

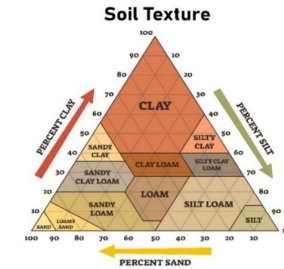
TABLE 1: Soil Report

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

SOIL SAGE

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Soil Profile				Physical Properties				Location Ref
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Partical Size			Texture Hydro	
				Sand %	Silt %	Clay %		
Soil - 9.1	0	6	6	64	19	17	Sandy Loam	331414-Well
Soil - 9.2	6	12	6	78	13	9	Sandy Loam	
Soil - 9.3	12	18	6	63	20	17	Sandy Loam	
Soil - 9.4	18	24	6	67	18	15	Sandy Loam	
Soil - 10.1	0	6	6	71	12	17	Sandy Loam	331414-TB
Soil - 10.2	6	12	6	67	18	15	Sandy Loam	
Soil - 10.3	12	18	6	63	20	17	Sandy Loam	
Soil - 10.4	18	24	6	65	18	17	Sandy Loam	
Site Average				67	17	16		



Soil Profile				Physical Properties			Texture Hydro	Location Ref
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Sand %	Silt %	Clay %		
Soil - 2 REF	0	10	10	63	16	21	Sandy Clay Loam	MU3
Soil - 4 REF	0	8	8	45	28	27	Loam	MU3
Soil - 6.1 REF	0	6	6	35	24	41	Clay	MU3
Soil - 6.2 REF	6	12	6	47	24	29	Sandy Clay Loam	MU3
Soil - 6.3 REF	12	18	6	60	21	19	Sandy Loam	MU3
Soil - 6.4 REF	18	24	6	86	9	5	Loamy Sand	MU3
Soil - 11.1 REF	0	6	6	53	28	19	Sandy Loam	MU3
Soil - 11.2 REF	6	12	6	51	26	23	Sandy Clay Loam	MU3
Soil - 11.3 REF	12	18	6	50	26	24	Sandy Clay Loam	MU3
Soil - 11.4 REF	18	24	6	80	9	11	Sandy Loam	MU3
Soil - 16.1 REF	0	6	6	66	14	20	Sandy Loam	MU3
Soil - 16.2 REF	6	12	6	76	13	11	Sandy Loam	MU3
Soil - 16.3 REF	12	18	6	79	10	11	Sandy Loam	MU3
Soil - 16.4 REF	18	24	6	76	8	16	Sandy Loam	MU3
Site Ref Average				62	18	20		

Soil Profile				Chemical Properties				Organic Matter (LOI) %	SAR
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH Sat Paste	ECe mmhos/cm	CEC meq/100g	Excess Lime		
Soil - 9.1	0	6	6	7.9	0.38	23.2	LOW	1.5	0.8
Soil - 9.2	6	12	6	8.5	0.35	18.4	HIGH	0.7	2.3
Soil - 9.3	12	18	6	8.3	0.49	22	HIGH	1.4	3.7
Soil - 9.4	18	24	6	8.5	1.25	23.6	HIGH	1.2	3.3
Soil - 10.1	0	6	6	7.9	7.1	25.8	LOW	3.5	8.1

Soil - 10.2	6	12	6	7.9	8	26.6	LOW	1.4	8.7
Soil - 10.3	12	18	6	7.8	7.53	25.6	HIGH	1	10.8
Soil - 10.4	18	24	6	8.1	4.64	25.7	HIGH	0.9	17.6
Site Average				8.1	3.7	23.9		1.5	6.9

