Soil and Plant Laboratory, Inc.
www.soilandplantlaboratory.com

352 Mathew Street
Santa Clara, CA 95050
408-727-0330 phone
408-727-5125 fax

SANTA CLARA OFFICE
May 18, 2001
Lab. No. 26396

H. T. HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

Attn: Ernst Strenge

RE: **LEONA QUARRY** – PROJ. NO. 1950-01, P. O. NO. 01-390

BACKGROUND

The following evaluation has taken into account the thorough background information that accompanied the samples.

SUMMARY

Characteristics common to the reference soils that may also help preclude invasive species include moderate acidity and low phosphorus availability. Adjustment to soil chemistry is needed for both the fill and potential topsoil to lower pH, increase potassium and improve the balance between calcium and magnesium.

All of the reference soils have substantial organic content while the soils for new planting are low in organic. The incorporation of composted organic matter would offer advantages such as introducing a microbial population, improving soil structure and providing some nutrients. There is a significant concern here though because this could increase the phosphorus level beyond what is typical at the reference sites. Since higher phosphorus is a distinguishing characteristic in the sample from the Broom area this might not be desirable. There would still be an advantage to soil structure from incorporating a more inert source of organic such as nitrogen stable sawdust.

REFERENCE SITES

The slightly alkaline pH of sample 1 deviates from the moderate acidity at all the other areas. Correlating with the higher pH are lower levels of the micronutrients. Based on levels in 2 it appears the goal should be to have a lower pH.

All of these sites show favorably low salinity, and sodium. SAR values indicate sodium is adequately balanced by calcium and magnesium.

APPENDIX A.
Soil Analysis Laboratory Testing Results

H. T. HARVEY & ASSOCIATES
May 18, 2001
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Particle size makeup is diverse and if it were not for the abundance of organic matter these soils would be susceptible to consolidation as the various size particles intermingle. The predominate classification is gravelly sandy clay loam. Infiltration rates are estimated to be in the range of 0.22 to 0.26 inch per hour.

Available nutrient levels show all low in nitrogen and phosphorus. Potassium is barely adequate in 1 but well above sufficiency in the others. All show a proper balance between calcium and magnesium. Sample 1 shows lower micronutrient levels with zinc and iron deficient. In the other areas levels are higher with manganese particularly abundant. Sulfate levels vary from low to fair.

RHYOLITE FILL SOILS

Characteristics of 2 deviate significantly from 1 and are also more dissimilar from the reference soils. While salinity of 2 would not typically be restrictive it is much higher than in any of the other samples. This reflects high soluble levels of calcium, magnesium and sulfate. This is also associated with a slightly alkaline pH. If this is readily distinguishable from 1, then its use for the root zone should be minimized. If it will be blended with 1, then at least there will be some dilution bringing salt content closer to that found in the reference soils. Either will need pH adjustment. Sodium levels are favorably low.

Sample 1 has more silt and clay than 2 but both show a broad range of coarse particles similar to the reference soils. Organic levels are very low and infiltration rates are estimated at 0.23-inch per hour.

Available nutrient levels match the low nitrogen and phosphorus of the reference soils but potassium levels are much lower and in deficiency ranges. Calcium levels are lower than desired relative to the abundance of magnesium. Micronutrients are not deficient but are much lower than in the reference samples. The adjustment of pH may compensate for this sufficiently. Sulfate is deficient in 1 and very high in 2.

POTENTIAL TOPSOILS

Characteristics of these two samples are significantly different and the higher pH and higher phosphorus level in 2 makes it particularly undesirable. All characteristics of 2 are very similar to the undesirable Broom soil.

Sample 1 will need to have pH lowered but it does show favorably low nitrogen and phosphorus. Potassium is very deficient and needs aggressive supplementation to bring it in line with the reference soils. The pH adjustment should improve micronutrient levels. Iron is deficient at this time. The characteristic of this that still deviates from all the other samples is its high magnesium level. This cannot be altered by the amendment program even though the addition of calcium and potassium will improve the cation balance. The abundance of magnesium might be a significant enough deviation that use of this source should be reconsidered.

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Texture of 2 is fairly similar to the reference soils but organic content is lower. It is still in a fairly normal range for a topsoil horizon. The infiltration rate is estimated at 0.28-inch per hour.

BROOM SOIL – INVASIVE, NON-NATIVE HABITAT

Characteristics that deviate mostly from the reverence sites are slight alkalinity and an adequate phosphorus level. While micronutrient levels are lower, none are in a deficiency range. Sulfate is marginal at best. Salinity, sodium and boron are safely low and comparable to the reference soils.

Texture is similar to the others except that more gravel is present. Organic content is normal for native topsoil and the infiltration rate is estimated at 0.21 inch per hour.

RECOMMENDATIONS

Because of the steepness of planting areas you might consider blending amendments with the fill or topsoil before that is spread. It would be difficult to obtain the desired degree of pH adjustment without being able to blend sulfur with these soils. The efficiency of improving the calcium to magnesium balance would also be compromised if materials were just applied to the surface.

FILL SOILS

In order to most closely match characteristics of the reference soil the preference would be to minimize use of soil represented by samples 2. For bulk blending amendments the following formula would apply:

Amount Per 10 Cubic Yards

7 pounds	Soil Sulfur
5 pounds	Potassium Sulfate (0-0-50)
16 pounds	Agricultural Gypsum

If materials are incorporated to 6 inches after the soil has been spread then the equivalent rates would be:

Amount / 1000 Square Feet

13 pounds	Soil Sulfur
9 pounds	Potassium Sulfate (0-0-50)
30 pounds	Agricultural Gypsum

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POTENTIAL TOPSOILS

It is suggested that #2 not be used. For bulk blending amendments with #1 the following formula would apply:

Amount Per 10 Cubic Yards

6 pounds	Soil Sulfur
8 pounds	Potassium Sulfate (0-0-50)
22 pounds	Agricultural Gypsum

If materials are incorporated to 6 inches after the soil has been spread then the equivalent rates would be:

Amount / 1000 Square Feet

11 pounds	Soil Sulfur
14 pounds	Potassium Sulfate (0-0-50)
40 pounds	Agricultural Gypsum

As noted above, this topsoil would still have much higher magnesium availability than the reference soils. The additions of calcium and potassium should be sufficient that the magnesium level would not interfere with the plants ability to utilize either of these nutrients.

Jim West
JIM WEST

Fax 7 pages and mail.

