San Jose Office
March 1, 2016
Report 16-055-0100

Gates & Associates, Inc.
2671 Crow Canyon Road
San Ramon, CA 94583

Attn: David Gates
RE: Homes at Deer Hill, Lafayette, Job# 4987/5034

Background

Five samples were processed on February 24, 2016 identified as site soil from depths of 12 to 18 inches from an area where new landscaping is scheduled for installation. The samples were analyzed for horticultural suitability, fertility, and physical characteristics. The results of the analyses are attached.

Analytical Results and Comments

The reaction of the samples ranges from slightly acidic at a pH of 6.6 in sample 2 to moderately alkaline at a pH of 7.9 in sample 3. Qualitative lime is favorably absent in all five samples. Soils with a pH above 7.5 are considered to be above the range preferred by most plants, and soils with a pH above 7.9 could cause most plants to show some yellowing of foliage and poor vigor. Soil sulfur is recommended in the sample 3 and 5 areas in order to help decrease the pH to a more favorable range. Soil sulfur works slowly and only to the depth it is incorporated. Alkalinity in the subsoil in these areas will remain elevated so this should be taken into account during plant selection.

Salinity (ECe), sodium and boron are safely low in all five samples. The sodium adsorption ratio (SAR) shows sodium adequately balanced by soluble calcium and magnesium in all five samples; this balance is important for soil structure quality, which relates to the rate at which water infiltrates the soil.

According to the USDA Soil Classification system, the texture of the less than 2mm fraction of the soil is sandy loam in sample # 1 and sandy clay loam in samples 2-5. Organic matter content is low in all five samples. Based on this information the average estimated infiltration rate is 0.31 inch per hour. Incorporation of a nitrogen stabilized organic amendment or composted greenwaste product is recommended in order to improve soil nutrient holding capacity and porosity.

In terms of soil fertility, nitrogen and sulfate are low in all five samples and phosphorus is low or fair in all but sample 2. Potassium is low in sample 1 and calcium and magnesium are sufficient in all five samples. Of the micronutrients; copper is low in sample 1 and zinc is low inall five samples. Manganese and iron are low or fair in all but samples 2 and 5.

Recommendations

Nitrogen, phosphorus, potassium and calcium fertilizers are recommended, along with a nitrogen stabilized amendment or composted greenwaste product. If a composted greenwaste amendment is chosen, that would provide additional phosphorus and potassium as well as micronutrients, product depending.

The primary symptom of zinc, manganese and iron deficiencies is a general yellowing of leaves with veins remaining green. In severe cases, leaves may become pale yellow or whitish, but veins remain green.

Brown spots may develop between veins and leaf margins may turn brown. Zinc deficiencies typically appear first on older, interior leaves. Manganese deficiency symptoms appear first on younger leaves. Iron deficiency shows first and more severely on the newer growth at branch tips. If these symptoms are present after plant installation they may be treated with an application of a chelated micronutrient product at the manufacturer's recommended rate. Decreasing the soil pH to a more favorable range in some areas will also help improve micronutrient availability. Incorporation of a composted greenwaste amendment would also provide additional micronutrients and may be sufficient to negate any deficiency, product depending.

Boron is safely low for general ornamental plants and may be below optimum levels for plant nutritional purposes in all five samples. Irrigation water often supplies sufficient boron to meet plant nutritional requirements. However, if boron is low in the irrigation water and/or plants show symptoms of boron deficiency after they are well established, you may consider an application of a product containing boron at the manufacturer's label rate. Boron deficiency symptoms often include stunted or deformed younger growth and tight internodes. Tissue testing can be performed to identify a boron deficiency if it is suspected. Incorporation of a composted greenwaste amendment will often provide sufficient boron to negate any deficiency, product depending.

