2003P005

INFINITY
ENGINEERING SERVICES, LTD.

Registered Professional Engineer (Civil) CERTIFICATE NO. 14394 ROBERT S. MITCHELL Date Signed 5/8/03 ARIZONA U.S.A.

FINAL DRAINAGE REPORT
for
COLTER COMMONS
IES Job No. 0815
November 8, 2002
Revised May 7, 2003
S20002073

"COLTER COMMONS" is a proposed 11.8 acre, 29 lot single family subdivision of a portion of the Southwest quarter of Section 14, Township 2 North, Range 1 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The project is located Northerly of the Northeast corner of Dysart and Camelback Roads in a County Island. (Please see Vicinity Map at Page 2).

The site is vacant desert sloping generally from Northwest to Southeast at roughly 0.3%. Offsite flows from the North and West have been cut off by the Colter Channel (FCDMC #93-08). This site is former excess right-of-way from that project.

The project shall be designed to meet Flood Control District of Maricopa County (FCDMC) criteria, namely:

1) Colter Street shall be designed to be all-weather accessible. Gutter depth shall not exceed 8 inches and flow velocity shall not exceed 10 fps.

2) Pads will be set a minimum of 0.5' above the low outfall of the lot.

3) Finished floors will be set a minimum of 8" above the pad elevation or 14" above the low outfall of the lot whichever is higher. The finished floor elevations shall be free from inundation during a 100 year peak runoff event.

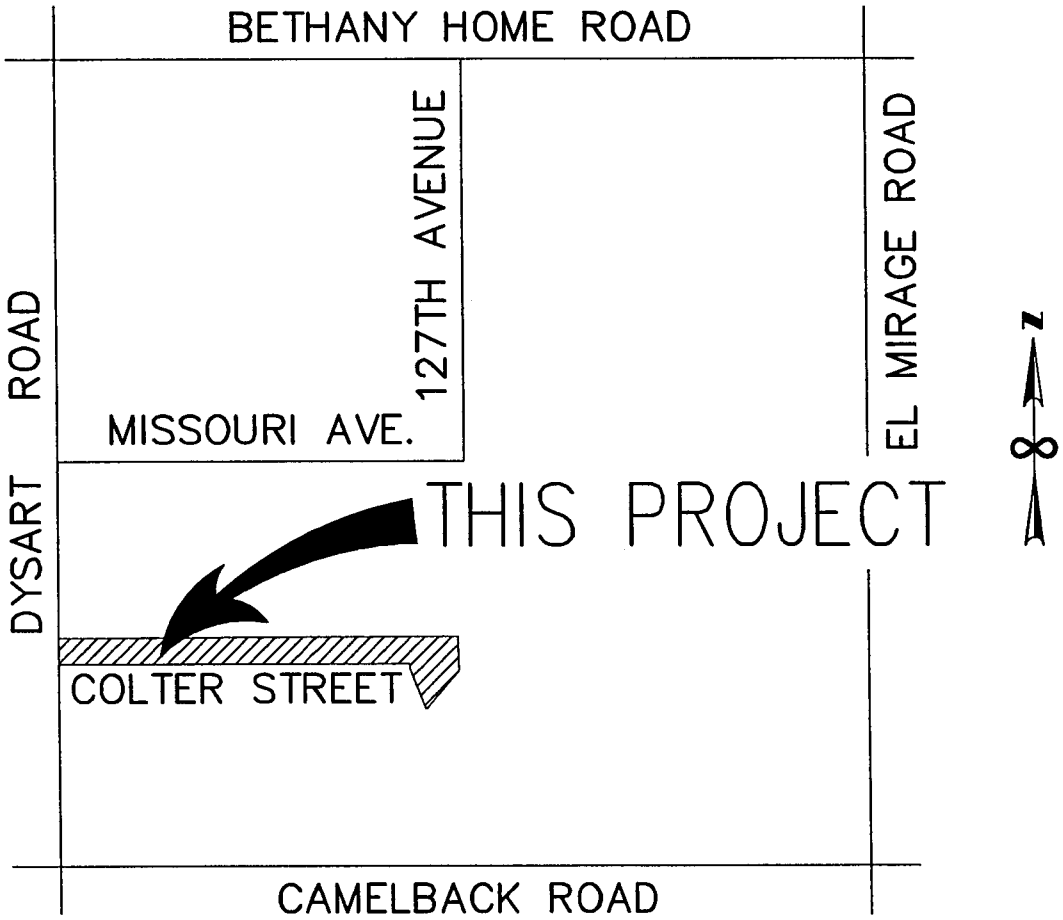
4) Drainage design will be per FCDMC Drainage Design Manuals.