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COMPREHENSIVE SOIL ANALYSIS
(A05-1, A05-2 or A05-3)

Santa Clara Office
Lab No. 26396
LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
1	22	7.4	0.6	5	6	6	170	3050	402	2.0	3	22	13	1.1	CA, Sage Disturbed Reference
	189	Low		0.3		0.2	0.6	1.0	1.0	0.5	0.3	1.1	0.1		0.9901-A10610 23 4
2	20	5.9	0.4	6	7	4	400	2000	672	4.6	11	54	68	4.4	CA, Sage Undisturbed
	166			0.3		0.2	2.1	0.9	2.2	1.7	1.6	3.6	1.0		0.8301-A10611 23 4
3	18	5.5	0.6	13	15	1	290	1340	330	2.8	9	90	52	3.9	Chamise Undisturbed
	102			0.8		0.1	2.3	0.9	1.7	1.6	2.0	9.2	1.2		0.8701-A10612 23 4
4	22	5.9	0.3	7	10	2	250	1860	372	3.2	11	82	47	4.3	CA, Sage / Cham. Undisturbed
	130			0.4		0.1	1.3	0.9	1.3	1.2	1.7	5.7	0.7		1.0101-A10613 23 4

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
1	2.9	1.2	1.1	0.2	0.11	0.7	0.8	14.2	14.6	11.9	11.4	27.6	22.7	26.4	Gravelly Sandy Clay Loam
2	1.1	0.8	0.9	0.3	0.14	0.8	0.9	7.7	15.9	19.2	11.6	21.0	25.3	22.9	Gravelly Sandy Clay Loam
3	1.7	1.4	1.0	0.7	0.13	1.7	0.8	11.3	14.1	15.2	9.8	23.8	28.3	22.9	Gravelly Loam
4	1.0	0.7	0.7	0.3	0.13	0.8	0.8	10.5	16.0	15.8	11.4	22.6	29.3	20.9	GravelLoam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

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COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Santa Clara Office
Lab No. 26396
LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
5	22	5.3	0.5	6	11	8	430	2290	506	5.6	25	106	142	7.2	Coast Live Oak Undisturbed
	167			0.4		0.3	2.1	1.0	1.6	2.0	3.6	6.9	2.1		0.8201-A10614 23 4
6	16	6.9	0.3	5	6	7	70	1620	856	1.4	3	33	23	0.6	RH 1 Fill
	155	None		0.3		0.3	0.4	0.8	3.3	0.6	0.5	2.5	0.4		0.7801-A10615 23 4
7	15	7.3	3.2	4	6	1	120	1430	896	3.3	5	18	39	0.6	RH 2 Fill
	136	None		0.3		0.1	0.8	0.8	3.9	1.6	0.9	1.5	0.8		0.7801-A10616 23 4
8	17	6.7	0.5	4	5	4	90	3290	2300	2.2	1	24	23	0.6	Top Soil 1
	358	Low		0.3		0.2	0.3	0.9	4.7	0.5	0.1	1.0	0.2		0.6401-A10617 23 4

Sample #	Saturation Extract Values Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
5	1.8	1.1	1.0	0.6	0.34	1.6	0.8	6.2	10.6	21.2	12.8	18.8	23.3	23.9	Gravelly Sandy Clay Loam
6	1.0	0.8	1.1	0.1	0.13	0.6	1.2	11.0	14.5	13.4	10.0	21.7	30.0	24.9	Gravelly Loam
7	18.2	25.5	1.9	0.2	0.09	47.1	0.4	11.1	16.1	18.1	16.1	30.4	18.5	16.9	Gravelly Sandy Loam
8	1.7	2.0	1.0	0.1	0.07	1.0	0.7	3.9	13.2	15.0	14.8	27.3	24.4	18.5	GravelSandy Loam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

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Santa Clara Office
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LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
9	20	7.3	0.7	4	6	16	110	2870	830	2.4	4	18	52	1.7	Top Soil 2
	217	Low		0.2		0.7	0.4	1.0	2.1	0.6	0.4	0.9	0.6		0.8601-A10618 23 4
10	20	7.3	0.7	11	14	20	190	2330	668	2.4	8	27	27	1.6	Broom Soil
	175	None		0.6		0.8	0.8	0.9	1.9	0.7	1.0	1.5	0.3		0.9401-A10619 23 4

Percent of Sample Passing 2 mm Screen

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Gravel: Coarse 5-12	Gravel: Fine 2-5	Sand: Very Coarse 1-2	Sand: Coarse 0.5-1	Sand: Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
9	2.8	2.0	2.7	0.1	0.14	1.4	1.7	9.7	8.8	6.0	6.5	30.6	30.4	26.5	Gravelly Loam
10	3.4	2.7	1.1	0.3	0.14	1.3	0.6	21.5	14.0	11.4	11.7	29.0	21.4	26.5	Very GravSandy Clay Loam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

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SANTA CLARA OFFICE
June 12, 2001
Lab. No. 26149

H. T. HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

Attn: Ernst Strenge

RE: LEONA QUARRY – PROJ. NO. 1950-01, P. O. NO. 01-429

BACKGROUND

It is understood that displacement of the tuff soil from the upper portion of the slope will be used to fill the lower part to create a more gently grade. It was also indicated that some of the rhyolite soil evaluated 5/18 may be blended with this.

Specific questions raised in your 5/24 letter are addressed at the end of this report.

REFERENCE SITE - TUFF

Characteristics are similar to reference sites represented by samples 2 through 5, which apparently are of rhyolite origin. Characteristics that may be particularly important in establishing the desired plants are the moderate acidity, low phosphorus and abundance of potassium.

TUFF FILL

Reaction is just a little lower than the moderately acidic level seen in the reference sample. Fertility characteristics that need adjustment include correcting the extremely low calcium level and increasing potassium and organic content.

Texture may initially be coarser than the reference material but should break down with weathering. The presence of organic matter will also help compensate for this.

DISCUSSION

Comparing the tuff fill and the rhyolite fill to the reference soil, similarities include low potassium, high magnesium and low organic content. The two fill materials differ from each other in that the tuff is a little more acidic than the target and is extremely low in calcium. The rhyolite is more alkaline than desired but does show the desired calcium content.

H. T. HARVEY & ASSOCIATES
June 12, 2001
Lab. No. 26149

RECOMMENDATIONS

In order to most closely match characteristics of the tuff reference soil amendment needs would be:

	Amount Per 10 Cubic Yards	Amount / 1000 Square Feet to 6 inches	
100% Tuff Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	5 pounds	10 pounds	Calcium Carbonate Lime
	22 pounds	45 pounds	Agricultural Gypsum
70% Tuff Fill 30% Rhyolite Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	22 pounds	40 pounds	Agricultural Gypsum
100% Rhyolite Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	16 pounds	30 pounds	Agricultural Gypsum
	7 pounds	13 pounds	Soil Sulfur

One of the items raised in your list of questions was the rate for amending an individual pit 2 feet in diameter by 1-foot depth. From the above rates listed for 10 cubic yards multiplying by 0.186 would result in units of ounces weight per pit.

MISCELLANEOUS QUESTIONS

Responses are numbered to correspond with your numbered questions.

1. Rh1 needs potassium and calcium and would still have much higher magnesium than the reference material. Rh2 would not need as much potassium but still needs calcium and would still have high magnesium and higher soluble salts.

2. The high magnesium in both makes it even more important to address the potassium and calcium levels. This balance of the cations may be playing a significant role in determining the plant population.

3. Initial corrections should bring current conditions to sufficient similarity. Maintenance of those conditions depends on the natural recycling of nutrients from microbial activity. Without organic matter being present this would be slowed significantly. Fungal innoculum referred to in 9 may also be beneficial in this respect.

H. T. HARVEY & ASSOCIATES
June 12, 2001
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4. Check with Northern California Fertilizer Co. 408-453-7907.

5. Check with TMT Enterprises 408-432-9040.

6. Using less will just leave results farther from the target. Impact of that on maintaining the desired plants is not known.

7. If materials are only applied to the surface rates of sulfur and gypsum should be reduced by 30%. While the effectiveness of organic matter would be severely reduced if not incorporated, there would still be a long term benefit from applying some just as a top mulch if that is all that is possible.

