

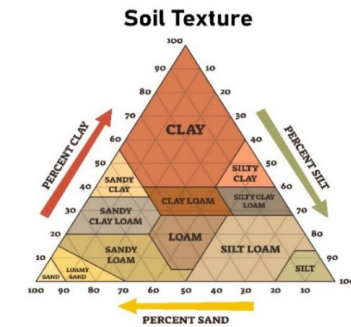
TABLE 1: Soil Report

<b>Client</b>	Civitas		
<b>Operator</b>	Bonanza Creek	<b>Date</b>	17-May-23
<b>Location ID - Name</b>	CPW North Side	<b>Ward</b>	20230512
<b>Type</b>	Well, Tank Battery, Roads, Reference		

# SOIL SAGE

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Soil Profile				Physical Properties				
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Partical Size			Texture Hydro	Location Ref
				Sand %	Silt %	Clay %		
Soil - 12.1	0	6	6	73	14	13	Sandy Loam	331381-Well
Soil - 12.2	6	12	6	77	12	11	Sandy Loam	
Soil - 12.3	12	18	6	81	10	9	Loamy Sand	
Soil - 12.4	18	24	6	89	6	5	Sand	
Site Average				80	11	10		



Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Sand %	Silt %	Clay %	Texture Hydro	Location Ref
Soil - 5.1 REF	0	6	6	87	6	7	Loamy Sand	MU10
Soil - 5.2 REF	6	12	6	90	5	5	Sand	MU10
Soil - 5.3 REF	12	18	6	90	5	5	Sand	MU10
Soil - 5.4 REF	18	24	6	90	4	6	Sand	MU10
Soil - 6.1 REF	0	6	6	74	14	12	Sandy Loam	MU10
Soil - 6.2 REF	6	12	6	75	12	13	Sandy Loam	MU10
Soil - 6.3 REF	12	18	6	83	6	11	Loamy Sand	MU10
Soil - 6.4 REF	18	24	6	68	14	18	Sandy Loam	MU10
Soil - 10.1 REF	0	6	6	69	18	13	Sandy Loam	MU10
Soil - 10.2 REF	6	12	6	69	18	13	Sandy Loam	MU10
Soil - 10.3 REF	12	18	6	69	18	13	Sandy Loam	MU10
Soil - 10.4 REF	18	24	6	85	8	7	Loamy Sand	MU10
Soil - 15.1 REF	0	6	6	41	30	29	Clay Loam	MU10
Soil - 15.2 REF	6	12	6	53	22	25	Sandy Clay Loam	MU10
Soil - 15.3 REF	12	18	6	89	6	5	Sand	MU10
Soil - 15.4 REF	18	24	6	91	4	5	Sand	MU10
<b>Site Ref Average</b>				<b>76</b>	<b>12</b>	<b>12</b>		

Location	Soil Profile			Chemical Properties				
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH Sat Paste	ECe mmhos/cm	CEC meq/100g	Excess Lime	Organic Matter (LOI) %
Soil - 12.1	0	6	6	7.5	0.51	10.9	NONE	1.6
Soil - 12.2	6	12	6	7.7	0.58	9	NONE	1.5
Soil - 12.3	12	18	6	7.8	0.36	6.4	NONE	1.4
Soil - 12.4	18	24	6	7.7	0.36	2.9	NONE	1.4
<b>Site Average</b>				<b>7.7</b>	<b>0.5</b>	<b>7.3</b>		<b>1.5</b>

