Appendix A

Runoff Curve Numbers

- **Table A.1 Piñon Ridge Site Curve Number Calculations**
- **NRCS Piñon Ridge Soil Report**
- **Runoff Curve Numbers from TR-55**

Table A.1
Pinon Ridge Site Curve Number Calculations

Subbasin	Area		Parameters	Soil and Area Relationships							Effective CNs
	(mi^2)	(ac)									
1	1.26	808.9	Soil ID No. (See Map)	73	18	56	87	45	88	23	Area Sum_1 (ac)
			Measured Area (ac)	68.3	264.7	2	287.5	76.9	46.9	37	783.3
			Adj. Area (ac)[1]	70.5	273.4	2.1	296.9	79.4	48.4	38.2	808.9
			HSG	B	B	C	D	D	D	C	
			Veg./Gnd Cover	Sag	Sag	Sag	Pin	Pin	Pin	Pin	
			CN	51	51	63	80	80	80	73	CN_{eff1} = 67
2	0.24	151.7	Soil ID No. (See Map)	15	73	56	18				Area Sum_2 (ac)
			Measured Area (ac)	14.2	102.5	27	2				145.7
			Adj. Area (ac)[1]	14.8	106.7	28.1	2.1				151.7
			HSG	B	B	C	B				
			Veg./Gnd Cover	Sag	Sag	Sag	Sag				
			CN	51	51	63	51				CN_{eff2} = 53
3	0.13	85.1	Soil ID No. (See Map)	15	73						Area Sum_3 (ac)
			Measured Area (ac)	19.9	61.9						81.8
			Adj. Area (ac)[1]	20.7	64.4						85.1
			HSG	B	B						
			Veg./Gnd Cover	Sag	Sag						
			CN	51	51						CN_{eff3} = 51
4	0.62	395.9	Soil ID No. (See Map)	15	73	56	18	87	23	88	Area Sum_4 (ac)
			Measured Area (ac)	76.8	59.8	86.8	23.4	65.6	52.7	4.0	369.1
			Adj. Area (ac)[1]	82.4	64.1	93.1	25.1	70.4	56.5	4.3	395.9
			HSG	B	B	C	B	D	C	D	
			Veg./Gnd Cover	Sag	Sag	Sag	Sag	Pin	Pin	Pin	
			CN	51	51	63	51	80	73	80	CN_{eff4} = 62
5	0.19	124.4	Soil ID No. (See Map)	73	56	104	79				Area Sum_5 (ac)
			Measured Area (ac)	12.1	56.2	54.8	2.0				125.1
			Adj. Area (ac)[1]	12.0	55.9	54.5	2.0				124.4
			HSG	B	C	D	B				
			Veg./Gnd Cover	Sag	Sag	Sag	Sag				
			CN	51	63	70	63				CN_{eff5} = 65
Total =	2.44	1566	Sag = Sagebrush w/grass (fair)			Pin = Pinyon-juniper (fair)					CN_{eff} = 64

[1]Area adjustment was required because of discrepancies between areas measured electronically and with a planimeter.

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Report—Soil Features

Soil Features– San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties									
Map symbol and soil name	**Restrictive Layer**				**Subsidence**		**Potential for frost action**	**Risk of corrosion**	
	Kind	**Depth to top**	**Thickness**	**Hardness**	**Initial**	**Total**		**Uncoated steel**	**Concrete**
		In	*In*		*In*	*In*			
15—Barx fine sandy loam, 3 to 6 percent slopes									
Barx		—	—		0	—	Low	High	Moderate
17—Barx-Progresso complex, 3 to 12 percent slopes									
Barx		—	—		0	—	Low	High	Moderate
Progresso	Lithic bedrock	20-40	—	Indurated	0	—	Low	Moderate	Low
18—Begay fine sandy loam, 1 to 6 percent slopes									
Begay		—	—		0	—	Low	High	Moderate
23—Bodot, dry-Ustic Torriorthents complex, 5 to 50 percent slopes									
Bodot, dry	Paralithic bedrock	20-40	—	Weakly cemented	0	—	Low	High	Low
Ustic torriorthents	Lithic bedrock	10-80	—	Indurated	0	—	Low	Moderate	Low

Soil Features– San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
45—Gladel-Bond-Rock outcrop complex, 1 to 50 percent slopes									
Gladel	Lithic bedrock	5-15	—	Indurated	0	—	Low	High	Low
Bond	Lithic bedrock	6-20	—	Indurated	0	—	Low	Moderate	Low
Rock outcrop	Lithic bedrock	0-4	—	Indurated	0	—	None		
49—Gypsiorthids, 3 to 25 percent slopes									
Gypsiorthids		—	—		0	—	Low	High	High
50—Gypsum land									
Gypsum land		—	—		0	—	None	High	High
56—Mikim loam, 1 to 6 percent slopes									
Mikim		—	—		0	—	Low	High	Low
60—Monogram loam, 1 to 8 percent slopes									
Monogram		—	—		0	—	Low	High	Low
73—Paradox fine sandy loam, 1 to 4 percent slopes									
Paradox		—	—		0	—	Low	High	Low

Soil Features– San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
75—Pinon-Bowdish-Progresso loams, cool, 1 to 12 percent slopes									
Pinon, cool	Lithic bedrock	10-20	—	Indurated	0	—	Low	Moderate	Low
Bowdish, cool	Lithic bedrock	20-40	—	Indurated	0	—	Low	High	Moderate
Progresso, cool	Lithic bedrock	20-40	—	Indurated	0	—	Low	Moderate	Low
79—Pojoaque-Chilton complex, 5 to 30 percent slopes, extremely stony									
Pojoaque		—	—		0	—	Low	Moderate	Low
Chilton		—	—		0	—	Low	Moderate	Low
87—Rock outcrop									
Rock outcrop	Lithic bedrock	0-4	—	Indurated	0	—	None		
88—Rock outcrop-Orthents complex, 40 to 90 percent slopes									
Rock outcrop	Lithic bedrock	0-4	—	Indurated	0	—	None		
Orthents	Paralithic bedrock	10-80	—	Weakly cemented	0	—	Low	Moderate	Low
104—Vananda silty clay, 1 to 6 percent slopes									
Vananda		—	—		0	—	Low	High	High

Data Source Information

Soil Survey Area: San Miguel Area, Colorado, Parts of Dolores, Montrose, and San Miguel Counties
Survey Area Data: Version 6, Feb 1, 2008

Runoff Curve Numbers from TR-55

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2]	A [3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.