8. As noted above 0.186 times the 10 cubic yard rate equals ounces weight per pit.

9. Mycorrhizal fungi use would not alter the amendments suggested and based on work done by others this may be beneficial. I do not have sufficient experience with their use and direction should be based on consultation with others.

10. Without organic matter these soils will be subject to consolidation which would mean less water penetration and more likely surface erosion concerns. Organic matter would help this a great deal.

11. The comment about phosphorus was only with respect to organic matter derived from yard waste. This is not a concern with sawdust.

12. Here again it is only the addition or organic matter than can create a condition similar to the reference soil. The organic matter will result in better water penetration and the ability to retain a better reserve for the plants. Estimated infiltration rates noted are not at field capacity. I have no familiarity with rain patterns.

Jim West

JIM WEST

Fax 4 pages and mail.

(408) 727-5125

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COMPREHENSIVE SOIL ANALYSIS
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1950-01

Samples Taken: Samples Rec'd: 5/30/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
1	22	5.5	0.4	7	6	2	250	1450	388	4.6	8	22	85	3.7	Tuff Reference
	111			0.3		0.1	1.6	0.8	1.6	2.1	1.4	1.8	1.6		1.0101-A12162 25 4
2	16	5.3	0.4	6	13	6	90	190	828	2.4	2	9	32	0.1	Tuff Fill Soil
	87			0.6		0.3	0.9	0.2	5.2	1.7	0.6	1.1	0.9		0.8001-A12163 25 4

Sample #	Saturation Extract Values Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
1	1.2	0.9	0.7	0.3	0.08	0.9	0.7	12.4	13.8	11.0	10.4	19.7	34.4	24.5	Gravelly Loam
2	0.3	0.4	1.9	0.1	0.08	0.7	3.1	21.7	21.0	19.3	16.7	24.6	17.1	22.3	Very GravSandy Clay Loam

6/ 5/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

APPENDIX C

GEOBRUGG

Service/Maintenance Manual
Rockfill Barrier - 30 ft-ton
June 28, 2002

Service/Maintenance Manual
Rockfill Barrier - 74 ft-ton to 295 ft-ton
July 1, 2002

Service / Maintenance Manual – 30 ft-ton Rockfall Barrier
GEOBRUGG Technical Department

GEOBRUGG

NOTE: Rockfall, Landslides, Debris Flows or Avalanches are sporadic and unpredictable. Causes range from human (construction, etc.) to environmental (weather, earthquakes, etc.) Because of the multiplicity of factors affecting such an event, it is not and cannot be an exact science that guarantees the safety of individuals and property. However, by the application of sound engineering principles to a predictable range of parameters, and by the use of properly designed protection measures in identified risk areas, the risk of injury and property loss can be substantially reduced. Inspection and maintenance of such systems is necessary to insure the desired protection level. It can also be degraded by impact damage, which exceeds the design limits of a particular system or by corrosion caused by pollution or other man-made factors.

SERVICE / MAINTENANCE OF ROCKFALL PROTECTION BARRIERS:

GEOBRUGG Rockfall Protection Barriers are designed to require little or no maintenance when impacted by rocks with kinetic energy within the design load rating of the system (please refer to the GEOBRUGG Impact Load Chart). However, minor maintenance is occasionally required after such impacts, depending on frequency. Other repairs may be necessary if rock impacts with kinetic energy beyond the design load rating are experienced. The most common (though infrequent) maintenance tasks required are outlined below. Please refer to the layout and design drawings for the particular installation for specific detail on assembly as needed.

Infrequent rockfall will obviously require less maintenance than frequent rockfall events. If frequent events (daily) take place well within the energy absorption design load of a system, the service efforts will generally be limited to routine checking as outlined below. Major events such as rockfalls with energies around system design load may necessitate some minor repairs. Major events such as rockfalls beyond system design load may necessitate repairs that are more significant.

ROUTINE CHECKING:

- Periodic "quick" checking of the systems once to twice per year for major events:
  - are any bigger rocks lying in the nets?
  - have any braking elements responded?
  - is the effective height reduced due to sagging ropes?
  - re-checking of the wire rope clips (using a torque wrench)

- Does chainlink have any holes requiring repair? Chainlink material may become tattered from frequent rockfalls or may acquire holes from bigger rockfall events. Any holes or tears should be repaired to prevent rocks smaller than the mesh size of the nets from passing through the nets or to improve the aesthetics of a system.

- Clearing out of soil, rubble, dead leaves, etc. behind a system as necessary to prevent the formation of jump platforms. Such accumulations result in a reduced effective barrier height and reduced system flexibility and thus reduced energy dissipating capability. For such reasons, debris should never be allowed to accumulate behind the systems to more than 1/4 to 1/3 the height of the nets.

- Periodic checking of the anchorage condition after approximately 10 years.

CHECKING MAJOR EVENTS:

If a major event occurs (energy around the design load of the system), the following service work must be carried out:

- Braking Elements. Check whether one or more braking elements have responded. Braking elements need no maintenance unless they are fully deformed, in which case they need to be replaced. Testing has shown that these new braking elements perform as intended up to the point of full activation, even if by several separate events. However, once any single braking element activation has accumulated to ~40 cm. or more, it should be replaced in order to maintain the full energy absorption capacity of the system as a whole. Care must be taken in any case that the additional sagging of the nets caused by the responding of braking elements does not become excessive, as this has a strong influence on the effective height of the barrier. Re-tightening of the appropriate ropes can also be carried out without exchange of the braking elements.

- Support Rope Tightening. Braking element response will result in extra slack in the support ropes and thus sagging of the support rope and net(s). If braking elements have responded, but not enough to warrant replacement, a judgment needs to be made whether or not the sag and consequent reduction in effective height is acceptable. The sag can be reduced or eliminated without replacing the braking element(s) by simply re-tensioning the support rope. Support ropes can be tightened to obtain the original effective height if deemed necessary.

- Support Ropes & Shackles. Examine for possible damage or loss of strength. Crushed or broken rope wires may result from rockfall events. The rope should be repaired or replaced if more than approximately 10% of the rope cross section is affected. Severe buckling of ropes is also a reason to proceed with replacement. Shackles are used to connect adjacent ring net panels and end ring net panels to support rope structure.

- Ring Nets and Anchorages. Examine for possible damage. Damaged rings of the ring net should be repaired. Clips on the rings that have broken or moved significantly should be replaced. Significantly damaged nets should be replaced, though the need for this is quite rare. Examine the anchorages to ensure they do not appear to have been disturbed, weakened, or damaged. If a major event occurs (beyond design load but within the ultimate load), the following service work must be carried out:

- Replacement of braking elements as necessary (as above)

- Support Rope & shackle repair, replacement or tightening (as above)

- Net repair or replacement as necessary (as above)

- Anchorage repair

- Column repair or replacement as necessary. The fundamental function of the columns is to provide the nets with the necessary effective height. Direct rock impacts to the columns may bend or deform the columns, though such deformation is rare. Slightly bent columns do not

have to be repaired or replaced as long as their condition does not mean a significant loss of height or ill-fitting nets, or unless the deformation has aesthetic consequences. If so desired for aesthetic reasons, minor deformation can usually be pounded out and repainted. Column foundations should be examined to ensure that no damage exists and that the connections are sound.