	Bottom Depth		Soil Thickness				Excess Lime	Organic Matter (LOI) %	SAR
	Top Depth (in)	(in)	(in)	pH	ECe	CEC			
				Sat Paste	mmhos/cm	meq/100g			
Soil - 5.1 REF	0	6	6	8.1	0.18	7.5	NONE	0.5	0.2
Soil - 5.2 REF	6	12	6	8.3	0.15	4.4	NONE	0.3	0.1
Soil - 5.3 REF	12	18	6	8.2	0.16	3.7	NONE	0.3	0.2
Soil - 5.4 REF	18	24	6	8.3	0.17	5.2	NONE	0.3	0.2
Soil - 6.1 REF	0	6	6	7.1	0.54	8.6	NONE	1.5	0.1
Soil - 6.2 REF	6	12	6	7.5	0.47	9	NONE	1.1	0.2
Soil - 6.3 REF	12	18	6	7.9	0.44	17.3	LOW	0.7	0.5
Soil - 6.4 REF	18	24	6	8	0.49	23.2	HIGH	1.2	1
Soil - 10.1 REF	0	6	6	7	2.17	9.5	NONE	1.3	3.1
Soil - 10.2 REF	6	12	6	7.2	1.88	11.4	NONE	1.4	3.4
Soil - 10.3 REF	12	18	6	7.6	1.19	9.4	NONE	1.1	3.1
Soil - 10.4 REF	18	24	6	7.9	0.58	5.3	NONE	0.6	2.8
Soil - 15.1 REF	0	6	6	7.7	1.57	26.9	HIGH	3.4	1.4
Soil - 15.2 REF	6	12	6	7.5	1.98	21	NONE	2.6	2.5
Soil - 15.3 REF	12	18	6	8	0.29	2.7	NONE	0.3	1.4
Soil - 15.4 REF	18	24	6	8	0.3	2	NONE	0.2	1.2
Site Ref Average				7.8	0.79	10.4		1.1	1.3

Location	Soil Profile			Extraction Method			Nitrate - N		Nitrate-			Potassium		
				KCL	M3	NH4OAc								
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Nitrate-N	Phosphorus P	Potassium K			N	Phosphorus P	K			
				ppm	ppm	ppm			ppm	ppm	ppm			
Soil - 12.1	0	6	6	7.3	241	311	13	0-12	7.3	241	311			
Soil - 12.2	6	12	6	9	101	223	16	12-24	3.6	39.5	97.5			
Soil - 12.3	12	18	6	4.3	58	137	8							
Soil - 12.4	18	24	6	2.9	21	58	14							
Site Average				6	105	182	13							

	Bottom Depth		Soil Thickness	Potassium							
	Top Depth (in)	(in)	(in)	Nitrate-N ppm	Phosphorus P ppm	K ppm	Nitrate - N Lbs/A				
Soil - 5.1 REF	0	6	6	2.1	15	92	4	0-12	2.1	15	92
Soil - 5.2 REF	6	12	6	0.5	9	25	1	12-24	0.5	9	24
Soil - 5.3 REF	12	18	6	< 0.1	9	24	0				
Soil - 5.4 REF	18	24	6	0.5	9	24	1				
Soil - 6.1 REF	0	6	6	11.2	66	205	20	0-12	7.3	34	179
Soil - 6.2 REF	6	12	6	7.3	34	179	13	12-24	7	22	193.5
Soil - 6.3 REF	12	18	6	8.2	8	65	15				
Soil - 6.4 REF	18	24	6	10.7	5	52	51				
Soil - 10.1 REF	0	6	6	3.3	39	335	6	0-12	6.4	35	317
Soil - 10.2 REF	6	12	6	6.4	35	317	12	12-24	4.6	50	124.5
Soil - 10.3 REF	12	18	6	2.5	18	127	4				

Soil - 10.4 REF	18	24	6	0.7	31	42	3						
Soil - 15.1 REF	0	6	6	8.5	69	207	15		0-12	8.5	69	207	
Soil - 15.2 REF	6	12	6	4.4	25	116	8		12-24	0.85	8	20	
Soil - 15.3 REF	12	18	6	1	10	20	2						
Soil - 15.4 REF	18	24	6	0.7	6	20	1						

Site Ref Average

4.5 24 116 10

Location	Soil Profile			Plant Available			Hot Water	Ca-NO3	M3	AB-DTPA			
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	NH4OAc	NH4OAc	NH4OAc							
				Calcium	Magnesium	Sodium							
				Ca	Mg	Na							
				ppm	ppm	ppm	Boron B	Chloride Cl	Sulfate S	Copper Cu	Iron Fe	Manganese Mn	Zinc Zn
Soil - 12.1	0	6	6	1577	230	68	0.97	8.5	21.5	1.3	11.3	1.7	2.99
Soil - 12.2	6	12	6	1265	213	69	0.61	6.1	14.8	0.8	7	2.1	1.08
Soil - 12.3	12	18	6	897	165	52	0.47	3.6	8	0.53	5.9	1.7	0.64
Soil - 12.4	18	24	6	382	82	27	0.26	3.5	6.5	0.25	5.8	2.6	0.53
Site Average				1030	173	54	0.58	5.4	12.7	0.72	7.5	2.0	1.31

