M23/04

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1 Plan

DRAINAGE REPORT
FOR
FOUR HILLS VILLAGE, LOT 26A, BLOCK 14

ZONE ATLAS NO. M-23

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PREPARED FOR

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DRAINAGE REPORT

FOR

FOUR HILLS VILLAGE, LOT 26A, BLOCK 14

PURPOSE

It is the purpose of this report to determine the boundaries of the basin draining onto Lot 26A, to determine the runoff contributed to the lot by a 100-year frequency storm, and to propose a means of controlling the runoff leaving the lot in order to meet the 1972 Albuquerque Drainage Resolution requirements.

PROJECT LOCATION AND DESCRIPTION

Lot 26A is located in Block 14 of Four Hills Village on the northeast corner of the intersection of Bush Court and Speakman Drive, S.E. Several lots to the east drain along the rear lot line and into Lot 26A. A house has been constructed on the site, and grading has cut off the storm water's only outlet.

EXISTING HYDROLOGY

The existing basin which empties into Lot 26A consists of all of Lots 27 and 28, Block 14, and half each of Lots 22, 23, 24, 25, and 29, Block 14. All are developed with the exception of Lot 28. A 100-year storm runoff was calculated for this basin of 2.2 acres using the Rational Formula and rainfall curves from the Albuquerque Master Plan of Drainage, 1963, for undeveloped and developed conditions. Calculations

are provided in the Appendix. Basin boundaries are defined on Plate 1.

Storm water presently flows along a path following the rear lot lines of Lots 23, 24, 25, and 26 in a strip of bare soil approximately 8 feet wide at the flow line. Due to grading of Lot 26, the water does not have an outlet.

PROPOSED DRAINAGE SOLUTION

As the lots comprising the drainage basin are developed, Lot 26A must continue to receive storm waters. Discharge from the property must not exceed the undeveloped runoff rate for a 100-year storm. Therefore, a detention basin is proposed for the rear, unused section of Lot 25. The basin extends the width of the lot and approximately 12 feet from the rear lot line, where a sideslope of 3:1 returns to natural ground. A reinforced retaining wall will be required next to the existing garden wall that forms the rear lot line to prevent overturning of the garden wall by water pressure. The transformer box and telephone riser will be removed and replaced at the locations shown on Plate 3. The 10'-6" long garden wall marking the lot line 25/26A will be removed and replaced with a reinforced retaining wall with a 2'-0" wide weir to discharge excess flow. The weir is placed so as to release runoff at the undeveloped flow rate into a channel comprised of header curbs and a 4-inch thick concrete mat. The channel is set at a 2 percent slope, to discharge to the flow line of the street. A 1/4-inch steel deck plate will

replace the sidewalk pedestrian surface. Cut and fill shall be affected so that the top of the channel is at ground line, and a sideslope not exceeding 2:1 shall return to natural ground.

CONCLUSION

Lot 26A of Block 14 in Four Hills Village is presently susceptible to damage from erosion and undermining of retaining walls. The drainage improvements recommended in this report will require acquisition of access to a 16' x 70' area along the rear lot line of Lot 25 and a 3' x 175' strip along the rear lot line of Lot 26 and will protect the property and meet the requirements of the Albuquerque 1972-2 Drainage Resolution.

RECOMMENDATIONS

The following recommendations are made for drainage improvements to Lot 26A:

1. Grade 16' x 70' area in rear of Lot 25 with a flat bottom and 3:1 sideslopes for ponding.
2. Build retaining walls as indicated on Plate 3 of standard 6" x 8" x 12" CMU.
3. Build channel as shown on Plate 3, extending to the flow line of the street.
4. Remove sidewalk and curb and replace with channel and steel deck plate.

APPENDIX

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Lot 26A is the release point for all areas (2.2 acres) of developed land. The lot may therefore release only the equivalent undeveloped runoff for the area.

Undeveloped Runoff

A — Area = 2.2 acres

L — Length of watercourse = 680'

S — Slope of watercourse = 4.71%

B — Ground factor = 1.84 (poor grass)

C — Runoff factor = 0.40

T_c — Time of Concentration = $\text{Log}^{-1}(.3641(B) + .3854 \log(L) - .191 \log(S) = .3613)$

T_c = 18.52 min.

I — Intensity = $\frac{189}{25 + T_c}$ = 4.34 inches/hour

Q_u — Total runoff (undeveloped) = $CIA = (0.40)(4.34)(2.2) = 3.82$ cu ft/sec.

