ON THIS PLAN SHALL NOT INTERFERE WITH THE DRAINAGE FLOWS. THE PROVISION OF 0.5 FT VERTICAL CLEARANCE ABOVE THE DRAINAGE PATH IS REQUIRED WHEN CONSTRUCTING WALL OF FENCES.

AS BUILT INFORMATION: CONTRACTOR / WORK STAKED BY / INSPECTOR'S ACCEPTANCE BY / FIELD VERIFICATION BY / DRAWINGS CORRECTED BY — DATE

MICRO-FILM INFORMATION: RECORDED BY / NO. — DATE

BENCH MARKS

SURVEY INFORMATION: FIELD NOTES — NO. / BY / DATE

ENGINEER'S SEAL

MARIA A. HINOJOS NEW MEXICO REGISTERED PROFESSIONAL ENGINEER

REMARKS / REVISIONS / DESIGN — NO. / DATE / BY

DESIGNED BY / DRAWN BY / CHECKED BY — DATE

COUNTY OF BERNALILLO
PUBLIC WORKS DEPARTMENT

TITLE: SANDIA HEIGHTS SOUTH, UNIT 23
FINAL GRADING/DRAINAGE PLAN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
COUNTY ENGINEER					

BHI JOB NO. 91280.02

DRAWING NO.	MAP NO. D-23	SHEET 1 OF 2

USERNAME: C9128002.PAD
FILENAME: GRADE.GRF