5) Retention for runoff from the site from the 100 year storm event has been waived by FCDMC as part of the purchase agreement. Retention for the "first flush" (Volume = CIA = 1.0 X 0.5 X 16.56 acres = 30,057 cf) shall be provided in two tracts. (See pg. 19)

Flows in excess of the first flush shall be directed to the Colter Channel via concrete pipe culverts. The peak discharge of 62 cfs (6.5 + 55.5) occur at a time of concentration of less than 20minutes, well before the peak flow in the channel of *1200± cfs. The contributory area of the project (16.6 ac) is insignificant compared to the *2630 acres contributing to the channel (*Per "Hydrology for the Colter Channel" by FCDMC 7/8/92).

Please see the following detailed calculations.

4701 S. Lakeshore Drive ∞ Suite 3 ∞ Tempe, Arizona 85282 ∞ Phone (480) 839-8600 ∞ Fax (480) 839-8800



VICINITY MAP

N.T.S.

Peak Discharge Calculations (100yr.)

Concentration Pt #1 : A = 1.185 ac.
(See Map in Pocket at end of Report.

$T_c = 11.4 \quad L^{0.5} \quad K_b^{0.52} \quad S^{-0.31} \quad i^{-0.38} \times \frac{60 min}{hr} =$

Assume 6min; $i_p = 8.4$ (Pg.8) $\quad i = i_p \frac{1.97}{2.07}$ (Pg.9) $= 7.99$

$11.4 \quad L = 0.729 mi. \quad K_b = 0.04, \quad S = 22.6'/mi, \quad i = 7.99''/hr.$

$11.4 \times 0.270 \times 0.1875 \times 0.380 \times 0.454 \times 60 =$
$5.97 min$

$Q = CiA = (0.69)(7.99)(1.185) = \underline{6.5 cfs.}$
Pg.10

Use a double scupper in sump to convey water from Street to Tract A (Pg.11)

Use 15" Pipe @ S = 0.9 % to convey overflow to Cotter Channel. V = 5.5 fps.

Conc. Pt #2 : 4.66ac , assume $T_c = 9.5$ min, $i_p = 7.1$, $i = 6.76$

$L = 0.191$, $K_b = 0.37$, $S = 25.1$ ft/mi, $i = 6.76$

$T_c = 11.4 \times 0.4367 \times 0.180 \times 0.368 \times 0.484 \times 60 =$
9.57 min ✓
$\therefore i = 6.76$

$Q = CiA = (0.69)(6.76)(4.66) = 21.7$ cfs

Street slope = 0.2% Street Cap @ 2" over T/C = 20 cfs

See Page 13

Conc. Pt. 3: A = 7.01 ac, assume T_c = 12 min, i_p = 6.6, i = 6.28

L = 0.259 K_b = 0.036, s = 21.6 ft/mi, i = 6.28

11.4 × 0.5085 × 0.1775 × 0.3856 × 0.497 × 60
= 11.8 min ✓

∴ i = 6.28

$$Q = CiA = (0.69)(6.28)(7.01) = 30.4 \text{ cfs.}$$

Street slope = 0.18%, street capacity @ 3" over TC
= 29.7 cfs

Conc. Pt. 4 ; $A = 11.59$ ac, assume $T_c = 15$, $i_p = 5.9$, $i = 5.61$

$L = 0.374$, $K_b = 0.34$, $s = 18.2$ ft/mi, $i = 5.61$

$11.4 \times 0.612 \times 0.172 \times 0.4067 \times 0.519 \times 60 =$

$= 15.2$ min ✓

$$Q = CiA = (0.69)(5.61)(11.59) = 44.9 \text{ cfs.}$$

Street slope = 0.24% @ roughly 3.5" over 4" curb
capacity = 42.4 cfs.

downstream @ street slope = 0.2% @ 4" over top of curb
street capacity = 46.1 cfs.

