Berge-Brewer & associates, inc.

phone (719) 227-7181 - fax (719) 227-7186 - 2850 serendipity circle west - suite 100 - colorado springs, co 80917

ENGINEERS
PLANNERS
SURVEYORS

Unapproved.

PRELIMINARY DRAINAGE REPORT

BARNES CORRIDOR

PREPARED FOR:

LDC, INC.

2850 SERENDIPITY CIRCEL WEST

COLORADO SPRINGS, CO 80917

PREPARED BY:

BERGE-BREWER AND ASSOCIATES, INC.

2580 SERENDIPITY CIRCLE WEST, SUITE 100

COLORADO SPRINGS, CO 80917

Prepared by: Zachary Collins, EI
Reviewed by: Roger G. Berge, PE
Preparation Date: August 29, 2006

060139-FDR(0)

CPC ZC 07-117
CPC CP 07-118
CPC V 07-119
PLANNER: O'CONNOR

file: MDDP's Barnes

TABLE OF CONTENTS

Existing Drainage Conditions

Currently stormwater within the *Site* generally flows form northwest to southeast as overland sheet flow, which eventually overtops the curb and enters the Barnes Road section. From here stormwater is generally routed easterly, within the westbound lane of Barnes Rd. Existing public d-10R cub opening inlets of various lengths effectively intercept stormwater and route it to Sand Creek.

The *Site* was previously studied in the Sand Creek DBPS (*Ref. 4)*, and the Stetson Hills MDDP (*Ref. 5*). The Stetson Hills MDDP covered a large area including the *Site*, the adjacent Stetson Hills Filing No. 24, and surrounding Public Roads. Basin boundaries of the *Site* are Comstock Loop, Barnes Rd, Charlotte Parkway, and Jackpot Dr.

The *Site* lies within two (2) major basins as delineated in *Ref. 5*. The westerly portion of the *Site* lies within Basin C1.4 and discharges to the existing 6'x4' RCBC under Barnes Rd. Offsite, upstream, and adjacent Basin C1.3 discharges to an existing 20' D-10 R Inlet. Offsite, downstream, and adjacent Basin C1.1 discharges to existing 10' and 8' D-10 R Inlets. Offsite, downstream, and adjacent Basin C1.2 discharges to an existing 10' D-10 R Inlet. Stormwater generated within Major Basin C of the Stetson Hills MDDP drains to the existing 6'X4' RCBC located under Barnes Rd.

The easterly portion lies within Basin E2.3 and discharges to an existing storm sewer system located at the intersection of Charlotte Parkway and Barnes Rd. Offsite, downstream, adjacent Basins E2.1and E2.2 also drain to this existing storm sewer system. Stormwater generated within Major Basin E of the Stetson Hills MDDP drains to the Sand Creek main channel located just east of the intersection of Charlotte Parkway.

Both Basins C and E of *Ref. 5* use the Standard Rational Method for Hydrologic calculations with runoff coefficients (C_5 / C_{100} = 0.75 / 0.80) associated with a Neighborhood Commercial land use.

The Stetson Hills Filing No. 24 Subdivision to the north was studied in more detail in the Stetson Hills No. 24 FDR (*Ref. 7*). That report adjusted the basin boundaries within that subdivision and constructed storm sewer improvements to effectively intercept 100% of all storm recurrances and route stormwater to the existing RCBC crossing under Barnes Rd via an existing 60" RCP pipe. This 60" RCP flows southerly through the *Site* and is contained in an existing 60' Drainage Easement. This storm sewer system and drainage easement effectively intercepts offsite basins and routes stormwater downstream as bypass flows.

Proposed Drainage Conditions

Offsite Basins to the north should continue to operate as they currently are. Currently all of the D-10 R curb opening inlets in the Comstock ROW are constructed. However this road was never completed and the absence of an asphalt surface and upstream erosion control measures have resulted in large amounts of sedimentation around the inlets. In addition, dense vegetative growth has occurred around two of the inlets and has greatly reduced the capacity of these inlets. Future development of this area may require some relocation or modification of the existing storm sewer system to work with any pedestrian paths or access roads. If the existing inlets remain in there current configuration, some maintenance and repair should be preformed (by the City of Colorado

Springs) to ensure these inlets will continue to operate as planned and protect from any offsite overland stormwater from entering the *Site*.

The Final Drainage Report for this subdivision (to be completed at a t the time of Development Plan submittal) will address any changes to the existing drainage basins as delineated in *References 5* and *6*. Hydrologic calculations for the *Site* will be performed using Rational Method using runoff coefficients (C_5 / C_{100} = 0.75 / 0.80) associated with a Neighborhood Commercial land use. Appropriate storm sewer structures as well as any required Stormwater Quality facilities will be specified in the Final Drainage Report.

