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HYDROLOGY SECTION

ALBUQUERQUE
NEW MEXICO
1706

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
KEN SCHULTZ

CHIEF ADMINISTRATIVE OFFICER
GENE ROMO

DEPUTY CAO DEVELOPMENT & ENTERPRISE SERVICES
LARRY LARRANAGA

DEPUTY CAO PUBLIC SERVICES
DAN WEAKS

October 31, 1988

REVISED CERTIFICATE OF COMPLETION AND ACCEPTANCE

Mr. Rick Semones
Presley Company of New Mexico
1909 Carlisle, N.E.
Albuquerque, NM 87110

RE: PROJECT NO. 3186, ~~NOR-ESTE-ESTATES,~~ (MAP NO. C-19) 306A

Dear Mr. Simones:

This is to certify that the City of Albuquerque accepts Project No. 3186 as being completed according to approved plans and construction specifications. If all required right-of-ways and/or easements have been dedicated, the City of Albuquerque will accept for continuous maintenance all public infrastructure improvements constructed as part of Project No. 3186.

The project is described as follows:

- Project consisted of the installation of paving, water lines, sanitary sewer lines and storm drainage improvements for Nor Este Estates.

- The contractor's warranty began May 19, 1988, and will be effective for a period of one (1) year.

33 @ #.50 = #16.50

Sincerely,

Russell B. Givler, P.E.
Chief Construction Engineer
Construction Mgmt. Division
Engineering Group
Public Works Department

RBG:jla

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz
Mayor

UTILITY DEVELOPMENT DIVISION
HYDROLOGY SECTION
(505) 768-2650

September 2, 1987

Dennis Lorenz, P.E.
Espey, Huston & Associates, Inc.
317 Commercial Street, NE
Albuquerque, New Mexico 87102

RE: REVISED GRADING PLAN AND STORM DRAIN HGL CALCULATIONS FOR NOR ESTE ESTATES, RECEIVED AUGUST 21 AND 24, 1987 FOR WORK ORDER APPROVAL (C-19/D6A)

Dear Dennis:

The grading plans dated August 6, 1986 are approved. Per your letter dated August 21, 1987, the lot owners with rear yards along public streets are required to control discharge of nuisance flows into public right-of-ways.

The storm drain HGL calculations are acknowledged, and the Work Order construction drawings have been signed-off by Hydrology.

Approval of the temporary Wyoming Arroyo Crossing of the Domingo Baca will be by separate letter.

Prior to Final Plat sign-off, an executed Subdivision Improvements Agreement is required, along with the La Cueva Channel Improvements being completed.

If you have any questions, call me at 768-2650.

Cordially,

Roger A. Green, PE

Roger A. Green, P.E.
C.E./Hydrology Section

cc: Rick Semones, Presley Co.

RAG/bsj

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

P. O. BOX 25851 - ALBUQUERQUE, N. M. 87125
TELEPHONE 884-2215

Log F-1 The

August 26, 1987

C-19/D6A

Jay T. Olson
Espey, Huston & Associates, Inc.
317 Commercial Street NE
Albuquerque, New Mexico 87102

Re: Grading Plan, Nor Este Estates

Dear Jay:

While it is not normally AMAFCA's role to review grading plans, you asked for it!

Sheets 8 & 9 show sheet flow into the La Cueva Channel. Sheet flows should be channeled along the outside (north) edge of the maintenenace road until they enter through a dip section.

Sheets 11 through 13 also show sheet flows approaching the channel; however, there is no maintenance road to protect the channel. A swale should be graded to intercept sheet flows and channel them into dip inlets.

I assume the 24" storm drain into the channel at O'Keefe Drive is as shown on Sheet 72, as there is no pipe inlet existing in the channel. In fact, I believe there is a dip inlet at this location. If this is not the case, please discuss. This detail is not shown on Sheet 11.

Sheet 1 shows a 54" storm drain in Wyoming which discharges into the channel; however, no other details on this storm drain are shown.

Without knowing the discharges to be carried in the valley gutters shown on Sheet 73, I seriously doubt if they will function properly. As evidence, witness the San Antonio Corridor/Pino Arroyo project currently under construction; nearly all the valley gutters have undermined.

I suggest that the entire area between the retaining walls/garden walls be paved with concrete, perhaps with a narrower width. Mowing a four-foot strip of grass seems a maintenance burden, especially with no mowing strip next to the wall.

A five or six foot high CMU retaining wall (Sheet 73) seems high; however, I defer to the structural experts. If sod is to be retained between the walls, consider raising the footer so that the top of the toe is even with the turf, allowing its use as a mowing strip. This would also allow the bottom course of block to function as weepholes, if normal spacing for mortar is left open between the vertical block faces. In any event, recommend the use of filter fabric (non-woven type) to enclose the crushed rock.

As to the connection details on Sheets 72 and 73, I submit the following:

a. Sheet 72, Concrete Drainage Outlet Detail: Extend the vertical wall over the lip of the channel, to ensure flows get into the channel.

b. Sheet 73, Expansion Joint Detail is okay.

On Sheets 1, 8, and 11, the existing training dike in the La Cueva Arroyo next to Wyoming parallels Wyoming for a distance. This should be shown for clarity. Also on Sheet 1, the note about the trainer dike on Barstow should say "Existing trainer dike built under separate contract." (AMAFCA has not accepted it).

Again, AMAFCA normally defers to the City and/or our designee to review and approve grading plans. In light of that, the above comments should be considered suggestions.

Sincerely,

Larry A. Blair
Field Engineer

cc: Fred Aguirre

PROJECT NAME NOR ESTE I ATES JOB NO. 8030

SUBJECT HYDRAULIC GRADE LINE CALCULATIONS

BY DL CK. BY _____ APPROVED BY _____ DATE 8-18-87 PAGE 1 OF 11

REVISED 8-24-87

DESIGN CRITERIA

I. HYDROLOGY

ALL FLOWRATES ARE TAKEN FROM THE APPROVED DRAINAGE REPORT FOR NOR ESTE ESTATES PREPARED BY EH:A, DATED JUNE 26, 1987.

II. HEADLOSSES

ALL HEADLOSSES WERE DETERMINED BY USE OF CRITERIA OUTLINED IN THE DPM VOL II CHP 22.

HEADLOSSES ARE AS FOLLOWS:

FRICTION $h_f = s_f L = \left(\frac{Q}{K}\right)^2 L$

VELOCITY $h_v = V^2/2g$

MANHOLE $h_{MH} = 0.05\, h_v$

BEND $h_b = K_b h_v$

JUNCTION $h_j = \Delta y + h_{v_1} - h_{v_2}$

$$\Delta y = \frac{Q_2V_2 - Q_1V_1 - Q_3V_3 \cos\theta}{1/2\,(A_1 + A_2)\,g} + \frac{(S_{f_1} + S_{f_2})L}{2}$$

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AUG 24 1987
HYDROLOGY SECTION

WHERE:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

S = SLOPE
A = AREA
R = HYD. RADIUS
n = 0.013

NOTES:

PROJECT NAME NOR ESTE ESTATES JOB NO. 8030

SUBJECT HYDRAULIC GRADE LINE CALCS

BY DL CK. BY _____ APPROVED BY _____ DATE 8-18-87 PAGE 2 OF 11

$$S_f = \text{FRICTION SLOPE} = \left(\frac{Qn}{1.49\, A R^{2/3}} \right)^2 = \left(\frac{Q}{K} \right)^2$$

$$K = \frac{1.49\, A R^{2/3}}{n}$$

NOTES:

PROJECT NAME NOR ES ESTATES JOB NO. 8030

SUBJECT HYDRAULIC GRADLINE CALCS

BY DL CK. BY _____ APPROVED BY _____ DATE 8-18-87 PAGE 4 OF 11

III CALCULATIONS

A. WYOMING BLVD.

START @ OUTFALL STA 17+65

$Q = 108.6$ $Q_f = 107.7$ $Q/Q_f = 1.01$

$D = 4.5'$ $d/D = 1.0$ $d = 4.5'$

$S = 0.003$

$A_f = 15.9$ $A/A_f = 1.0$ $A = 15.9$

$V_f = 6.83$ $V/V_f = 1.0$ $V = 6.83$

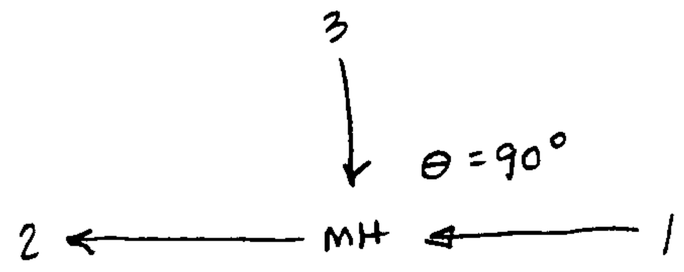
$K = 1685$ $S_f = 0.0042$ $h_v = 0.72'$

INV @ OUTFALL = 83.20

HGL = 83.20 + 4.50 = 87.70

EGL = 87.70 + 0.72 = 88.42

STA 20+64.9 MH JUNCTION



$Q_1 = 63.0$ $Q_f = 64.2$ $Q/Q_f = 0.98$

$D_1 = 4'$ $d/D = 0.80$ $d_1 = 3.2'$

$A_f = 12.57$ $A/A_f = 0.87$ $A_1 = 10.93$

$V_f = 5.11$ $V/V_f = 1.14$ $V_1 = 5.83$

$S_1 = 0.002$ $K = 1430$ $S_f = 0.002$

$S_3 = 0.01$

$Q_2 = 108.6$ $Q_3 = 62.4$ $Q_f = 66.7$ $Q/Q_f = 0.94$

$A_2 = 15.9$ $A_f = 7.07$ $A/A_f = 0.82$ $A_3 = 10.93$

$V_2 = 6.83$ $V_f = 9.43$ $V/V_f = 1.14$ $V_3 = 10.75$

$S_{f_2} = 0.0042$ $D = 3'$ $d/D = 0.76$ $d_3 = 2.28'$

NOTES:

PROJECT NAME NOR ESTE ESTATES JOB NO. 8030

SUBJECT HYDRAULIC GRADE LINE CALCS

BY _____ CK. BY DL APPROVED BY _____ DATE 8-18-87 PAGE 5 OF 11

$h_{mH} = 0.05\, h_{v_2} = \underline{0.03'}$ $\quad h_{v_1} = 0.72$ $\quad h_{v_2} = 0.53$

$$\Delta y = \frac{108.6(6.83) - 63(5.83) - 62.4(10.75)(0)}{1/2\,(10.93 + 5.83)} + \frac{(0.0042 + 0.002)\,8}{2}$$

$\Delta y = 0.89'$

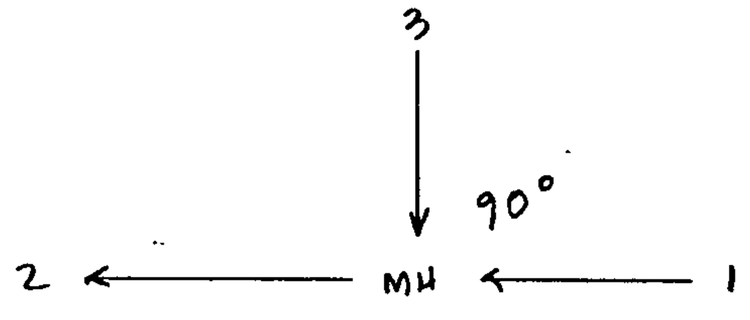
$h_j = 0.89 + 0.72 - 0.53 = \underline{1.08'}$

$HGL_2 = 87.70 + 1.24 = \underline{88.94}$

$HGL_1 = 88.94 + 1.11 = \underline{90.05}$

$h_f = 0.0042\,(295.88) = \underline{1.24'}$

STA 22+41.90 MH JUNCTION



$Q_2 = 63.0$
$V_2 = 5.83$
$A_2 = 10.93$
$S_2 = 0.002$
$S_{f_2} = 0.002$

$h_f = 0.002\,(170.0) = 0.33'$

$HGL_2 = 90.05 + 0.33 = \underline{90.38}$

$Q_1 = 33.5$ $\quad Q_f = 36.5$ $\quad \frac{Q}{Q_f} = 0.92$ $\quad S_1 = 0.003$ $\quad K = 609$

$A_f = 7.07$ $\quad A/A_F = 0.80$ $\quad A_1 = 5.66$ $\quad S_f = 0.003$

$V_f = 4.74$ $\quad V/V_F = 1113$ $\quad V_1 = 5.36$

$D = 3'$ $\quad d/D = 0.75$ $\quad d_1 = 2.25'$

$Q_3 = 14.7$ $\quad Q_f = 22.6$ $\quad \frac{Q}{Q_f} = 0.65$

$S_3 = 0.01$

$A_f = 3.14$ $\quad A/A_f = 0.7$ $\quad A_3 = 2.20$

$V_f = 4.94$ $\quad V/V_f = 1.10$ $\quad V_3 = 5.43$

$D = 2'$ $\quad d/D = 0.59$ $\quad d_3 = 1.18$

NOTES:

PROJECT NAME NOR E ESTATES JOB NO. 8030

SUBJECT HGL CALCS

BY _____ CK. BY M APPROVED BY _____ DATE 8-18-87 REVISED 8-24-87 PAGE 6 OF 11

$h_{mH} = 0.05\, h_{v_2} = \underline{0.02'}$ $\quad h_{v_1} = 0.45$ $\quad h_{v_2} = 0.53$

$$\Delta y = \frac{63(5.83) - 33.5(5.36) - 0}{1/2\,(5.66 + 10.93)\,g} + \frac{(0.002 + 0.003)(6)}{2} = 0.72'$$

$h_j = 0.72 + 0.45 - 0.53 = \underline{0.64'}$

$HGL = 90.38 + 0.64 + 0.02 = \underline{91.04}$

STA 25+58 MH

$Q = 33.5$ $\quad V = 5.36$

$K = 609$ $\quad A = 5.66$

$S_f = 0.003$

$h_f = 0.003(311.08) = \underline{0.94'}$

$HGL = 91.04 + 0.94 = \underline{91.98}$

$h_v = 0.45'$

$EGL = 91.98 + 0.45 = \underline{92.43}$

$h_{MH} = 0.05\, h_v = \underline{0.02'}$

$HGL = 91.98 + 0.02 = \underline{92.00}$

$EGL = 92.43 + 0.02 = \underline{92.45}$

STA 10+90 ALAMEDA MH

$Q = 33.5$ $\quad Q_f = 41.0$ $\quad Q/Q_f = 0.82$

$S = 0.01$

$D = 30''$ $\quad d/D = 0.68$ $\quad d = 1.7'$ $\quad R_f = 0.63$ $\quad R/R_f = 1.17$ $\quad R = 0.73$

$A_f = 4.91$ $\quad A/A_f = 0.74$ $\quad A = 3.63$

$V_f = 7.74$ $\quad V/V_f = 1.12$ $\quad V = 8.67$

$S_f = 0.0099$ $\quad K = 337$

$h_f = 0.0099\,(95) = \underline{0.94'}$

$h_v = \underline{1.17'}$

$HGL = 92.00 + 0.94 = \underline{92.94}$

$EGL = 92.94 + 1.17 = \underline{94.11}$

NOTES:

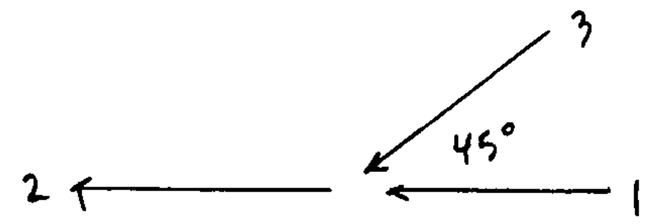
B. OAKLAND

STA 9+90 MH JUNCTION

FROM WYOMING CALCS STA 20+64.9

HGL = 90.05
EGL = 90.77

STA 10+63 WYE



$Q_2 = 62.4$ $Q_f = 66.7$ $Q/Q_f = 0.94$
$S_2 = 0.01$
$D = 3'$ $d/D = 0.76$ $d_2 = 2.28$
$V_f = 9.43$ $V/V_f = 1.14$ $V_2 = 10.75$
$A_f = 7.07$ $A/A_f = 0.82$ $A_2 = 5.80$
$K = 624$ $S_f = 0.010$

$h_v = 1.79'$
$h_f = 0.01(69.0) = 0.69'$
HGL = 90.05 + 0.69 = 90.74
EGL = 90.74 + 1.79 = 92.53

$Q_1 = 50.2$ $Q_f = 66.7$ $Q/Q_f = 0.75$
$S_1 = 0.01$
$D = 3'$ $d/D = 0.65$ $d_1 = 1.95$
$A_f = 7.07$ $A/A_f = .75$ $A_1 = 5.30$
$V_f = 9.43$ $V/V_f = 1.10$ $V_1 = 10.4$

$r_f = 0.75$ $r/r_f = 1.15$ $r_1 = 0.86$
$K = 550$
$S_f = 0.0083$

$Q_3 = 12.2$ $Q_f = 28.4$ $Q/Q_f = 0.43$
$S_3 = 0.078$
$D = 1.5$ $d/D = 0.46$ $d_3 = 0.7'$
$A_f = 1.77$ $A/A_f = 0.45$ $A_3 = 0.8$
$V_f = 6.89$ $V/V_f = 0.96$ $V_3 = 6.62$

NOTES:

PROJECT NAME NOR TE ESTATES JOB NO. 8030

SUBJECT HGL CALCS

BY _____ CK. BY IJL APPROVED BY _____ DATE 8-18-87 PAGE 8 OF 11

$$\Delta y = \frac{62.4(10.75) - 50.2(10.4) - 12.2(6.62)(\cos 45^\circ)}{\frac{1}{2}(5.8 + 5.3)\,g} + \frac{(0.018)(6)}{2}$$

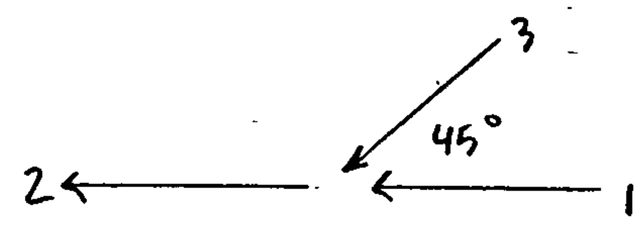
$\Delta y = 0.56'$ $h_{v_1} = 1.68'$ $h_{v_2} = 1.79$

$h_j = 0.56 + 1.68 - 1.79 = 0.45'$

$HGL = 90.74 + 0.45 = 91.19$

$EGL = 91.19 + 1.79 = 92.98$

STA 10+83 WYE



$Q_2 = 50.2$
$A_2 = 5.30$
$V_2 = 10.4$
$S_{f_2} = 0.0083$
$K = 550$

$h_f = 0.0083(20) = 0.17'$ $h_{v_2} = 1.68'$

$HGL = 91.19 + 0.17 = 91.36$

$EGL = 91.36 + 1.68 = 93.04$

$Q_1 = 38.0$ $Q_f = 41.0$ $Q/Q_f = 0.93$
$S_1 = 0.01$
$A_f = 4.91$ $A/A_f = 0.83$ $A_1 = 4.08$
$D = 2.5'$ $d/D = 0.77$ $d_1 = 1.92'$ $K = 389$
$V_f = 7.74$ $V/V_f = 1.14$ $V_1 = 8.82$
$S_{f_1} = 0.0095$

$Q_3 = 12.2$ $Q_f = 55.6$ $Q/Q_f = 0.22$
$S_3 = 0.28$
$D = 1.5$ $d/D = 0.36$ $d_3 = 0.54$
$A_f = 1.77$ $A/A_f = 0.32$ $A_3 = 0.57$
$V_f = 31.4$ $V/V_f = 0.86$ $V_3 = 26.0$

NOTES:

PROJECT NAME NOR GATE ESTATES JOB NO. 8030

SUBJECT HGL CALCS

BY _____ CK. BY DL APPROVED BY _____ DATE 8-18-87 PAGE 9 OF 11

$$\Delta y = \frac{50.2(10.4) - 38(8.82) - 12.2(24.0)(\cos\theta)}{-1/2(5.30 + 4.08)g} + \frac{(0.0178)}{2}(6)$$

$\Delta y = -0.20'$ $\quad h_{v_1} = 1.21$ $\quad h_{v_2} = 1.68$

$h_j = -0.20 + 1.21 - 1.68 = -0.67$ ASSUME $h_j = \underline{0}$

HGL = 91.36

STA 11+89.6 MH

Q = 38.0
A = 4.08
V = 8.82
S_f = 0.0095

$h_f = 0.0095(97.6) = 0.93'$ $\quad h_v = 1.21'$

HGL = 91.36 + 0.93 = 92.29

EGL = 92.29 + 1.21 = 93.50

NOTES:

ESPEY, HUSTON & ASSOCIATES, INC.
Engineering & Environmental Consultants

REVISED 8-24-87

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

BY: DL
DATE: 8-18-87
SHEET: 10 OF: 11

PROJECT: NOR ESTE ESTATES
LINE: WYOMING BLVD

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S_f	L	Δ	JUNCTION D	JUNCTION θ	LOSSES h_f	h_p	h_j	h_{mh}	h_t	h_{misc}	Σ	E.G.	h_v	H.G.
17+65	OUTFALL	54"	108.6	15.90	6.83	1685	.0042	295.88	—	—	—	1.24	—	—	—	—	—	1.24	88.42		87.70
20+64.9	MH (J)									36"	90°	—	—	1.08	0.03	—	—	1.11	89.66	0.72	88.94
22+41.9	MH (J)	48"	63.0	10.93	5.83	1430	0.002	170.00	—	—	—	0.33	—	—	—	—	—	0.33	90.77	0.72	90.05
										24"	90°	—	—	0.64	0.02	—	—	0.66	90.91	0.53	90.38
25+58	MH	36"	33.5	5.66	5.36	609	0.003	311.08	—	—	—	0.94	—	—	—	—	—	0.94	91.57	0.53	91.04
									—			—	—	—	0.02	—	—	0.02	92.43	0.45	91.98
10+90	MH	30"	33.5	3.63	8.67	337	.0099	95	—	—	—	0.94	—	—	—	—	—	0.94	92.45	0.45	92.00
																			94.11	1.17	92.94

REMARKS:

MANNING'S n: _____

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

BY: DL
DATE: 8-18-87
SHEET: 11 OF: 11

PROJECT: NOR ESTE ESTATES
LINE: OAKLAND AVE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S_f	L	Δ	JUNCTION		LOSSES							E.G.	h_v	H.G.
										D	θ	h_f	h_b	h_j	h_{mh}	h_t	h_{misc}	Σ			
9+90	MH(J)																				
10+63	18" WYE	36	62.4	5.80	10.75	624	0.01	69.0	—	—	—	0.69	-	—	—	—	—	0.69	90.77	0.72	90.05
										18"	45°	—	—	0.45	—	—	—	0.45	92.53	1.79	90.74
10+83	18" WYE	36	50.2	5.30	10.40	550	0.0083	20	—	—	—	0.17	—	—	—	—	—	0.17	92.98	1.79	91.19
										18"	45°	—	—	0	—	—	—	0	93.04	1.68	91.36
11+89.6	MH	30	38.0	4.08	8.82	389	.0095	97.6	—	—	—	0.93	—	—	—	—	—	0.93	93.04	1.68	91.36
																			93.50	1.21	92.29

REMARKS:

MANNING'S n: _____

ESPEY,
HUSTON &
ASSOCIATES, INC.
Engineering & Environmental Consultants

DRAINAGE REPORT

FOR

NOR ESTE ESTATES

SUBDIVISION

PREPARED FOR:

PRESLEY COMPANY OF NEW MEXICO
1909 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87110

JUNE 1987

317 Commercial N.E. • Albuquerque, New Mexico 87102 • (505) 242-1909

PURPOSE AND SCOPE

The purpose of this Drainage Report is to establish the criteria for controlling surface runoff from NOR ESTE ESTATES and contributing upstream areas in a manner which is acceptable to the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA). The Plan studies the existing and developed conditions of NOR ESTE ESTATES, and La Cueva Arroyo watershed, and analysis both conditions at the 100-year and 10-year/6-hour duration storm events. The Plan outlines drainage management criteria for the development of NOR ESTE ESTATES and establishes a final alignment and improvement to the La Cueva Arroyo between Wyoming Blvd. and Barstow Street.

The scope of this Plan is to ensure that NOR ESTE ESTATES and La Cueva Channel Improvement will be protected from storm runoff and that the development of this project will not increase the flooding potential of adjacent and downstream properties.

Approval of this Drainage Report shall facilitate Preliminary Plat and Work Order approval for NOR ESTE ESTATES and La Cueva Channel Improvement Project.

SITE LOCATION AND DESCRIPTION

The NOR ESTE ESTATES is located in northeast Albuquerque (See Figure 1) and is bounded by Modesto Avenue on the north, Wyoming Boulevard on the west, Alameda Avenue on the south, and Barstow Boulevard on the east. The project is identified as NOR ESTE I by the "NOR ESTE SECTOR DEVELOPMENT PLAN".

The plan area is presently undeveloped, except for an existing auto salvage yard located on approximately 4 acres near the northwest corner of the site. The existing site topography slopes from east to west at approximately 3%. The major drainage feature within the site is the La Cueva Arroyo. The La Cueva Arroyo is located near the north/south midpoint of NOR ESTE ESTATES. The La Cueva Arroyo effectively breaks the Subdivision into two havles, both of which are a portion of the La Cueva Basin.

The major soils groups present within the plan area are: Embudo Gravelly Fine Sandy Loam (EmB), a type "B" soil; Embudo Tijeras Complex (EtC), a type "B" soil; and Tijeras Gravelly Find Sandy Loam (TgB), a type "B" soil. Embudo and Tijeras soils consist of deep, well drained soils that formed in alluvium derived from decomposed granite rock on old alluvial fans. Slopes are generally 0 to 9 percent. On both soils, runoff is medium and the hazard of water erosion is moderate (See Figure 2).

EXISTING DRAINAGE CONDITIONS

The project site is comprised of several parcels of land which are presently undeveloped. An existing auto salvage yard is located near the northwest corner of the site. The salvage yard has been purchased by the developer and the previous owner is in the process of moving off the property. The remainder of the plan area is undeveloped and covered with native vegetation. All existing roadways consist of graded earth or gravel roads, with the exception of Alameda which has one-half width paving along the La Cueva High School frontage.

The predominant drainage feature within the project site is the La Cueva Arroyo, which is located at the approximate north/south midpoint of the site, in addition to several localized tributaries of the La Cueva. Recent improvements to the La Cueva Arroyo have been made by AMAFCA. A trainer dike composed of riprap was constructed near the midpoint of the site to prevent pirating of flows from La Cueva main channel south into a minor tributary. A soil cement trainer dike was also constructed just west of Wyoming to divert the La Cueva main channel flows north and around a cluster of existing homes located west of Wyoming, between Modesto and Oakland. This trainer dike conveys the main channel into the North La Cueva Alignment which outfalls at the existing triple 10 ft. x 10 ft. concrete box culvert located at I-25.

The La Cueva Arroyo drainage basin originates in the Sandia Mountains. La Cueva and its tributaries meander across north Albuquerque in their natural state. A triple 10' x 10' box culvert located at I-25 has excess capacity to drain anticipated developed flows from La Cueva under I-25. A concrete channel was constructed in conjunction with the Sperry plant which conveys flows to just west of Jefferson Street. From there, flows are conveyed by an earthen channel to the North Diversion Channel.

PROPOSED DRAINAGE CONDITIONS

The drainage criteria utilized in this report was established in the approved "Drainage Master Plan for NOR ESTE", prepared by Espey, Huston and Associates, Inc., February 1987. That report and plan established major infrastructure requirements for NOR ESTE ESTATES and the La Cueva Channel.

The proposed Drainage Plan (See Exhibit I) identifies the major infrastructure improvements required to manage developed storm runoff from NOR ESTE ESTATES and contributing upstream drainage areas. The Plan shows: 1) Drainage basins; 2) developed peak flow rates at critical analysis points; 3) Proposed drainage patterns; 4) and required street and drainage infrastructure improvements.

NOR ESTE ESTATES consists of a residential development in accordance with the "NOR ESTE SECTOR DEVELOPMENT PLAN". The infrastructure required by this development consists of the adjacent perimeter streets, (Alameda, Wyoming, Barstow and Modesto), future interior residential streets, extension of public water, sanitary sewer, and storm sewer improvements, construction of the La Cueva Arroyo channel from Barstow to Wyoming, and construction of a temporary crossing facility at Wyoming on the North Domingo Baca Arroyo.

As shown by the Drainage Plan, NOR ESTE ESTATES is programmed to utilize the La Cueva channel as it's principle drainage outfall. All stormwater runoff will be routed overland via residential street networks to various release points into the channel. The La Cueva Arroyo will be improved as a concrete lined trapezoidal channel to confine the developed 100-year/6-hour design storm with required freeboard.

The La Cueva Arroyo is identified as a major open space link. NOR ESTE ESTATES reserves approximately 11 acres as the La Cueva Arroyo/Open Space/Park. The facility will provide three basic uses: 1) provide permanent channel improvements for the La Cueva Arroyo and drainage access for the adjacent residential developments within the NOR ESTE ESTATES; 2) provide park space for use by the area residents; and 3) provide a major open space link through use of bike, pedestrian, and future equestrian trails.

Four all-weather arroyo crossings are ultimately required in the immediate vicinity of NOR ESTE ESTATES: one at Barstow and one at Wyoming for the La Cueva Arroyo; one internal crossing of La Cueva Arroyo within NOR ESTE ESTATES; and one at Wyoming on the North Domingo Baca Arroyo. The developer shall provide the internal crossing of La Cueva as part of the development of NOR ESTE ESTATES. Responsibility for providing crossing structures at Wyoming and Barstow lies with the City of Albuquerque. Presently, there are no funds available for construction of these structures; therefore, the developer shall provide an interim facility at Wyoming on the North Domingo Baca Arroyo to pass the 100-year undeveloped design storm in accordance with criteria established by the City Engineer. Crossing facilities for the La Cueva shall consist of a temporary paved dip section at Wyoming, with the Barstow crossing zone to be barracaded. Criteria for crossing the North Domingo Baca at Wyoming was established by the City Hydrologist such that the depth times velocity product shall not exceed 6.5 for the 100 year/6 hour undeveloped design storm. This shall be accomplished by placing a series of 27" x 43" cmp culverts under Wyoming. The culverts will drain that portion of the flow required to reduce the DxV product below 6.5. Conceptual criteria for all three interim crossings has been reviewed and verbally approved by the City Engineer. For specific information on the crossing of the North Domingo Baca at Wyoming, see separate submittal to City Hydrology, File C19/D6.