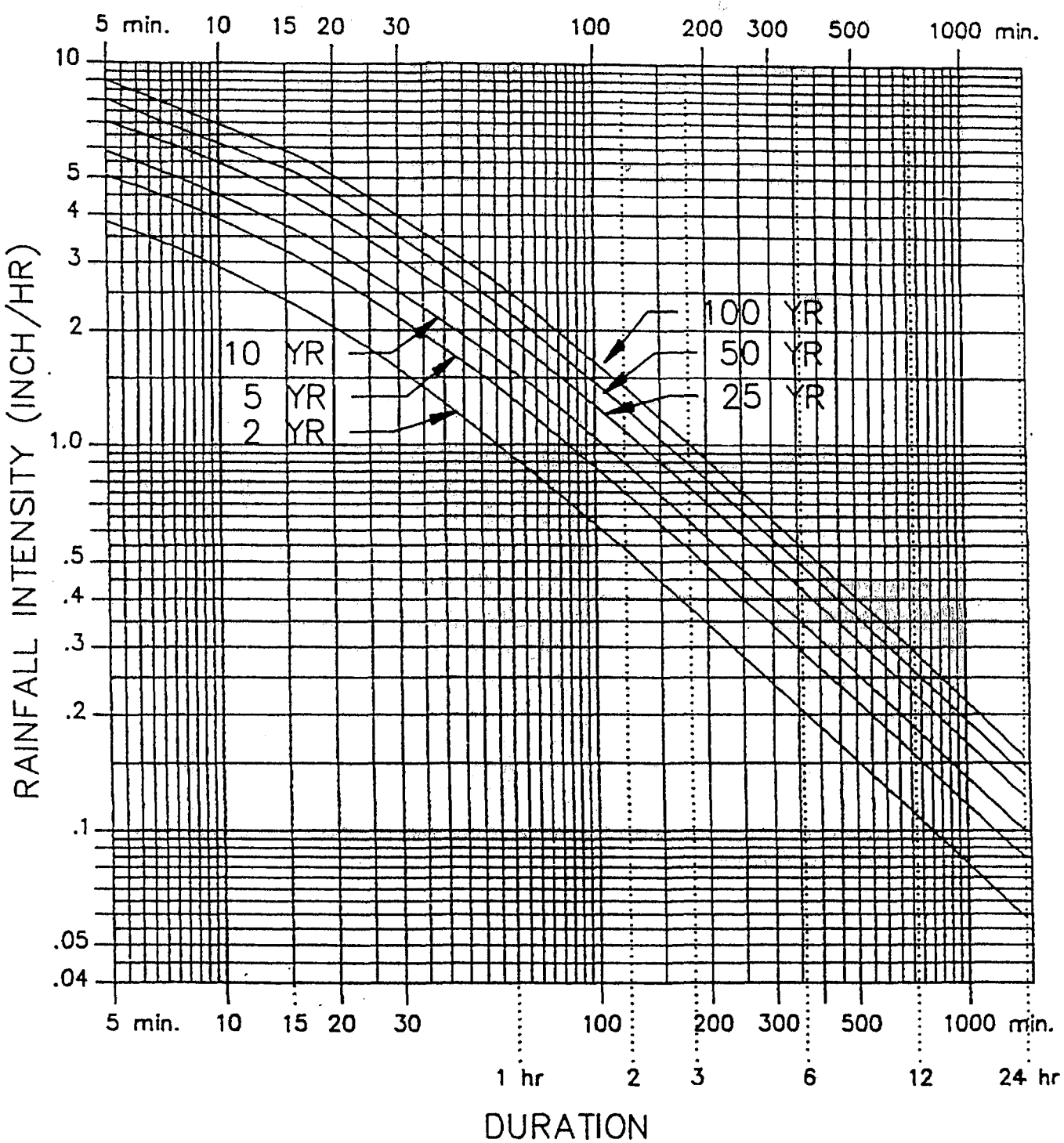
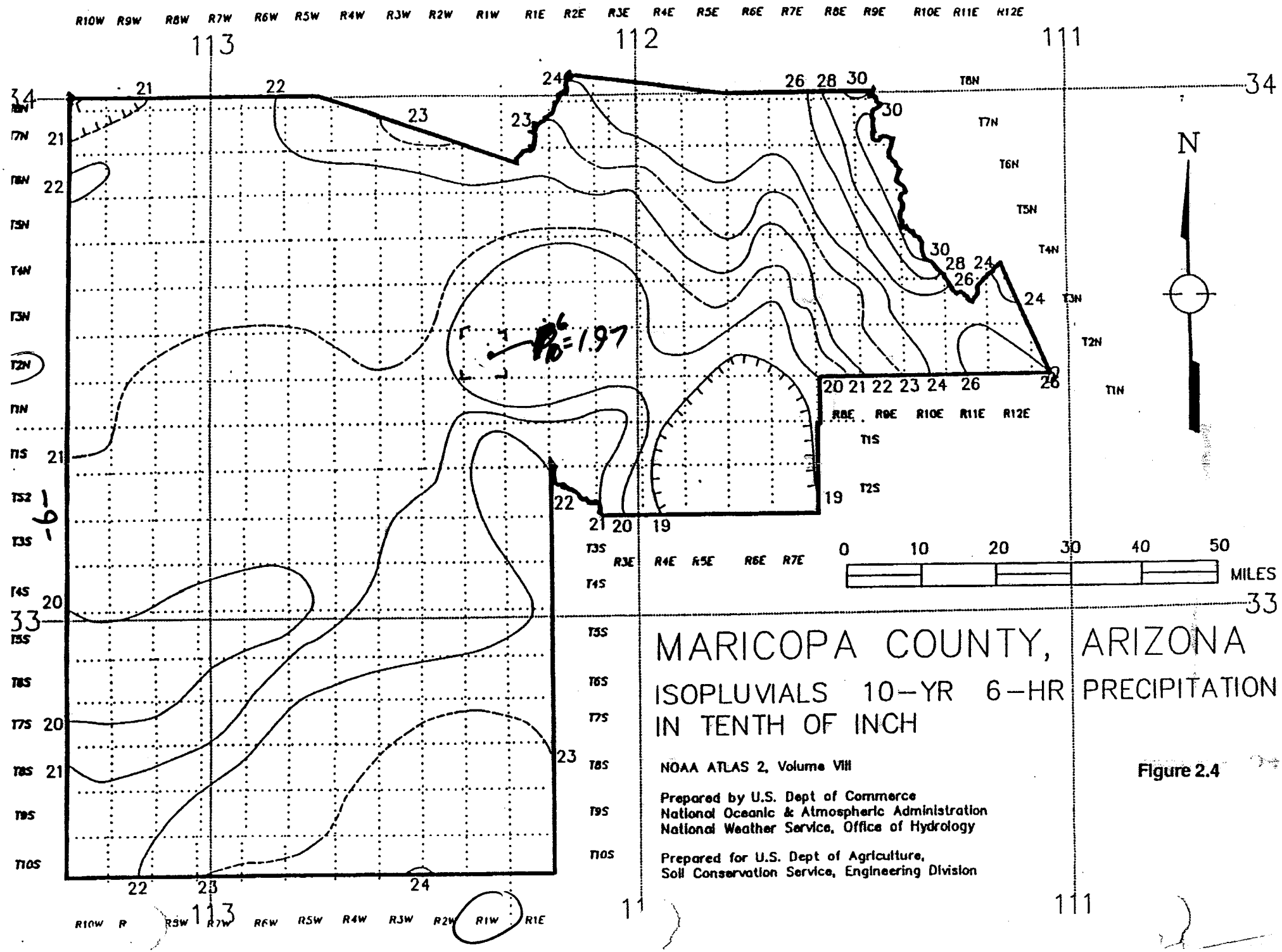