Current proposed development of the *Site* is consistent with previous Master Plans for the area, including the Drainage studies referenced herein. Stormwater discharge for the *Site* shall be at the two locations previously approved in the Stetson Hills MDDP, and as discussed above.

II. GENERAL INFORMATION:

Purpose

The purpose of this Drainage Report is to analyze the existing and proposed drainage facilities, determine runoff quantities from both on-site and off-site sources, ensure adequacy of existing facilities, size any new proposed facilities, and present solutions for proper conveyance of developed storm water runoff.

Location

"Barnes Corridor" (hereby referred to as the *Site*) is located within the SE¼ of Section 19 and the NW ¼ of Section 30, T 13 S, R 65 W, of the 6th P.M., in the City of Colorado Springs, El Paso County, Colorado. The general location is northeast of the intersection of Tutt Blvd and Barnes Rd. More specifically, the *Site* is bound by Barnes Rd ROW to the south, Lot 1 C S H P East Filing No. 1 to the southeast, Lot 1 Children's World to the east, Jackpot Dr ROW to the north, Comstock Loop ROW to the northwest, and Lots 3 and 4 Barnes Corner Stop to the southwest. The pertinent figure(s) is(are) included in the "Location" appendix of this report.

Description

The *Site* contains 10.45-acres, more or less, and is currently vacant. The *Site* consists of two unplatted parcels, zoned PIP1 NP within the City of Colorado Springs. Existing vegetation consists of dense native grasses and some trees. There are currently no significant drainage structures or noticeable drainage paths within the *Site*. It is being proposed to plat the two parcels into one lot with a zone change to OC. Future proposed development of the *Site* consists of a neighborhood commercial center with associated improvements.

Drainage Basin

The *Site* lies within the Sand Creek Drainage Basin and stormwater from the *Site* is tributary to Sand Creek located ¼ mile east of the *Site*.

Floodplain

Panel Number 08041C0539F dated March 17, 1997 of the Federal Emergency Management Agency's Flood Insurance Rate Map show that no portion of the *Site* is located within a designated floodplain. The pertinent figure(s) is(are) included in the "Floodplain" appendix of this report.

Soils

According to the S.C.S. "Soil Survey of El Paso County Area, Colorado" (*Ref. 1*) the *Site* lies within soils type numbers "85" and "97", which is "Stapleton-Bernal sandy loams, 3 to 20 percent slopes" and "Truckton sandy loam, 3 to 9 percent slopes", respectively. The Stapleton part is defined as hydrologic group "B", is deep and well drained, permeability is rapid, surface runoff is medium, and the hazard of erosion is moderate. The Truckton soil is defined as hydrologic group "B", is deep and well drained, permeability is moderately rapid, surface runoff is slow to medium, and the hazards of erosion and soil-blowing are moderate. Any hydrologic calculations for this Site should use Hydrologic Group "B" soils. The pertinent figure(s) is(are) are included in the "Soils" appendix of this report.

III. DRAINAGE CONDITIONS:

Previous Drainage Studies

Listed below are the previous drainage studies that were referenced during the drainage analysis contained herein.

Sand Creek Drainage Basin Planning Study
Kiowa Engineering Company, March 1996 (*Ref. 4*)

Master Development Drainage Plan for Stetson Hills Subdivision Phase 1
Merrick & Company, May 1997 (*Ref. 5*)

Final Drainage Report for Stetson Hills Filing No. 24 Comstock Loop
Merrick & Company, October 1999 (*Ref. 6*)

Stormwater Quality

Stormwater Quality will be required for the *Site* per the EPC/COS DCM Vol.2. As the final development of the *Site* is unknown at this time, none will be specified herein.

Detention

Previously calculated developed flows from *Ref.5* were produced assuming fully developed flows and runoff coefficients established at that time are consistent with the current proposed development of the *Site,* therefore stormwater detention will not be required.

Erosion Control

Erosion control in conformance with an approved Grading and Erosion Control Plan and SWQ will be installed during the construction phase of this development. A construction cost estimate for temporary erosion control and permanent stormwater quality facilities will be provided with the Grading and Erosion Control Plan, when required.

IV. IMPROVEMENT COSTS:

Engineer's improvement cost estimates will be provided at the time of the Final Drainage Report .