SERVICE / REPAIR WORK:

After performing any repair work to the system, re-assembly should be done in accordance with the original design drawings (i.e. with correct wire rope clip torques, clip orientation on the rope, etc.)

- Cleanout: Cleanout procedures for the systems will depend on the quantity of material in the nets and may require at least partial disassembly to allow material to be removed by hand or with heavy equipment. Some alternatives include:

  1) For systems alongside roads or with easy access, cleanout will be most easily accomplished by driving behind the fence (where space allows) with heavy equipment such as a backhoe or loader.

  2) If there is insufficient space behind the barriers to allow equipment passage, and jersey barriers are used for traffic protection with the nets being elevated off the ground, cleanout may be possible without requiring any degree of fence disassembly. After moving any jersey barrier that may be in front of any particular section, accumulated rocks can be removed through the 2'-8" high gap between the bottom of the nets and the ground, taking care not to "snag" the bottom of the net or bottom support rope with the equipment that is being used.

  3) If better access is still required or desired, varying degrees of partial system disassembly can be undertaken as follows (with or without temporarily moving jersey barrier that may or may not be in place):

     a) loosening the bottom support rope where it is attached to the anchor by removing the wire rope clips, and then sliding the bottom support rope through the affected nets to allow the nets to hang freely. Or,
     b) it may be possible to unbolt the bottom cable guide assembly(s) from the columns, thereby allowing the bottom support rope and bottom of the nets to swing outward and/or be lifted.
     Please note that the nets can withstand being driven over with rubber tires, but should not be driven over with track rigs.

- Chainlink: Holes or tears in the chainlink fabric can be patched or entire panels can be replaced. Chainlink should be reattached to the nets with galvanized hog rings.

- Braking Element replacement: If the braking element tube is not too badly deformed, the tube can simply be slid off the rope and a new tube can be slid onto the rope and into place. If the rope will no longer freely slide through the tube, the braking element will need to be cut out and a new braking element (tube with a prefabricated sling with presses at both ends) is spliced back into place.

- In a top support rope: First secure the support rope from moving through the cable guides by attaching one end of a come-along to the rope between the column and the braking element, and the other end to the anchor. Alternatively, a vise-grip or cable clip can be applied to the rope at the column cable guide, whatever works, to prevent the rope from passing through the cable guide when tension on the rope is relieved. Next, detach the support rope from the anchor by removing the wire rope clips. Finally, slide the old tube off the rope, slide a new tube onto the rope, and re-secure the rope to the anchor, and remove whatever restraining device was used. If the tube does not want to stay in place and instead wants to slide down the rope, a small piece of baling wire can be tied around the rope at the end of the tube to prevent it from sliding.

  If the tube will not freely slide off the rope, the old braking element will need to be cut out of the rope and replaced with a spare. This is accomplished by cutting the support rope on each side of the old braking element and removing the old braking element. A new braking element is then spliced into place using loop splices (as shown in the design drawings) on each side of the replacement. Then, re-secure the rope to the anchor, and remove whatever restraining device was used.

- In a bottom support rope: Same as above, except the support rope does not need to be secured prior to disconnecting it from the anchor.

- Required material / tools:
  - spare braking element
  - wire rope cutter
  - wire rope clips of appropriate size
  - come-along (or vise-grips, cable clips),
  - set of socket wrenches with torque setting ability
  - ladder

- Repairing damaged Support Ropes: Broken or damaged support ropes can be spliced back together using wire rope clips and a small length of the same diameter wire rope, per the splicing detail in the design drawings. First, remove the net section in question from the support rope. Next, attach the ends of a come-along to the support rope on each side of the damaged section of rope, and tension. Cut the support rope on either side of the damaged section. Attach a new piece of wire rope to the two cut ends of the support rope by using a clipped splice per the design drawings. Remove the come-along and shackle the net(s) to the support rope. Alternatively, the repair cable can be spliced over the damaged section of cable without cutting out the damaged section.

  Replacement of a support rope will necessitate removal of the net(s) from the support rope section in question. The support rope is then removed by unfastening the cable guides from the columns, and removing the wire rope clips from the anchors. The new rope is then installed (per design drawings) by putting it into place, re-attaching the cable guides, tensioning the rope as necessary and re-attaching to the anchors.

- Support Rope tightening. If the net sag is undesirable, and no braking elements are fully activated, the sag can be eliminated by re-tightening the support rope where it is attached to the anchor. First, attach a come-along to the anchor at one end and to the rope at the other end. Using the come-along, apply more tension to the rope as necessary. Next, detach the support

rope from the anchor by removing the wire rope clips. Refasten the clips at the attachment to the anchor after removing any of the resultant slack. Remove the come-along.

Tension on these ropes should be such that it is only enough to eliminate the undesirable sag. Any more tension will inhibit the proper operation of the system.

- Repairing or replacing damaged Nets: Single rings that are broken can be replaced. Damaged rings should be cut and a new ring spliced back into place, eliminating the damaged portion.

  If an entire net needs to be replaced, the chainlink mesh material must first be removed and carefully stored. Next, proceed as in section "Cleanout – 3a" (above)(top and bottom support ropes). The new net is now fastened again by sliding the support ropes through the ring nets. The support ropes are then fastened to the anchors with cable clips. Adjacent nets are shackled together. Finally, the chainlink is fastened to the new net again using galvanized hog rings on 2' centers vertically and horizontally.

- Column replacement or repair: Columns can be detached from the foundations after removal of support ropes, retaining ropes and nets by removing the four base plate nuts and lifting the column up off the foundation bolts.

Service / Maintenance Manual - 74 ft-ton to 295 ft-ton Rockfall Barrier(s) - Ring Nets
GEOBRUGG Technical Department

GEOBRUGG

NOTE: Rockfall, Landslides, Debris Flows or Avalanches are sporadic and unpredictable. Causes range from human (construction, etc.) to environmental (weather, earthquakes, etc.) Because of the multiplicity of factors affecting such an event it is not and cannot be an exact science that guarantees the safety of individuals and property. However, by the application of sound engineering principles to a predictable range of parameters, and by the use of properly designed protection measures in identified risk areas, the risk of injury and property loss can be substantially reduced. Inspection and maintenance of such systems is necessary to insure the desired protection level. It can also be degraded by impact damage, which exceeds the design limits of a particular system or by corrosion caused by pollution or other man-made factors.

SERVICE / MAINTENANCE OF ROCKFALL PROTECTION BARRIERS:

GEOBRUGG Rockfall Protection Barriers are designed to require little or no maintenance when impacted by rocks with kinetic energy within the design load rating of the system (please refer to the GEOBRUGG Impact Load Chart). However, minor maintenance is occasionally required after such impacts, depending on frequency. Other repairs may be necessary if rock impacts with kinetic energy beyond the design load rating are experienced. The most common (though infrequent) maintenance tasks required are outlined below. Please refer to the layout and design drawings for the particular installation for specific detail on assembly as needed.

Infrequent rockfall will obviously require less maintenance than frequent rockfall events. If frequent events (daily) take place well within the energy absorption design load of a system, the service efforts will generally be limited to routine checking as outlined below. Major events such as rockfalls with energies around system design load may necessitate some minor repairs. Major events such as rockfalls beyond system design load may necessitate more significant repairs.