The ultimate arroyo crossing structures will be provided by the City when funds are available, in accordance with adopted policies. Interim transition structures and erosion control facilities will be required upstream and downstream from the improved sections of the La Cueva and North Domingo Baca Arroyos. For specific information on the La Cueva channel improvements the reader should review the "Technical Report for La Cueva Channel Improvements" and approved construction plans which are available upon request.

HYDROLOGY

The hydrology presented in this study has three (3) sources: 1) "Review and Refinement of the NEHDMP"; 2) SCS method for determination of surface runoff, as outlined in the City of Albuquerque "Development Process Manual", Volume II; and 3) The "Drainage Master Plan for NOR ESTE."

Discussions with AMAFCA established that the channel hydrology for the La Cueva Arroyo, as outlined in the "Review and Refinement of the NEHDMP", should be accepted and utilized. The 100-year discharges computed under "Hydrologic Condition VI" of that study will be utilized for all channel hydrology and hydraulic calculations. Condition VI of the referenced report is described as:

> "Maintained existing channels and fully developed master plan land use without AMAFCA Drainage Resolution 1972-2 and without proposed flood-water detention reservoirs."

The hydrology of smaller basins will be determined using the SCS method as outlined in the "Development Process Manual", Volume II, Chapter 22. The 100-year and 10-year developed peak discharges at various analysis points are listed in Appendix "A".

EROSION CONTROL

Interim erosion control measures shall be implemented during the construction phase of the subdivision development. The contractor shall be required to obtain a topsoil disturbance permit prior to beginning any earthwork operations. The contractor will be required to adhere to local dust control and air pollution ordinances during the construction phase of the project. In order to limit the discharge of sediment downstream, a ditch dike system shall be placed in appropriate locations, as indicated and detailed on the grading plan. These interim erosion control measures shall remain in place until paving and downstream drainage facilities are in place.

I. CRITERIA FOR HYDROLOGIC CALCULATIONS PER THE SCS METHOD AS OUTLINED IN THE DPM, VOL II, CHAPTER 22:

A. RAINFALL $P_{100} = 2.40''$ $P_{10} = 1.58''$

B. TIME OF CONCENTRATION

$$T_c = 0.007B\,(L)^{0.77}/(S)^{0.385}$$

WHERE: L = LENGTH (FT)
S = SLOPE (FT/FT)

C. RUNOFF

$$Q = \frac{45.4\,A\,R}{T_c}$$

WHERE: A = AREA (AC)
R = DIRECT RUNOFF (IN.)

D. VOLUME

$$V = 3630\,AR$$

E. SCS CURVE NUMBER (CN)

CN DETERMINED USING PLATES 22.2 C-2 AND 22.2 C-3.

F. SOILS

EMB, TgB, Etc, ALL TYPE 'B' CN = 61.

TABLE I

EXISTING CONDITION

AP	CONTR. BASINS	AREA	L	H	T_c	%IMP	CN	R_{10}	R_{100}		Q_{10}	Q_{100}	V_{10}	V_{100}	
1	OS I	14	1750	65	10	0	61	0.05	0.20		3.2	12.8	2540	10160	
2	OS II	3260	—	—	—	0	—	—	—		2570	4630	—	—	*
3	OS III	15.7	1400	52	10	0	61	0.05	0.20		3.6	14.4	2850	11400	
4	A	8	600	35	10	0	61	0.05	0.20		1.8	7.2	1450	5810	
5	B	50	2600	80	10	0	61	0.05	0.20		11.4	45.6	9075	36,300	
6	C	41	2600	80	10	0	61	0.05	0.20		9.3	37.2	7440	29,765	
4	OS I + A	22	2350	100	10	0	61	0.05	0.20		5.0	20.0	3995	15,980	
5	OS II + B	3310	—	—	—	0	—	—	—		2510	4810	—	—	*
6	OS III + C	65	4000	132	17	0	61	0.05	0.20		8.7	34.8	11,795	47,180	

* HYDROLOGY PER "REVIEW & REFINEMENT TO THE N.E. HEIGHTS DRAINAGE MANAGEMENT PLAN."

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ESPEY, HUSTON & ASSOCIATES INC.
Engineering & Environmental Consultants

NOR ESTE ESTATES

SUBJECT HYDROLOGY

SHEET 2 OF 13 BY DL

DATE 5-21-87 CK BY

TABLE II

DEVELOPED CONDITION

AP	CONTR. BASINS	AREA	L	H	T_c	%IMP	CN	R_{10}	R_{100}		Q_{10}	Q_{100}	V_{10}	V_{100}	
1	OS I	14	1750	65	10	50	78	0.30	0.80		19.1	50.8	15,245	40,655	
2	OS II	3260	—	—	—	—	—	—	—		4630	4870	—	—	*
3	OS III	15.7	1400	52	10	50	78	0.30	0.80		21.3	57.0	17,095	45,590	
4	—	0	—	—	—	—	—	—	—		0	0	0	0	
5	TOTAL	3310	—	—	—	—	—	—	—		4540	4810	—	—	*
6	X	5.60	2500	75	12	75	88	0.80	1.50		16.9	31.8	16,260	30,490	
7	I	9.35	845	21	10	50	78	0.35	0.80		14.8	34.0	11,880	27,150	
8	II	23.60	1750	41	10	50	78	"	"		37.5	85.7	29,985	68,535	
9	III	7.05	800	15	10	50	78	"	"		11.2	25.6	8,955	20,475	
10	VIII	0.30	150	5	10	50	78	"	"		0.5	1.1	380	870	
11	IV	1.80	200	8	10	55	81	0.40	0.90		3.3	7.4	2,615	5,880	
12	V	11.95	1800	54	10	55	81	"	"		27.1	48.8	17,350	39,040	
14	VI	18.60	2330	72	12	55	81	"	"		28.1	63.3	27,010	60,765	
13	VIB	12.00	2330	72	12	55	81	"	"		19.1	42.9	18,295	41,165	
14	VIA	6.00	750	33	10	55	81	"	"		10.9	24.5	8,710	19,600	
14	VI+IX / X+XII	33.2	2820	75	14	62	83	0.40	1.05		43.1	113.0	48,205	126,540	
15	IX+X+XII	14.60	2820	75	14	75	88	0.80	1.50		37.9	71.0	42,400	79,500	

* HYDROLOGY PER "REVIEW & REFINEMENT TO THE NE HEIGHTS DRAINAGE MANAGEMENT PLAN"

TABLE II

DEVELOPED CONDITION.

