PRELIMINARY
DRAINAGE REPORT
FOR
SERENO CANYON COMMUNITY CENTER

September 27, 2005

WP #042054

Prepared for:

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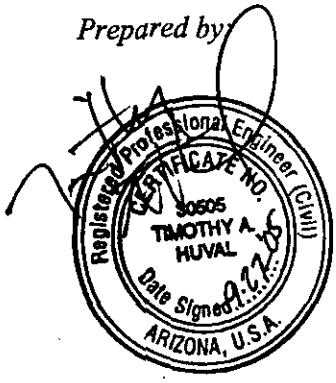

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1.0 INTRODUCTION

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Sereno Canyon is located in Section 11, Township 4 North, Range 5 East. The site is currently an assemblage of undeveloped parcels bound to the west by the existing Sonoran Crest Development (122nd Street alignment), to the east by the 128th Street alignment, to the north by the Happy Valley Road alignment, and to the south by the McDowell Mountain Sonoran Preserve. Access to the development is planned from the west via the ½ -mile section roadway, Alameda Road. Plate 1 provides a Vicinity Map for the project and surrounding areas, and Plate 2 provides an Aerial Map.

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The existing site is undeveloped land located within the HEC-1 drainage sub-basin "E1" and "D", according to the *Conceptual Master Drainage Report for Sereno Canyon*. The property is situated at the upstream end of this sub-basin and is therefore not impacted by off-site flows routed from upstream HEC-1 sub-basins. Currently, there is an existing wash that passes through and around the site that serves as the project's low point. The majority of the proposed development is located on the southwest side of this wash, with a small portion located on the northeast side of the wash. The direction of on-site flow is toward the wash at an approximate slope of 10%.

Separated by a ridge, the southeastern portion of the site is located within the HEC-1 drainage sub-basin "D". The direction of flow in this sub-basin is primarily from the south to the north at an approximate slope of 12%. Vegetation is typical Sonoran Desert type with creosote bush, jumping cholla, saguaro, cacti, Palo Verde, ironwood, and mesquite trees. This sub-basin does not significantly impact proposed improvements.

2.2 Flood Insurance Rate Map (FIRM)

The Flood Insurance Rate Maps (FIRM) for Maricopa County, Arizona and incorporated areas, Map Numbers 04013C1255F and 04013C1260E, dated July 19, 2001 indicates the site is within Zone "X" (shaded).

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> *Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.*

The location of the development relative to the FIRM panel is illustrated on Plate 3 – *Flood Insurance Rate Map (FIRM)*.

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The approximate 11-acre proposed development consists of a 10,000 square foot clubhouse, spa facilities, putting greens, a swimming pool and a parking lot.

3.0 METHOD OF ANALYSIS

3.1 Hydrology

The drainage improvements for Sereno Canyon Community Center are planned to be designed based on Chapter 2 of the Design Standards and Policies Manual for the City of Scottsdale. Peak discharge values for specific concentration points within the watershed have been previously estimated in the *Conceptual Master Drainage Report for Sereno Canyon*. This report presents details on drainage areas, drainage characteristics, and HEC-1 computer output files for the 100-year hydrologic analyses. The Rational Method has been utilized to determine the 10- and 100-year on-site peak flows at concentration points within the Community Center. Please refer to Appendix A for the Rational Method calculations.

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The Final Drainage Report for Sereno Canyon Community Center will address hydraulic computations including roadway capacities, wash cross-sections, curb-openings, and other hydraulic components of the drainage improvements.

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4.1 Identification of Major Drainage Courses / 404 Washes

There are no washes on the site with an anticipated 100-year flow equal to or greater than 750 cfs, therefore no washes are categorized as a Vista Corridor. There are no washes on-site that have been determined as a Section 404 Wash.

4.2 Existing and Proposed Drainage System

The existing drainage patterns are planned to be maintained in their natural location and condition where possible. A combination of graded swales and local pathways are proposed to route on-site runoff to the point of discharge into the wash at the project's low point. The portion of the development located on the north side of the wash is planned to intercept sheet flow generated by the off-site sub-basin a. Please refer to Plate 4 – *Drainage Map* for details of the proposed drainage system.

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The depth of flow over streets is in accordance with City of Scottsdale Flood Plain and Drainage Ordinance.

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Construction of the approved drainage improvements is planned to occur along with the infrastructure for the Community Center.

4.5 Storm Water Storage

Per the *Conceptual Master Drainage Report* for Sereno Canyon, storm water storage is not required for the Community Center.

4.6 Maintenance

Ongoing maintenance of the designed or recommended drainage systems is required to preserve the design integrity and purpose of the drainage system. Failure to provide maintenance can prevent the drainage system from performing to its intended design purpose and can result in reduced performance. It is the responsibility of private developers, homeowner associations, etc. for facilities on private property, within all drainage easements, private streets, and right-of-ways unless accepted by the City for maintenance. A regular maintenance program is required to have drainage systems perform to the level of protection or service as presented in this report and the project's plans and specifications.