DEVELOPED RUNOFF

A = 2.2 acres

C = 0.65 (partial natural & partial paved)

T_c = 18.52

I = 4.34

Q_D (Developed) = $(0.65)(4.34)(2.2) = 5.46$ cfs

PROJECT NAME Lot 26A Tentative SHEET 1 OF

PROJECT NO. 73-014.1 BY JJP DATE 1/12/7

SUBJECT Undeveloped Runoff CH'D DATE

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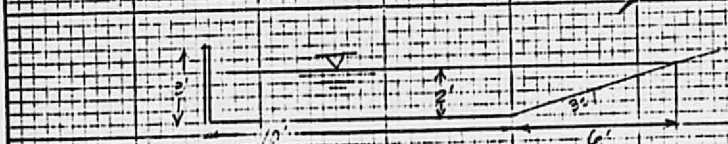
The storage volume required is the peak difference of inflow and outflow. The outflow is undeveloped runoff. Inflow is developed Q.

Storm Duration Tc minutes	Storm Intensity $I=\frac{189}{Tc+27}$ inches/hour	Runoff Rate $Q_R=CIA$ cu.ft./sec	Runoff Volume $V_R=60TcQ_R$ cu.ft.	Discharge Rate $Q_D=3.82$ cu.ft./sec	Discharge Volume $V_D=60TcQ_D$ cu.ft.	Storage Volume $V_S=V_R-V_D$ cu.ft.
10	5.10	7.72	4632.0	3.82	2292	2340
12	5.11	7.81	5263.2	3.82	2750.4	2512.8
14	4.85	6.94	5829.6	3.82	3202.8	2626.8
16	4.61	6.59	6326.4	3.82	3667.2	2659.2
18	4.40	6.27	6769.2	3.82	4125.6	2643.6
20	4.20	6.01	7212.0	3.82	4584	2628

MAXIMUM STORAGE VOLUME REQUIRED 2670 CU.FT.

AVERAGE PEAK VELOCITY SECTION — $A=\frac{1}{2}H+\frac{1}{2}H(2:1)$



70' / 2.11 = 33.18 cu.ft./ft

2670 ÷ 70 = 29.67 cu.ft./ft

$30=12H+\frac{1}{2}(2H\times H)$

$H=1.71$

PROJECT NAME [illegible] SHEET 2 OF

PROJECT NO. 3-1661 BY [illegible] DATE 5/12/

SUBJECT Storage Volume Calculation CH'D DATE

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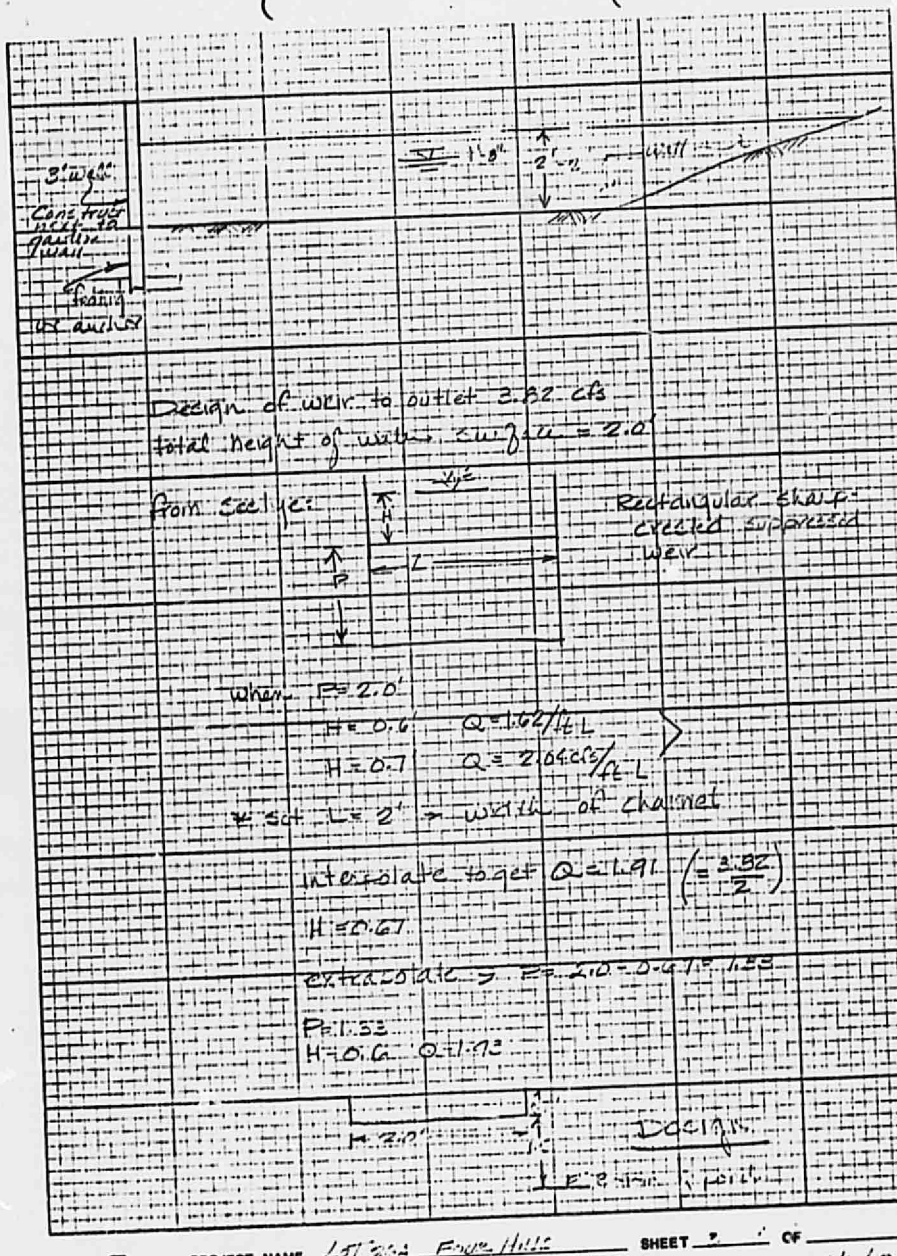