	Bottom Depth		Soil Thickness (in)	pH		ECe mmhos/cm	CEC meq/100g	Excess Lime	Organic Matter (LOI) %	SAR
	Top Depth (in)	(in)		Sat Paste						
Soil - 2 REF	0	10	10	8.2	3.4	20.9		NONE	2.2	14.2
Soil - 4 REF	0	8	8	7.2	7.74	21.5		NONE	5.9	10.7
Soil - 6.1 REF	0	6	6	8	1.74	28.2		LOW	4.7	4.6
Soil - 6.2 REF	6	12	6	8.4	2.23	31.2		HIGH	2.7	12.6
Soil - 6.3 REF	12	18	6	8.4	5.47	30		HIGH	1.1	15.7
Soil - 6.4 REF	18	24	6	8.1	1.25	10.4		LOW	0.6	4
Soil - 11.1 REF	0	6	6	5.8	2.93	9.7		NONE	3.6	16
Soil - 11.2 REF	6	12	6	8	11.26	34		HIGH	1.9	32.9
Soil - 11.3 REF	12	18	6	8.6	14.86	37.9		HIGH	1.2	50.1
Soil - 11.4 REF	18	24	6	8.5	9.64	25.6		HIGH	0.5	29
Soil - 16.1 REF	0	6	6	6.6	0.75	10.6		NONE	2.6	0.3
Soil - 16.2 REF	6	12	6	7.1	0.42	7		NONE	1	0.5
Soil - 16.3 REF	12	18	6	7.7	0.37	9		NONE	0.9	0.5
Soil - 16.4 REF	18	24	6	7.9	0.74	21.6		LOW	1	1.2

Site Ref Average				7.8	4.49	21.3			2.1	13.7
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Location	Soil Profile		Extraction Method						Phosphorus P	Potassium K	
			KCL	M3	NH4OAc						
	Bottom Depth (in)	Soil Thickness (in)	Nitrate-N ppm	Phosphorus P ppm	Potassium K ppm	Nitrate - N Lbs/A					
							Nitrate-N ppm	Phosphorus ppm			Potassium ppm
Soil - 9.1	0	6	6	1.2	58	375	2	0-12	1.15	37	224
Soil - 9.2	6	12	6	1.1	16	73	2	12-24	3.05	29	141.5
Soil - 9.3	12	18	6	2.5	33	142	5				
Soil - 9.4	18	24	6	3.6	25	141	7				
Soil - 10.1	0	6	6	81.7	730	2652	147	0-12	93.35	425	2390
Soil - 10.2	6	12	6	105	120	2128	189	12-24	63.55	57.5	420.5
Soil - 10.3	12	18	6	83.9	69	577	151				
Soil - 10.4	18	24	6	43.2	46	264	78				
Site Average				#REF!	#REF!	#REF!	#REF!				

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Potassium			Nitrate - N Lbs/A	Nitrate-N ppm	Phosphorus P ppm	Potassium K ppm	
				Nitrate-N ppm	Phosphorus P ppm	K ppm					
Soil - 2 REF	0	10	10	1.3	66	703	4				
Soil - 4 REF	0	8	8	3.1	95	694	7				
Soil - 6.1 REF	0	6	6	43.4	59	399	78	0-12	30	40	294.5

Soil - 6.2 REF	6	12	6	16.6	21	190		30		12-24	2.3	9	49
Soil - 6.3 REF	12	18	6	1.8	5	58		3					
Soil - 6.4 REF	18	24	6	2.8	13	40		5					
Soil - 11.1 REF	0	6	6	48.9	92	378		88		0-12	31.45	57.5	349
Soil - 11.2 REF	6	12	6	14	23	320		25		12-24	2.7	7.5	162.5
Soil - 11.3 REF	12	18	6	4.2	9	221		8					
Soil - 11.4 REF	18	24	6	1.2	6	104		2					
Soil - 16.1 REF	0	6	6	21.5	83	244		39		0-12	14.85	59	193.5
Soil - 16.2 REF	6	12	6	8.2	35	143		15		12-24	7.15	20	110
Soil - 16.3 REF	12	18	6	5.9	30	151		11					
Soil - 16.4 REF	18	24	6	8.4	10	69		15					
Site Ref Average				13	39	265		24					