5.0 CONCLUSIONS

- The drainage improvements are planned to be developed in accordance with the *Conceptual Master Drainage Report for Sereno Canyon Community Center*
- Drainage structures are planned to be designed based on the appropriate City of Scottsdale ordinance and code requirements.
- The Rational Method has been used to estimate peak discharges for the on-site and off-site drainage basins.
- Per the Master Drainage Report, storm water storage is not being provided within the Community Center.
- On-going maintenance is required for all drainage systems in order to assure design performance. Maintenance is the responsibility of private parties.

APPENDIX A

Hydrology

Project: *Sereno Canyon Community Cer* **Reference:** *City of Scottsdale Engineering & Design Standards*
WIP#: *042054* **Known Values:** *Design Storm: 10-Year / 100-Year*
Location: *City of Scottsdale* **Calculated Values:** $Tc = \frac{(Length\ of\ Area)}{(Average\ Velocity*60)}$
Date: *9/27/2005* $Q =$ *"C" x Intensity x Area (ac)*

Table1: Rational Method Hydrology Worksheet

Concentration Point - Land Use Description	Area		Weighted "C" Value	Length of Area	Average Velocity	Time of Concen.	10 - Year			100 - Year		
	(sq ft)	(ac)		(ft)	(fps)	(min)	Intensity (in/hr)	Q (cfs)	Total Q (cfs)	Intensity (in/hr)	Q (cfs)	Total Q (cfs)
On-Site Sub-Basins												
A - Parking Lot	11,772	0.3	0.95	200	6.5	0.5	6.1	1.6	**1.6**	9.2	3.0	**3.0**
B - Parking Lot	6,677	0.2	0.95	100	6.5	0.3	6.1	0.9	**0.9**	9.2	1.7	**1.7**
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D - Putting Green	5,515	0.1	0.66	150	6.5	0.4	6.1	0.5	**0.5**	9.2	1.0	**1.0**
E - Club House Rooftop/Patio	14,445	0.3	0.95	200	6.5	0.5	6.1	1.9	**1.9**	9.2	3.6	**3.6**
F1 - Spa Facilities	5,194	0.1	0.95	50	6.5	0.1	6.1	0.7	**0.7**	9.2	1.3	**1.3**
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b - Mountain	47,554	1.1	0.70	250	6.5	0.6	6.1	4.7	**4.7**	9.2	8.8	**8.8**

Runoff Coefficients

Land Use	"C" Value Hydrologic Soil Group B	C	D
Composite Area-wide Values			
Commercial and industrial areas:	0.90		
Residential areas-single family (average lot size):			
R1-1-190:	0.33	0.50	0.58
R1-130:	0.35	0.51	0.59
R1-70:	0.37	0.52	0.60
R1-43:	0.38	0.55	0.61
R1-35 (35,000 sq. ft./lot):	0.40	0.56	0.62
R1-18 (18,000 sq. ft./lot):	0.43	0.58	0.64
R1-10 (10,000 sq. ft./lot):	0.47	0.62	0.67
R1-7 (7,000 sq. ft./lot):	0.51	0.64	0.70
Townhouses (R-2, R-4):	0.63	0.74	0.78
Apartments and condominiums (R-3, R-5):	0.76	0.83	0.87
Specific Surface Type Values			
Paved streets or parking lot (concrete or asphalt), roofs, dirveways, etc.	0.95		
Lawns, golf courses, and parks (grassed areas):	0.33	0.56	0.66
Undisturbed natural desert or desert landscaping (no impervious weed barrier):	0.31	0.48	0.56
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FIGURE 2.2-17

