

Colorado Civil Technologies, Inc.

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Date: 21-Mar-05

Project: **Mule Shoe Subdivision, 1175 18.5 Road, Fruita, CO 81521**
Subject: **DRAINAGE FEE CALCULATION**
Engineer: **Colorado Civil Technologies, Inc.**

Drainage Fee In Place Of Detention - Fruita Land Use Code, Section 17.19.150

Drainage Fee (\$) = 14,000 (C100d - C100h) A^{0.7}

C100d = Post Development Runoff Coefficient = 0.43 Composite

C100h = Pre- Development Runoff Coefficient = 0.42 Composite

A = Total Area of Subdivision Area Under Consideration
Area in Acres = 3.00

Drainage Fee (\$) = 14,000 (0.43 - 0.42) 3.00^{0.7} = \$302.07 ✓ OK

Prepared By:

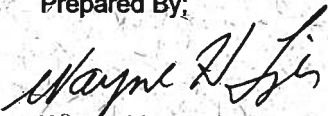
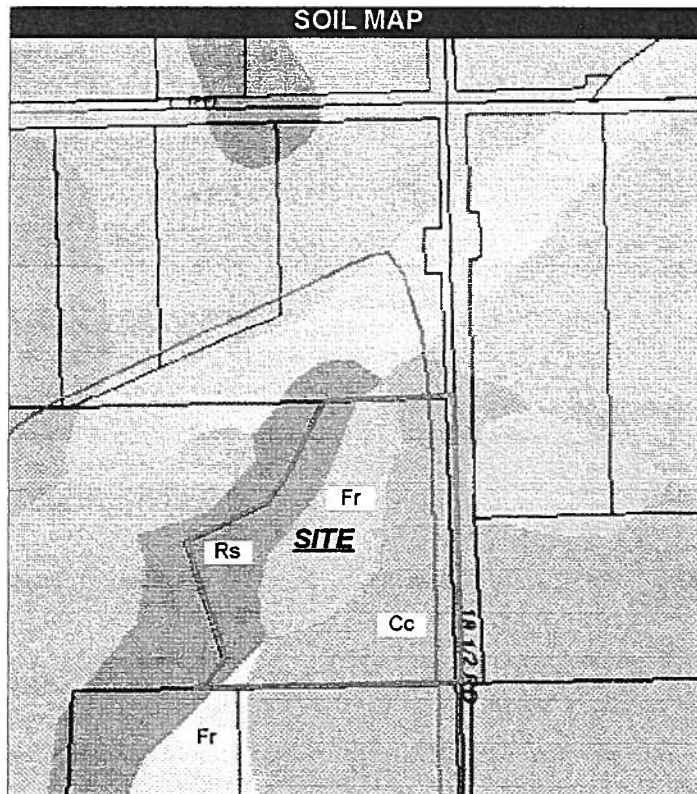

Wayne Lizer, PE



EXHIBIT 1.0 of 6.0



N
N.T.S.

MULE SHOE SUBD.
SITE SOILS MAP

EXHIBIT 2.0

MULE SHOE SUBD.

Mapunit: Cc PERSAYO SILTY CLAY LOAM, 5 TO 12 PERCENT SLOPES

Component: PERSAYO % of Mapunit 90

Hydrologic Group D Frost Action: Low Corrosivity to Concrete: Moderate Corrosivity to Steel: High

Depth in inches	Fragments %		Percentage passing sieve				Liquid Limit	Plasticity Index	Classification	
	> 10	3-10	#4	#10	#40	#200			Unified	AASHTO
0 3.9	0 0	0 0	100 100	100 100	95 100	85 95	35 45	10 15	ML	A-6
									ML	A-7
3.9 15	0 0	0 0	100 100	100 100	95 100	85 95	35 45	10 15	ML	A-6
									ML	A-7

Monday, January 14, 2002

Soil Survey information downloaded from National Soil Information System (NASIS), USDA Natural Resources Conservation Service

Page 12 of 40

Mapunit: Fr FRUITLAND FINE SANDY LOAM, 2 TO 5 PERCENT SLOPES

Component: FRUITLAND % of Mapunit 90

Hydrologic Group B Frost Action: Low Corrosivity to Concrete: Low Corrosivity to Steel: High

Depth in inches	Fragments %		Percentage passing sieve				Liquid Limit	Plasticity Index	Classification	
	> 10	3-10	#4	#10	#40	#200			Unified	AASHTO
0 16	0 0	0 0	100 100	100 100	70 85	40 50	25 30	5 10	SC-SM	A-4
									SC	A-4
16 40	0 0	0 0	100 100	100 100	70 85	40 50	25 30	5 10	SC	A-4
									SC-SM	A-4
40 60	0 0	0 0	100 100	100 100	85 95	50 65	25 30	5 10	CL	A-4
									CL-ML	A-4

EXHIBIT 3.0

Monday, January 14, 2002

Soil Survey information downloaded from National Soil Information System (NASIS), USDA Natural Resources Conservation Service

Page 16 of 40

MULE SHOE SUBD.

