DRAINAGE REPORT
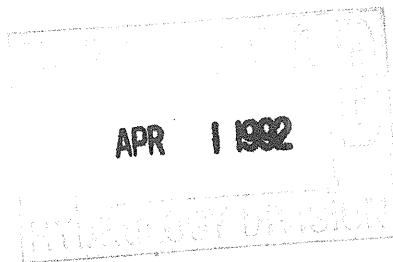
FOR

Hunters Ridge Subdivision

APR 1 1992

Prepared for:

Mock Homes, Inc.
8301 Washington NE
Albuquerque, NM 87113

April 1992

3/31/92

PURPOSE

The purpose of this report is to present the drainage management plan for final plat and work order approval. All applicable ordinances and the Development Process Manual were utilized to prepare this plan. Due to the site area less than 30 acres, the rational method was employed.

EXISTING CONDITIONS

The project comprises an area of 21.55 acres at the east end of Taylor Ranch. This site is bounded by the existing Prairie Ridge I and IA on the west, by the Del Rio Apartments on the south, by the existing Prairie Ridge II on the north and by Santolina Drive and Montano Plaza Drive on the east. (See the attached Vicinity Map.) The existing plat designation is Tract 33A-2A, Taylor Ranch.

The tract is fairly steep, sloping from northwest to southeast at approximately five percent, with some areas at eight percent. Vegetative cover is typical of west side property, and the soils are sandy. There is a somewhat improved earthen channel running west to east through the site that terminates at a de-silting pond at Montano Plaza Drive. The flows in this channel originate primarily in Prairie Ridge Units I and IA to the west. Flows leave these existing residential developments via a concrete channel that terminates at the boundary of this tract. Some on-site flows also reach this arroyo; but for the most part, sheet across this site. Approximately one-half of this tract drains to Montano Plaza Drive with the other half draining to Santolina Road. While the travel paths vary, all on-site flows currently reach the Montano Ponds adjacent to the west side of Coors NW.

The approved grading and drainage plan for Prairie Ridge I indicates that Lots 18 through 32, Block B that are adjacent to the west boundary were to have rear yard ponding. There is no evidence that these ponds exist. Off-site flows enter this project from these lots. The only other off-site flows entering this tract are those from Prairie Ridge via the concrete channel. A 50-foot temporary drainage easement exists where these flows cross this site.

The Montano Ponds, File E-12/D4, was studied by Community Sciences, Inc. in a report to the City of Albuquerque dated 12/20/85. The report verifies the capacity of these ponds with respect to the upland drainage basin, including the site covered by this report. The verification analysis considered this site as having 20 DU's/acre, which its zoning allowed. Total anticipated flow in Montano Plaza Drive from all areas equaled 103 cfs. Contributing areas and their flows were as follows:

- Del Rio Apartments, Q = 31 cfs
- Prairie Ridge Unit IA, Q = 4 cfs
- Prairie Ridge Unit I, Q = 24 cfs
- 1/2 Tract 33A-2A (1/2 this project) = 44 cfs

The remaining flows from this site were anticipated to reach the Montano Ponds via Santolina Drive to Spanish Broom and then to the ponds. This anticipated flow rate equaled 39 cfs. The "Drainage Management Plan for Mesa Antigua Subdivision" verifies the capacity of the Montano Ponds for the fully-developed basin.

The existing flows from this site that reach Spanish Broom, along with the developed flows from Prairie Ridge Units II and VI, are currently collected in a 36-inch storm drain at the east end of Spanish Broom. We will show later in this report that this storm drain does have the available capacity to accept our developed flow rate, with minor modifications.

The existing flows that reach Montano Plaza Drive are collected via a large transverse drop inlet adjacent to the Montano Ponds. We will show later in this report that this inlet does have the capacity to accept our developed flow rate.

HYDROLOGIC ANALYSIS

The rational method procedures outlined within the emergency rule of 1986 were utilized for this analysis. All drainage basins associated with this project were less than 30 acres in area, so HYMO was not employed.