To Prepare for Mass Planting:
Drainage of the root zone should be improved by first loosening the top 10 inches of any undisturbed or compacted soil. The following materials should then be evenly spread and thoroughly blended with the top 6 inches of soil to form a homogenous layer:

Material	Amount per 1000 Square Feet	Area
Nitrogen Stabilized Organic Amendment*	5 cubic yards	All Areas
Ammonium Sulfate (21-0-0)	7 pounds	All Areas
Triple Superphosphate (0-45-0)*	3 pounds	Sample 1, 3, 4, 5 Areas
Potassium Sulfate (0-0-50)*	7 pounds	Sample 1 Area Only
Soil Sulfur	12 pounds	Sample 3 Area Only
Soil Sulfur	9 pounds	Sample 5 Area Only

OR (Bay-Friendly)

Composted Greenwaste Amendment*	5 cubic yards	All Areas
Blood Meal (12-0-0)	6 pounds	All Areas
Feather Meal (12-0-0)	12 pounds	All Areas
Soil Sulfur	12 pounds	Sample 3 Area Only
Soil Sulfur	9 pounds	Sample 5 Area Only

*The rate may change based on the analysis of the chosen organic amendment. This rate is based on 270 lbs. of dry weight of organic matter per cubic yard of amendment.

To Prepare Backfill For Trees and Shrubs:

- Excavate planting pits at least twice as wide as the diameter of the rootball.
- Soil immediately below the root ball should be left undisturbed to provide support but the sides and the bottom around the side should be cultivated to improve porosity.
- The top of the rootball should be at or slightly above final grade.
- The top 12 inches of backfill around the sides of the rootball of trees and shrubs may consist of the above amended soil or may be prepared as follows:

3 parts	Site Soil All Areas
1 part	Nitrogen Stabilized Organic Amendment*

Uniformly blended with:

Material	Amount per Cubic Yard of Backfill	Area
Ammonium Sulfate (21-0-0)	1/3 pound	All Areas
Triple Superphosphate (0-45-0)*	1/4 pound	Sample 1, 3, 4, 5 Areas
Potassium Sulfate (0-0-50)*	1/3 pound	Sample 1 Area Only
Soil Sulfur	2/3 pound	Sample 3 Area Only
Soil Sulfur	1/2 pound	Sample 5 Area Only

OR (Bay-Friendly)

3 parts	Site Soil All Areas
1 part	Composted Greenwaste Amendment*

Uniformly blended with:

Material	Amount per Cubic Yard of Backfill	Area
Blood Meal (12-0-0)	1/3 pound	All Areas
Feather Meal (12-0-0)	2/3 pound	All Areas
Soil Sulfur	2/3 pound	Sample 3 Area Only
Soil Sulfur	1/2 pound	Sample 5 Area Only

- Backfill below 12 inches required for 24 inch box or larger material should not contain the organic amendment, soil sulfur, ammonium sulfate, blood meal or feather meal but should still contain the triple superphosphate and potassium sulfate at the recommended rate. Iron sulfate should be incorporated at a 1 1/3 pound rate in the sample 3 area and a 1 pound rate in the sample 5 area. **Caution: iron sulfate can stain moist concrete.**
- Ideally a weed and turf free zone should be maintained just beyond the diameter of the planting hole. A
- 2-4 inch deep layer of coarse mulch can be placed around the tree or shrub. Mulch should be kept a minimum 4 inches from the trunk.
- Irrigation of new plantings should take into consideration the differing texture of the rootball substrate and surrounding soil matrix to maintain adequate moisture during this critical period of establishment.

Maintenance

Maintenance fertilization may rely primarily on a nitrogen only program supplemented with a complete fertilizer in the fall and spring. You may begin applying Ammonium Sulfate (21-0-0) at a rate of 5 pounds per 1000 square feet 45-60 days after planting with refertilization every 45-60 days. Alternatively, slow release Sulfur Coated Urea (43-0-0) may be applied at a 5 pound rate with refertilization scheduled at 3 month intervals. Once the landscape has become well established the frequency of fertilization should be decreased depending on color and rate of growth desired. In the spring and fall substitute a complete fertilizer such as 16-6-8 to help ensure continuing adequate phosphorus and potassium.

Alternatively, organic sources of fertilizer such as Alfalfa, Blood, Soybean and Cotton Seed Meal may be applied per the label rate. Alfalfa Meal at a rate of 20 pounds per 1000 square feet would provide slow release nitrogen for 2-3 months or a combination of Blood and Feather Meal at a total of 16 pounds per

1000 square feet would provide nitrogen for 3-4 months. Refertilization may be accomplished with a nitrogen only organic fertilizer during the growing season. In the fall and spring, substitute a complete organic fertilizer such as (5-5-5) applied at the manufacturer's label rate. Or, nutrient rich composted greenwaste may be spread in a 1 to 2 inch layer, which generally carries enough nutrition to boost complete nutrition though a source of nitrogen might also be added at a half rate to assure adequate nitrogen availability.