ROUTINE CHECKING:

- Periodic "quick" checking of the systems once to twice per year for major events:
  - are any bigger rocks lying in the nets?
  - have any braking elements responded?
  - is the effective height reduced due to sagging ropes?
  - re-checking of the wire rope clips (using a torque wrench)

- Does chainlink have any holes requiring repair? Chainlink material may become tattered from frequent rockfalls or may acquire holes from bigger rockfall events. Any holes or tears should be repaired to prevent rocks smaller than the ring diameter of the nets from passing through, or to improve the aesthetics of a system.

- Clearing out of soil, rubble, dead leaves, etc. behind a system as necessary to prevent the formation of jump platforms. Such accumulations result in a reduced effective barrier height and reduced system flexibility and thus reduced energy dissipating capability. For such reasons, debris should never be allowed to accumulate behind the systems to more than 1/4 to 1/3 the height of the nets.

- Periodic checking of the anchorage condition after approximately 10 years.

CHECKING MAJOR EVENTS:

If a major event occurs (energy around the design load of the system), the following service work must be carried out:

- Braking Elements: Check whether one or more braking elements have responded. Braking elements need no maintenance unless they have been fully deformed, in which case they need to be replaced. Testing has shown that these new braking elements perform as intended up to the point of full activation, even if by several separate events. However, once any single braking element activation has accumulated to ~40 cm. or more, it should be replaced in order to maintain the full energy absorption capacity of the system as a whole. Care must be taken in any case that the additional sagging of the nets caused by the responding of braking elements does not become excessive, as this has a strong influence on the effective height of the barrier. Re-tightening of the appropriate ropes can also be carried out without exchange of the braking elements.

- Support Rope(s) and Retaining Rope(s) tightening: Braking element response will result in extra slack in the support ropes, and thus sagging of the support rope and net(s). If braking elements have responded, but not enough to warrant replacement, a judgment needs to be made whether or not the sag and consequent reduction in effective height is acceptable. The sag can be reduced or eliminated without replacing the braking element(s) by simply re-tensioning the support rope. Support ropes can be tightened to obtain the original effective height if deemed necessary. Similarly, braking element response in tieback ropes will result in tieback ropes being slack. Slack tieback ropes should always be free of any slack, and thus need to be re-tightened if necessary.

- Support Ropes & Shackles and Retaining Ropes: Examine for possible damage or loss of strength. Crushed or broken rope wires may result from rockfall events. The rope should be repaired or replaced if more than approximately 10% of the rope cross section is affected. Severe buckling of ropes is also a reason to go ahead with replacement. Shackles are used to connect the ring nets to the support rope.

- Ring Nets and Anchorages. Examine for possible damage. Damaged rings of the ring net should be repaired. Clips on the rings that have broken or moved significantly should be replaced. Significantly damaged nets should be replaced, though the need for this is quite rare. Examine the anchorages to ensure they do not appear to have been disturbed, weakened, or damaged. If a major event occurs (beyond design load, but within the ultimate load), the following service work must be carried out:

- Replacement of braking element(s) as necessary (as above)

- Support Rope(s) & shackle repair and Retaining Rope(s) repair, replacement or tightening (as above)

- Net repair or replacement as necessary (as above)

- Anchorage repair

- Column repair or replacement as necessary. The fundamental function of the columns is to provide the nets with the necessary effective height. Direct rock impacts to the columns may bend or deform the columns, though such deformation is rare. Slightly bent columns do not have to be repaired or replaced as long as their condition does not mean a significant loss of height or ill-fitting nets, or unless the deformation has aesthetic consequences. If so desired for aesthetic reasons, minor deformation can usually be pounded out and re-painted.

  For columns with the column breakaway assembly at the base, extremely large impacts may cause the breakaway assembly to engage, allowing the column to rotate (tieback ropes prevent the column from laying all the way down). In this case, the breakaway shear bolts will need to be replaced after the column has been righted, and the retaining rope braking elements will need to be replaced. Foundations should be examined to ensure that no damage exists, and that the connections are sound.

  For columns without the column breakaway assembly at the base, foundations should be examined to ensure that no damage exists, and that the connections are sound.

SERVICE / REPAIR WORK:

After performing any repair work to the system, re-assembly should be done in accordance with the original design drawings (i.e. with correct wire rope clip torques, clip orientation on the rope, etc.)

- Cleanout: Cleanout procedures for the systems will depend on the quantity of material in the nets, and may require at least partial disassembly to allow material to be removed by hand or with heavy equipment. Some alternatives include:

  1) For systems alongside roads or with easy access, cleanout will be most easily accomplished by driving behind the fence (where space allows) with heavy equipment such as a backhoe or loader. Prior to driving equipment behind a system, the retaining ropes need to be detached from the top of the columns by opening the top cable guide on the column, and slipping the pressed loop of the rope off the top of the column. Alternatively, the retaining rope can be detached from the anchors by removing the wire rope clips on the clip loop attachments to the anchors.

  2) If there is insufficient space behind the barriers to allow equipment passage, and jersey barriers are used for traffic protection with the nets being elevated off the ground, cleanout may be possible without requiring any degree of fence disassembly. After moving any jersey barrier that may be in front of any particular section, accumulated rocks can be removed through the 2'-8" high gap between the bottom of the nets and the ground, taking care not to "snag" the bottom of the net or bottom support rope with the equipment that is being used.

  3) If better access is still required or desired, varying degrees of partial system disassembly can be undertaken as follows (with or without temporarily moving jersey barrier that may or may not be in place):

a) unshackle the bottom of the net from the bottom support rope, allowing the bottom of net to be raised (please note that the bottom support rope will still be in place, and care must be taken not to "snag" it with the equipment being used). Or,
b) loosening the bottom support rope by removing the wire rope clips at the clipped loop end of the rope with no unshackling, and then pulling up the bottom support rope slightly, net and all. Or,
c) it may be possible to open the bottom cable guide assembly(s), thereby allowing the bottom support rope and bottom of the nets to swing outward and/or be lifted. Or,
d) unshackling the affected net from the support ropes. The net will then fall to the ground, allowing the rock to be removed. Again, please note that the support ropes will still be in place, and care must be taken not to "snag" them with the equipment being used. The net can then be lifted back into place, and be re-shackled to the support ropes and adjacent nets as before. Please note that the nets can withstand being driven over with rubber tires, but should not be driven over with track rigs.

- Chainlink: Holes or tears in the chainlink fabric can be patched or entire panels can be replaced. Chainlink should be re-attached to the nets with galvanized hog rings as necessary.

- Braking Element replacement: Attach the ends of a come-along to the support rope on each side of the old braking element, and tension. Cut the support rope on each side of the old braking element to remove the old braking element. A spare braking element (tube with a prefabricated sling with pressed loops at both ends) is then spliced back into the support rope by using loop splices (as shown in the design drawings) on each side of the replacement. Remove the come-along, re-shackle the net (as necessary) to the support rope.

- In a retaining rope: These braking elements are most easily replaced by simply replacing the entire retaining rope. Alternatively, the retaining rope can be disconnected from the anchor, and if the tube is not too badly deformed, the tube can be slid off the rope. A replacement tube (spare braking element with rope sling removed) is then slid back into place, and the retaining rope is reconnected to the anchor. If the tube does not want to stay in place and instead wants to slide down the rope, a small piece of baling wire can be tied around the rope at the end of the tube to prevent it from sliding. If the tube will not freely slide off the rope, it will need to be cut out and replaced with a braking element spare using loop splices.