AP	CONTR BASINS	AREA	L	H	T_c	%IMP	CN	R_{10}	R_{100}		Q_{10}	Q_{100}	V_{10}	V_{100}
15	IX	4.2	800	5	10	75	88	0.80	1.50		15.2	28.6	12,200	22,870
16	XI	4.9	2500	75	12	80	90	0.80	1.50		14.8	27.8	14,230	26,680
CHANNEL	VII	11.0	700	21	10	22	68	0.15	0.40		7.5	20.0	5,990	15,970
6	XII	5.5	2500	75	12	75	88	0.80	1.50		16.6	31.2	15,975	29,950
6	X+XII	11.1	2500	75	12	75	88	0.80	1.50		33.5	63.0	32,235	60,440
14	XII	5.5	2820	75	14	75	88	0.80	1.50		14.3	26.8	15,970	29,950
14	X+IX+VI	27.7	2820	75	14	62	83	0.40	1.05		35.9	94.3	40,220	105,580
15	XII	5.5	2700	75	14	75	88	0.80	1.50		14.3	26.8	15,970	29,950
15	X+IX	9.8	2700	75	14	75	88	0.80	1.50		25.5	47.8	28,455	53,365
											39.9			
INTERIM CONDITION														
1	OS I	14.0	1750	65	10	0	61	0.05	0.20		3.2	12.8	2540	10160
3	OS III	15.7	1400	52	10	0	61	0.05	0.20		3.6	14.4	2850	11400
16	XI	4.9	2500	75	12	4	61	0.05	0.20		0.9	3.6	890	3560

* HYDROLOGY PER "REVIEW AND REFINEMENT TO THE N.E. HEIGHTS DRAINAGE MANAGEMENT PLAN"

II HYDRAULIC CALCULATIONS

A. STORM DRAIN SIZING @ AP #'S 6, 13, 14 & 15.

TABLE III ILLUSTRATES THE RESULTS OF THE STORM DRAIN SYSTEM SIZING. MANNINGS EQUATION WAS USED TO DETERMINE PIPE SIZES ($n = 0.013$). INLET TYPE AND NUMBER WERE DETERMINED USING DPM VOL II, PLATES 22.3 D-1 THRU D-7.

B. STORM DRAIN - HYDRAULIC GRADE LINE PROFILES

HYDRAULIC GRADE LINE CALCULATIONS AND PROFILES SHALL BE PROVIDED FOR REVIEW AS A CONDITION OF DRC APPROVAL.

TABLE III

STORM DRAIN SIZING

AP	CONTR BASINS	Q	STREET SLOPE	STREET WIDTH	d	INLET TYPE	# INLETS	Q INLETS	PIPE DIA	PIPE SLOPE	Q PIPE	Q RESIDUAL	COMMENT
6	X	16.9	0.03	86	0.45	A	1	7.5	18"	0.01	7.5	9.4	
					0.38	B	1	8.0	24"	0.01	15.5	1.4	STREET FLOW TO AP 15.
			Q10										
6	X+XI	33.5	0.03	86	NA	NA	NA	NA	30"	0.01	33.5	0	MAIN SIZED TO DRY 10YR @ INTERSECTION
6	X+XI	33.5	0.03	98	NA	NA	NA	NA	36"	0.002	33.5	0	" "
		28+61.6											
13	VIB	42.9	0.005	30	0.65	A	2	18	30"	0.01	18	24.9	
			Q100		0.54	B	2	20	30"	0.01	38	4.9	STREET FLOW TO AP 14
14	VI	63.3									38	25.3	TOTAL SURFACE FLOW AT AP 14
14	VIA	25.3	0.067	46	0.37	A	2	14	36"	0.01	52	11.3	
					0.28	B	2	10.5	36"	0.01	62.4	0.9	STREET FLOW TO AP 15
			7										
15	IX+X+XII	63.0									33.5	29.5	TOTAL SURFACE FLOW AT AP 15
			SAG	98'	0.87' MAX	C	2	29.5	48"	0.002	63.0	0	

33.5
39.7
73.4

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SUBJECT SD SIZING

NOR ESTE ESTATES

SHEET 6 OF 13 BY DL
DATE 6-25-87 CK BY 6-25-87

REVISED

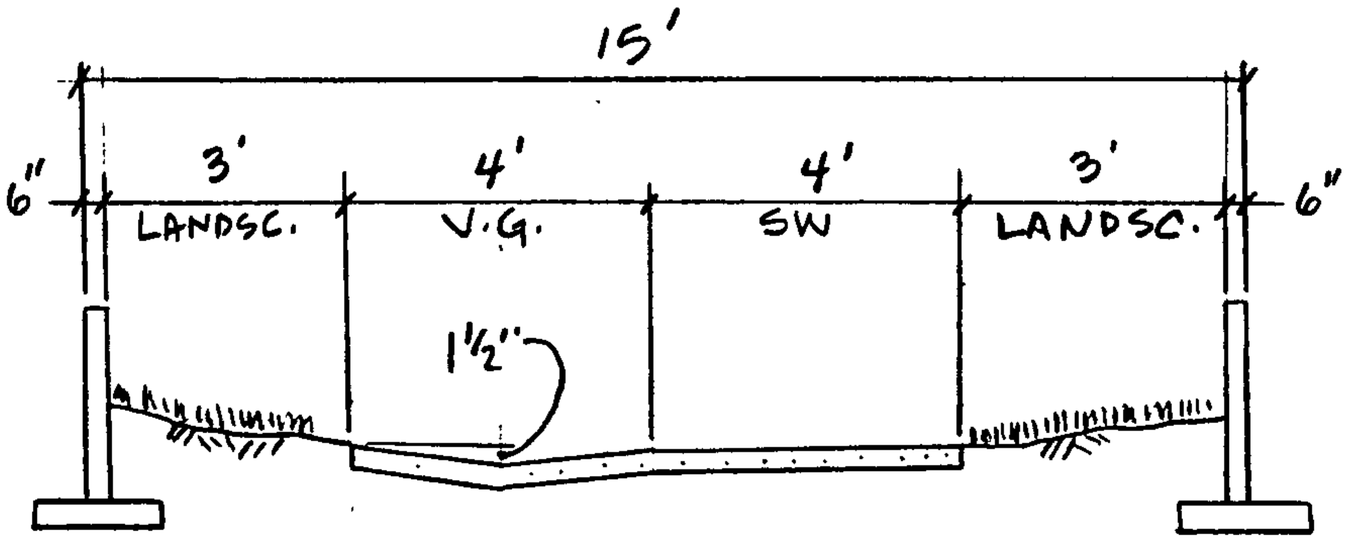
TABLE III

STORM DRAIN SIZING

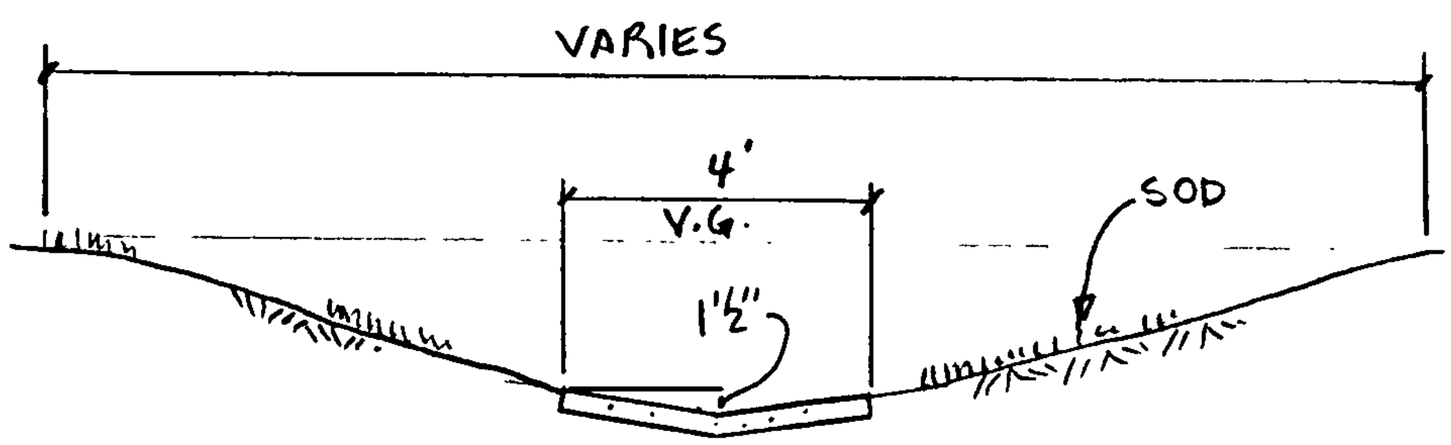
AP	CONTR BASINS	Q	STREET SLOPE	STREET WIDTH	d	INLET TYPE	# INLETS	Q INLETS	PIPE DIA	PIPE SLOPE	Q PIPE	Q RESIDUAL	COMMENT
14	VI + IX + X + XII	108.6	NA	NA	NA	NA	NA	NA	54"	0.003	108.6	0	PIPE FLOW TO LA CUEVA
12	V	48.8	0.0064	30	0.65	A	2	18	24	0.01	18	38.8	
					0.60	B	2	28	24	0.05	46	2.8	STREET FLOW TO AP 8