V. DRAINAGE FEES:

Drainage Fees for the 2006 Sand Creek Drainage Basin are as follows:

Drainage Fee	$8,133/acre x 10.45 acres =	$84,989.85
Bridge Fee	$511/acre x 10.45 acres =	$5,339.95
Pond Land Fee	$734/acre x 10.45acres =	$7,670.30
Pond Facilities Fee	$1,788/acre x 10.45 acres =	$18,684.60
TOTAL		**$116,684.70**

VI. REFERENCES:

Soil Survey of El Paso County Area, Colorado
United States Department of Agriculture, Soil Conservation Service, 1981 (*Ref. 1*)

Drainage Criteria Manual – City of Colorado Springs and El Paso County
City of Colorado Springs, Department of Public Works, El Paso County, Engineering Division Oct. 1987, revised November 1991, October 1994, January 2003 (*Ref. 2*)

Drainage Criteria Manual Vol. 2 – City of Colorado Springs and El Paso County
City of Colorado Springs, Department of Public Works, El Paso County, Engineering Division, November 2, 2002 (*Ref. 3*)

Sand Creek Drainage Basin Planning Study
Kiowa Engineering Company, March 1996 (*Ref. 4*)

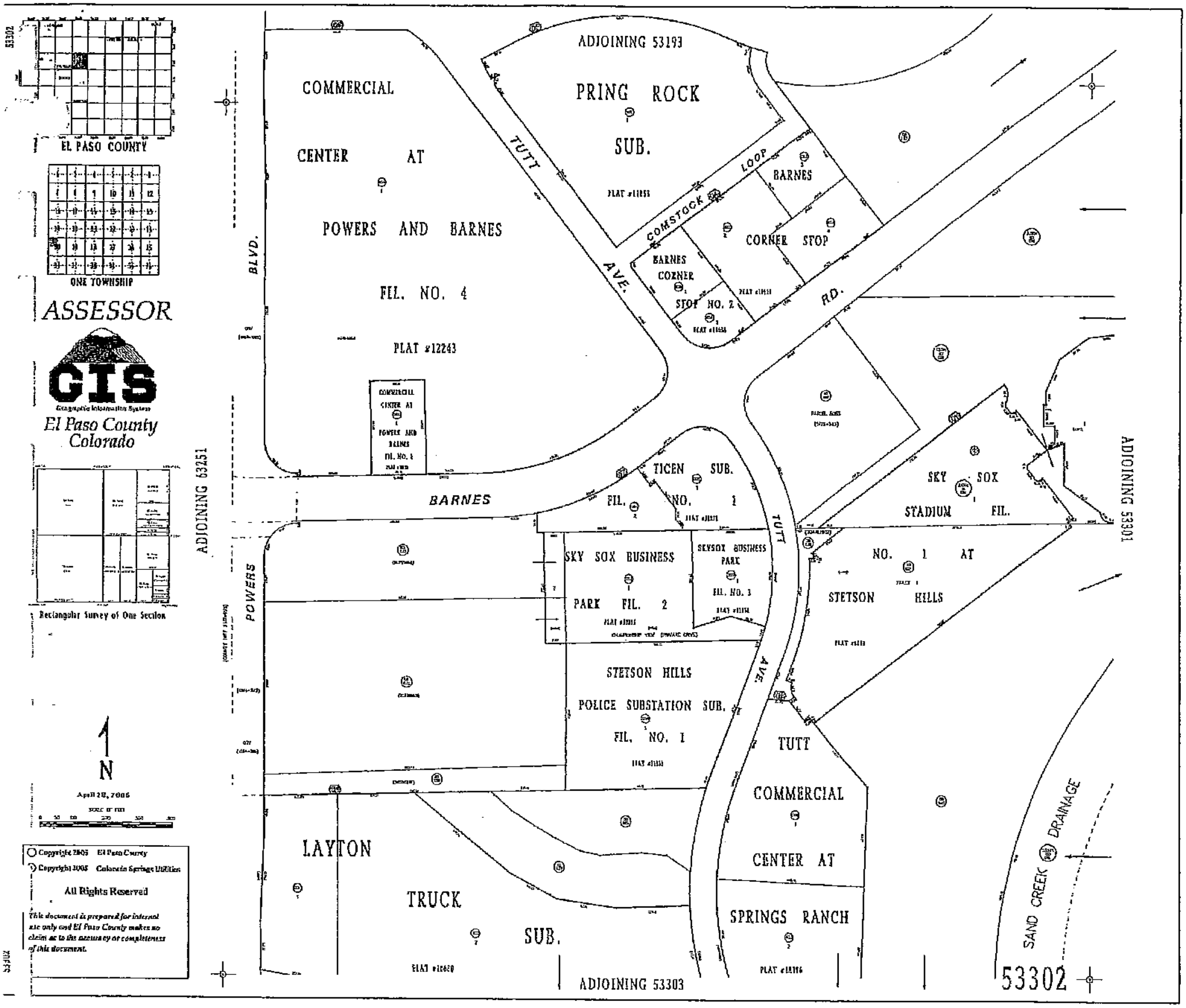
Master Development Drainage Plan for Stetson Hills Subdivision Phase 1
Merrick & Company, May 1997 (*Ref. 5*)

Final Drainage Report for Stetson Hills Filing No. 24 Comstock Loop
Merrick & Company, October 1999 (*Ref. 6*)

LOCATION:

VICINTY MAP


Bridlespur Ave
Old Mill Rd
Iron Horse Trl
Buckshot Way
Copen Dr
Fabray Ln
Cinch Cir
Chaparral Rd
Bittercreek Dr
Jackpot Dr
Charlotte Pky
Purcell Dr
Pring Ranch Rd
N Powers Blvd
Steed Way
Tutt Blvd
Jeffrey Rd
Comstock
Ashley Dr
Cold Springs Dr
Thornbury Way
Lyndhurst Dr
Barnes Rd
Ashby Field Dr
Hillock Dr
Tee Shot Dr
Knollvale Ln
© 2006 Europa Technologies
© 2006 Navteq
Pointer 38°53'50.65" N 104°42'44.26" W elev 6600 ft
Streaming 100%
Eye alt 15215 ft


53302
EL PASO COUNTY
ONE TOWNSHIP
ASSESSOR
GIS
Geographic Information System
El Paso County
Colorado
Rectangular Survey of One Section
N
April 28, 2006
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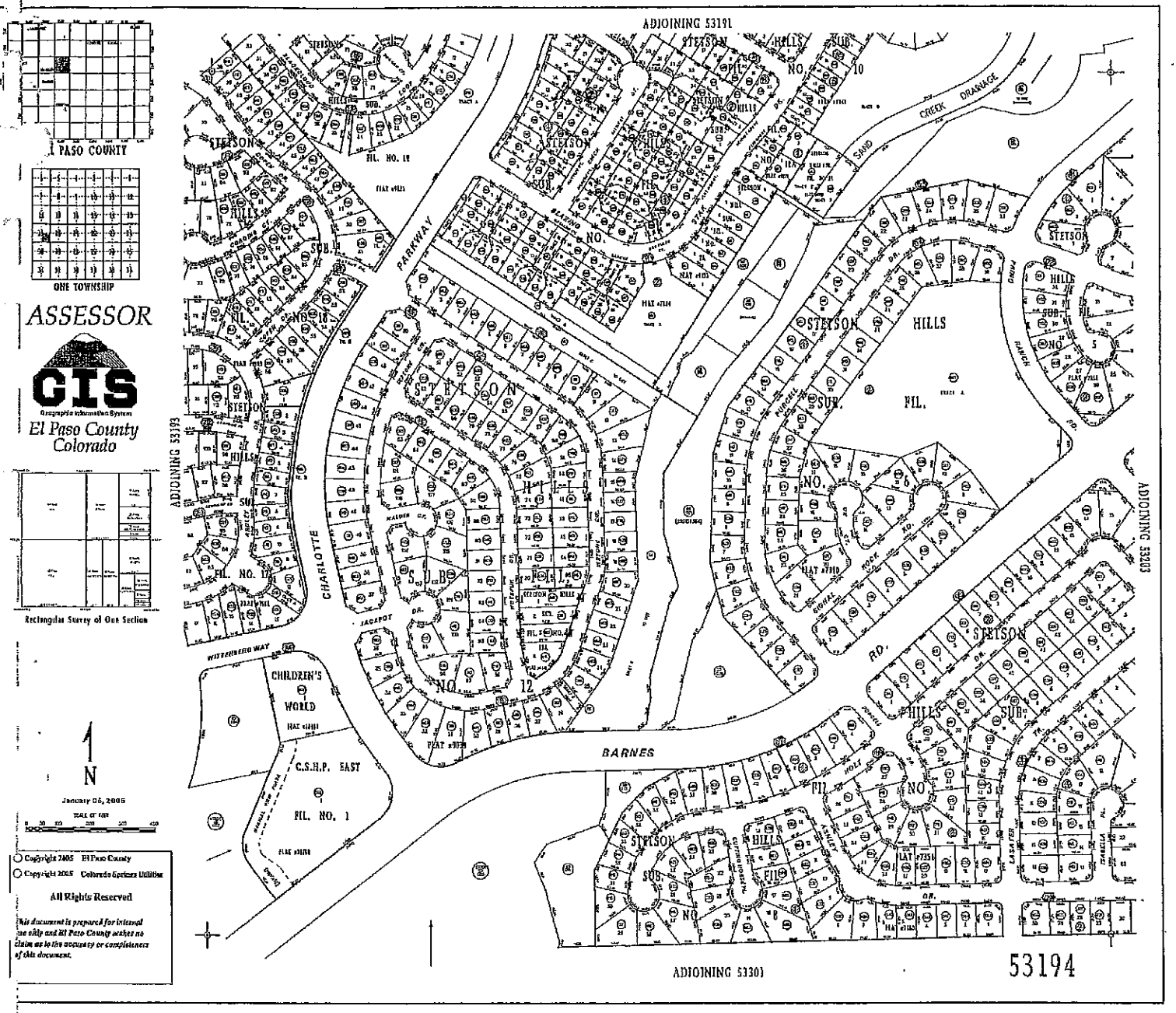
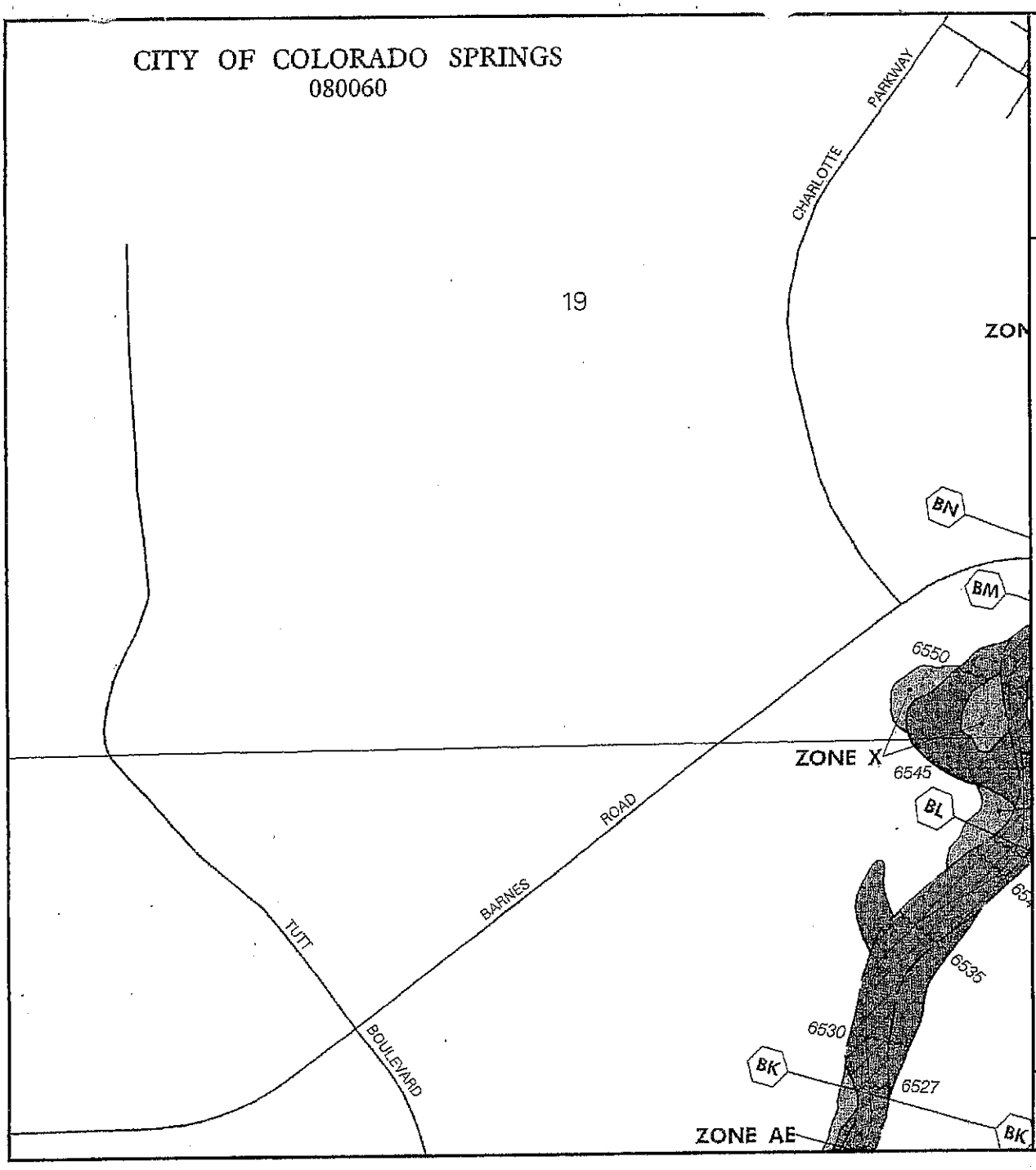
ADJOINING 53193
ADJOINING 53251
ADJOINING 53301
ADJOINING 53303
COMMERCIAL CENTER AT POWERS AND BARNES FIL. NO. 4
PLAT #12243
PRING ROCK SUB.
TUTT AVE.
COMSTOCK LOOP
BARNES
CORNER STOP
BARNES CORNER STOP NO. 2
RD.
BLVD.
POWERS
BARNES
TICEN SUB. FIL. NO. 1
SKY SOX STADIUM FIL.
NO. 1 AT STETSON HILLS
SKY SOX BUSINESS PARK FIL. 2
SKYSOX BUSINESS PARK FIL. NO. 3
STETSON HILLS POLICE SUBSTATION SUB. FIL. NO. 1
TUTT COMMERCIAL CENTER AT SPRINGS RANCH
LAYTON TRUCK SUB.
SAND CREEK DRAINAGE
53302



FLOODPLAIN:

FEMA FIRM MAP

CITY OF COLORADO SPRINGS
080060



APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 539 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0539	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0539	F

