

TRADITIONS AT CAUGHLIN RANCH

UNIT NO. 2

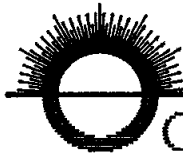
HYDROLOGY REPORT

PREPARED FOR

CENTEX REAL ESTATE CORPORATION

**NEVADA DIVISION
1570 SOUTHVIEW DRIVE
SPARKS, NEVADA 89436**

PREPARED BY

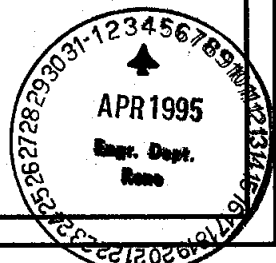


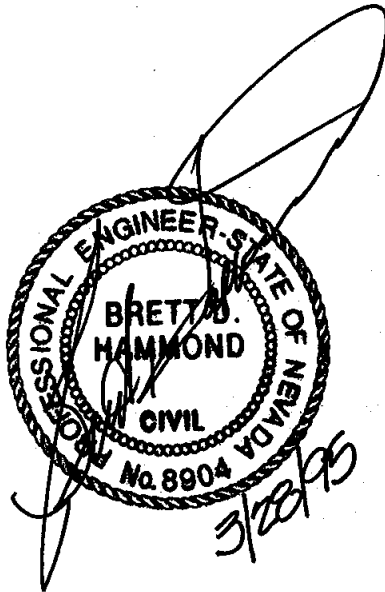
2105 CAPURRO WAY, SUITE F. SPARKS, NV 89431
(702) 358-3303 FAX (702) 358-3329

**Odyssey ENGINEERING
INCORPORATED**

MARCH 1995

Handwritten:
S
4/11/95
GR





**TRADITIONS AT CAUGHLIN RANCH
UNIT NO. 2
DRAINAGE REPORT**

INTRODUCTION

This report represents the calculations supporting storm drainage system design for The Traditions at Caughlin Ranch Unit No. 2 Subdivision which consists of 48 single family residential units.

The site is located in the West half of Section 28, Township 19 North, Range 19 East, M.D.M., within the City of Reno, Nevada. The site is bordered on the North by Traditions Unit No. 1, the South by future Traditions and Alum Creek, the East by Village Green Parkway and the West by future Traditions Unit No. 3. Village Green Parkway is fully improved with the exception of curb and gutter which will be constructed with the development of the adjacent units of The Traditions at Caughlin Ranch. The entire site is located in unshaded Zone X, area of minimal flooding, as designated on the FEMA flood insurance rate maps.

On February 8, 1994, The Reno City Council granted the following approvals in connection with The Traditions at Caughlin Ranch:

- A. Annexation of 110.05 acres by ordinance;
- B. A zoning map amendment from LLR-1 upon annexation to P.U.D. on 10.05 acres, subject to certification by Council and the existing standards contained in the Caughlin Ranch Development Standards Handbook;
- C. An amendment to the Caughlin Ranch P.U.D. to add +/- 10.05 acres to the existing +/- 2,307 acre site, subject to certification by Council and the existing standards contained in the Caughlin Ranch Development Standards Handbook;
- D. A tentative map to develop, in 14 phases, a 307 lot single family residential subdivision on 123.2 acres located along the North and South sides of Caughlin Parkway, subject to conditions; and



- E. A special use permit to allow fills in excess of ten feet and cuts in excess of twenty feet.

Traditions at Caughlin Ranch Unit No. 2 will be the second final map of this subdivision.

EXISTING STORM DRAIN SYSTEM

The existing Topography of the site traverses down in a north-westerly direction, and the ground cover consists of sagebrush and native grasses. As mentioned previously, Village Green Parkway is fully improved with storm drain facilities. Referencing the Hydrology Report for Traditions at Caughlin Ranch Unit No. 1, prepared by Odyssey Engineering Inc., dated November 1994, the existing storm drain within Village Green Parkway discharges into the Westgate Detention Pond. There is also a 24" diameter main stubbed into the Traditions Unit No. 1 site from Caughlin Parkway. All storm drainage improvements for Traditions Unit No.'s 1, 2 and 3 will connect to this 24" stub. With construction of Traditions Unit No. 1, there is a 15" diameter main within Ramcreek Trail that will be extended in Unit No. 2.

