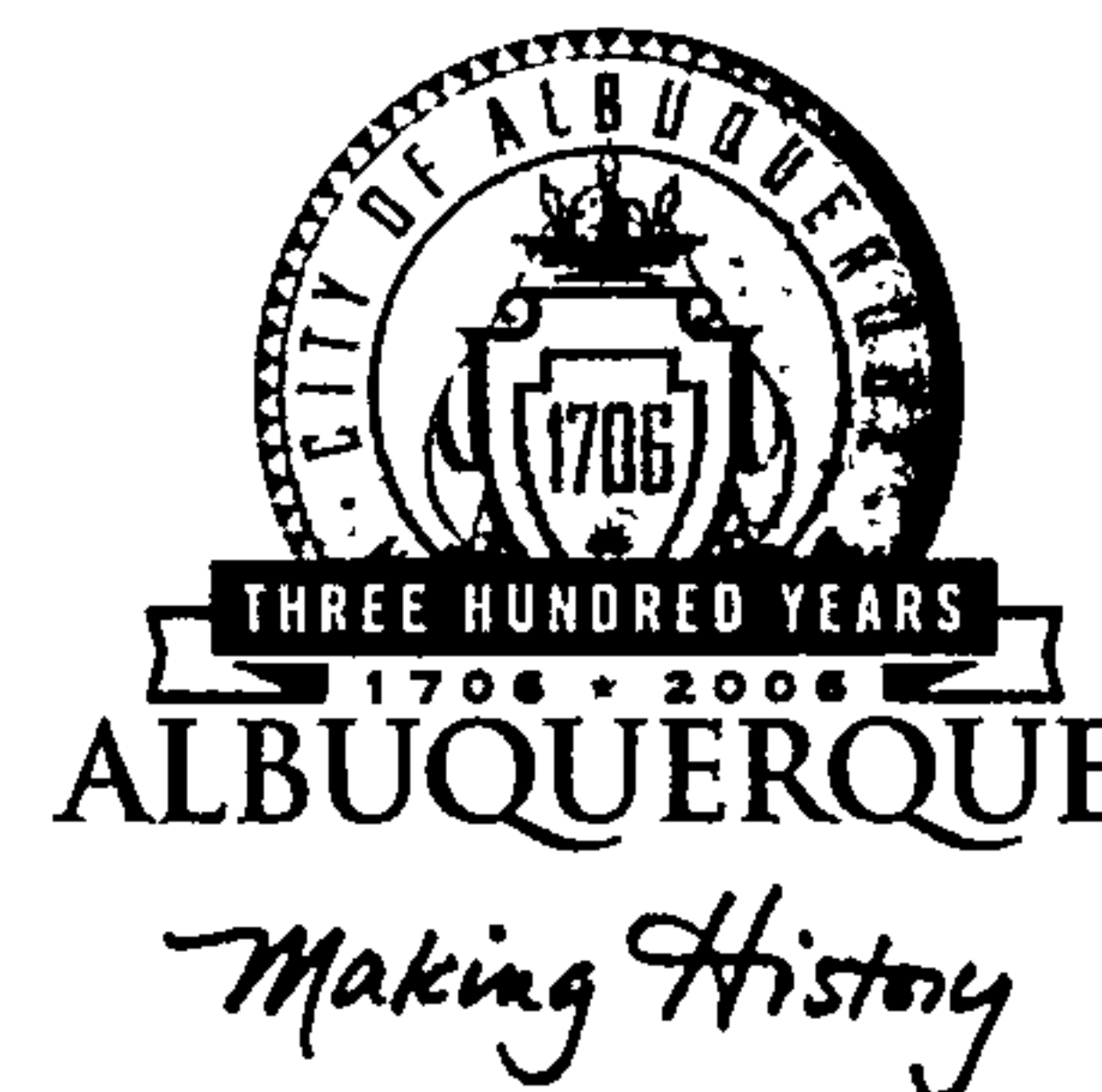


CITY OF ALBUQUERQUE



August 18, 2005

Mr. Mark Goodwin, PE
MARK GOODWIN & ASSOCIATES
P.O. Box 90606
Albuquerque, NM 87199

RE: KENSINGTON SUBDIVISION, UNIT 5 (H-10/D23C)
Engineers Certification for Release of Financial Guaranty
Engineers Stamp dated 08/17/2004
Engineers Certification dated 08/18/2005

Dear Mark:

P.O. Box 1293

Based upon the information provided in your Engineer's Certification Submittal dated 08/18/2005, the above referenced plan is adequate to satisfy the Grading and Drainage Certification for Release of Financial Guaranty.