Figure 3.2
Rainfall Intensity-Duration-Frequency Relation
(Phoenix Metro Area)



MARICOPA COUNTY, ARIZONA

ISOPLUVIALS 10-YR 6-HR PRECIPITATION IN TENTH OF INCH

NOAA ATLAS 2, Volume VIII

Prepared by U.S. Dept of Commerce
National Oceanic & Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Dept of Agriculture,
Soil Conservation Service, Engineering Division

Figure 2.4

Table 3.2
C Coefficients for Use with the Rational Method

Land Use	Return Period			
	2-10 Year	25 Year	50 Year	100 Year
Streets and Roads				
Paved Roads	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Gravel Roadways & Shoulders	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Industrial Areas				
Heavy	0.70 – 0.80	0.77 – 0.88	0.84 – 0.95	0.88 – 0.95
Light	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Business Areas				
Downtown	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Neighborhood	0.55 – 0.65	0.61 – 0.72	0.66 – 0.78	0.69 – 0.81
Residential Areas				
Lawns – Flat	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
– Steep	0.25 – 0.40	0.28 – 0.44	0.30 – 0.48	0.31 – 0.50
Suburban	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Single Family	0.45 – 0.55	0.50 – 0.61	0.54 – 0.66	0.56 – 0.69
Multi-Unit	0.50 – 0.60	0.55 – 0.66	0.60 – 0.72	0.63 – 0.75
Apartments	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Parks/Cemetaries	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
Playgrounds	0.40 – 0.50	0.44 – 0.55	0.48 – 0.60	0.50 – 0.63
Agricultural Areas	0.10 – 0.20	0.11 – 0.22	0.12 – 0.24	0.13 – 0.25
Bare Ground	0.20 – 0.30	0.22 – 0.33	0.24 – 0.36	0.25 – 0.38
Undeveloped Desert	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Mountain Terrain (Slopes > 10%)	0.60 – 0.80	0.66 – 0.88	0.72 – 0.95	0.75 – 0.95

Note: Values of C for 25, 50 and 100 Year were derived using frequency adjustment factors of 1.10, 1.20, and 1.25, respectively, with an upper limit of 0.95 for C for the 2-10 Year values.