PROPOSED STORM DRAIN SYSTEM

The proposed storm drain system throughout Traditions Unit No. 2 is designed to perpetuate flows through the project and to maintain existing flow patterns. All storm water flows from Unit No. 2 were calculated using the Rational Method. As with Unit No. 1, the Flow rates listed as Q5 year and Q100 year as shown on the improvement plans represent final developed conditions. Catch basin flow rates are for there particular subarea and storm drain mains represent flows at ultimate buildout (Reference figure 1 for subarea delineation and flows).

The storm drain system was designed to carry all 100 year flows within the pipe systems. All 100 year flows and 100 year catch basin capacities are shown on the plans. The 100 year flows from Units 1, 2 and 3 will discharge at a low point in Foxcreek Trail within Unit No. 1 and will connect to the existing 24" diameter stub mentioned previously.

A 12" diameter main will be constructed within Foxcreek Trail that will connect to a Future System within Unit No. 3. A temporary swale will be constructed to carry the flows to Alum Creek until the future system is installed.

With development of Unit No. 2, lots 203 through 213 and 229 through 243 have walkout basements. Lots 203 through 213 will drain to an existing concrete drainage swale built with Unit No. 1. This swale discharges into existing catch basins also constructed with Unit No. 1. Lots 229 through 243 will drain to a common area and future catch basins that will be constructed along Elk creek Trail within Unit No. 3.

STORM DRAINAGE CALCULATION METHODOLOGY

As mentioned previously, the Rational Method was used for all flow calculations.

$$\text{Design Flow} = Q = CiA$$

Where: Q = Runoff (cubic feet per second)
 C = Runoff Coefficient
 i = Rainfall Intensity (inches per hour)
 A = Watershed Area (acres)

Since the site land use will be single family residential averaging 4.45 units per acre, a C value of 0.55 was used.

Per the City of Reno Engineering Design Manual, rainfall intensity curves were used to determine the average intensity. The time of concentration with a minimum buildup time of ten minutes is expressed as follows:

$$T_c = 10 \text{ or } L/(V \times 60) \text{ whichever is greater}$$

Where: T_c = Time of Concentration at calculation point (minutes)
 L = Length of Watershed (feet)
 V = Flow Velocity (feet per second)

Since the time of concentration values calculated were less than 10 minutes in every case 10 minutes was used. The 5 year storm rainfall intensity is $i_5 = 1.4$ in/hr, and the 100 year intensity is $i_{100} = 3.8$ in/hr.

CATCH BASIN ANALYSIS

Utilizing the above calculation method, flows were calculated at each catch basin. Calculated flows and descriptions for each catch basin are listed below.

Catch Basin No. 1 is located in Ramcreek Trail between lots 226 and 227. The street slope entering this catch basin is 4.2 percent. The 5 year and 100 year flows are 1.16 cfs and 3.14 cfs respectively. The catch basin is a type 4-R with a capacity of 3.8 cfs therefore containing all excess runoff.

Catch Basin No. 2 is also located within Ramcreek Trail between lots 232 and 233. The 5 year and 100 year flows are 1.05 cfs and 2.84 cfs respectively. This is a type 4-R catch basin with a capacity of 3.5 cfs therefore containing all excess storm runoff.

Catch Basin No. 3 is also located within Ramcreek Trail between lots 219 and 220. The 5 year and 100 year flows are 1.15 cfs and 3.11 cfs respectively. This is a type 4-R catch basin with a capacity of 3.5 cfs therefore containing all excess storm runoff.