If you have any questions, you can contact me at 924-3982.

Albuquerque

New Mexico 87103

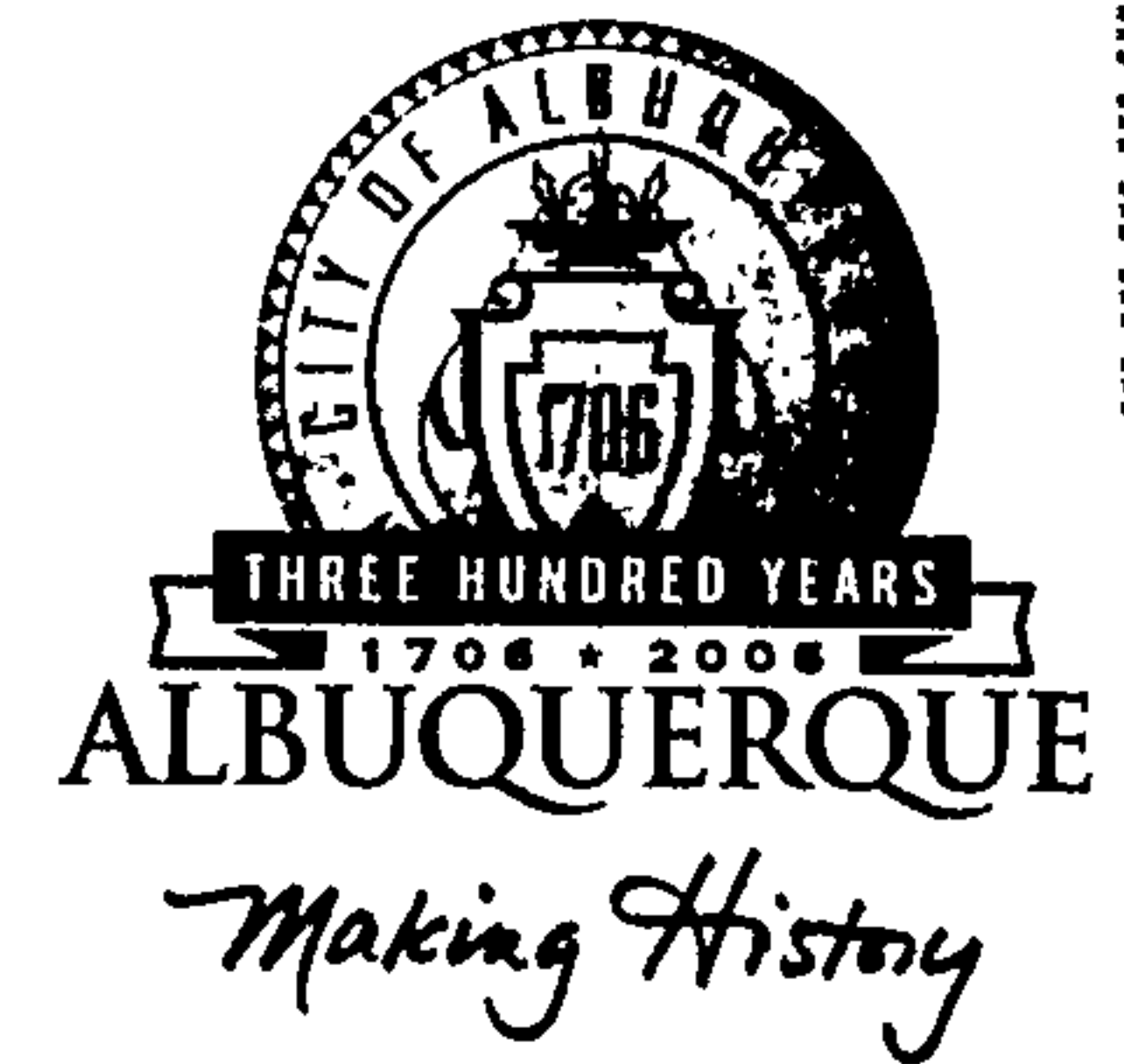
www.cabq.gov

Sincerely,

Arlene V. Portillo
Plan Checker, Planning Dept.- Hydrology
Development and Building Services

C: Marilyn Maldonado, COA# 691383
File

CITY OF ALBUQUERQUE



August 18, 2004

John MacKenzie, P.E.
Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199

**Re: Kensington Subdivision Unit 5, Preliminary Plat
Engineer's Stamp dated 8-17-04 (H10-D23C)**

Dear Mr. MacKenzie,

P.O. Box 1293

Based upon the information provided in your submittal received 8-18-04, the above referenced plan is approved for Preliminary Plat action by the DRB.

