

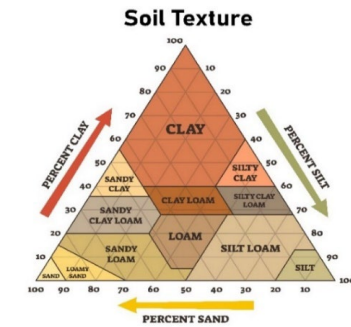
TABLE 1: Soil Report

Client	Civitas		
Operator	Bonanza Creek	Date	17-May-23
Location ID - Name	CPW North 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 - 8.1	0	6	6	64	18	18	Sandy Loam	305671-Well-TB
Soil - 8.2	6	12	6	62	18	20	Sandy Loam	
Soil - 8.3	12	18	6	62	18	20	Sandy Loam	
Soil - 8.4	18	24	6	63	18	19	Sandy Loam	
Soil - 9.1	0	6	6	79	10	11	Sandy Loam	305671-TB
Soil - 9.2	6	12	6	81	10	9	Loamy Sand	
Soil - 9.3	12	18	6	81	10	9	Loamy Sand	
Soil - 9.4	18	24	6	75	10	15	Sandy Loam	
Site Average				71	14	15		



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
Site Ref Average				76	12	12		

Soil Profile				Chemical Properties					
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH	ECe	CEC	Excess Lime	Organic Matter (LOI) %	SAR
				Sat Paste	mmhos/cm	meq/100g			
Soil - 8.1	0	6	6	7.6	2.5	25.8	HIGH	1.8	2.7
Soil - 8.2	6	12	6	7.6	4.08	27.1	HIGH	1.3	3

Soil - 8.3	12	18	6	7.7	3.74	27	HIGH	1.2	2.6
Soil - 8.4	18	24	6	7.6	2.83	22.4	HIGH	1.3	0.8
Soil - 9.1	0	6	6	7.8	0.7	19.5	HIGH	1	0.6
Soil - 9.2	6	12	6	7.8	0.66	20.2	HIGH	0.7	0.4
Soil - 9.3	12	18	6	7.9	0.56	20.7	HIGH	0.7	0.4
Soil - 9.4	18	24	6	7.7	1.05	19.5	HIGH	0.7	0.5
Site Average				7.7	2.0	22.8		1.1	1.4

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	pH	ECe	CEC	Excess Lime	Organic Matter	SAR
				Sat Paste	mmhos/cm	meq/100g		(LOI) %	
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

Soil Profile	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Extraction Method			Nitrate - N Lbs/A		Nitrate- N ppm	Phosphorus P ppm	Potassium K ppm
				KCL	M3	NH4OAc					
				Nitrate-N ppm	Phosphorus P ppm	Potassium K ppm					
Soil - 8.1	0	6	6	1.6	183	433	3	0-12	1.6	183	433
Soil - 8.2	6	12	6	1.1	80	304	2	12-24	3.4	34	254
Soil - 8.3	12	18	6	3.4	48	269	6				
Soil - 8.4	18	24	6	3.4	20	239	16				
Soil - 9.1	0	6	6	1	120	168	2	0-12	1	120	168
Soil - 9.2	6	12	6	1.2	92	140	2	12-24	1.8	61.5	114.5
Soil - 9.3	12	18	6	1.2	88	114	2				
Soil - 9.4	18	24	6	2.4	35	115	4				
Site Average				2	83	223	5				

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	Nitrate-N	Phosphorus P	Potassium K	Nitrate - N
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				ppm	ppm	ppm	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						

Plant Available													
Soil Profile				NH4OAc	NH4OAc	NH4OAc	Hot Water	Ca-NO3	M3	AB-DTPA			
Location	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 ppm	Mg ppm	Na ppm	Boron B ppm	Chloride Cl ppm	Sulfate S ppm	Copper Cu ppm	Iron Fe ppm	Manganese Mn ppm	Zinc Zn ppm
Soil - 8.1	0	6	6	4195	339	199	1.78	56	221.6	1.37	14.1	2.4	3.09
Soil - 8.2	6	12	6	4441	361	260	1.4	81.6	352.4	1.4	13.4	2	2.11
Soil - 8.3	12	18	6	4437	370	245	1.22	92.1	356.2	1.53	13.9	1.8	2.61
Soil - 8.4	18	24	6	3578	366	186	1.49	86.6	217.7	1.58	20.4	2.4	3.15
Soil - 9.1	0	6	6	3558	141	27	0.75	3.1	67.3	0.97	20.1	1.5	1.3
Soil - 9.2	6	12	6	3737	124	23	0.67	1.5	58.3	0.93	29.6	1.3	0.82
Soil - 9.3	12	18	6	3877	116	21	0.57	1.7	66.3	0.93	30.2	1.3	0.78
Soil - 9.4	18	24	6	3464	208	27	0.42	6.3	76.5	0.65	10.9	1.7	1.01
Site Average				3911	253	124	1.04	41.1	177.0	1.17	19.1	1.8	1.86

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 ppm	Mg ppm	Na ppm	Boron B ppm	Chloride Cl ppm	Sulfate S ppm	Copper Cu ppm	Iron Fe ppm	Manganese Mn ppm	Zinc Zn 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
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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. 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

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	Notes
		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	Root Formation
Magnesium	Mg	2,000	0.2	80,000	Chlorophyll Formation
Phosphorus	P	2,000	0.2	60,000	
Sulfur	S	1,000	0.1	30,000	Proteins & NPK Uptake
Chlorine	Cl	100	--	3,000	
Iron	Fe	100	--	2,000	Chlorophyll catalyst
Boron	B	20	--	2,000	Absorption Calcium
Manganese	Mn	50	--	1,000	
Zinc	Zn	20	--	300	
Copper	Cu	6	--	100	Photosynthesis & Respiration - correlated with %OM
Molybdenum	Mo	0.1	--	1	Fixation of Organic Nitrogen
Nickel	Ni	0.1	--	1	

Source: E.Epstein, 1965