Mapunit: Rs

USTIFLUVENTS, 0 TO 2 PERCENT SLOPES

Component: USTIFLUVENTS

% of Mapunit 85

Hydrologic Group B

Frost Action: Low

Corrosivity to Concrete: High

Corrosivity to Steel: High

Depth in inches	Fragments %		Percentage passing sieve				Liquid Limit	Plasticity Index	Classification	
	> 10	3-10	#4	#10	#40	#200			Unified	AASHTO
0 2	0 0	0 0	100 100	100 100	60 70	30 40	20 25	0 5	SC-SM	A-4
									SM	A-2
									SM	A-4
									SC-SM	A-2
2 7.9	0 0	0 0	100 100	100 100	85 95	50 65	20 25	0 5	CL-ML	A-4
									ML	A-4
7.9 22	0 0	0 0	100 100	100 100	50 90	15 50	20 30	0 10	SC-SM	A-2
									SM	A-4
									SC-SM	A-4
									SC	A-2
									SM	A-2
									SC	A-4
22 60	0 0	5 10	35 45	30 40	20 30	10 20	20 25	0 5	GC-GM	A-1
									GM	A-1
									GP-GM	A-1

EXHIBIT 4.0

MULE SHOE SUBDIVISION

LAND USE OR SURFACE CHARACTERISTICS	SCS HYDROLOGIC SOIL GROUP (SEE APPENDIX "C" FOR DESCRIPTIONS)											
	A			B			C			D		
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
UNDEVELOPED AREAS Bare ground	10-20	16-26	23-35	14-22	22-30	30-38	20-28	28-36	36-44	24-32	30-38	40-48
	14-24	22-32	30-40	20-28	28-36	37-45	26-34	35-43	40-48	30-38	40-48	50-58
Cultivated/Agricultural	08-18	13-23	16-26	11-19	15-23	21-29	14-22	19-27	26-34	18-26	23-31	31-39
	14-24	18-28	22-32	16-24	21-29	28-36	20-28	25-33	34-42	24-32	29-37	41-49
Pasture	12-22	20-30	30-40	18-26	28-36	37-45	30-38	34-42	44-52	30-38	40-48	50-58
	15-25	25-35	37-47	23-31	34-42	45-53	30-38	42-50	52-60	37-45	50-58	62-70
Meadow	10-20	16-26	23-35	14-22	22-30	30-38	20-28	28-36	36-44	24-32	30-38	40-48
	14-24	22-32	30-40	20-28	28-36	37-45	26-34	35-43	44-52	30-38	40-48	50-58
Forest LITTLE SALT WASH	05-15	08-18	11-21	08-16	11-19	14-22	10-18	13-21	16-24	12-20	16-24	20-28
	08-18	11-21	14-24	10-18	14-22	18-26	12-20	16-24	20-28	15-23	20-28	25-33
RESIDENTIAL AREAS 1/8 acre per unit	40-50	43-53	46-56	42-50	45-53	50-58	45-53	48-56	53-61	48-56	51-59	57-65
	48-58	52-62	55-65	50-58	54-62	59-67	53-61	57-65	64-72	56-64	60-68	69-77
1/4 acre per unit	27-37	31-41	34-44	29-37	34-42	38-46	32-40	36-44	41-49	35-43	39-47	45-53
	35-45	39-49	42-52	38-46	42-50	47-55	41-49	45-53	52-60	43-51	47-55	57-65
1/3 acre per unit	22-32	26-36	29-39	25-33	29-37	33-41	28-36	32-40	37-45	31-39	35-43	42-50
	31-41	35-45	38-48	33-41	38-46	42-50	36-44	41-49	48-56	39-47	43-51	53-61
1/2 acre per unit	16-26	20-30	24-34	19-27	23-31	28-36	22-30	27-35	32-40	26-34	30-38	37-45
	25-35	29-39	32-42	28-36	32-40	36-44	31-39	35-43	42-50	34-42	38-46	46-54
1 acre per unit	14-24	19-29	22-32	17-25	21-29	26-34	20-28	25-33	31-39	24-32	29-37	35-43
	22-32	26-36	29-39	24-32	28-36	34-42	28-36	32-40	40-48	31-39	35-43	46-54
MISC. SURFACES Pavement and roofs	93	94	95	93	94	95	93	94	95	93	94	95
	95	96	97	95	96	97	95	96	97	95	96	97
Traffic areas (soil and gravel)	55-65	60-70	64-74	60-68	64-72	67-75	64-72	67-75	69-77	72-80	75-83	77-85
	65-70	70-75	74-79	68-76	72-80	75-83	72-80	75-83	77-85	79-87	82-90	84-92
Green landscaping (lawns, parks)	10-20	16-26	25-35	14-22	22-30	30-38	20-28	28-36	36-44	24-32	30-38	40-48
	14-24	22-32	30-40	20-28	28-36	37-45	26-34	35-43	42-52	30-38	40-48	50-58
Non-green and gravel landscaping	30-40	36-46	45-55	45-55	42-50	50-58	40-48	48-56	56-64	44-52	50-58	60-68
	34-44	42-52	50-60	50-60	48-56	57-65	46-54	55-63	64-72	50-58	60-68	70-78
Cemeteries, playgrounds	20-30	26-36	35-45	35-45	32-40	40-48	30-38	38-44	46-54	34-42	40-48	50-58
	24-34	32-42	40-50	40-50	38-46	47-55	36-44	45-53	54-62	40-48	50-58	60-68