If we can be of any further assistance, please feel free to contact us.

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Project : Homes At Deer Hill

COMPREHENSIVE SOIL ANALYSIS

Report No : **16-055-0100**
Purchase Order :
Date Recd : 02/24/2016
Date Printed : 02/29/2016

Sample Description - Sample ID	Half Sat %	pH	ECe dS/m	NO_3-N ppm	NH_4-N ppm	PO_4-P ppm	K ppm	Ca ppm	Mg ppm	Cu ppm	Zn ppm	Mn ppm	Fe ppm	Organic % dry wt.	Lab No.
	TEC	Qual Lime		Sufficiency Factors											
Site Soil 12-18" #1	22	7.5	0.3	4	12	6	156	3065	585	0.8	1.3	9	22	0.8	32359
	205	None		0.4		0.2	0.6	0.9	1.4	0.3	0.1	0.4	0.2		
Site Soil 12-18" #2	22	6.6	0.2	2	12	35	222	2949	536	1.5	2.5	11	65	1.6	32360
	196	None		0.3		1.3	1.0	1.0	1.4	0.6	0.3	0.5	0.7		
Site Soil 12-18" #3	23	7.9	0.4	5	15	17	260	3135	509	1.3	3.4	8	31	2.1	32361
	204	None		0.4		0.6	1.0	1.0	1.2	0.5	0.3	0.4	0.3		
Site Soil 12-18" #4	24	7.1	0.4	7	10	20	333	2779	532	1.6	2.6	7	48	2.0	32362
	189	None		0.4		0.7	1.4	0.9	1.3	0.7	0.3	0.3	0.5		
Site Soil 12-18" #5	23	7.6	0.3	4	12	11	206	3111	359	1.2	1.7	10	42	1.3	32363
	189	None		0.3		0.4	0.9	1.0	0.9	0.5	0.2	0.5	0.4		

Saturation Extract Values						SAR	Gravel %		Percent of Sample Passing 2 mm Screen					USDA Soil Classification	Lab No.
									Sand			Silt	Clay		
Ca meq/L	Mg meq/L	Na meq/L	K meq/L	B ppm	SO_4 meq/L		Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	.002-.05	0-.002		
1.6	1.0	0.8	0.1	0.06	0.4	0.7	0	0.3	0.8	1.2	53.6	27.1	17.2	Sandy Loam	32359
1.2	0.8	0.3	0.2	0.07	0.7	0.4	3.5	2.4	1.8	1.8	46	25.1	25.2	Sandy Clay Loam	32360
2.4	1.2	0.5	0.2	0.06	0.5	0.3	2.4	3.3	1.4	1.6	48.6	25.1	23.2	Sandy Clay Loam	32361
2.1	1.3	0.4	0.3	0.09	0.6	0.3	2.3	4.1	0.8	0.8	50	21.1	27.2	Sandy Clay Loam	32362
1.8	0.8	0.6	0.2	0.04	0.6	0.5	0.7	1.5	0.8	1.2	47.6	27.1	23.2	Sandy Clay Loam	32363

Sufficiency factor (1.0=sufficient for average crop) below each nutrient value. N factor based on 200 ppm constant feed. SAR = Sodium adsorption ratio. Half Saturation %=approx field moisture capacity. Nitrogen(N), Potassium(K), Calcium(Ca) and Magnesium(Mg) by sodium chloride extraction. Phosphorus(P) by sodium bicarbonate extraction. Copper(Cu), Zinc(Zn), Manganese(Mn) & Iron(Fe) by DTPA extraction. Sat. ext. method for salinity (ECe as dS/m),Boron (B), Sulfate(SO_4), Sodium(Na). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm(1/2 inch) sieve. Particle sizes in millimeters. Organic percentage determined by Walkley-Black or Loss on Ignition.

* LOW , SUFFICIENT , HIGH