Albuquerque

If you have any questions, you can contact me at 924-3981.

New Mexico 87103

Sincerely,

Kristal D. Metro
Engineering Associate, Planning Dept.
Development and Building Services

www.cabq.gov

C: Bradley Bingham, DRB
file



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

May 12, 2004

Mark Goodwin, P.E.
Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199

**Re: Kensington Subdivision Unit 5, Preliminary Plat
Engineer's Stamp dated 4-29-04 (H10-D23C)**

Dear Mr. Goodwin,

Based upon the information provided in your submittal received 4-29-04, the above referenced plan is approved for Preliminary Plat action by the DRB.

If you have any questions, you can contact me at 924-3981.

Sincerely,

Kristal D. Metro
Engineering Associate, Planning Dept.
Development and Building Services

C: Bradley Bingham, DRB
file

DRAINAGE REPORT
for
KENSINGTON, UNIT 5

APRIL 2004



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Figure 1 *Vicinity Map*

Figure 2 *Excerpt from Ladera Vista Drainage Report*

Appendix A *AHYMO Printout*

Appendix B *Drainage Calculations*

Plate 1 *Preliminary Plat*

Plate 2 *Grading & Drainage Plan*

PROJECT DESCRIPTION

This drainage report has been prepared in support of the development of a 2.76 acre in-fill tract located along the south side of Ladera Drive between Muir Drive NW and Ouray Road NW. The proposed development will consist of 18 single-family residential lots at a density of 6.52 DU / Acre.

DRAINAGE DESIGN CRITERIA AND PREVIOUS REPORTS

Existing and proposed hydrological conditions were analyzed for the 100-year, 6-hour storm event. The AHYMO hydrology modeling software was used in accordance with Section 22.2 of the City of Albuquerque Development Process Manual (DPM) in determining site run-off. AHYMO printouts have been included in Appendix A of this report. Manning's Equation was used in determining street capacities.

Excerpts from the previously submitted Ladera Vista Drainage Report, February 2002, by Mark Goodwin & Associates, PA, have been included in Figure 2 of this report. In that report, this tract was identified as Basin B-2.

EXISTING DRAINAGE CONDITIONS

As a part of the development process in designing the Ladera Vista Subdivision, a Letter of Map Revision was prepared and approved by FEMA , which removed this tract from the 100-year flood plain boundary.

The site currently sits lower than the existing homes located on its east, west and south sides as well as Ladera Drive on its north side. Even with that, the only offsite flows impacting this site are from a short stretch (60') of Big Pine Drive to the west. Site flows in the present state remain on-site with mild grades falling to low areas on-site. An existing 18" storm drain has been extended to this site from the east. A perforated riser pipe at the end of the 18" line serves as a catch point for ponded waters.

DEVELOPED DRAINAGE CONDITONS

Future developed runoff waters from this site were accounted for as a part of the Ladera Vista development (please see Figure 2). In following the recommendations first presented in the Ladera Vista Drainage Report, the existing 18" storm drain is proposed to be extended to a future type double "c" ~~from~~ drop inlet located in a sump area as shown on the enclosed plan. A total of 9.52 cfs of developed flow will be routed via on-site streets to this drop inlet.

SUMMARY

With the required infrastructure already in place to safely convey the developed storm flows from the Kensington, Unit 5 site, the development of this site will have no adverse impacts on downstream properties.

DRAINAGE REPORT

for

Ladera Vista Subdivision

Prepared By

*Amy L. Driscoll, PE
Mark Goodwin & Associates, PA
P.O. Box 90606
Albuquerque, NM 87199*



February 8, 2002

INTRODUCTION

This report is being submitted for Bulk Plat and Preliminary Plat approval by City Hydrology.

Please see the enclosed Zone Atlas Map, H-10. The proposed Ladera Vista Subdivision is located on the west side near the Ladera Golf Course and is bounded by Ladera Drive, Ouray Road, the Kensington Subdivision, Miami Road and 72nd Street. The project covers 20 acres and will be developed into 135 single family residential homes.