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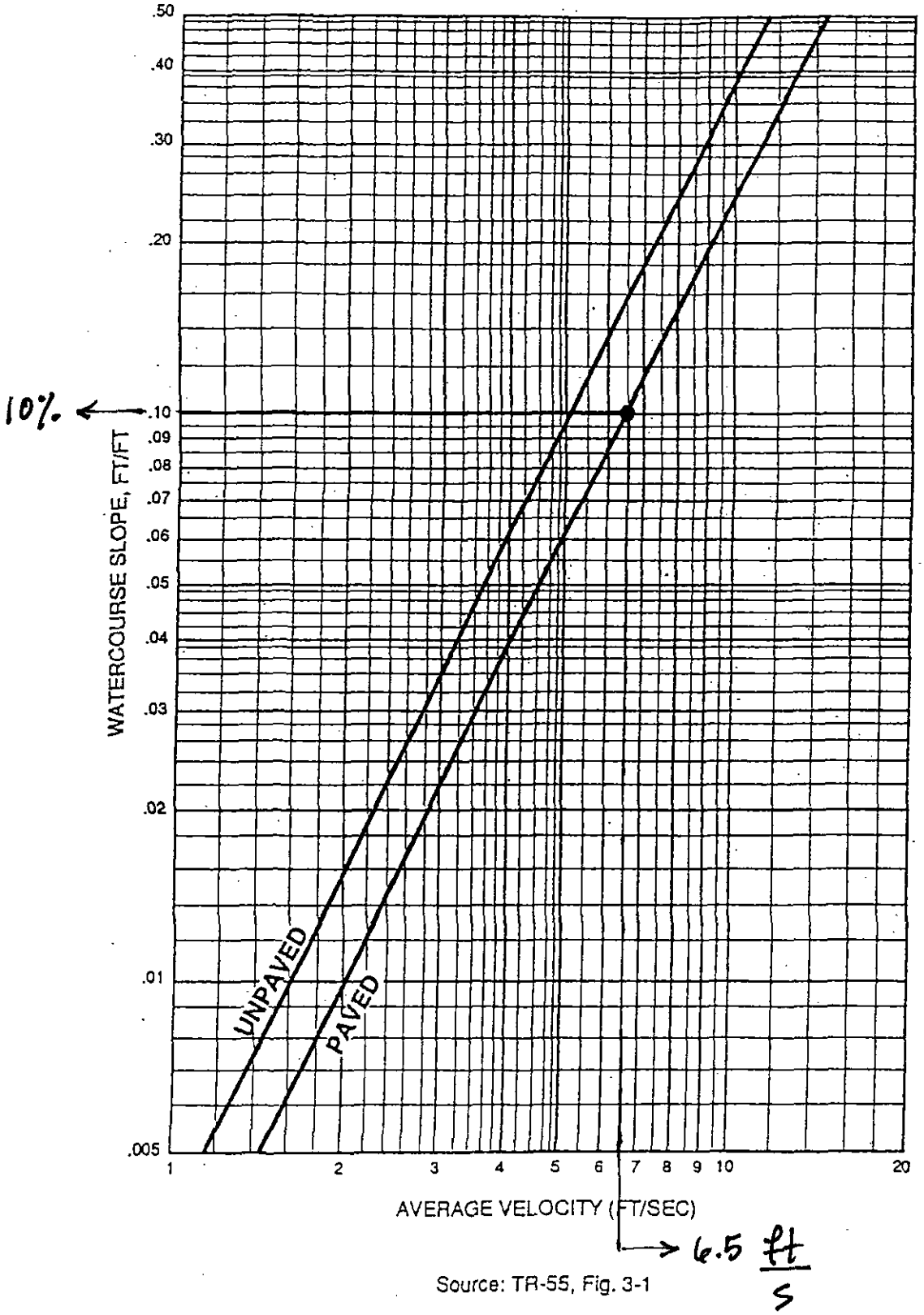
APPENDIX B

Figure B-1. Average Velocity for Estimating Travel Time for Shallow Concentrated Flow