- Required material / tools:
  1. spare braking element
  2. wire rope cutter
  3. wire rope clips of appropriate size
  4. come-along (or vise-grips, cable clips),
  5. set of socket wrenches with torque setting ability
  6. ladder

- Repairing damaged Support Ropes: Broken or damaged support ropes can be spliced back together using wire rope clips and a small length of the same diameter wire rope, per the splicing detail in the design drawings. Attach the ends of a come-along to the support rope on each side of the damaged section of rope, and tension. Cut the support rope on either side of the damaged section of support rope. Attach a new piece of wire rope having the same diameter, to

the two cut ends of the support rope by using a clipped splice per the design drawings. Remove the come-along and re-shackle the net (as necessary) to the support rope.

Replacement of a support rope will necessitate removal of all shackles and netting from the support rope section in question. The support rope is then removed by loosening and opening the cable guide assemblies, and removing the wire rope clips from the clipped loop end of the rope. The new rope is then installed (per design drawings) by putting it into place, re-attaching the clip loop on one end after tensioning the rope as necessary, and re-securing the cable guides.

- Support Rope tightening. If the net sag is undesirable, and no braking elements are fully activated, the sag can be eliminated by re-tightening the top support rope at the clipped loop. First, attach a come-along to the cable, then loosen the clips, and using the come-along, apply more tension to the rope as necessary. Then re-fasten the clips at the clip loop to the cable guide after removing any of the resultant slack. Remove the come-along.

  Tension on these ropes should be such that it is only enough to eliminate the undesirable sag. Any more tension will inhibit the proper operation of the system.

- Repairing or replacing damaged Nets: Single rings that are broken can be replaced. Damaged rings should be cut and a new ring spliced back in place, eliminating the damaged portion.

  If an entire net needs to be replaced, the chainlink mesh material must first be removed and carefully stored. Next, remove the shackles from the net panel. The new net is now fastened again to the support ropes and adjacent nets using the shackles. Finally, the chainlink is fastened to the new net again using galvanized hog rings on 2' centers vertically and horizontally.

- Column replacement or repair: Columns can be detached from the foundations after removal of support ropes, retaining ropes and nets by removing the four base plate nuts and lifting the column up off the foundation bolts.

  If the breakaway assembly has engaged, the column can be placed back in a vertical position and two new shear bolts can be attached in the breakaway assembly per the design drawings. In such an instance, the retaining rope braking elements will also need to be replaced.

APPENDIX D

Legal Description
Geologic Hazard Abatement District (GHAD) Property
Leona Property, Oakland California

AUGUST 11, 2004
JOB NO.: 1020-00

LEGAL DESCRIPTION
GEOLOGIC HAZARD ABATEMENT DISTRICT (GHAD)
LEONA PROPERY
OAKLAND, CALIFORNIA

REAL PROPERTY, SITUATE IN THE INCORPORATED TERRITORY OF THE CITY OF OAKLAND, COUNTY OF ALAMEDA, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

BEING ALL OF THAT CERTAIN PARCEL OF LAND GRANTED TO LEONA, LLC, BY DEED RECORDED JUNE 2, 2004, IN DOCUMENT NO. 2004-244483 OF OFFICIAL RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING ALL OF CROWN RIDGE COURT, AS SAID CROWN RIDGE COURT IS SHOWN AND SO DESIGNATED ON THE AMENDED MAP, TRACT 5018, RECORDED FEBRUARY 11, 1988, IN BOOK 175 OF MAPS AT PAGE 1, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING ALL OF EDENVALE PLACE, AS SAID EDENVALE PLACE IS SHOWN AND SO DESIGNATED ON THAT CERTAIN PARCEL MAP NO. 7106, RECORDED DECEMBER 1, 1997, IN BOOK 232 OF PARCEL MAPS AT PAGE 88, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING A PORTION OF MOUNTAIN BOULEVARD, AS SAID MOUNTAIN BOULEVARD IS SHOWN AND SO DESIGNATED ON THAT CERTAIN MAP ENTITLED "LEONA HEIGHTS ADDITION," RECORDED FEBRUARY 27, 1925, IN BOOK 4 OF MAPS AT PAGE 64, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WESTERN CORNER OF PARCEL THREE, AS SAID PARCEL THREE IS DESCRIBED IN SAID DEED (2004-244483);

THENCE, FROM SAID POINT OF BEGINNING, ALONG THE BOUNDARY LINE, THE FOLLOWING FIFTY-THREE (53) COURSES:

1) NORTH 41°14'29" EAST 110.65 FEET,

2) NORTH 50°02'49" EAST 58.46 FEET,

3) SOUTH 55°28'54" EAST 316.09 FEET,

4) NORTH 41°07'43" EAST 136.86 FEET,

5) NORTH 23°07'33" EAST 261.93 FEET,

6) SOUTH 49°47'02" EAST 298.00 FEET,

7) NORTH 31°20'49" EAST 23.54 FEET,

8) SOUTH 58°07'51" EAST 50.00 FEET,

9) SOUTH 55°34'31" EAST 525.86 FEET,

10) NORTH 49°21'05" EAST 687.70 FEET,

29) ALONG THE ARC OF A TANGENT 730.00 FOOT RADIUS CURVE TO THE LEFT, THROUGH A CENTRAL ANGLE OF 10°22'59", AN ARC DISTANCE OF 132.29 FEET,

30) SOUTH 52°00'20" WEST 1.00 FEET,

31) SOUTH 37°59'40" EAST 371.73 FEET,

32) SOUTH 52°04'51" WEST 349.00 FEET,

33) NORTH 37°59'40" WEST 124.69 FEET,

34) SOUTH 51°57'18" WEST 1,854.61 FEET,

35) SOUTH 51°03'42" EAST 328.48 FEET,

36) SOUTH 37°06'48" WEST 93.00 FEET,

37) NORTH 56°17'57" WEST 346.14 FEET,

38) ALONG THE ARC OF A TANGENT 7,958.61 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 02°46'18", AN ARC DISTANCE OF 385.00 FEET,

39) ALONG THE ARC OF A REVERSE 210.02 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 36°28'21" WEST, THROUGH A CENTRAL ANGLE OF 13°34'36", AN ARC DISTANCE OF 49.77 FEET,

40) ALONG THE ARC OF A NON-TANGENT 42.00 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 84°42'52" WEST, THROUGH A CENTRAL ANGLE OF 64°33'32", AN ARC DISTANCE OF 47.32 FEET,

41) NORTH 69°50'40" WEST 225.02 FEET,

42) ALONG THE ARC OF A TANGENT 962.07 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 08°56'53", AN ARC DISTANCE OF 150.25 FEET,

43) NORTH 60°53'47" WEST 110.81 FEET,

44) ALONG THE ARC OF A TANGENT 508.04 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 13°20'10", AN ARC DISTANCE OF 118.25 FEET,

45) ALONG THE ARC OF A REVERSE 492.04 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 42°26'23" WEST,

LEGAL DESCRIPTION AUGUST 11, 2004
PAGE 4 OF 4 JOB NO.: 1020-00

THROUGH A CENTRAL ANGLE OF 13°27'25", AN ARC DISTANCE OF 115.56 FEET,

46) NORTH 61°01'02" WEST 416.40 FEET,

47) ALONG THE ARC OF A TANGENT 2,008.15 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 04°25'01", AN ARC DISTANCE OF 154.81 FEET,

48) NORTH 56°36'01" WEST 753.45 FEET,

49) ALONG THE ARC OF A TANGENT 1,208.09 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 09°57'19", AN ARC DISTANCE OF 209.91 FEET,

50) NORTH 46°41'34" WEST 135.31 FEET,

51) SOUTH 34°19'40" WEST 32.55 FEET,

52) NORTH 51°50'59" WEST 131.94 FEET,

53) ALONG THE ARC OF A TANGENT 5,959.45 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 02°29'06", AN ARC DISTANCE OF 258.47 FEET TO SAID POINT OF BEGINNING.