Catch Basin No.'s 4 and 5 are located within Foxcreek Trail between lots 245 and 246. The 5 year and 100 year flows at these catch basins are 3.43 cfs and 9.32 cfs respectively. They are both type 4-R with a combined capacity of 11.6 cfs therefore containing all excess storm runoff.

There is an existing catch basin within lot 205 that is to be removed and abandoned.

DRAINAGE SUBAREA DESIGNATION

Drainage Subarea "A" is 4.46 ac. and drains to catch basin 4 and 5

Drainage Subarea "B" drains to existing catch basin within Unit No. 1

Drainage Subarea "C" is 0.84 ac. and drains to an existing catch basin built within Unit 1

Drainage Subarea "D" is 1.49 ac. and drains to catch basin No. 3

Drainage Subarea "E" is 1.26 ac. and drains to catch basin No. 2

Drainage Subarea "F" drains to future Traditions Unit No. 3

Drainage Subarea "G" drains to future Traditions Unit No. 3

Drainage Subarea "H" drains to an existing catch basin within Unit 1

Drainage Subarea "I" is 1.5 ac. and drains to catch basin No. 1

Drainage Subarea "J" drains to an existing catch basin built within Unit No. 1

CONCLUSION

With development of The Traditions at Caughlin Ranch Unit No. 1, the proposed storm drainage system is designed to carry all 100 year flows which will be generated by development of Units 1, 2 and 3. The proposed mains will connect into existing facilities located within Traditions Unit No. 1, which are adequate to carry the proposed 100 year developed flows.

The drainage and grading design for this subdivision will provide drainage protection for the homes within the development, and will maintain existing drainage patterns within the watershed area.

**TABLE I
EXISTING CONDITIONS**

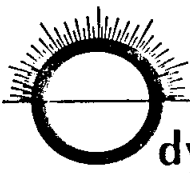
| Sub-area | Area (acres) | C | Tc (min.) | I5 (in/hr) | Q5 cfs | I100 in/hr | Q100 cfs |
|----------|--------------|------|-----------|------------|--------|------------|----------|
| A | 4.46 | 0.30 | 10 | 1.4 | 1.87 | 3.8 | 5.08 |
| B | ± 1.6 | 0.30 | 10 | 1.4 | 0.67 | 3.8 | 1.82 |
| C | 0.84 | 0.30 | 10 | 1.4 | 0.35 | 3.8 | 0.96 |
| D | 1.49 | 0.30 | 10 | 1.4 | 0.63 | 3.8 | 1.70 |
| E | 1.26 | 0.30 | 10 | 1.4 | 0.53 | 3.8 | 1.44 |
| F | ± 2.45 | 0.30 | 10 | 1.4 | 1.03 | 3.8 | 2.79 |
| G | ± 1.05 | 0.30 | 10 | 1.4 | 0.44 | 3.8 | 1.20 |
| H | ± 1.40 | 0.30 | 10 | 1.4 | 0.59 | 3.8 | 1.60 |
| I | 1.5 | 0.30 | 10 | 1.4 | 0.63 | 3.8 | 1.71 |
| J | ± 0.60 | 0.30 | 10 | 1.4 | 0.25 | 3.8 | 0.68 |
| Total | | | | | 6.99 | | 18.98 |