Location	Soil Profile			Plant Available			Hot Water	Ca-NO3	M3 Sulfate S	AB-DTPA Copper Cu	Iron Fe	Manganese Mn	Zinc Zn	
	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	NH4OAc Calcium	NH4OAc Magnesium	NH4OAc Sodium								
				Ca ppm	Mg ppm	Na ppm								
Soil - 9.1	0	6	6	3736	397	51	1.13	3.2	36	4.52	7.7	2.9	4.41	0-12
Soil - 9.2	6	12	6	2966	356	103	0.93	0.8	24.1	1.64	6.8	2.6	1.15	12-24
Soil - 9.3	12	18	6	3383	461	195	1.39	5.9	34.8	3.85	12.8	3.3	2.96	
Soil - 9.4	18	24	6	3877	370	184	1.11	50.4	64	3.34	13.4	2.1	2.79	
Soil - 10.1	0	6	6	2540	501	501	2.4	202.1	229.2	1.64	19.1	9.1	8.57	0-12
Soil - 10.2	6	12	6	3100	363	613	1.7	451.1	339.2	1.2	13.2	9.4	2.22	12-24
Soil - 10.3	12	18	6	3484	445	691	1.56	509.1	208.3	0.83	4.8	3	1.37	
Soil - 10.4	18	24	6	3560	397	897	1.77	299.1	115.4	1.18	7.4	2.4	1.28	
Site Average				3331	411	404	1	190.2	131.4	2.28	10.7	4.4	3.09	

Reference	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Calcium	Magnesium	Sodium	Boron B	Chloride Cl	Sulfate S	Copper Cu	Iron Fe	Manganese Mn	Zinc Zn	
				Ca	Mg	Na								
				ppm	ppm	ppm						ppm	ppm	
Soil - 2 REF	0	10	10	1756	726	979	6.08	145.6	150.6	0.99	7.7	5	0.81	
Soil - 4 REF	0	8	8	1958	648	1046	4.09	527.1	500.2	0.9	10.6	4.8	2.29	
Soil - 6.1 REF	0	6	6	3062	1091	642	6.14	52.9	62.3	7.33	8.6	4	3.59	0-12
Soil - 6.2 REF	6	12	6	3751	990	845	7.03	73.2	110.7	2.36	8.9	3.9	1.29	12-24
Soil - 6.3 REF	12	18	6	3671	848	1017	4.19	163.6	445.9	0.94	9.6	3.4	0.33	
Soil - 6.4 REF	18	24	6	1530	245	133	0.96	36.9	85.8	0.53	7.2	2	0.57	
Soil - 11.1 REF	0	6	6	855	216	611	1.41	97.6	55.8	0.92	68.1	14.9	2.29	0-12
Soil - 11.2 REF	6	12	6	3887	438	2328	3.47	181.1	999.9	0.52	9.2	3.4	0.5	12-24
Soil - 11.3 REF	12	18	6	3796	581	3107	3.58	230.1	1357	0.58	5.2	2	0.17	
Soil - 11.4 REF	18	24	6	2803	472	1695	1.62	110.6	642.2	0.31	5.7	1.4	0.14	
Soil - 16.1 REF	0	6	6	1519	280	18	0.85	26.5	14.3	4.46	32.8	4.2	6.61	0-12
Soil - 16.2 REF	6	12	6	1008	177	19	0.57	3.7	6.5	3.88	10.6	4.6	2.16	12-24
Soil - 16.3 REF	12	18	6	1426	162	23	0.55	2.1	10.1	1.72	6.7	2.9	0.89	
Soil - 16.4 REF	18	24	6	3748	284	72	0.68	21.9	33.3	0.69	5.5	2.6	0.45	
Site Ref Average				2484	511	895	2.94	119.5	319.6	1.87	14.0	4.2	1.58	

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. The higher the Alkanility, the higher the buffering capacity against pH change.
CEC - Cation Exchange Capacity	The measure of how many cations can be retained on soil particle surfaces.
CEC Ranges	
Range 11-50	High Clay, more lime to correct a given pH, greater capacity to hold nutrients, physical effects of high clay content, high water-holding capacity
Range 1-10	High Sand, Nitrogen and potassium leaching, less lime to correct a given pH, physical effects of high sand content, low water-holding capacity

Optimal pH range for plant growth

6.0 -7.0

Typical Soil Concentrations sufficient for plant growth					Notes
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	

Source: E.Epstein, 1965

Reference Key

Low
Medium
High

Optimal
Neutral
No Reference

Analytical Error