All of the pertinent hydrologic parameters and calculation methods are located in the appendix of this report.

PROPOSED MANAGEMENT PLAN

As a developed site, this plan proposes to discharge stormwater runoff at three locations into two conveyance systems, ultimately to reach the same ponding system. It is proposed to discharge 14 cfs from the northern 5.6 acres via a concrete channel to Santolina. These flows will then be collected, along with 42 cfs from Prairie Ridge Unit II at Spanish Broom and conveyed east. The capacity of Spanish Broom is 76 cfs, which is sufficient for the combined 56 cfs anticipated. These flows would not be required to utilize the right of way adjacent to the street.

Approximately 1,100 feet east of Santolina, the 56 cfs would combine with an additional 37 cfs at Hillspire and Spanish Broom. These additional flows are generated within a portion of Prairie Ridge Units II and VI. This makes for a combined total flow rate of 93 cfs. At this intersection, six double "c" inlets and a 36-inch storm drain were placed to collect these flows. Per calculations included in this report, the capacity of the existing system is 100 cfs. Research of all pertinent drainage reports indicates that the flows from the northern 1/3 of this project were anticipated in Spanish Broom and indeed the street will carry these flows. A double "C" and an "A" inlet will need to be added to this storm drain at the end of Spanish Broom. The existing inlets do not have the capacity for the additional flows, but the storm drain does with these modifications.

This plan proposes to discharge the southern 15.95 acres to Montano Plaza Drive via one concrete channel outlet and by the entrance street. Combined flows would equal 38 cfs from this site and 59 cfs from all other developments for a total of 97 cfs. The capacity of Montano Plaza is 120 cfs without utilizing all of the available right of way. The capacity of the existing inlet system in Montano Plaza at the Montano Ponds is 116 cfs, so new construction at this location is not proposed. All pertinent calculations for capacities are

included in this report. The appropriate calculations indicating the ability to turn flows without leaving the right of way are also included.

As cited earlier, the ponds designed for the lots in Prairie Ridge Unit I adjacent to this project were either "filled" or never constructed. It is anticipated that nuisance flows from these lots could enter this project. To prevent this occurrence and to bring these lots into compliance with the approved plan, this plan proposes to construct a two-foot high, solid core wall at the subdivision boundary. This will confine the flows to those properties where it is generated.

CAN'T BLOCK OFF-SITE FLOWS.

This plan also proposes to construct rear yard ponds on 19 lots along the north and east boundary. Retaining walls will be constructed in conjunction with these ponds in an effort to insure that problems cited above do not occur with this project. These ponds are necessary so that the grading in these areas matches reasonably well with adjacent property, yet directs flows where they were originally anticipated.
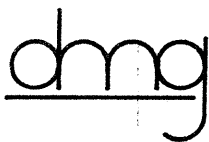
INTERIM EROSION CONTROL

Due to the sensitive nature of the sandy soils associated with this site, an Erosion Control Plan is a part of this report and project.

The plan centers on the fact that storm waters will not be allowed free discharge during the construction process until all street paving is accomplished. In addition, the plan requires that a snow fence be placed along the east boundary, once construction commences, and shall remain in place and be maintained until all homes along the boundary are constructed.

CONCLUSIONS

The proposed Hunters Ridge Subdivision, comprising 96 lots on 21.55 acres, can be readily accommodated through implementation of this plan. The only downstream improvements would be those on Spanish Broom in existing City of Albuquerque drainage right of way, with minimal impact to the existing neighborhood. It has been adequately shown, by this report and others cited, that the other off-site conveyance systems are adequate and, indeed, were masterplanned with this project in mind. It has also been shown in this report that the internal conveyance of stormwater can be accomplished while meeting all current City requirements.

D. MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS & SURVEYORS

Total Site Area = 21.55 Ac. however, we are going to separate the site into 2 basins which is how existing site drains:

Basin A = 5.60 Ac. to Sontalina

Basin B = 15.95 Ac. to Montano Plaza

In addition, we need to calculate flows in sub-basin B-1 to size outlet channel

Sub-basin B-1 = 7.06 Ac.

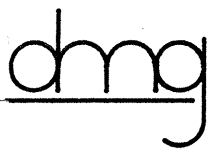Entire project lies west of Rio Grande

$P(100-6) = 2.70$ in.

Determine Composite "C":

BASIN A

* Streets, Drives, etc.	0.95	1.42	1.35
Roofs (1500#/hse.)	0.90	0.99	0.89
Lawns & Landscape	0.85	3.29	.823
		5.60	

Basin A Composite "C" = 0.53

* includes 32' street, 4' swk, 800# patio/house & 100# walk/hse.

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CONSULTING ENGINEERS & SURVEYORS

PROJECT _Hunters Ridge_
SUBJECT _Drainage_
BY _MG_   DATE _4/4/92_
CHECKED _____ DATE _____
SHEET _2_ OF _____

BASIN B

Streets, Drives, etc	0.95	3.57	3.39
Roofs	0.90	2.41	2.17
Lawns & Landscape	0.25	9.97	2.49
		15.95	8.05

Basin B Composite "C" = 0.51

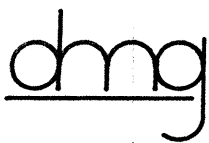Sub-Basin B-1 Composite "C" = 0.51

Determine Time of Concentration:

BASIN A

We will assume all flow in street

$L = 720'$

$S(\text{AVG.}) = 7\%$

$$T_c = 0.0078 \frac{(720)^{.77}}{(.07)^{.385}} = 3.44 \text{ min.} \quad \text{USE } 10 \text{ min.}$$

It is obvious that all basins have a $T_c < 10 \text{ min.}$

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Determine Rainfall Intensity:

$$I = (2.20)(6.84)(10^{-.51}) = 4.65 \text{ in/hr.}$$

Determine Peak Rate of Runoff

BASIN A = $(.53)(4.65)(5.60) = 14 \text{ cfs}$

BASIN B = $(.51)(4.65)(15.95) = 38 \text{ cfs}$

SUB-BASIN B-1 = $(.51)(4.65)(7.06) = 17 \text{ cfs}$

Determine Runoff Volume:

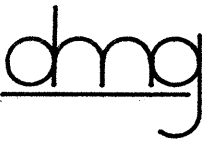Soil Type = BkcA = Type "A"

BASIN A % impervious = 41%

BASIN B % impervious = 39%

BASIN A Composite CN = 82   Runoff Vol. = 0.79

BASIN B Composite CN = 80   Runoff Vol. = 0.72

BASIN A Runoff Vol. = 16,059 cu. ft.

BASIN B Runoff Vol. = 41,687 cu. ft.

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Since we will attempt to drain 5.60 Ac. of our parcel to Santolina to Spanish Broom to the Muntwo Ponds, we need to verify the following:

1. Capacity of Spanish Broom

2. Capacity of Storm Drain at east end of Spanish Broom.

3. Runoff from Prairie Ridge Units I & II that drain to Storm Drain.

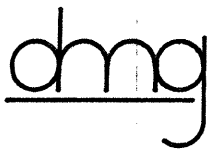The drainage basin from Units I & II that reach the storm drain is comprised of 2 sub-basins

1. 17 Ac. portion that reaches Spanish Broom directly

2. 15 Ac. portion that reaches Spanish Broom via Hillspire

The remainder of Units I & II drain to Purple Sage & a different storm drain.