MAP NUMBER
08041C0539 F

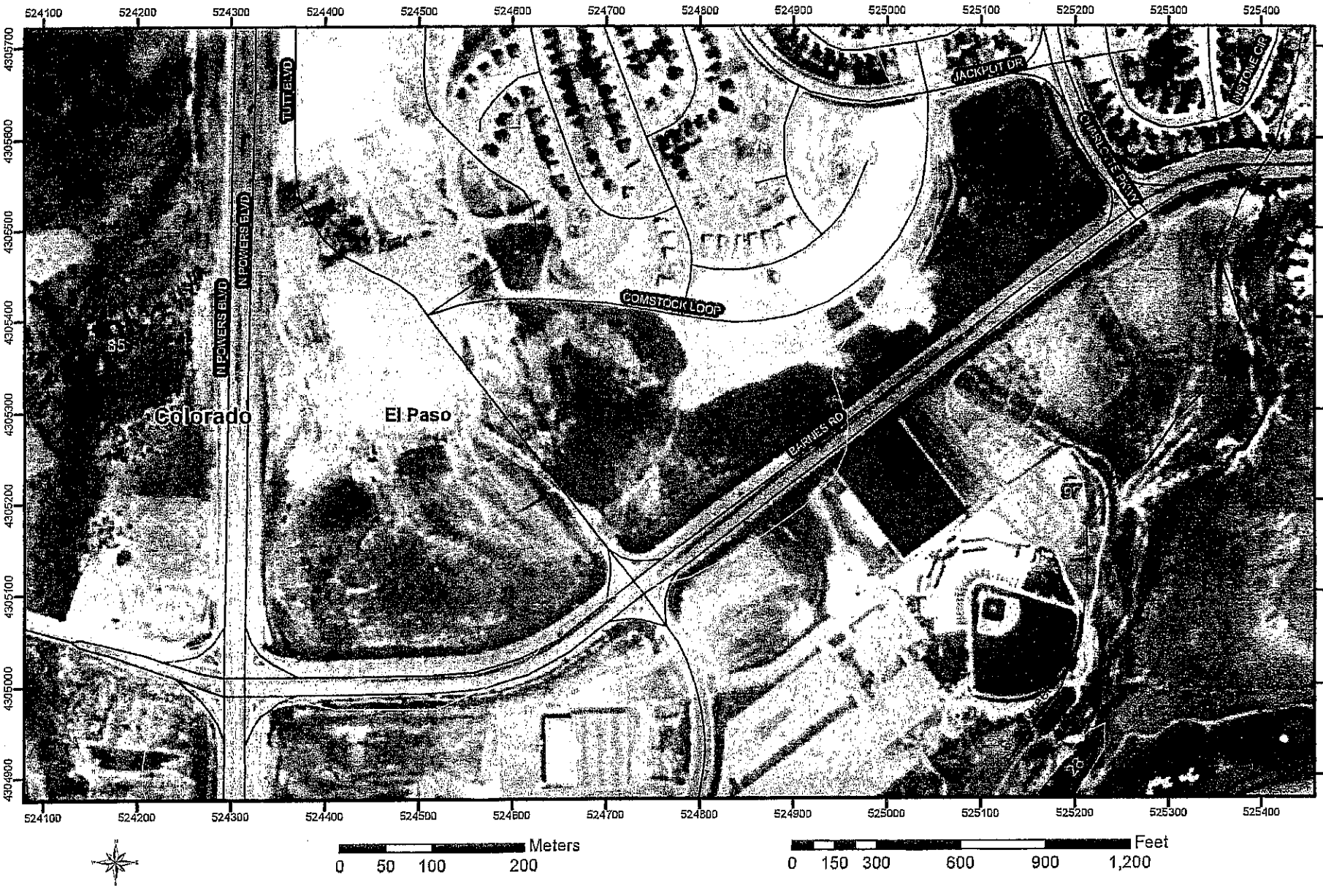
EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

SOILS:

S.C.S. SOIL CLASSIFICATION

El Paso County Area, Colorado



El Paso County Area, Colorado

MAP LEGEND

- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gulley
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gulley
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

MAP INFORMATION

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov

Coordinate System: UTM Zone 13

Soil Survey Area: El Paso County Area, Colorado
Spatial Version of Data: 1
Soil Map Compilation Scale: 1:24000