INFINITY
ENGINEERING SERVICES, LTD.
610 West Broadway Road ∞ Suite 215
∞ Tempe, Arizona 85282
∞ Phone (602) 902-0571
∞ Fax (602) 902-0594

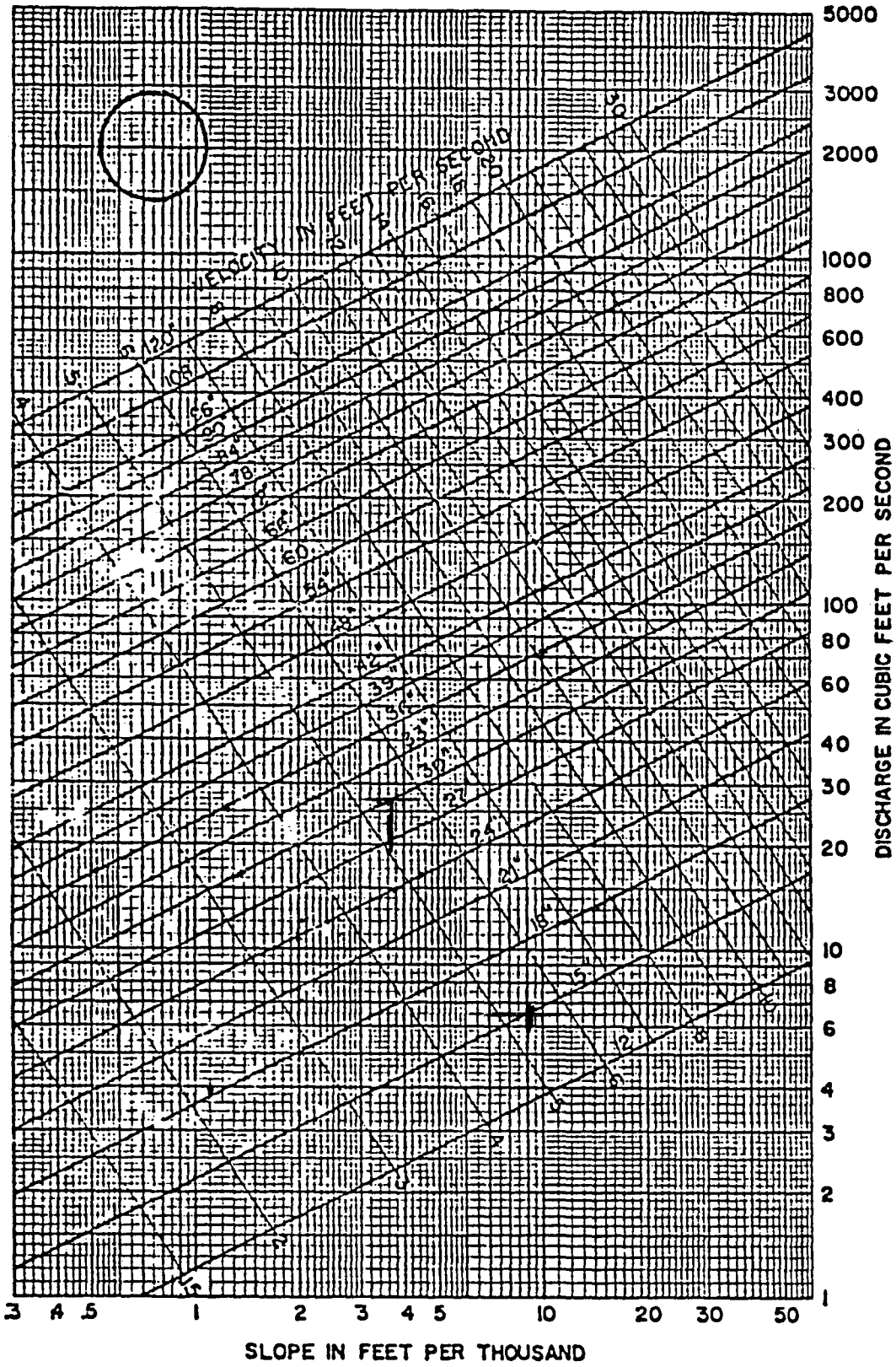
PROJECT NUMBER _____.
SHEET NO. _____ OF _____.
DATE _____. BY _____.