CONTAINING 134.11 ARCES OF LAND, MORE OR LESS.

END OF DESCRIPTION

Parcel name: GHAD

North: 9456.7293 East : 7597.9310

Line Course: N 41-14-29 E Length: 110.65
North: 9539.9314 East : 7670.8752

Line Course: N 50-02-49 E Length: 58.46
North: 9577.4720 East : 7715.6889

Line Course: S 55-28-54 E Length: 316.09
North: 9398.3533 East : 7976.1296

Line Course: N 41-07-43 E Length: 136.86
North: 9501.4411 East : 8066.1495

Line Course: N 23-07-33 E Length: 261.93
North: 9742.3236 East : 8169.0230

Line Course: S 49-47-02 E Length: 298.00
North: 9549.9132 East : 8396.5801

Line Course: N 31-20-49 E Length: 23.54
North: 9570.0171 East : 8408.8261

Line Course: S 58-07-51 E Length: 50.00
North: 9543.6180 East : 8451.2888

Line Course: S 55-34-31 E Length: 525.86
North: 9246.3373 East : 8885.0548

Line Course: N 49-21-05 E Length: 687.70
North: 9694.3176 East : 9406.8258

Line Course: N 33-51-34 E Length: 95.01
North: 9773.2145 East : 9459.7613

Line Course: S 38-18-32 E Length: 156.87
North: 9650.1217 East : 9557.0052

Line Course: N 51-41-28 E Length: 564.93
North: 10000.3223 East : 10000.2945

Line Course: S 32-37-35 E Length: 401.98
North: 9661.7731 East : 10217.0256

Line Course: N 51-41-28 E Length: 533.65
North: 9992.5831 East : 10635.7702

Line Course: N 38-18-32 W Length: 300.70
North: 10228.5364 East : 10449.3660

Line Course: N 41-34-59 E Length: 296.00
North: 10449.9428 East : 10645.8227

Line Course: S 48-25-01 E Length: 225.00
North: 10300.6092 East : 10814.1214

Line Course: N 84-18-52 E Length: 130.97
North: 10313.5842 East : 10944.4471

Line Course: S 51-31-37 E Length: 41.79
North: 10287.5847 East : 10977.1646

Curve Length: 64.23 Radius: 25.00
Delta: 147-11-42 Tangent: 84.93
Chord: 47.97 Course: N 49-46-20 E
Course In: N 66-10-29 E Course Out: N 33-22-11 E
RP North: 10297.6834 East : 11000.0341
End North: 10318.5619 East : 11013.7851

Curve Length: 14.27 Radius: 10.00
Delta: 81-47-12 Tangent: 8.66
Chord: 13.09 Course: N 82-28-35 E
Course In: N 33-22-11 E Course Out: S 48-25-01 E

```
    RP  North: 10326.9133          East : 11019.2855
    End North: 10320.2762          East : 11026.7654
Line  Course: N 41-34-59 E  Length: 187.36
        North: 10460.4205          East : 11151.1172
Line  Course: S 48-25-01 E  Length: 158.94
        North: 10354.9312          East : 11270.0034
Curve  Length: 151.44              Radius: 770.00
        Delta: 11-16-08           Tangent: 75.97
        Chord: 151.20              Course: S 43-36-57 E
    Course In: S 40-44-59 W     Course Out: N 52-01-07 E
    RP  North: 9771.6037           East : 10767.3813
    End North: 10245.4659          East : 11374.3035
Line  Course: S 37-58-53 E  Length: 646.89
        North: 9735.5803           East : 11772.4031
Curve  Length: 121.26              Radius: 670.00
        Delta: 10-22-12           Tangent: 60.80
        Chord: 121.10              Course: S 32-47-47 E
    Course In: S 52-01-07 W     Course Out: N 62-23-19 E
    RP  North: 9323.2586           East : 11244.3020
    End North: 9633.7850           East : 11837.9967
Line  Course: S 27-36-41 E  Length: 197.00
        North: 9459.2210           East : 11929.3007
Curve  Length: 132.29              Radius: 730.00
        Delta: 10-22-59           Tangent: 66.33
        Chord: 132.11              Course: S 32-48-11 E
    Course In: N 62-23-19 E     Course Out: S 52-00-20 W
    RP  North: 9797.5557           East : 12576.1621
    End North: 9348.1786           East : 12000.8706
Line  Course: S 52-00-20 W  Length: 1.00
        North: 9347.5630           East : 12000.0826
Line  Course: S 37-59-40 E  Length: 371.73
        North: 9054.6136           East : 12228.9140
Line  Course: S 52-04-51 W  Length: 349.00
        North: 8840.1360           East : 11953.5954
Line  Course: N 37-59-40 W  Length: 124.69
        North: 8938.4005           East : 11876.8381
Line  Course: S 51-57-18 W  Length: 1854.61
        North: 7795.4411           East : 10416.2827
Line  Course: S 51-03-42 E  Length: 328.48
        North: 7588.9968           East : 10671.7819
Line  Course: S 37-06-48 W  Length: 93.00
        North: 7514.8345           East : 10615.6663
Line  Course: N 56-17-57 W  Length: 346.14
        North: 7706.8926           East : 10327.6965
Curve  Length: 385.00              Radius: 7958.61
        Delta: 2-46-18            Tangent: 192.54
        Chord: 384.96              Course: N 54-54-48 W
    Course In: N 33-42-03 E     Course Out: S 36-28-21 W
    RP  North: 14328.0267          East : 14743.5832
    End North: 7928.1721           East : 10012.6918
Curve  Length: 49.77               Radius: 210.02
        Delta: 13-34-36           Tangent: 25.00
        Chord: 49.65               Course: N 60-18-57 W
    Course In: S 36-28-21 W     Course Out: N 22-53-45 E
    RP  North: 7759.2861           East : 9887.8482
    End North: 7952.7594           East : 9969.5579
Curve  Length: 47.32               Radius: 42.00
```