Map comprised of aerial images photographed on these dates:
1999

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

El Paso County Area, Colorado

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
70	Pits, gravel	92.7	0.0
71	Pring coarse sandy loam, 3 to 8 percent slopes	20,070.1	1.6
72	Pring coarse sandy loam, 8 to 15 percent slopes	3,490.5	0.3
73	Razor clay loam, 3 to 9 percent slopes	3,642.7	0.3
74	Razor stony clay loam, 5 to 15 percent slopes	3,503.6	0.3
75	Razor-Midway complex	32,439.1	2.6
76	Rizozo-Neville complex, 3 to 30 percent slopes	8,633.0	0.7
77	Rock outcrop-Coldcreek-Tolman complex, 9 to 90 percent slopes	15,397.3	1.2
78	Sampson loam, 0 to 3 percent slopes	7,227.5	0.6
79	Satanta loam, 0 to 3 percent slopes	5,221.8	0.4
80	Satanta loam, 3 to 5 percent slopes	1,365.9	0.1
81	Satanta-Neville complex, 3 to 8 percent slopes	2,219.5	0.2
82	Schamber-Razor complex, 8 to 50 percent slopes	18,183.7	1.5
83	Stapleton sandy loam, 3 to 8 percent slopes	13,476.8	1.1
84	Stapleton sandy loam, 8 to 15 percent slopes	4,036.3	0.3
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	6,879.0	0.6
86	Stoneham sandy loam, 3 to 8 percent slopes	19,769.3	1.6
87	Stoneham sandy loam, 8 to 15 percent slopes	2,349.7	0.2
88	Stroupe-Travessilla-Rock outcrop complex, 9 to 90 percent slopes	6,628.6	0.5
89	Tassel fine sandy loam, 3 to 18 percent slopes	2,509.3	0.2
90	Terry sandy loam, 1 to 8 percent slopes	2,147.3	0.2
91	Terry-Razor complex, 3 to 20 percent slopes	3,154.5	0.3
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	11,616.0	0.9

HYDROLOGY:

CRITERIA & CALCULATIONS

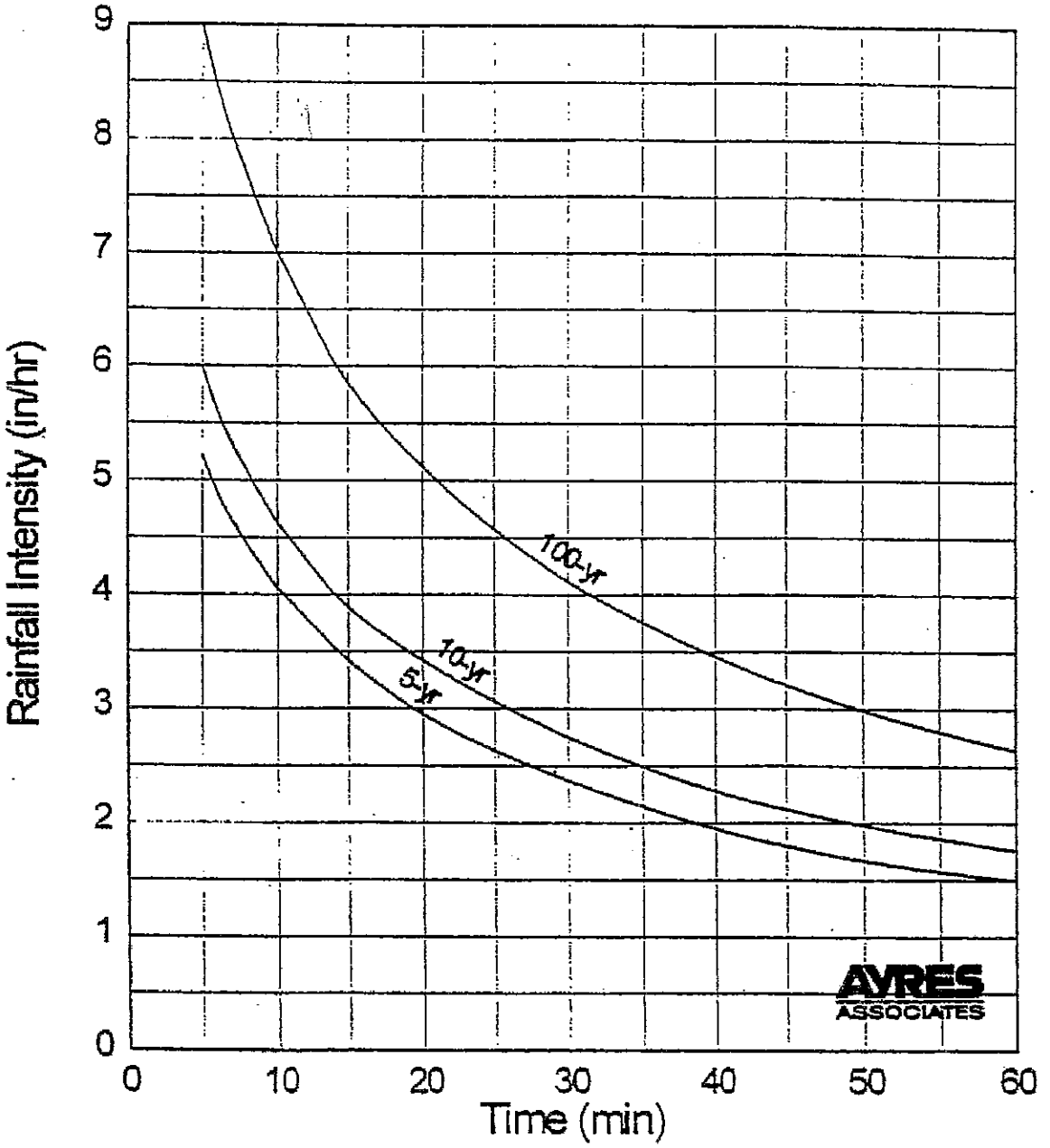
TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