Source: TR-55, Fig. 3-1

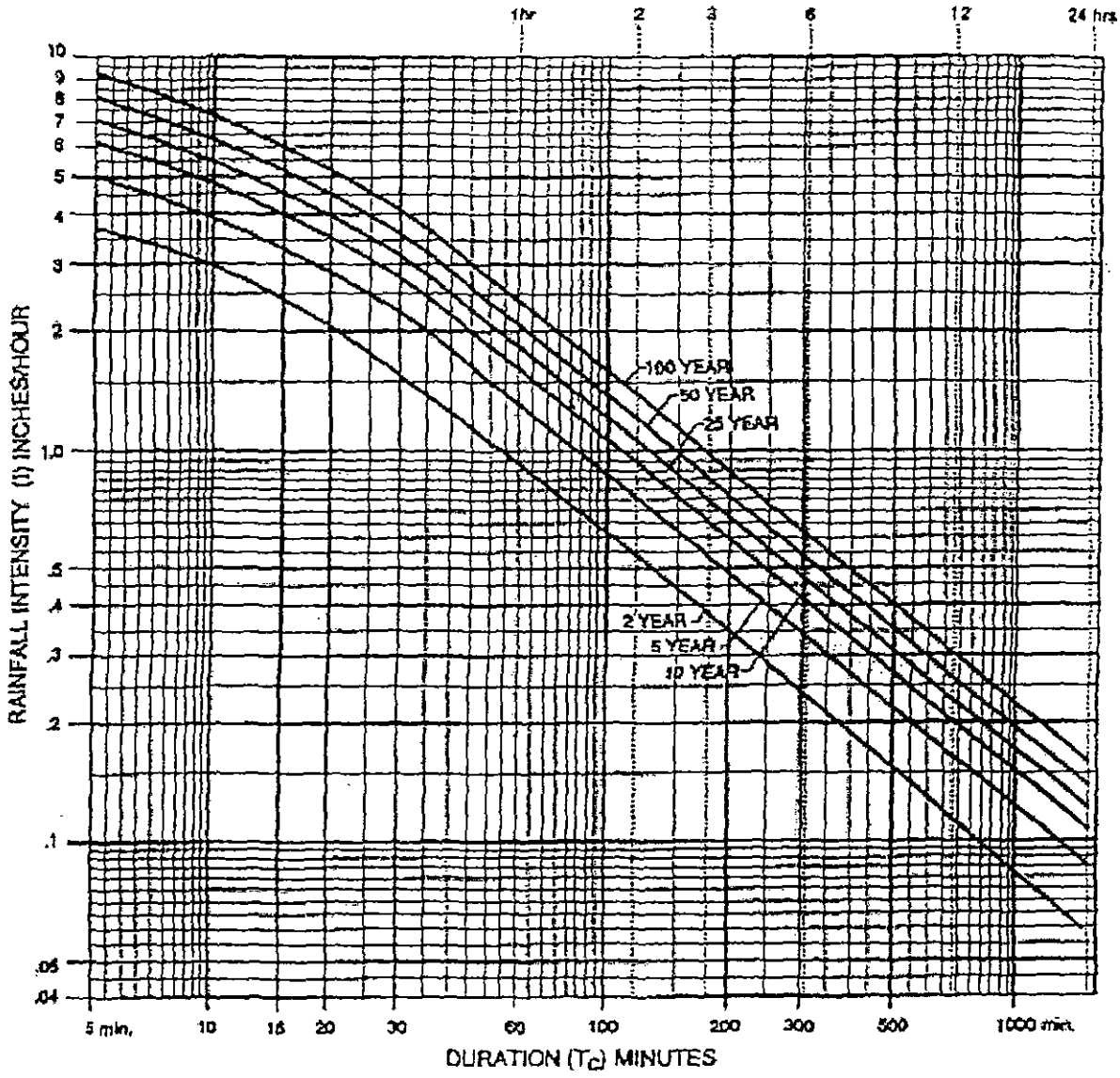


FIGURE 2.2-13

Rainfall Intensity (I) Values for Use in Rational Method

Source: Hydrologic Design Manual for Maricopa County

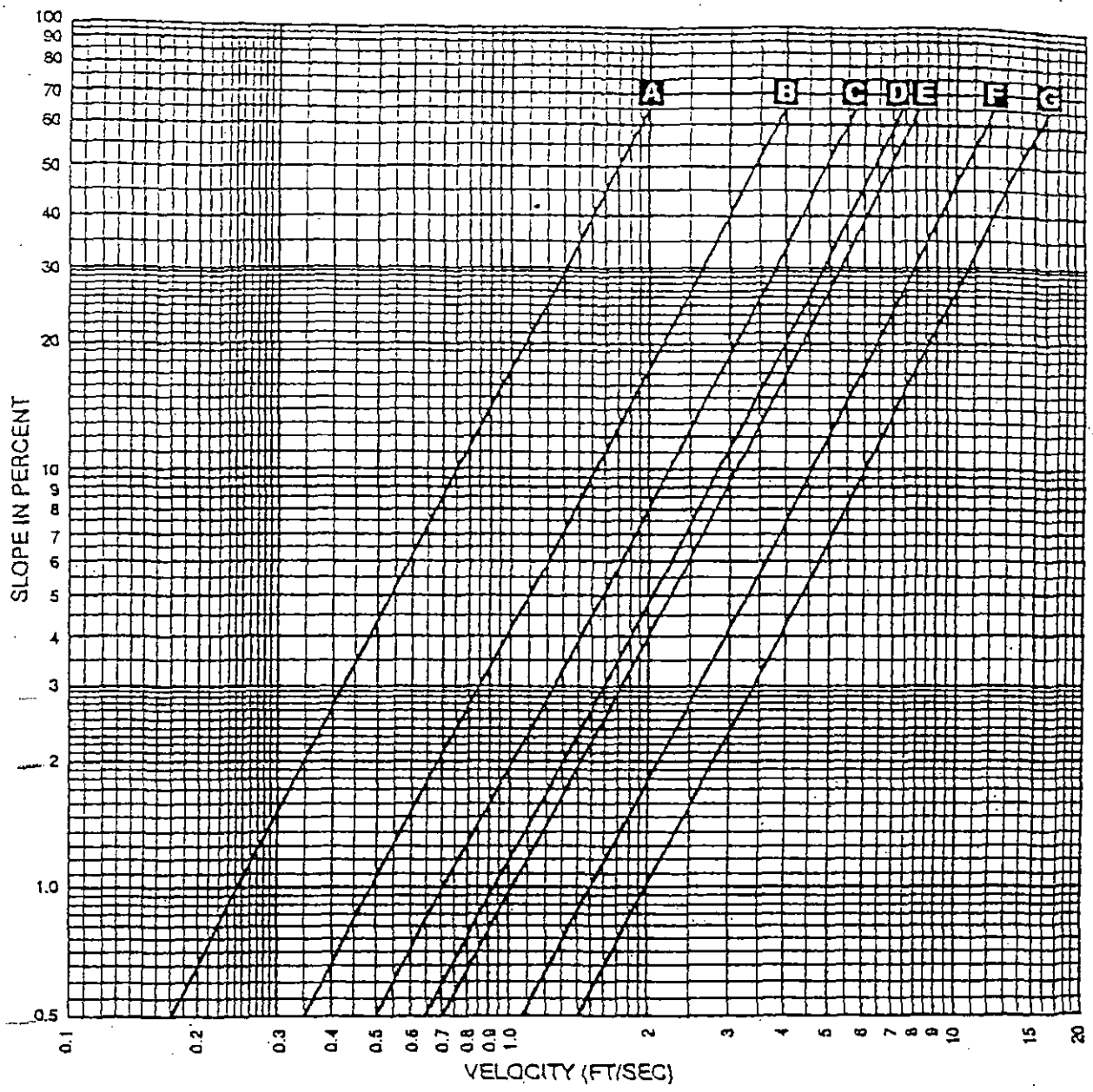


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FIGURE 2.2-14

Overland Flow Velocities for Upland Method of Estimating T_c

