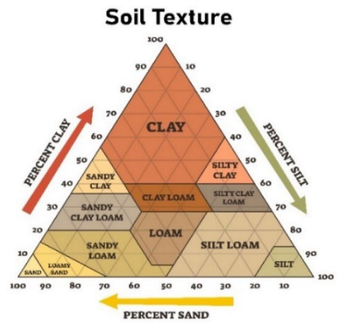
TABLE 1: Soil Report

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

SOIL REPORT

	Soil Profile			**Physical Properties** Partical Size				
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Sand %**	**Silt %**	**Clay %**	**Texture Hydro**	**Location Ref**
Soil - 5.1	0	6	6	61	14	25	Sandy Clay Loam	423850-Well
Soil - 5.2	6	12	6	55	22	23	Sandy Clay Loam	
Soil - 5.3	12	18	6	77	10	13	Sandy Loam	
Soil - 5.4	18	24	6	85	6	9	Loamy Sand	
Site Average				**70**	**13**	**18**		



	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Sand %**	**Silt %**	**Clay %**	**Texture Hydro**	**Location Ref**
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**					
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**pH Sat Paste**	**ECe mmhos/cm**	**CEC meq/100g**	**Excess Lime**	**Organic Matter (LOI) %**	**SAR**
Soil - 5.1	0	6	6	8.1	12.94	33.9	NONE	7	10.4
Soil - 5.2	6	12	6	7.4	9.18	30.9	HIGH	1.8	3.2
Soil - 5.3	12	18	6	7.3	4.01	12.7	NONE	1.3	2.2
Soil - 5.4	18	24	6	7.8	3.21	14.2	LOW	0.6	1.5
Site Average				**7.7**	**7.3**	**22.9**		**2.7**	**4.3**

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

	Soil Profile			**Extraction Method KCL**	**M3**	**NH4OAc**				**M3**	**NH4OAc**
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Nitrate-N**	**Phosphorus P**	**Potassium K**	**Nitrate - N**		**Nitrate-N**	**Phosphorus P**	**Potassium K**
				ppm	**ppm**	**ppm**	**Lbs/A**		**ppm**	**ppm**	**ppm**
Soil - 5.1	0	6	6	156	1551	3791	281	0-12	144.5	893.5	2597.5
Soil - 5.2	6	12	6	133	236	1404	239	12-24	56.55	79	205.5
Soil - 5.3	12	18	6	71.4	142	344	129				
Soil - 5.4	18	24	6	41.7	16	67	75				
Site Average				**101**	**486**	**1402**	**181**				

	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Nitrate-N**	**Phosphorus P**	**Potassium K**	**Nitrate - N**		**Nitrate-N**	**Phosphorus P**	**Potassium K**
				ppm	**ppm**	**ppm**	**Lbs/A**		**ppm**	**ppm**	**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**						
	Soil Profile			**Plant Available**										
				NH4OAc	**NH4OAc**	**NH4OAc**	**Hot Water**	**Ca-NO3**	**M3**	**AB-DTPA**				
Location	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Calcium Ca**	**Magnesium Mg**	**Sodium Na**	**Boron B**	**Chloride Cl**	**Sulfate S**	**Copper Cu**	**Iron Fe**	**Manganese Mn**	**Zinc Zn**	
				ppm	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	**ppm**	
Soil - 5.1	0	6	6	2718	836	829	3.21	527.1	522.8	1.61	22.9	11.8	14.85	0-12
Soil - 5.2	6	12	6	4208	551	393	1.31	839.1	284.4	1.61	36.3	3.5	2.74	12-24
Soil - 5.3	12	18	6	1580	371	199	0.77	471.1	129	3.18	16.2	6.2	4.09	
Soil - 5.4	18	24	6	2306	239	108	0.48	255.1	84.2	0.33	3.8	2.1	0.3	
Site Average				**2703**	**499**	**382**	**1.44**	**523.1**	**255.1**	**1.68**	**19.8**	**5.9**	**5.50**	
Reference	Top Depth (in)	Bottom Depth (in)	Soil Thickness (in)	**Calcium Ca**	**Magnesium Mg**	**Sodium Na**	**Boron B**	**Chloride Cl**	**Sulfate S**	**Copper Cu**	**Iron Fe**	**Manganese Mn**	**Zinc Zn**	
				ppm	**ppm**	**ppm**	**ppm**	**ppm**	**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**	

SOIL REPORT

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