PROJECT CITY OF CHANDLER
SUBJECT SCUPPER CAPACITIES

USE COUNTY STANDARDS: $Q = C_w(L+1.8w)d^{1.5}$ where $C_w = 2.3$
& 80% Reduction factor for clogging

# of Barrels	L+1.8w	d=4"		d=6"		d=7"	
		Q	80%Q	Q	80%Q	Q	80%Q
1	6.7	2.9	2.4	5.4	4.4	6.9	5.5
2	11.2	5.0	4.0	9.1	7.3	11.5	9.2
3	15.7	6.9	5.6	12.8	10.2	16.1	12.9
4	20.2	8.9	7.2	16.4	13.1	20.7	16.6
5	24.7	10.9	8.7	20.1	16.1	25.3	20.2
6	29.2	12.9	10.3	23.7	19.0	29.9	23.9
7	33.7	14.9	11.9	27.4	21.9	34.5	27.6
8	38.2	16.9	13.5	31.1	24.9	39.1	31.3
9	42.7	18.9	15.1	34.7	27.8	43.8	35.0
10	47.2	20.9	16.7	38.4	30.7	48.4	38.7

COMPUTED FROM MANNING'S FORMULA
n=0.012



PIPE CAPACITIES FLOWING FULL

INFINITY
ENGINEERING SERVICES, LTD.
610 West Broadway Road ∞ Suite 215
∞ Tempe, Arizona 85282
∞ Phone (602) 902-0571
∞ Fax (602) 902-0594

PROJECT _____

SUBJECT Street Capacities

PROJECT NUMBER _____

SHEET NO. _____ OF _____

DATE _____ BY _____

~~CITY OF~~ MARICOPA COUNTY.

Capacity and Velocity of Half Street Flow

Street Cross Section - 32 ' B/C to B/C

STANDARD 2% Crown w/ S/W & Parkway @ 1.5%

Curb and Gutter Treatment And Depth		Cross-Sectional Area of Half Street (s.f.)	$A \frac{1.486}{0.015} R^{2/3}$	Capacity of Half Street (cfs)/Velocity (fps) at Slope (%) Equal to:									
						0.2%							
4" Roll Curb & G	T/C 9"	2.52	73			3.26 / 1.3							
	+1"	4.08	133			5.95 / 1.45							
	+2"	6.11	224			10.02 / 1.65							
~~6" Vertical C&G~~	+3"	8.60	350			15.65 / 1.85							
	+4"	11.56	516			23.08 / 2.0							
7" Vertical C&G													

Per Mannings Equation: $Q = A \frac{1.486}{0.015} R^{2/3} S^{1/2}$, where n = 0.015 for concrete

RETENTION
SUMMARY.

INFINITY
ENGINEERING SERVICES, LTD.
4701 S. Lakeshore Drive, Suite 3,
Tempe, Arizona 85282
Phone (480) 839-8600
Fax (480) 839-8800

PROJECT NUMBER
PROJECT Coulter Commons.
SHEET NO. OF
SUBJECT First Flush Retention Summary.
DATE BY

Point #	Area (ac)	C	CA	Length (ft)	Slope (%)	Vel. (fps)	Tc (min)	I (in.)	Q (cfs)	Qcap & Facility
Tract										
A	1.185	1.0						0.5		2151 cf required
		Provided:		Triangular Cross Section Basin.						
				North end Area: 36 sf.						
				South end Area: 25 sf.						
				Average Area: 30.5				x Length = 140		= Vol. Provided =
										4270 cf ✓
B	15.375	1.0						0.5"		27,906 c.f. Required
					Provided:			Odd Shaped Basin. Volume		
								Per Computer Printout		
								Following:		31,806 c.f. ✓

Colter Commons
Date: May 8, 2003
Bottom=1040.7
WSE=1043.7

Site Volume Table: Unadjusted

Cut cu.yds	Fill cu.yds	Net cu.yds	Method
Site: wse-rev-b			
Stratum: wse-rev-b wse rev basin b			
1106	2	1103 (C) Grid	
1195	12	1182 (C) Composite	
1193	22	1171 (C) Prismoidal	
1218	23	1195 (C) End area	

AVG = 1178 × 27cf./cy. = 31,806cf.

Percolation Test and Geological Report For Retention Basins

Project

Colter Commons (10.8 Acres)
NE of Dysart Road and Camelback Road
Maricopa County, Arizona

Prepared For

Metropolitan Land Co.
2390 E. Camelback Road, Suite 438
Phoenix, Arizona 85016

CONSTRUCTION INSPECTION & TESTING CO.
2137 WEST 7TH STREET
TEMPE, ARIZONA 85281-7227
(480) 446-9876 FAX (480) 446-7580

CONSTRUCTION INSPECTION & TESTING CO.

2137 WEST 7TH STREET
TEMPE, ARIZONA 85281-7227
(480) 446-9876 FAX (480) 446-7580

October 30, 2002

Metropolitan Land Co.
2390 E. Camelback Road, Suite 438
Phoenix, Arizona 85016

Re: **Percolation Test Report**
For Retention Basins

Project: Colter Commons (10.8 Acres)
NE of Dysart Road and Camelback Road
Maricopa County, Arizona

CIT Project No. 02-21694-1

Attention: Greg Vulin

In accordance with your request, we have completed the percolation tests for the subject project in accordance with the requirements of the Maricopa County.

The accompanying report presents the results of this testing.