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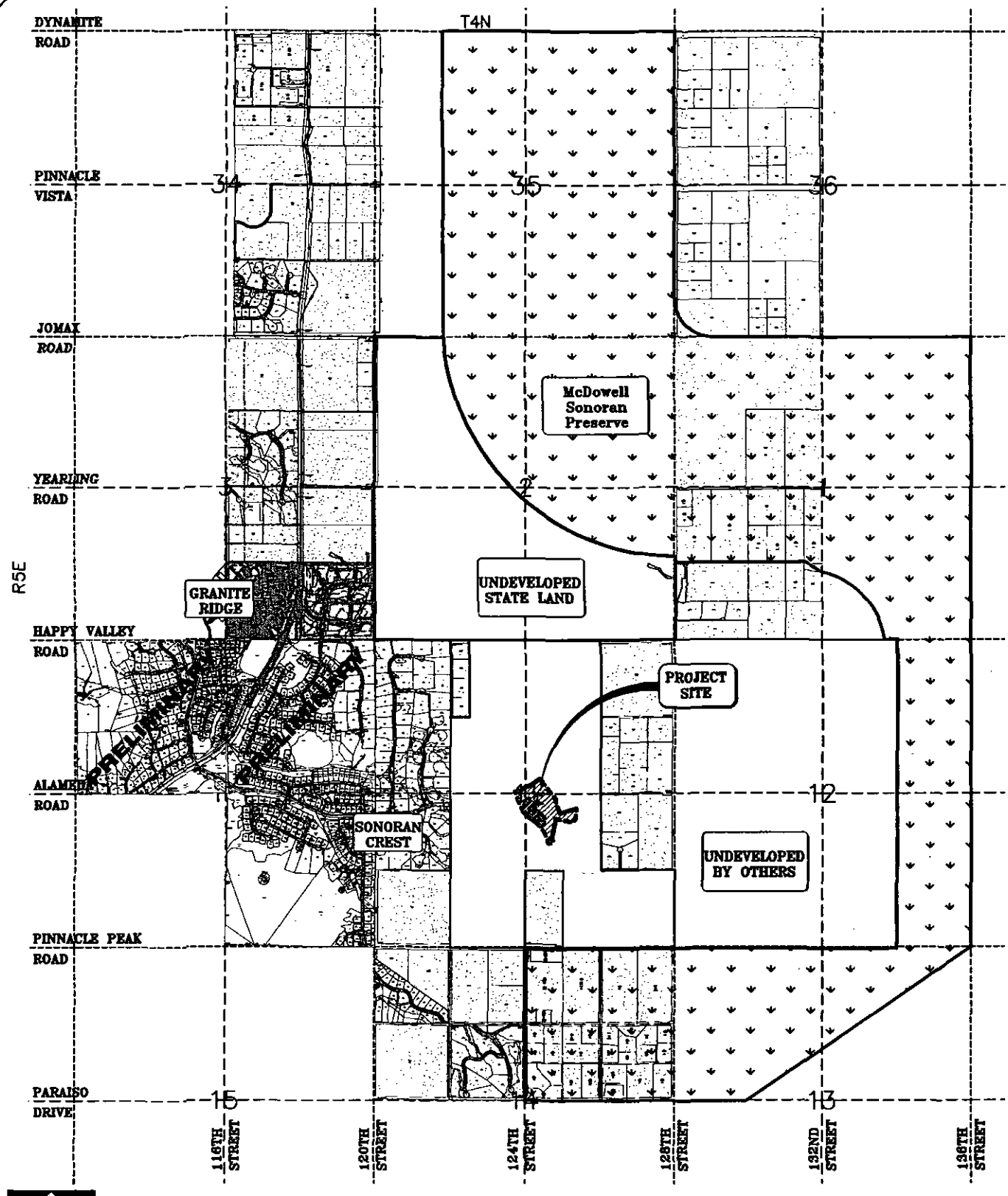
Vicinity Map



CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

SERENO CANYON COMMUNITY CENTER

Plate 1
"Vicinity Map"

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

N:\2004\042054\Project Support\Hydro\Exhibits\pdr\ PLATE 01-VICINITYMAP.dwg - Sep 21,2005

PLATE 2

Aerial Map

PLATE 3

Flood Insurance Rate Map (FIRM)