EXISTING CONDITIONS

Tract 348 was previously in the County, but is ~~now annexed into the City of Albuquerque.~~ The vacations of the 80 foot right-of-way for Ouray Road and the 60 foot right-of-way for 68th Street were approved at DRB. They will be included in the upcoming Bulk Plat. The plat is enclosed in the Appendix. All of the Zoning is now R-D.

Currently the site is vacant and covered in grass. Please see the enclosed Ladera Vista Grading and Drainage Plan. ~~Part of the site is a playa and is within the 100-year flood plain which is shown in the Appendix. The flood plain is identified as Zone AH at elevation 5110. A submittal to FEMA will be done to remove the site from the 100 year flood plain.~~

Tract C (Basin D) and Tract 349-A (Basin B-2) currently drain onto this site. Presently there are curbs along Ladera Drive, Ouray Road, and 72nd Street so flow does not enter from those streets. The Kensington Subdivision does not drain to our site. Flow that is past the crown on Miami Road enters this site.

PROPOSED DRAINAGE PLAN

Please see the Appendix for the AHYMO run and the Basin Exhibit. The flow for each basin is based on 60% Type D and 40% Type B.

Per the November 1997 Drainage Report for Kensington Subdivision Units One, Two, and Three by Isaacson and Arfman, 11.8 acres can contribute up to 41.92 cfs to Miami Road. Please see the Appendix for excerpts from this report. Off-site Basin D and on-site Basin A will contribute 38.8 cfs of developed flows for both basins to Miami Road.

~~Currently, Basin D drains to our site.~~ We are in the process of acquiring permission to grade a two-directional ~~swale in Basin D.~~ This swale will discharge 1.61 cfs of undeveloped flow to Miami. Miami has sufficient capacity for this flow (please see above). The swale will also discharge 3.12 cfs of undeveloped flow to Ladera Drive. This discharge to Ladera Drive will only be until the site is developed. Once the site is developed, all the flow from Basin D will go to Miami Road. The temporary increase to Ladera Drive is insignificant.

The Kensington Subdivision is to the east of the site. Per the January 2001 Drainage Report for Kensington Subdivision Phase Four by Isaacson and Arfman, ~~the Kensington Subdivision's 36-inch storm drain next to our site can accept up to 45 cfs from our site.~~ Please see the Appendix for excerpts from this report. As shown on the Basin Exhibit, Basins B1 and B2 will drain 44.81 cfs to the Kensington Subdivision.

~~Basin B2 will drain to a standpipe on our property.~~ When that site develops, our site can accept the full developed flow of 8.58 cfs from Basin B2.