PROJECT NAME Lot 2&3 Four Hills SHEET 2 OF
PROJECT NO. 12-211.1 BY JVP DATE 1/1/13
SUBJECT OUTLET WEIR & CHANNEL CH'D DATE

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

Outlet to channel = 3.82 cfs

Width = 2.0' ← set

channel length 175' approx.

minimum slope = .005

min. d. difference (.005)(175) = 0.88'

Check: mannings equation for flow depth & velocity

(HP 41CV program open channel flow)

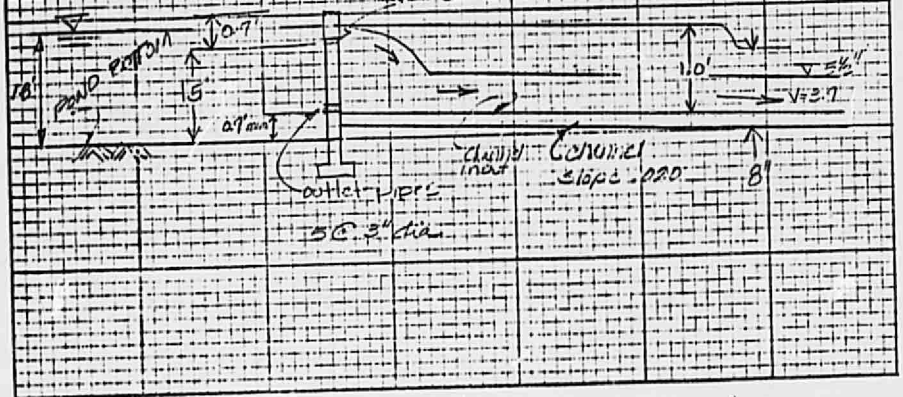
Q = 3.82 BW = 2.0 ZS = 0 n = .013 (concrete) ahs = .005

Depth = 0.49' Velocity = 3.37 fps Froude = 0.7

el. of outlet @ inlet (field notes) = 6.0'

el. of bottom of channel @ w.w. location = 5.2'

Set outlet pipe w/ invert 4.5' channel @ 5.0' min.



PROJECT NAME [illegible] SHEET 4 OF

PROJECT NO. 92-141 BY JJP DATE 4/6/93

SUBJECT Channel design CH'D DATE

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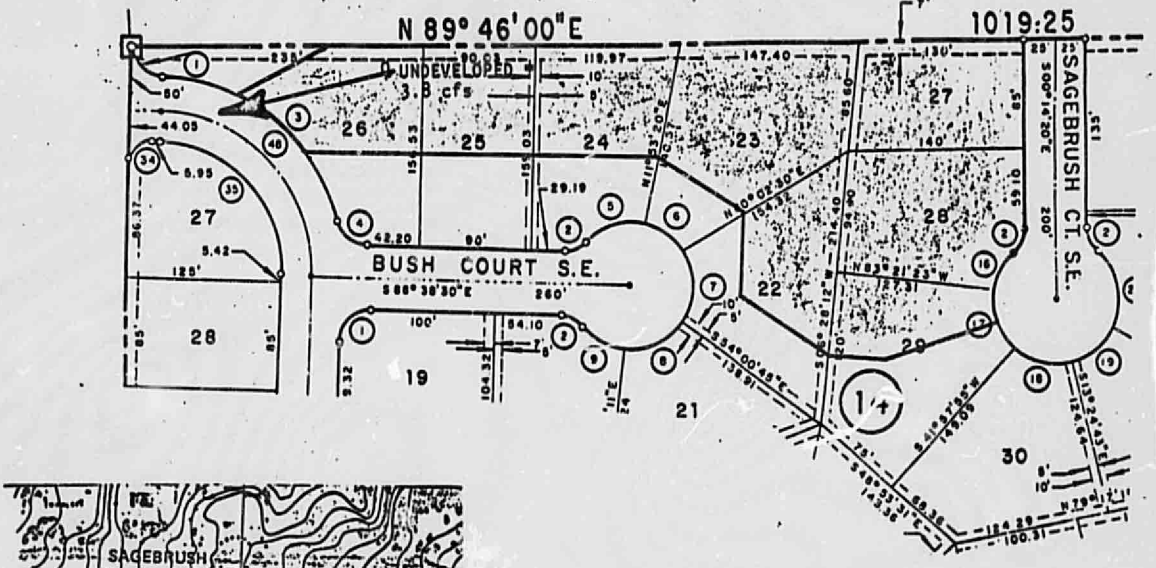