PLATE 4

Drainage Map

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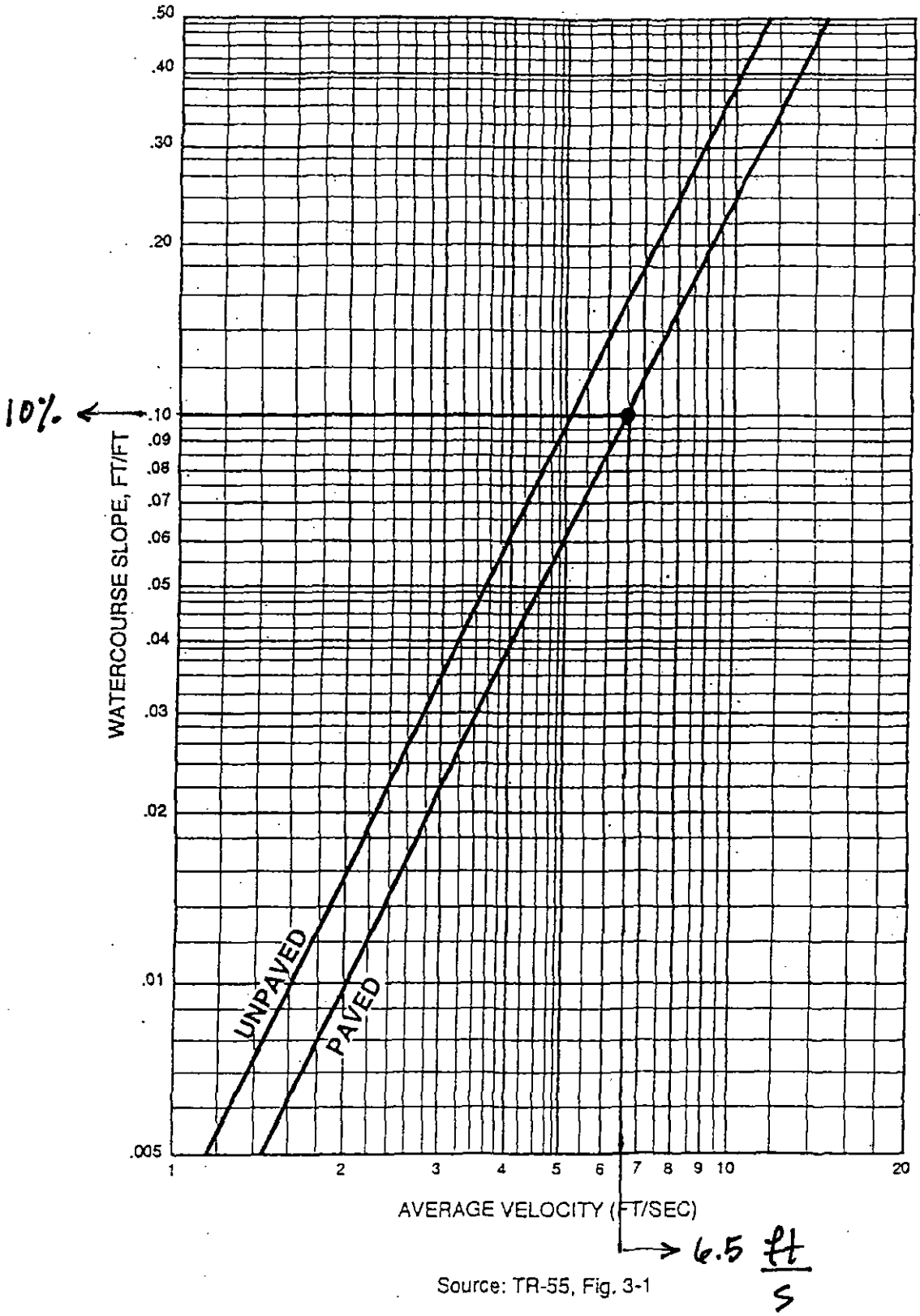
Mountain terrain - slopes greater than 10%:	0.70	0.70	0.70
Agricultural areas (Flood Irrigated Fields):	0.20	0.20	0.20

FIGURE 2.2-17

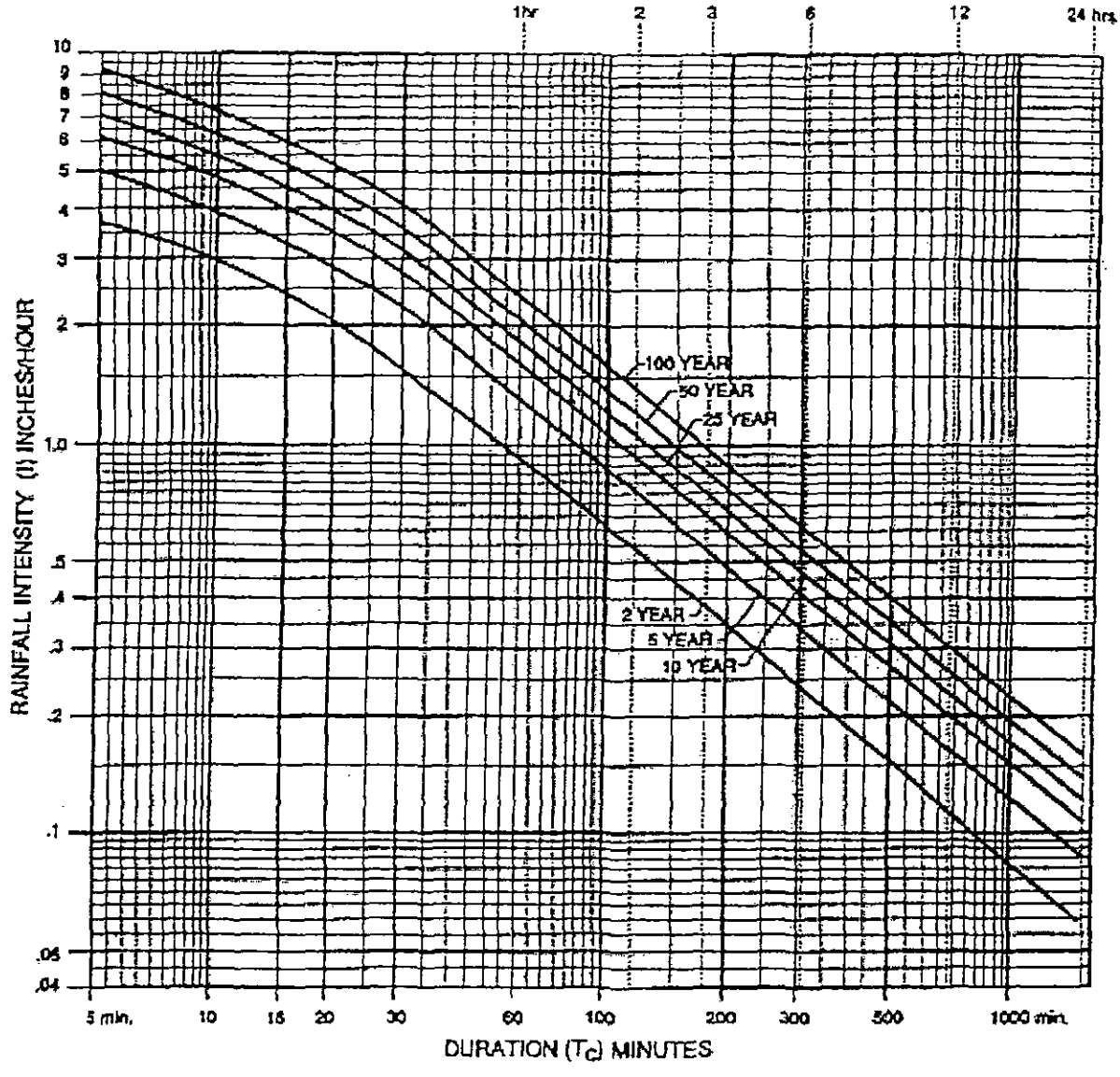
Runoff Coefficients (C) for use with the Rational Formula