Reference	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Calcium	Magnesium	Sodium	Boron B	Chloride Cl	Sulfate	Copper	Iron	Manganese	Zinc
				Ca	Mg	Na							
				ppm	ppm	ppm							
Soil - 5.1 REF	0	6	6	1169	131	68	0.27	1	3.2	0.4	7.8	1.4	0.31
Soil - 5.2 REF	6	12	6	746	73	7	0.21	0.2	2.9	0.22	5.6	1.2	0.31
Soil - 5.3 REF	12	18	6	604	69	6	0.19	0.2	2.5	0.18	5.4	1.3	0.24
Soil - 5.4 REF	18	24	6	849	100	8	0.17	0	3.7	0.21	6.1	1.1	0.18
Soil - 6.1 REF	0	6	6	1272	205	7	0.66	0.9	6.3	0.55	9.2	4	0.15
Soil - 6.2 REF	6	12	6	1318	227	14	0.62	0.9	4.6	0.49	5.3	2.7	1.32
Soil - 6.3 REF	12	18	6	2973	263	18	0.4	1.1	13.5	0.3	3.6	1.4	0.5
Soil - 6.4 REF	18	24	6	3848	435	44	0.62	1.6	17.6	0.5	4.5	1.3	0.12
Soil - 10.1 REF	0	6	6	1200	224	168	1.14	61.5	111.9	0.57	13.7	3.7	0.64
Soil - 10.2 REF	6	12	6	1503	264	194	1.23	60	99.2	0.49	10.2	3.1	0.81
Soil - 10.3 REF	12	18	6	1276	242	146	0.81	48.2	53.6	0.4	5.9	2	0.31
Soil - 10.4 REF	18	24	6	769	130	65	0.41	14.5	22.6	0.27	5	1.4	0.16
Soil - 15.1 REF	0	6	6	4091	636	148	2.12	6.5	145	5.2	10.5	2.6	3.12
Soil - 15.2 REF	6	12	6	2917	611	233	1.33	11.4	142.9	1.96	14.8	2.5	1.49
Soil - 15.3 REF	12	18	6	362	80	31	0.28	3.4	12.1	0.24	6	1.1	0.24
Soil - 15.4 REF	18	24	6	266	64	24	0.33	3.2	7.8	0.15	3.8	1.2	0.25
Site Ref Average				1573	235	74	0.67	13.4	40.6	0.76	7.3	2.0	0.63

# SOIL REPORT

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## Terms Defined

pH	A measure of the acidity or basicity (alkalinity) of a soil. pH is defined as the negative logarithm (base 10) of the activity of hydronium ion in a solution
Ece	The Electrical Conductivity of a saturated soil Extract that measures salinity
Alkalinity	Alkalinity indicates a solution's power to react with acid and buffer its pH - the power to keep its pH from changing.

CEC - Cation Exchange Capacity  
CEC Ranges  
Range 11-50  
Range 1-10

Optimal pH range for plant growth  
6.0 -7.0

The higher the Alkanility, the higher the buffering capacity against pH change.  
The measure of how many cations can be retained on soil particle surfaces.  
High Clay, more lime to correct a given pH, greater capacity to hold nutrients, physical effects of high clay content, high water-holding capacity  
High Sand, Nitrogen and potassium leaching, less lime to correct a given pH, physical effects of high sand content, low water-holding capacity

Reference Key

Low

Medium

High

Optimal

Neutral

No Reference

Analytical Error

Typical Soil Concentrations sufficient for plant growth

Element	Symbol	mg/kg	percent	Relative number
		ppm		of atoms
Nitrogen	N	15,000	1.5	1,000,000
Potassium	K	10,000	1	250,000
Calcium	Ca	5,000	0.5	125,000
Magnesium	Mg	2,000	0.2	80,000
Phosphorus	P	2,000	0.2	60,000
Sulfur	S	1,000	0.1	30,000
Chlorine	Cl	100	--	3,000
Iron	Fe	100	--	2,000
Boron	B	20	--	2,000
Manganese	Mn	50	--	1,000
Zinc	Zn	20	--	300
Copper	Cu	6	--	100
Molybdenum	Mo	0.1	--	1
Nickel	Ni	0.1	--	1

Notes

Root Formation  
Chlorophyll Formation  
Proteins & NPK Uptake  
Chlorophyll catalyst  
Absorption Calcium  
Photosynthesis & Respiration - correlated with %OM  
Fixation of Organic Nitrogen

Source: E.Epstein, 1965