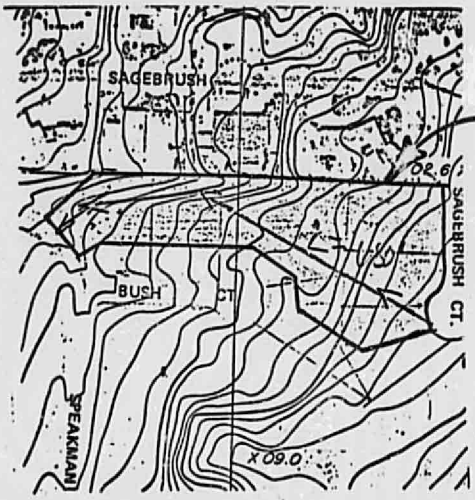

BASIN BOUNDARY

PLATE I
UNDEVELOPED RUNOFF

FOUR HILLS VILLAGE, LOT 26A,

DRAINAGE IMPROVEMENTS

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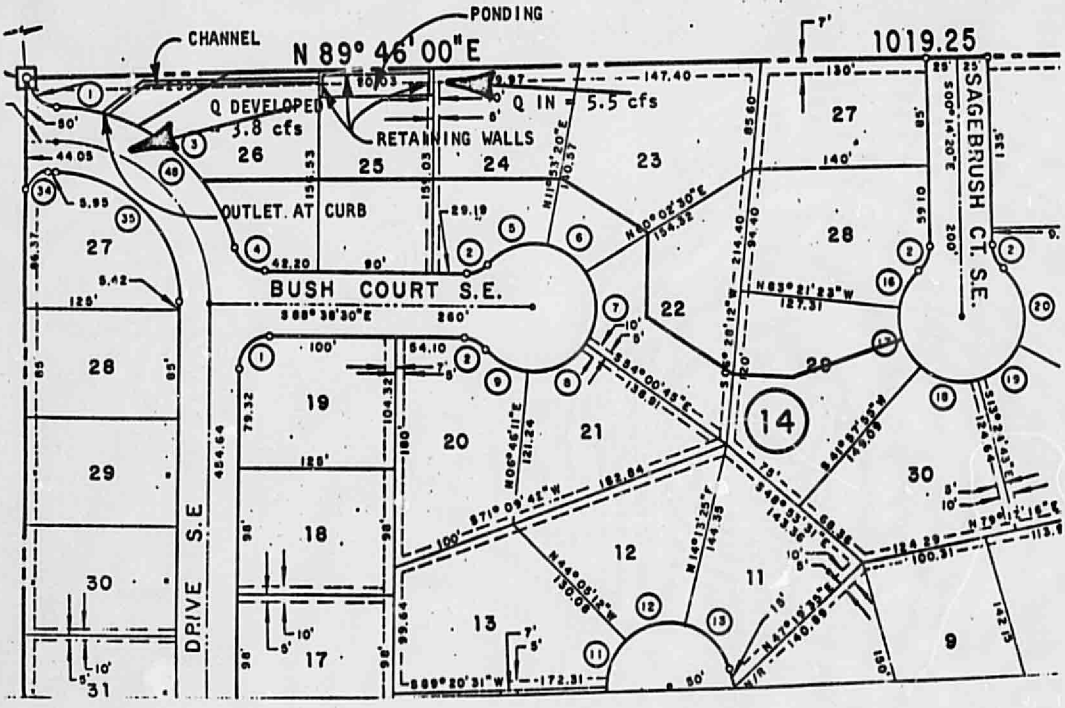

PLATE 2
DEVELOPED RUNOFF

FOUR HILLS VILLAGE, LOT 26A,

DRAINAGE IMPROVEMENTS