APPENDIX B

Figure B-1. Average Velocity for Estimating Travel Time for Shallow Concentrated Flow



Source: TR-55, Fig. 3-1



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Rainfall Intensity (I) Values for Use in Rational Method

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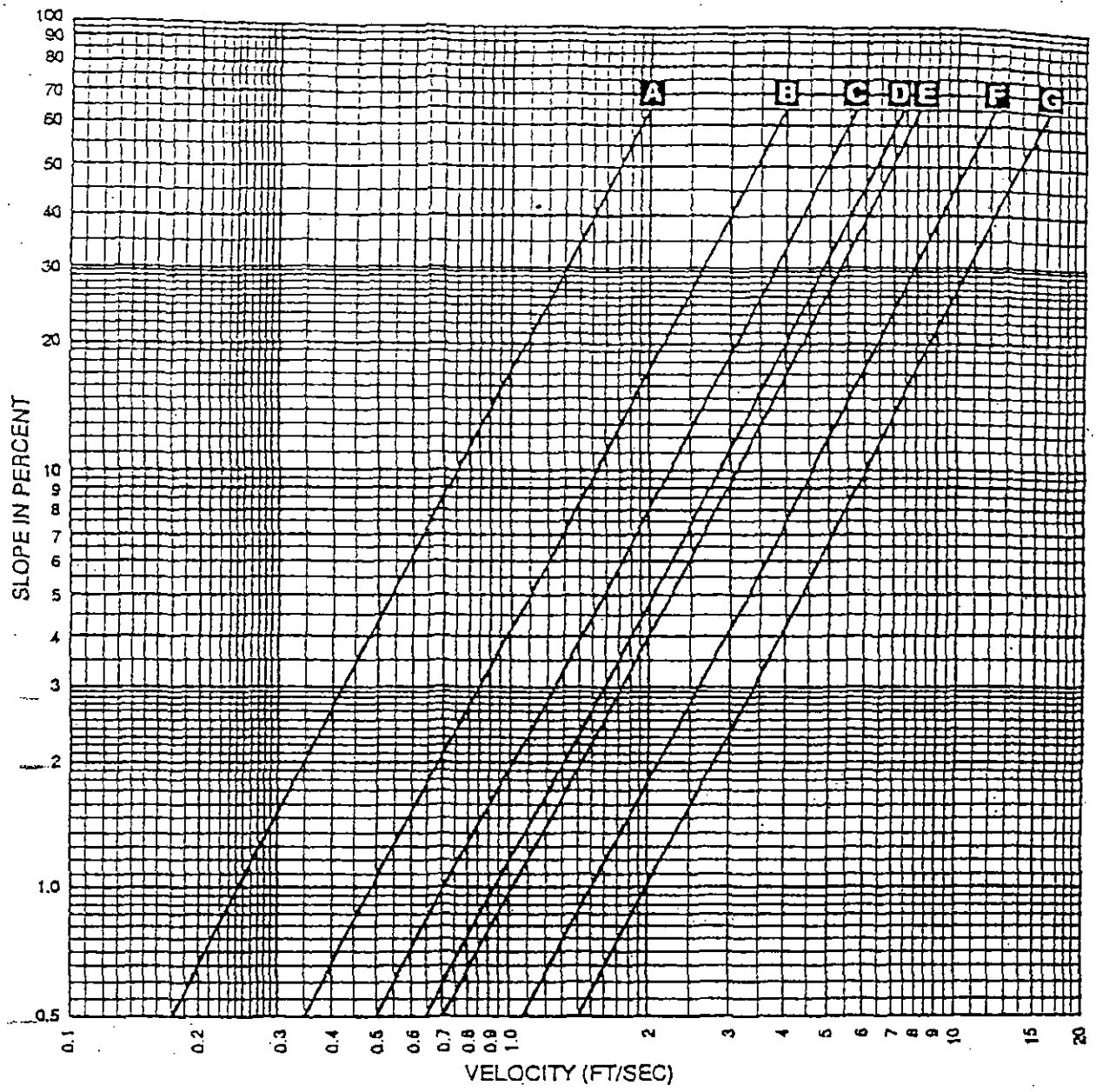