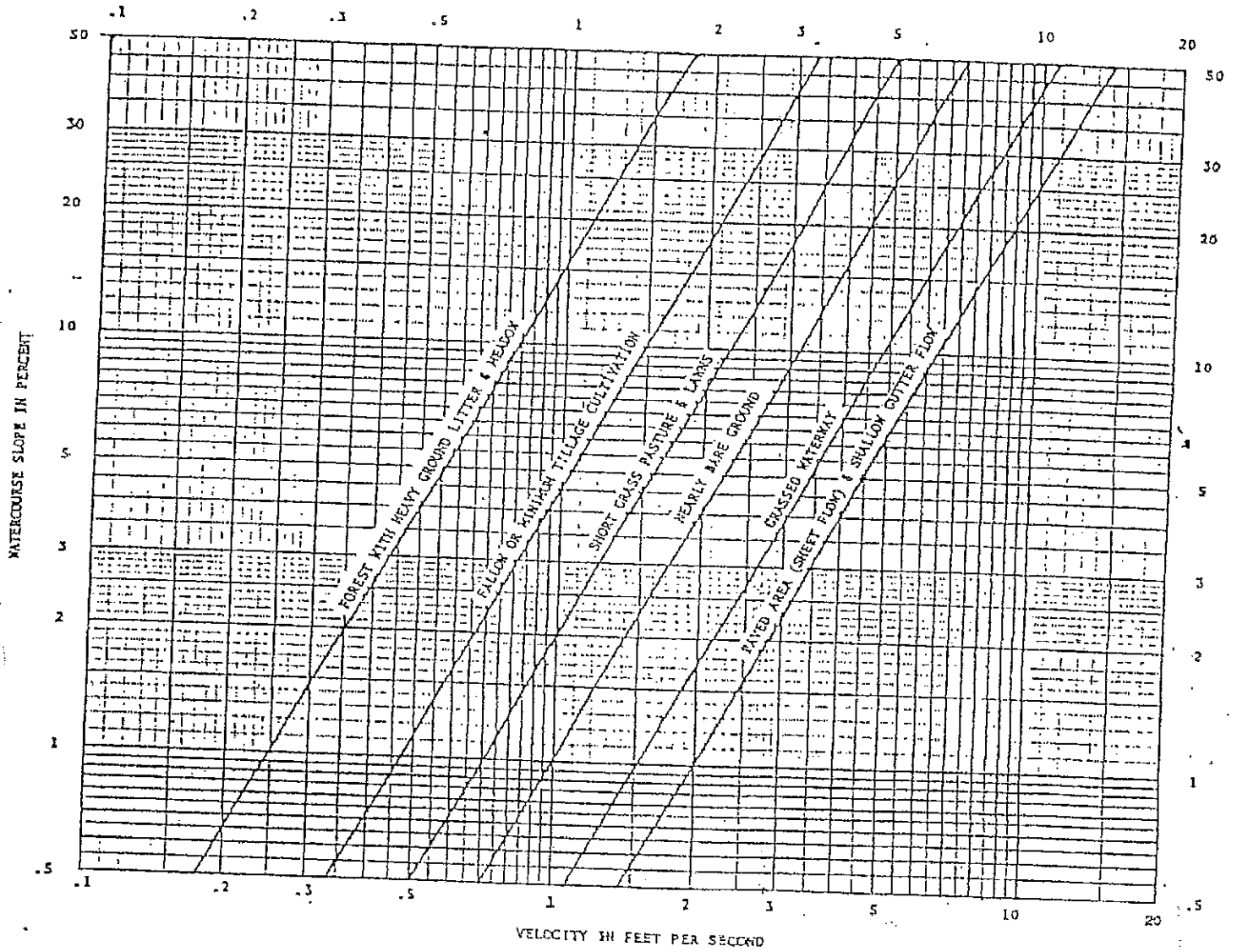
LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY 10 A&B*	10 C&D*	100 A&B*	100 C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90



Interim Release October 12, 1994 , Rainfall Intensity Curves
City Of Colorado Springs Drainage Criteria Manual



--Average velocities for estimating travel time for overland flow.

FIGURE 4

EXHIBITS:

DRAINAGE PLAN