Respectfully submitted,
Construction Inspection & Testing Co.

Reviewed by: Scott R. Smith, P.E.

Copies to: Addressee (3)

Colter Commons (10.8 Acres)
NE of Dysart Road and Camelback Road
Maricopa County, Arizona
CIT Project No. 02-21694-1

Percolation Test Report for Retention Basins

In accordance with Maricopa County requirements, the following items are submitted:

1. General Description of Area:

   Project encompasses approximately 10.8 acres of vacant land.

2. Method of Making Soil Profile & Percolation Test:

   Two (2) test holes were excavated utilizing a 12" diameter power auger. Pre-soaked, refilled and water levels recorded at five minute intervals until uniformity in rate of fall. The "stabilized rate" was determined from the above fall/time results.

3. Map Showing Location of Test Pit:

   Attached (Plate A)

4. Boring Logs and Percolation Test Results:

   Stabilized percolation rates as determined for the retention basins in cubic feet per hour per square foot are given in the following table:

Test Hole	Depth Below Natural Ground	Soil Type	Percolation Rate (Ft3/Ft2/Hr)
P1	3'	Clayey Sand	0.5
P2	3'	Clayey Sand	0.5

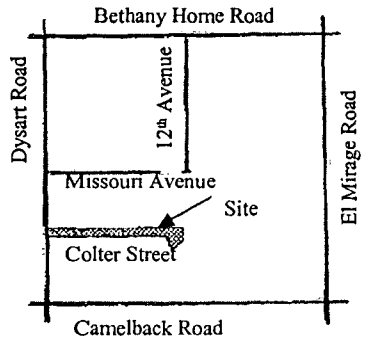
$\frac{3}{0.5} = 6hr \times 2 = 12hr.$

5. Description of Topography:

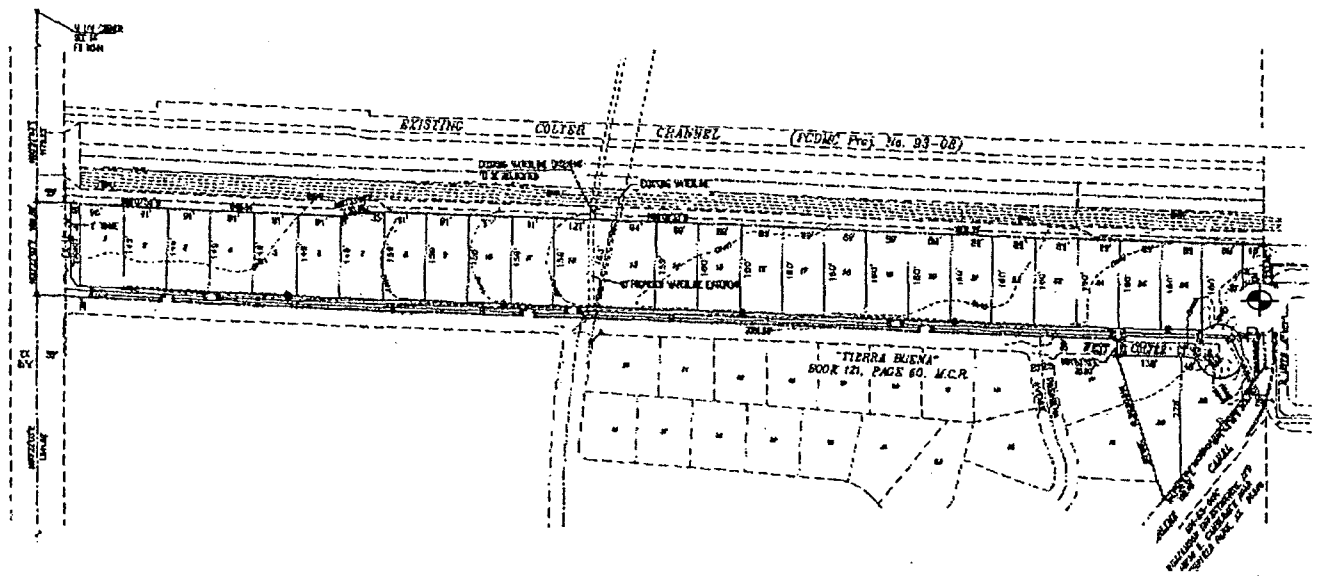
   See Item 1

6. Present and Future Uses Around Site:

   The immediate areas surrounding the subject project contain a mixture of residential land. Current land use will change as the area becomes developed.