Copy of Pistowarehouse.dat

```
START          TIME=0.0
*****
*****        Kensington Unit 5
*****        CALCULATE & ROUTE STORM FLOWS
*****        USE 100 YEAR 6 HOUR STORM EVENT
*****        FILE: Kensington5.dat  04/26/04  JSD
*****
RAINFALL       TYPE=1 RAIN QUARTER=0.0 IN
               RAIN ONE=1.87 IN RAIN SIX=2.20 IN
               RAIN DAT=2.66 IN DT=0.03333 HR
*****
*****
*****FIRST LOOK AT EXISTING FLOWS FROM THIS SITE
*****
COMPUTE NM HYD   ID=1 HYD NO=101.0 AREA=0.0043 SQ MI
                 PER A=20 PER B=0 PER C=80 PER D=0
                 TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD       ID=1 CODE=1
*****
*****LOOK AT SMALL AREA OF BIG PINE DR. THAT IMPACTS THIS SITE
*****
COMPUTE NM HYD   ID=2 HYD NO=102.0 AREA =0.0001 SQ MI
                 PER A=0 PER B=20 PER C=0 PER D=80
                 TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD       ID=2 CODE=1
*****
*****NEXT LOOK AT DEVELOPED CONDITIONS
*****
COMPUTE NM HYD   ID=3 HYD NO=103.0 AREA=0.0043 SQ MI
                 PER A=0 PER B=43 PER C=0 PER D=57
                 TP=0.1333 HR MASS RAINFALL=-1
PRINT HYD       ID=3 CODE=1
FINISH
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2.1386						
	2.1401	2.1416	2.1431	2.1446	2.1460	2.1475
2.1489						
	2.1504	2.1518	2.1532	2.1546	2.1560	2.1573
2.1587						
	2.1600	2.1614	2.1627	2.1640	2.1654	2.1667
2.1680						
	2.1692	2.1705	2.1718	2.1731	2.1743	2.1756
2.1768						
	2.1780	2.1792	2.1804	2.1817	2.1829	2.1840
2.1852						
	2.1864	2.1876	2.1887	2.1899	2.1910	2.1922
2.1933						
	2.1944	2.1956	2.1967	2.1978	2.1989	2.2000

*****FIRST LOOK AT EXISTING FLOWS FROM THIS SITE

COMPUTE NM HYD

ID=1 HYD NO=101.0 AREA=0.0043 SQ MI
 PER A=20 PER B=0 PER C=80 PER D=0
 TP=0.1333 HR MASS RAINFALL=-1

K = .117430HR TP = .133300HR K/TP RATIO = .880947
 SHAPE CONSTANT, N = 4.028876
 UNIT PEAK = 11.519 CFS UNIT VOLUME = .9992 B =
 357.09 P60 = 1.8700
 AREA = .004300 SQ MI IA = .41000 INCHES INF =
 .99800 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
 METHOD - DT = .033330

PRINT HYD

ID=1 CODE=1

PARTIAL HYDROGRAPH 101.00

RUNOFF VOLUME = .84844 INCHES = .1946 ACRE-FEET
 PEAK DISCHARGE RATE = 6.89 CFS AT 1.500 HOURS BASIN
 AREA = .0043 SQ. MI.

*****LOOK AT SMALL AREA OF BIG PINE DR. THAT IMPACTS THIS SITE

COMPUTE NM HYD

ID=2 HYD NO=102.0 AREA =0.0001 SQ MI
 PER A=0 PER B=20 PER C=0 PER D=80
 TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000
 SHAPE CONSTANT, N = 7.106420
 UNIT PEAK = .31584 CFS UNIT VOLUME = .9610 B =
 526.28 P60 = 1.8700
 AREA = .000080 SQ MI IA = .10000 INCHES INF =
 .04000 INCHES PER HOUR
 RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
 METHOD - DT = .033330

K = .130992HR TP.= .133300HR K/TP RATIO = .982685

SHAPE CONSTANT, N = 3.593448
UNIT PEAK = .49075E-01CFS UNIT VOLUME = .8722 B =
327.09 P60 = 1.8700
AREA = .000020 SQ MI IA = .50000 INCHES INF =
1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT = .033330

PRINT HYD

ID=2 CODE=1

PARTIAL HYDROGRAPH 102.00

RUNOFF VOLUME = 1.70586 INCHES = .0091 ACRE-FEET
PEAK DISCHARGE RATE = .26 CFS AT 1.500 HOURS BASIN
AREA = .0001 SQ. MI.

*****NEXT LOOK AT DEVELOPED CONDITIONS

COMPUTE NM HYD

ID=3 HYD NO=103.0 AREA=0.0043 SQ MI
PER A=0 PER B=43 PER C=0 PER D=57
TP=0.1333 HR MASS RAINFALL=-1

K = .072649HR TP = .133300HR K/TP RATIO = .545000
SHAPE CONSTANT, N = 7.106420
UNIT PEAK = 9.6767 CFS UNIT VOLUME = .9982 B =
526.28 P60 = 1.8700
AREA = .002451 SQ MI IA = .10000 INCHES INF =