C. DRAINAGE RUNDOWN STRUCTURES.

1. TYPICAL DRAINAGE & PEDESTRIAN ACCESS RIGHT-OF-WAY SECTION:



SECTION ① Between lots



PARK SECTION ② IN PARK

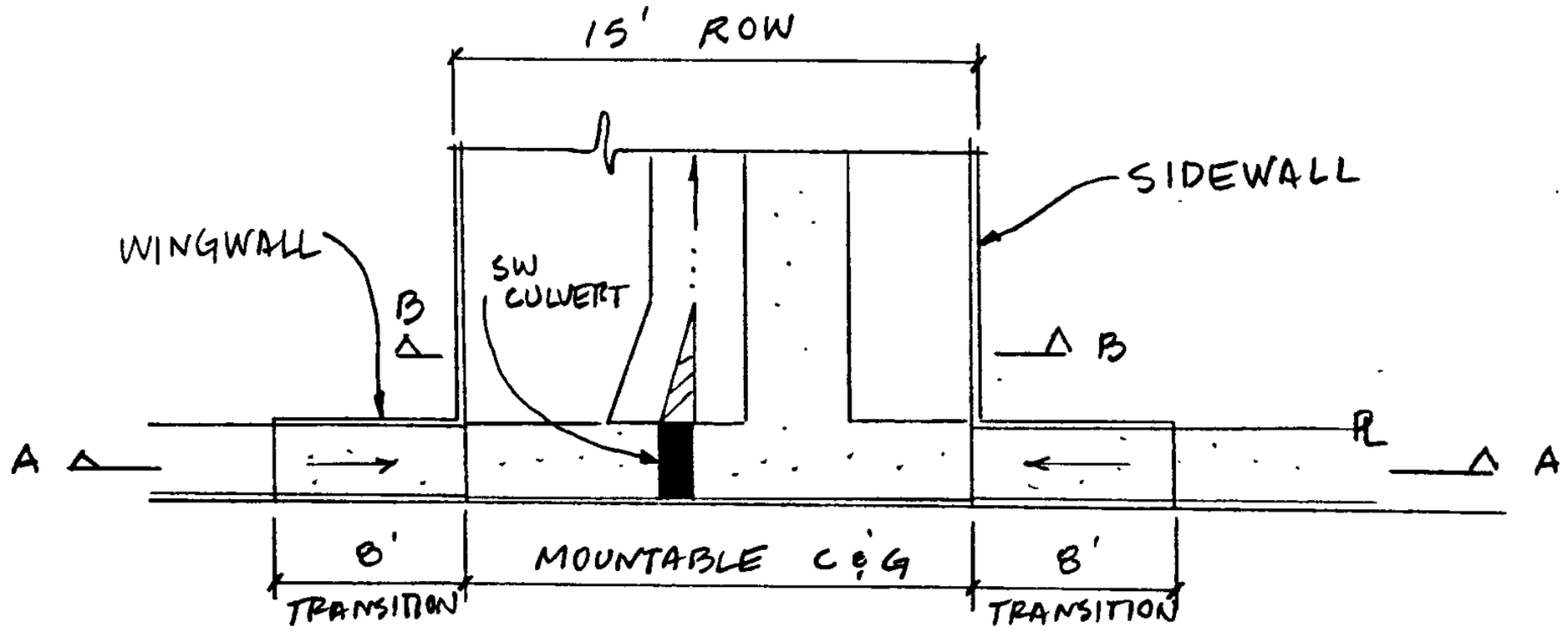
DRAINAGE SWALE CAPACITIES

AP #	Q_{100}	SLOPE	$n_{①}$	$n_{②}$	$d_{①}$	$d_{②}$	$V_{①}$	$V_{②}$
7	34.0	0.010	0.03	0.025	1.3'	1.0'	2.5	3.4
8	85.7	0.012	0.03	0.025	1.9'	1.4'	1.2	4.4
9	25.6	0.005	0.03	0.025	1.3'	1.0'	2.0	2.6
11	7.4	0.058	0.03	0.025	0.5'	0.3'	4.8	8.2

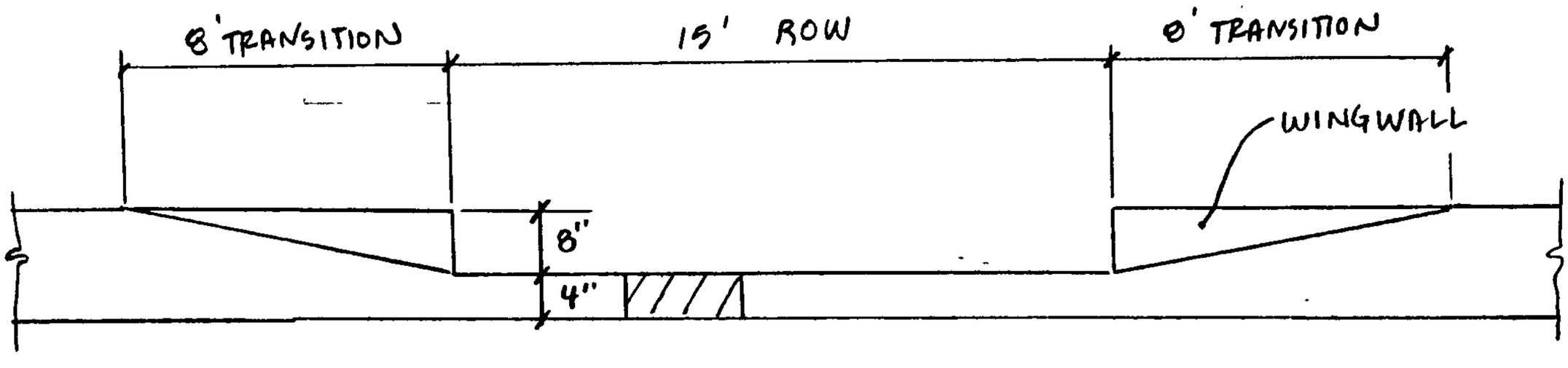
DEPTH AND VELOCITY DETERMINED USING MANNINGS EQ'N.