**TABLE II
PROPOSED CONDITIONS**

| Sub-area | Area acres | C | Tc min. | I5 in/hr | Q5 cfs | I100 in/hr | Q100 cfs |
|----------|------------|------|---------|----------|--------|------------|----------|
| A | 4.46 | 0.55 | 10 | 1.4 | 3.43 | 3.8 | 9.32 |
| B | ± 1.6 | 0.55 | 10 | 1.4 | 1.23 | 3.8 | 3.34 |
| C | 0.84 | 0.55 | 10 | 1.4 | 0.65 | 3.8 | 1.76 |
| D | 1.49 | 0.55 | 10 | 1.4 | 1.15 | 3.8 | 3.11 |
| E | 1.26 | 0.55 | 10 | 1.4 | 1.05 | 3.8 | 2.84 |
| F | ± 2.45 | 0.55 | 10 | 1.4 | 1.89 | 3.8 | 5.12 |
| G | ± 1.05 | 0.55 | 10 | 1.4 | 0.81 | 3.8 | 2.19 |
| H | ± 1.40 | 0.55 | 10 | 1.4 | 1.08 | 3.8 | 2.93 |
| I | 1.50 | 0.55 | 10 | 1.4 | 1.16 | 3.8 | 3.4 |
| J | ± 0.60 | 0.55 | 10 | 1.4 | 0.46 | 3.8 | 1.25 |
| Total | | | | | 12.91 | | 35.26 |

**TABLE III
CATCH BASIN CAPACITIES**

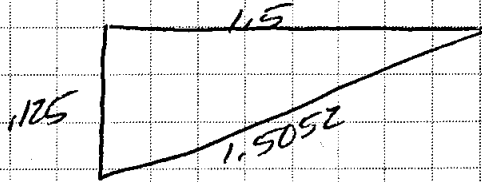
| Catch Basin | Type | Q100 cfs | Q cap cfs |
|-------------|------|----------|-----------|
| 1 | 4-R | 3.4 | 3.8 |
| 2 | 4-R | 2.84 | 3.5 |
| 3 | 4-R | 3.11 | 3.5 |
| 4 | 4-R | 4.66 | 5.8 |
| 5 | 4-R | 4.66 | 5.8 |