.04000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT = .033330

K = .130992HR TP = .133300HR K/TP RATIO = .982685
SHAPE CONSTANT, N = 3.593448
UNIT PEAK = 4.5370 CFS UNIT VOLUME = .9973 B =
327.09 P60 = 1.8700
AREA = .001849 SQ MI IA = .50000 INCHES INF =
1.25000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER
METHOD - DT = .033330

PRINT HYD

ID=3 CODE=1

PARTIAL HYDROGRAPH 103.00

RUNOFF VOLUME = 1.40730 INCHES = .3227 ACRE-FEET
PEAK DISCHARGE RATE = 9.26 CFS AT 1.500 HOURS BASIN
AREA = .0043 SQ. MI.

FINISH

NORMAL PROGRAM FINISH

END TIME (HR:MIN:SEC) = 10:06:42

DEVELOPED DRAINAGE CONDITIONS

$$\Sigma \text{ ACREAGE} = 2.76 \text{ AC}$$

1. **Find Q per lot:**

$$\text{Pads} = 35' \times 60' = 2100 \text{ sf}$$

$$\text{Drives} = 20' \times 20' = \underline{400 \text{ sf}}$$

$$\Sigma \cdot 2500 \cdot 18 = 45,000 \text{ sf} = 1.03 \text{ ac.} \rightarrow \text{'D'}$$

2. **Find Q generated in road row:**

$$\text{Use 20\% 'B' \& 80\% 'D' Row Area} = 0.6615 \text{ ac}$$

$$\therefore \text{'B'} = 0.13 \text{ ac} \quad \text{'D'} = 1.2 \text{ ac}$$

3. **Treatment Totals:**

$$\text{'D'} = 1.03 \text{ ac} + 0.53 \text{ ac} = 1.56 \text{ ac}$$

$$\text{'B'} = 2.76 \text{ ac} - 1.56 \text{ ac} = 1.2 \text{ ac}$$

4. **Rainfall:**

$$P_1 = 1.87 \text{ in} \quad P_6 = 2.2 \text{ in} \quad P_{24} = 2.66 \text{ in}$$

5. **AHYMO Output:**

$$Q \text{ Offsite} = 0.26 \text{ cfs} \quad Q \text{ Onsite} = 9.26 \text{ cfs}$$

$$Q / \text{Lot} = 0.51 \text{ cfs}$$

STREET CAPACITIES

1. Look at cul de sac just north of intersection with Big Pine Drive.

4" mountable curb, slope = 0.50%

$$Q = 0.51 \text{ cfs} \cdot 12 \text{ lots} = 6.12 \text{ cfs}$$

Street Section = 26' F-F

Use flow depth of 0.33'

$$A = (.07' \times 26') + 2(\frac{1}{2}(.26) \cdot 13) = 5.20 \text{ sf}$$

$$Rh = A/Wp = 5.20 / (26 + .66) = .195$$

$$V = 1.49(R)^{2/3}(S)^{1/2}/n = 1.49(.195)^{.67}(.005)^{1/2}/.017 = 2.07 \text{ fps}$$

$$Q = VA = 2.07(5.20) = 10.78 \text{ cfs}$$

$$10.78 > 6.12 \rightarrow \text{OK}$$

$$d = v^2/2g = .33 = (2.07)^2/64.4 = .40$$

$$.40 < .53 \rightarrow \text{OK}$$

2. Look at 22' F-F Stub Street

4" mountable, S = .51% $Q = .26 + 9.26 = 9.52 \text{ cfs}$

try $d = .33'$

$$A = (.11 \cdot 22) + 2(\frac{1}{2}(.22 \cdot 11)) = 4.84 \text{ sf}$$

$$Rh = 4.84 / (22 + .66) = 0.214$$

$$V = 1.49(.214)^{.67}(.0051)^{1/2} / .017 = 2.23 \text{ fps}$$

$$Q = 2.23(4.84) = 10.78$$

$$10.78 > 9.52 \rightarrow \text{OK}$$

$$d + v^2 / 2g = .33 + (2.23)^2 / 64.4 = .41$$

$$.41 < .53 \rightarrow \text{OK}$$

Note: 8" standard curb will be placed at end of stub street on both sides of drop inlet.

REQUIRED INLET AT END OF STUB STREET

$$Q \text{ tot.} = 9.26 \text{ on-site} + 0.26 \text{ off-site} = 9.52 \text{ cfs}$$

$$Q = CA (2qh)^{\frac{1}{2}}$$

$$\text{Where } C = .67 \quad H = .67'$$

$$\text{Single Albuquerque Grate Cross Area} = 6.94 \text{ sf}$$

$$\ominus \text{ Bearing \& Cross Bare Area} = 2.51 \text{ sf}$$

$$4.43 \text{ sf}$$

$$w / \frac{1}{2} \text{ clog factor, } A = 2.21 \text{ sf}$$

$$\text{Use curb opening area } .5 \times 3 = 1.5 \text{ sf}$$

$$Q \text{ grate} = .67 (2.21)(64.4 \cdot .67)^{\frac{1}{2}} = 9.73 \text{ cfs}$$

$$Q \text{ curb opening} = .67(1.5)(64.4 \cdot .67)^{\frac{1}{2}} = 6.60 \text{ cfs}$$

$$16.33 \text{ cfs}$$

∴ Although a single 'C' drop inlet will suffice, a double 'C' will be used to double capacity since in a sump area at end of street.