No. of DU's/Ac. = 4 which yields 42% impervious so we will use a composite "C" = 0.53

Sub-basin 1: $Q = 0.53(4.65)(17) = 42$ cfs

Sub-basin 2: $Q = 0.53(4.65)(15) = 37$ cfs

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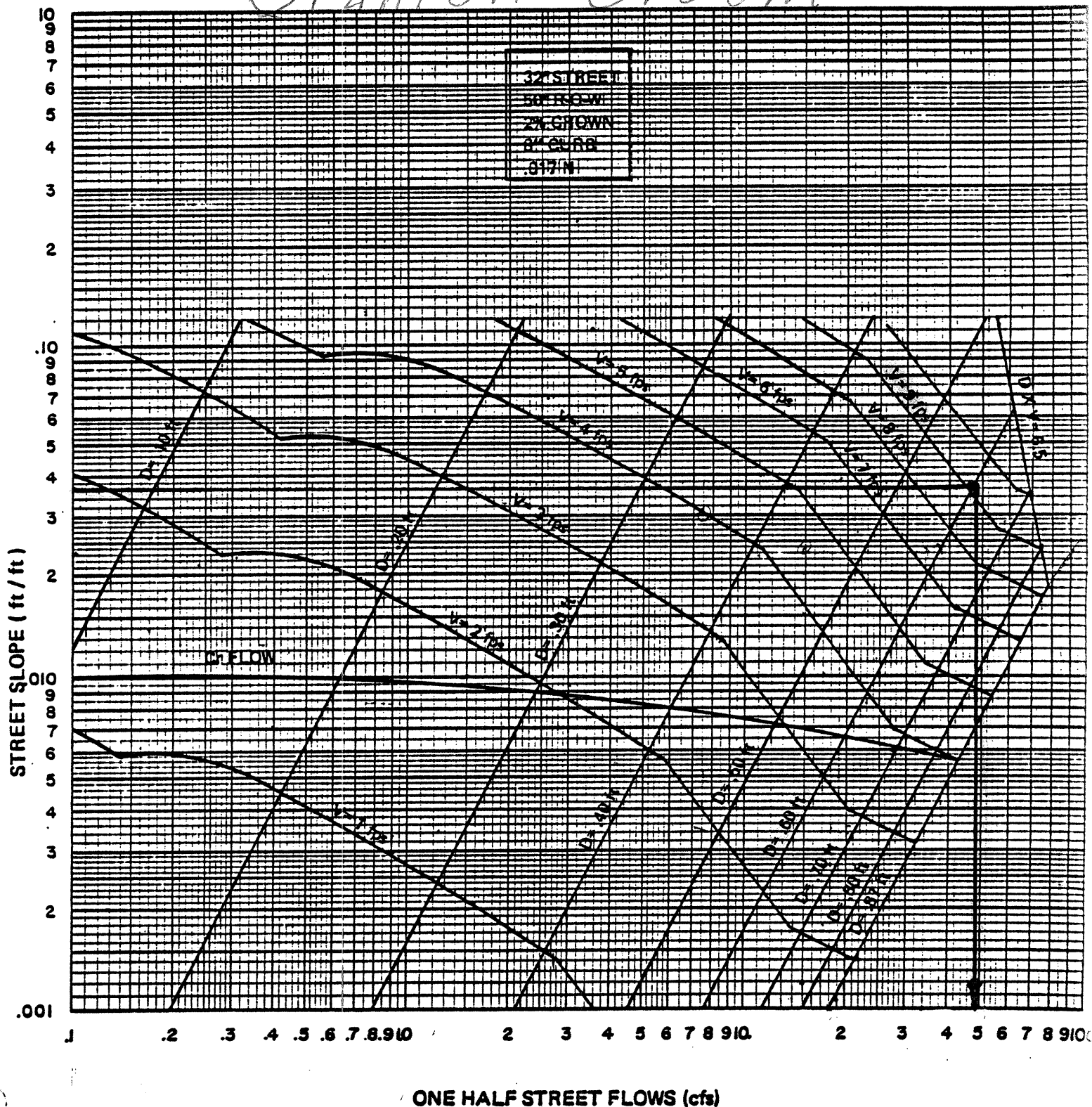Flow in Spanish Broom upstream = 42 + 14

= 56 cfs

Per attached nomograph Capacity of
Spanish Broom = 76 cfs > 56 cfs
[SHT 6?] [98?]