Catch basin Capacities

CB# 1 TYPE 4-R S = 4.2%

$Q_5 = 1.16$
 $Q_{100} = 3.4$



$A = 0.0938$
 $Wp = 1.0302$
 $R = A/Wp = 1.0575$

$Q = \frac{1.486}{n} R^{2/3} S^{1/2} A$
 $n = 0.014$

$Q_{gutter} = 1.304$

$Q_{street} = 3.10$

$d_{street} = 0.117$

$d_{total} = 0.117 + 0.125 = 0.295$

$K = 29$

$Q_{cap} = 3.8 CFS$

CB# 2 TYPE 4-R S = 4.2%

$Q_5 = 1.05 CFS$

$Q_{100} = 2.84 CFS$

$Q_{gutter} = 1.304$

$Q_{street} = 2.84 - 1.304 = 2.54$

$d_{street} = 0.158$

$d_{total} = 0.158 + 0.125 = 0.283$

$K = 29$

$Q_{cap} = 3.5 CFS$

CB# 3 TYPE 4-R S = 4.2%

$Q_5 = 1.15$

$Q_{100} = 3.11$

$Q_{gutter} = 1.304$

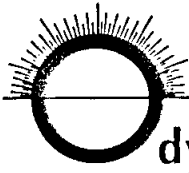
$Q_{street} = 3.11 - 1.304 = 2.81$

$d_{street} = 0.163$

$d_{total} = 0.163 + 0.125 = 0.288$

$K = 29$

$Q_{cap} = 3.5 CFS$



2105 Capurro Way Suite F
 Sparks, NV 89431
 (702) 359-3303 Fax (702) 359-3329

dysey ENGINEERING
 INCORPORATED

JOB Traditions UNIT 1202

SHEET NO. 2 OF 2

CALCULATED BY TM DATE 2-16-95

CHECKED BY _____ DATE _____

SCALE _____

CB# 4,5 Type U-R S=5.6%

$Q_G = 3.43 \text{ cfs}$

$Q_{100} = 9.32 \text{ cfs}$

$Q_{UTRI} = .351$

$Q_{STREET} = 9.32 - .351 = 8.97$

$d_{street} = 0.24$

$d_{total} = .24 + .125 = .365$

$K = 31$

$Q_{cap} = 5.8 \text{ cfs EACH}$

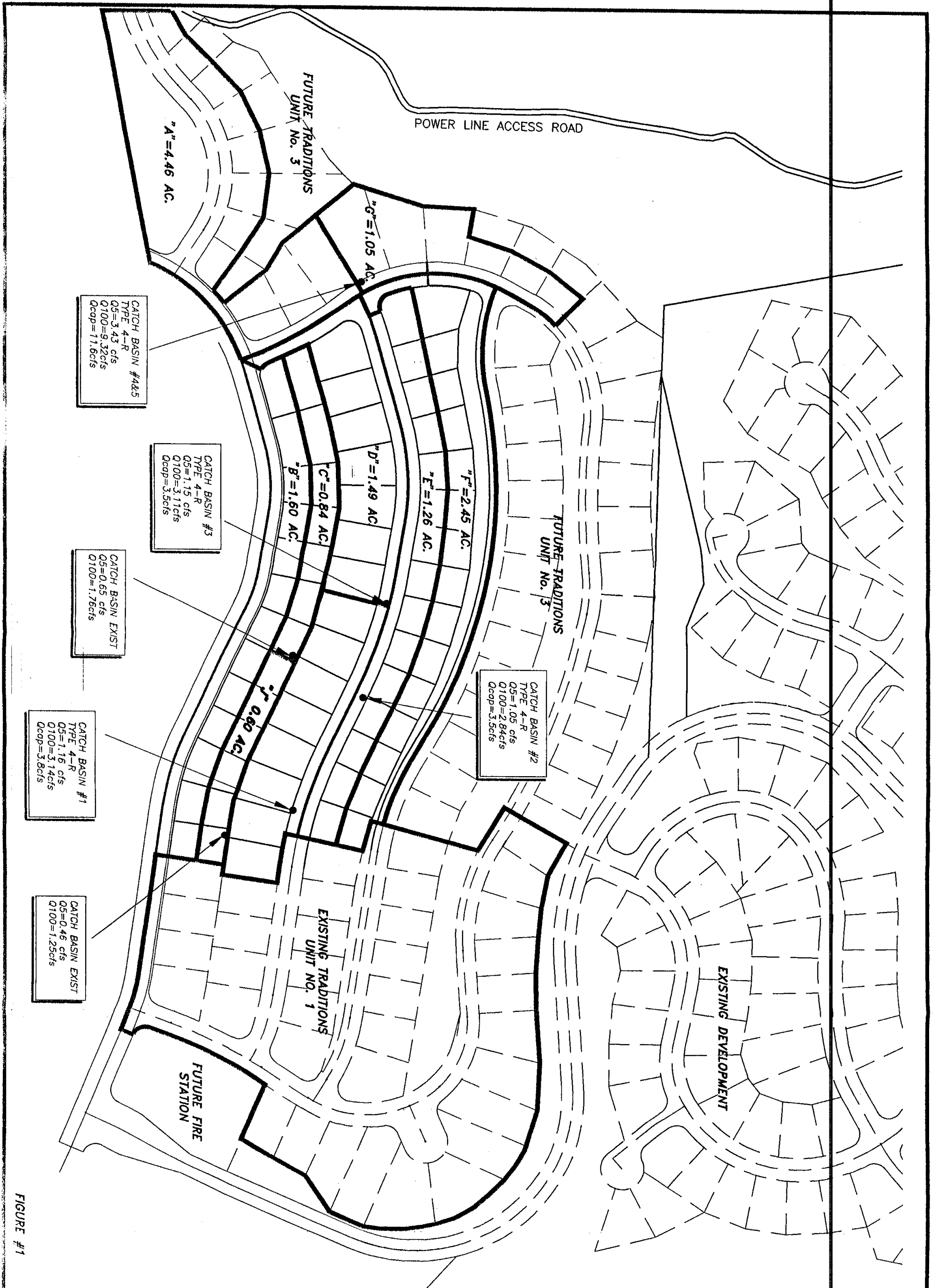


FIGURE #1