2. ENTRANCE CONDITIONS.

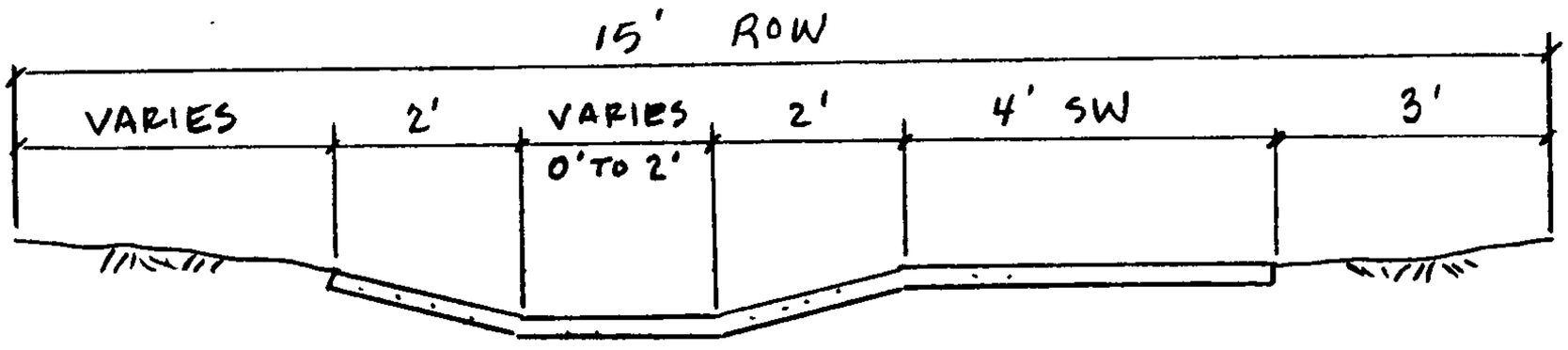
A. ANALYSIS POINTS 7, 9 & 11:



PLAN



SECTION A-A



SECTION B-B

DEPTH REQUIRED AT ENTRANCE

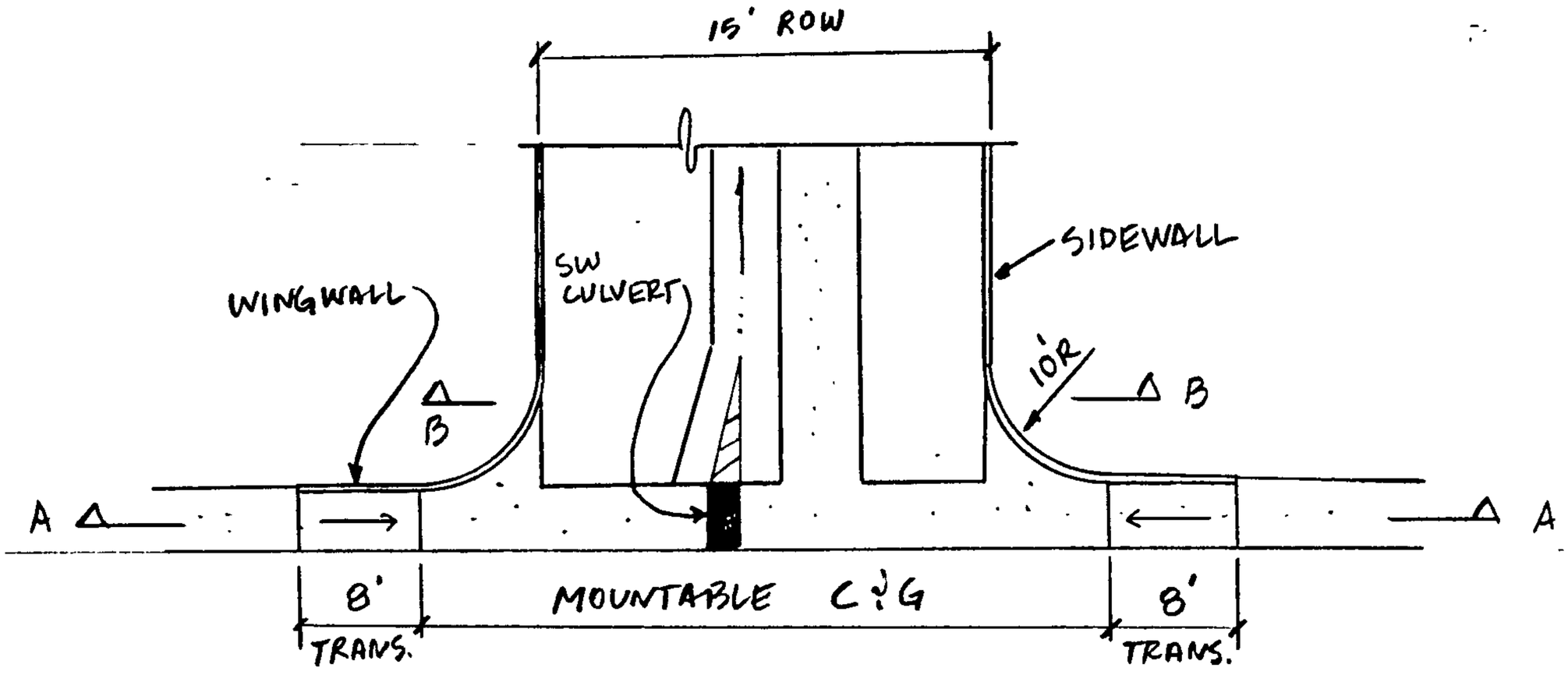
BY WEIR EQN: $Q = 3.33 L H^{3/2}$

WHERE: L = LENGTH (15')
H = DEPTH
Q = Q_{100}

AP #	Q_{100}	H
7	34.0	0.77'
9	25.6	0.64'
11	7.4	0.28'

$$H = \left(\frac{Q}{3.33L}\right)^{2/3}$$

B. ANALYSIS POINT 8:



PLAN.

DEPTH REQUIRED AT ENTRANCE

BY WEIR EQN: $Q = 3.33 L H^{3/2}$

WHERE: $Q = 85.7$ CFS

$L =$

$$H = \left(\frac{85.7}{3.33}\right)^{2/3} = 0.81'$$

⇒ DUE TO VERTICAL CURVE, DEPTH IS AVAILABLE.

D. STREET CAPACITIES

USING PLATES 22.3 D-1 THRU D-4:

SECTION	Q_{100}	d_{100}
7A	17.0	0.47'
7B	17.0	0.47'
8A	60.7	0.75'
8B	25.0	0.39'
9A	12.8	0.44'
9B	12.8	0.38'
12A	45.0	0.49'
12B	48.8	0.65'
13A	42.9	0.65'
14A	24.5	0.37'

ALL SECTIONS SATISFY ORDINANCE REQUIREMENTS.

ESPEY, HUSTON & ASSOCIATES INC.
Engineering & Environmental Consultants

SUBJECT PONDING VOLUMES

NOR ESTE ESTATES

SHEET 13 OF 13 . BY DL
DATE 6-26-87 CK BY

E. REAR YARD POND REQUIREMENTS

REAR YARD VOLUMES (100YR) TO BE MAINTAINED:

BLOCK	LOT	AREA(SF)	CN	POND VOL(CF)
1	2-4	3150	63	66
	5	5700	62	119
	6	9750	62	203
	7	4500	62	94
	8	2925	63	61
	9	1950	64	41
	28-45	2600	63	54
6	3-5	3775	62	79
	16,17	3550	62	74
8	2-14	750	63	16
	39	2850	63	59
	40	5550	62	116
11	1-5	1125	64	23
	6	3900	62	81
	7	4000	62	83
	8	1875	63	39
	9	1125	64	23
	10	2250	62	47
	16-24	1125	64	23
5	2	2600	63	54
	10,12,13	3480	63	73
	11	3680	63	77

EXAMPLE CALCULATION:

REAR YARD AREA = 3150 SF
IMPERVIOUS AREA = 150 SF (FUTURE PATIO)
% IMPERVIOUS = 5%
CN = 63 UNDEV CN = 61
R_{100} = 0.25"/"
$V = 3150\,(0.25)/12 = \underline{66\ CF}$


PICO LA
CUEVA
Google

NORESTE.

8125 OAKLAND.. NE.

- WALL.-