Vicinity Map
Not to Scale



Legend:

Approximate Test Hole Location

Plate A

Scale: N.T.S.	Drawn By: CR	Date: 10/29/02

Colter Commons (10.8 Acres)

NE of Dysart Road and Camelback Road

Maricopa, Arizona

CIT Project No. 02-21694-1

A DRAINAGE EXHIBIT FOR

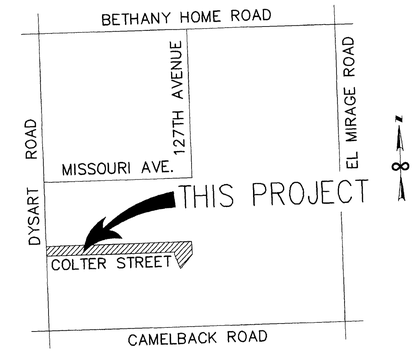
COLTER COMMONS

LOCATED AT THE NORTHEAST CORNER OF DYSART ROAD AND COLTER STREET

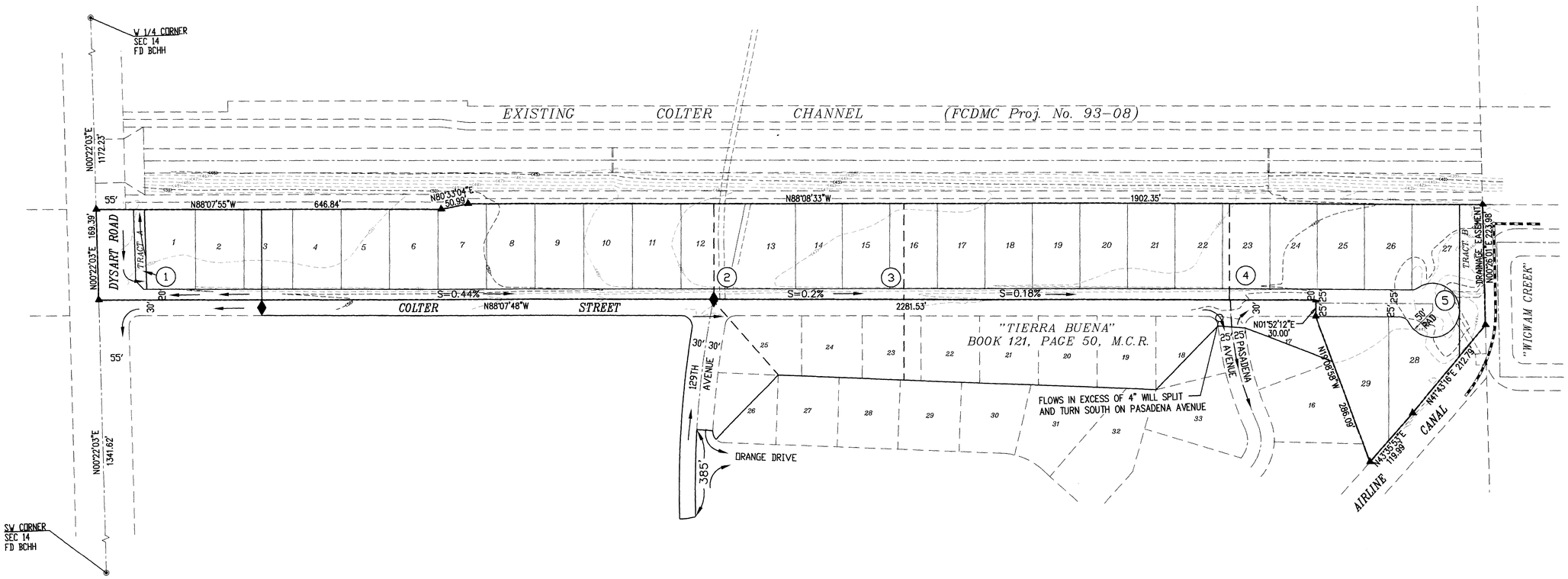
A PROPOSED R1-8/R1-10 SUBDIVISION OF A PORTION OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 2 NORTH, RANGE 1 WEST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

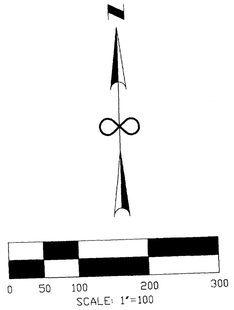
LEGEND

- GRADE BREAK
- (1) POINT OF CONCENTRATION
- DIRECTION OF FLOW
- STORM DRAIN PIPE AND CATCH BASIN



VICINITY MAP
N.T.S.





PREPARED: NOVEMBER 11, 2002
JOB NO. 0815
SHEET 1 OF 1

ENGINEER/SURVEYOR:
INFINITY ENGINEERING SERVICES, LTD.
4701 South Lakeshore Drive
Suite 3
Tempe, AZ 85282
Phone: (480)839-8600
Fax: (480)839-8800