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Overland Flow Velocities for Upland Method of Estimating T_c

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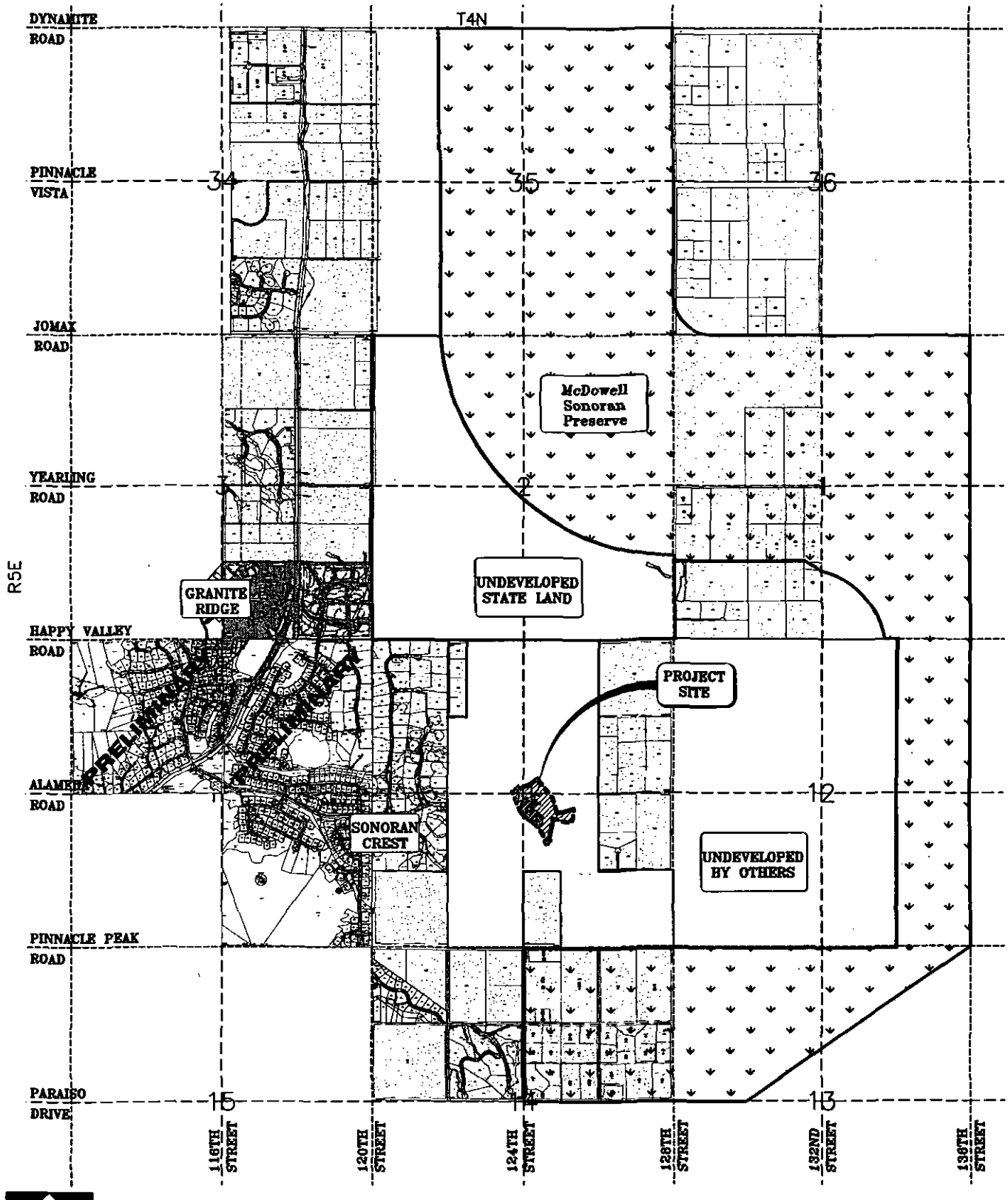

2500 0 1250 2500

1 inch = 2500 ft.

CROWN COMMUNITY DEVELOPMENT
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Land Surveyors
(602) 335-8500

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PLATE 2

Aerial Map

PLATE 3

Flood Insurance Rate Map (FIRM)

PLATE 4

Drainage Map