Combined flow at Spanish Broom & Hillspire
where 36" SD begins = 42 + 14 + 37 = 93 cfs

Per attached storm Drain Analysis the
Capacity of existing line = 93 cfs at least

STREET CAPACITY

Spanish Broom

STREET SLOPE (ft / ft)

ONE HALF STREET FLOWS (cfs)

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Capacity of Meadow Place Drive = 120 cfs

Existing Flow   "   "   "   = 59 cfs

Available Capacity = 61 cfs

Proposed Additional Flow from this project = 38 cfs
This leaves 23 cfs excess not counting above curb

Capacity of Spanish Broom Drive = 76 cfs

Existing Flow N of Hillspire = 42 cfs

Available Capacity = 34 cfs

Proposed Addition Flow from this project = 14 cfs
This leaves 20 cfs capacity not counting above curb

Capacity of Storm Drain Spanish Broom &
                              Hillspire = 100 cfs

Existing Flow to Storm Drain = 79 cfs

There is available capacity for the additional
14 cfs from our project. We will add
an inlet in the knuckle to collect our flows.

dmg D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

JOB _Hunters Ridge_
SUBJECT _Drainage_
JOB NO. _____ SHEET _16_ OF ____
BY _____ MG _____ DATE _4/5/92_
CHECKED _____ DATE _____

We now need to calculate that flows in Habcishaw and Stockbridge will not jump the street intersection:

From trial & error Mannings:

Habcishaw : $Q = 17$ cfs $d = 0.52'$ $V = 3.82$ fps

using $\frac{V^2}{2g} + d \longrightarrow 0.74' < 1.0$ o.k.

Stockbridge : $Q = 21$ cfs $d = 0.51'$ $V = 4.15$ fps

$\frac{V^2}{2g} + d = 0.77' < 1.0'$ o.k.

We will now calculate the open channels required for discharge onto Santolina. We will treat openings as weirs.

Basin A discharge : $Q = 14$ cfs

Max head $= 6'' = 0.5'$

$Q = CLH^{3/2}$ $C = 2.9$

$L = \dfrac{Q}{CH^{3/2}} = \dfrac{14}{2.9(0.5)^{3/2}} = 13.65'$ use $14'$

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We need to chk. the ability of the transverse drop inlet in a sump condition in Montano Place of the Montano Pond to intercept the proposed total $Q = 115$ cfs.

Based upon field surveys:

sump depth = 0.99'

$L = 40'$

Grate Opening = 79 sq in/ft × 40' = 21.9 sq ft

$Q = 5.37 @ 4 ft = 115.3$ cfs > 97 cfs   O.K.

The last calculation necessary is the volume for the 19 rear yard ponds we are proposing in an effort to minimize retaining wall heights along Sandolina and the north boundary.

Typical Lot Area = 0.1716 Ac.

Land Treatments:

Treatment A = 0 %

Treatment B = 58 % = 0.100 Ac.

Treatment C = 7 % = .012 Ac.

Treatment D = 35 % = .060 Ac.   1800 sq ft home + drives, walks etc

only ½ of lot will drain to rear, so we will determine vol & divide by 2

Weighted $C = \dfrac{.100(.65) + .012(.82) + .060(1.87)}{.1716}$

JOB _Hunters Ridge_

SUBJECT _Drainage_

JOB NO. _____ SHEET _19_ OF ____

BY _____MG_____ DATE _3/28/92_

CHECKED _____ DATE _____

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$C = 0.973$

$$Vol. = \frac{.973}{12}(.1716) = 0.014 \; Ac\text{-}Ft = 606 \; cu. \; ft.$$

Ponding Vol. Req. = 303 cu. ft.

with max $d = 1.5'$

Pond dimensions = $10 \times 20 \times 1.5'$