NOTES: 1. Values above and below pertain to the 2-year and 100-year storms, respectively.
 2. The range of values provided allows for engineering judgement of site conditions such as basic shape, homogeneity of surface type, surface depression storage, and storm duration. In general, during shorter duration storms ($T_c \leq 10$ minutes), infiltration capacity is higher, allowing use of a "C" value in the low range. Conversely, for longer duration storms ($T_c > 30$ minutes), use a "C" value in the higher range.
 3. For residential development at less than 1/8 acre per unit or greater than 1/8 acre per unit, and also for commercial and industrial areas, use values under MISC SURFACES to estimate "C" value ranges for use.

RATIONAL METHOD RUNOFF COEFFICIENTS
 (Modified from Table 4, UC-Davis, which appears to be a modification of work done by Rawls)

TABLE "B-1"

Date: March 21, 2005
 Project: Mule Shoe Subdivision
 Location: 1175 18 1/2 Road, Fruita, Colorado 81521
 Subject: COMPOSITE "C" VALUE CALCULATIONS
 Engineer: Colorado Civil Technologies

SUB-BASIN I.D. "H1" Lot Two, Historic

CONDITION 100 YEAR HISTORIC

Soils Type	Soil Name & Hydrologic Group	Basin Description	Cover Type, Treatment & Hydrologic Condition	"C"	Area Acres	Product Of "C" x Area
Cc	Persayo Silty Clay Loam, 5 to 12 % slopes, Group "D"	Pasture Land	Pasture Land	0.58	1.250	0.725
Fr	Fruitland Fine Sandy Loam, 2 to 5% Slopes, Group "B"	Pasture Land	Pasture Land	0.42	0.850	0.357
Rs	Ustifluvents, 0 to 2% Slopes, Group "B"	Little Salt Wash - Heavy Vegetation	Little Salt Wash - Heavy Vegetation	0.18	0.900	0.162
TOTALS					3.000	1.244

"C" (Weighted) = $\frac{1.244}{3.000} = 0.415$ USE **0.42** 100 yr

0.35 2 yr

SUB-BASIN I.D. "D1" Lot Two, Developed

CONDITION 100 YEAR DEVELOPED

Soils Type	Soil Name & Hydrologic Group	Basin Description	Cover Type, Treatment & Hydrologic Condition	"C"	Area Acres	Product Of "C" x Area
Cc	Persayo Silty Clay Loam, 5 to 12 % slopes, Group "D"	Pasture Land	Pasture Land	0.58	1.080	0.626
Cc	Persayo Silty Clay Loam, 5 to 12 % slopes, Group "D"	New Structure/ Roof	New Structure/ Roof	0.96	0.070	0.067
Cc	Persayo Silty Clay Loam, 5 to 12 % slopes, Group "D"	Fruitland Fine Sandy Loam, 2 to 5% Slopes, Group "B"	New Gravel Driveway	0.90	0.100	0.090
Fr	Fruitland Fine Sandy Loam, 2 to 5% Slopes, Group "B"	Pasture Land	Pasture Land	0.42	0.850	0.357
Rs	Ustifluvents, 0 to 2% Slopes, Group "B"	Little Salt Wash - Heavy Vegetation	Little Salt Wash - Heavy Vegetation	0.18	0.900	0.162
TOTALS					3.000	1.303

"C" (Weighted) = $\frac{1.303}{3.000} = 0.434$ USE **0.43**

* Existing bldgs on Lot 1 = 3174 sq ft

* 3100 ft²
 ↓
 2400' house
 525' garage
 200' patio

EXHIBIT 6.0