Delta: 64-33-32 Tangent: 26.53
Chord: 44.86 Course: N 37-33-54 W
Course In: S 84-42-52 W Course Out: N 20-09-20 E
RP North: 7948.8904 East : 9927.7365
End North: 7988.3184 East : 9942.2084
Line Course: N 69-50-40 W Length: 225.02
North: 8065.8535 East : 9730.9685
Curve Length: 150.25 Radius: 962.07
Delta: 8-56-53 Tangent: 75.28
Chord: 150.10 Course: N 65-22-14 W
Course In: N 20-09-20 E Course Out: S 29-06-13 W
RP North: 8969.0069 East : 10062.4691
End North: 8128.4064 East : 9594.5274
Line Course: N 60-53-47 W Length: 110.81
North: 8182.3033 East : 9497.7081
Curve Length: 118.25 Radius: 508.04
Delta: 13-20-10 Tangent: 59.39
Chord: 117.98 Course: N 54-13-42 W
Course In: N 29-06-13 E Course Out: S 42-26-23 W
RP North: 8626.1990 East : 9744.8139
End North: 8251.2717 East : 9401.9813
Curve Length: 115.56 Radius: 492.04
Delta: 13-27-25 Tangent: 58.05
Chord: 115.30 Course: N 54-17-19 W
Course In: S 42-26-23 W Course Out: N 28-58-58 E
RP North: 7888.1522 East : 9069.9458
End North: 8318.5718 East : 9308.3621
Line Course: N 61-01-02 W Length: 416.40
North: 8520.3371 East : 8944.1098
Curve Length: 154.81 Radius: 2008.15
Delta: 4-25-01 Tangent: 77.44
Chord: 154.77 Course: N 58-48-31 W
Course In: N 28-58-58 E Course Out: S 33-23-59 W
RP North: 10276.9972 East : 9917.1523
End North: 8600.4921 East : 8811.7125
Line Course: N 56-36-01 W Length: 472.34
North: 8860.5043 East : 8417.3792
Line Course: N 56-36-01 W Length: 281.11
North: 9015.2488 East : 8182.6944
Curve Length: 209.91 Radius: 1208.09
Delta: 9-57-19 Tangent: 105.22
Chord: 209.64 Course: N 51-40-13 W
Course In: N 33-21-07 E Course Out: S 43-18-26 W
RP North: 10024.3775 East : 8846.8785
End North: 9145.2670 East : 8018.2374
Line Course: N 46-41-34 W Length: 135.31
North: 9238.0775 East : 7919.7742
Line Course: S 34-19-40 W Length: 32.55
North: 9211.1969 East : 7901.4183
Line Course: N 51-50-59 W Length: 131.94
North: 9292.6997 East : 7797.6616
Curve Length: 258.47 Radius: 5959.45
Delta: 2-29-06 Tangent: 129.26
Chord: 258.45 Course: N 50-36-26 W
Course In: N 38-09-01 E Course Out: S 40-38-07 W
RP North: 13979.1710 East : 11478.9699
End North: 9456.7204 East : 7597.9282

Line Course: N 40-38-07 E Length: 0.00
        North: 9456.7204   East : 7597.9282

   Perimeter: 13653.16   Area: 5,841,954 sq.ft. 134.11 acres

Mapcheck Closure - (Uses listed courses, radii, and deltas)
Error Closure: 0.0094   Course: S 17-20-16 W
  Error North: -0.00896   East : -0.00280
Precision 1: 1,452,461.70

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May 18, 2001
Lab. No. 26396

Texture of 2 is fairly similar to the reference soils but organic content is lower. It is still in a fairly normal range for a topsoil horizon. The infiltration rate is estimated at 0.28-inch per hour.

BROOM SOIL – INVASIVE, NON-NATIVE HABITAT

Characteristics that deviate mostly from the reverence sites are slight alkalinity and an adequate phosphorus level. While micronutrient levels are lower, none are in a deficiency range. Sulfate is marginal at best. Salinity, sodium and boron are safely low and comparable to the reference soils.

Texture is similar to the others except that more gravel is present. Organic content is normal for native topsoil and the infiltration rate is estimated at 0.21 inch per hour.

RECOMMENDATIONS

Because of the steepness of planting areas you might consider blending amendments with the fill or topsoil before that is spread. It would be difficult to obtain the desired degree of pH adjustment without being able to blend sulfur with these soils. The efficiency of improving the calcium to magnesium balance would also be compromised if materials were just applied to the surface.

FILL SOILS

In order to most closely match characteristics of the reference soil the preference would be to minimize use of soil represented by samples 2. For bulk blending amendments the following formula would apply:

Amount Per 10 Cubic Yards

7 pounds	Soil Sulfur
5 pounds	Potassium Sulfate (0-0-50)
16 pounds	Agricultural Gypsum

If materials are incorporated to 6 inches after the soil has been spread then the equivalent rates would be:

Amount / 1000 Square Feet

13 pounds	Soil Sulfur
9 pounds	Potassium Sulfate (0-0-50)
30 pounds	Agricultural Gypsum

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POTENTIAL TOPSOILS

It is suggested that #2 not be used. For bulk blending amendments with #1 the following formula would apply:

Amount Per 10 Cubic Yards

6 pounds	Soil Sulfur
8 pounds	Potassium Sulfate (0-0-50)
22 pounds	Agricultural Gypsum

If materials are incorporated to 6 inches after the soil has been spread then the equivalent rates would be:

Amount / 1000 Square Feet

11 pounds	Soil Sulfur
14 pounds	Potassium Sulfate (0-0-50)
40 pounds	Agricultural Gypsum

As noted above, this topsoil would still have much higher magnesium availability than the reference soils. The additions of calcium and potassium should be sufficient that the magnesium level would not interfere with the plants ability to utilize either of these nutrients.

Jim West
JIM WEST

Fax 7 pages and mail.

Soil and Plant Laboratory, Inc.

P.O. Box 6566, Orange, California 92613-6566/(714) 282-8777/FAX (714) 282-8575
P.O. Box 153, Santa Clara, California 95052-0153/(408) 727-0330/FAX (408) 727-5125
P.O. Box 1648, Bellevue, Washington 98009-1648/(425) 746-6565/FAX (425) 562-9531

H T HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

COMPREHENSIVE SOIL ANALYSIS
(A05-1, A05-2 or A05-3)

Santa Clara Office
Lab No. 26396
LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	Parts Per Million Parts Dry Soil: NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
1	22	7.4	0.6	5	6	6	170	3050	402	2.0	3	22	13	1.1	CA, Sage Disturbed Reference
	189	Low		0.3		0.2	0.6	1.0	1.0	0.5	0.3	1.1	0.1		0.9901-A10610 23 4
2	20	5.9	0.4	6	7	4	400	2000	672	4.6	11	54	68	4.4	CA, Sage Undisturbed
	166			0.3		0.2	2.1	0.9	2.2	1.7	1.6	3.6	1.0		0.8301-A10611 23 4
3	18	5.5	0.6	13	15	1	290	1340	330	2.8	9	90	52	3.9	Chamise Undisturbed
	102			0.8		0.1	2.3	0.9	1.7	1.6	2.0	9.2	1.2		0.8701-A10612 23 4
4	22	5.9	0.3	7	10	2	250	1860	372	3.2	11	82	47	4.3	CA, Sage / Cham. Undisturbed
	130			0.4		0.1	1.3	0.9	1.3	1.2	1.7	5.7	0.7		1.0101-A10613 23 4

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
1	2.9	1.2	1.1	0.2	0.11	0.7	0.8	14.2	14.6	11.9	11.4	27.6	22.7	26.4	Gravelly Sandy Clay Loam
2	1.1	0.8	0.9	0.3	0.14	0.8	0.9	7.7	15.9	19.2	11.6	21.0	25.3	22.9	Gravelly Sandy Clay Loam
3	1.7	1.4	1.0	0.7	0.13	1.7	0.8	11.3	14.1	15.2	9.8	23.8	28.3	22.9	Gravelly Loam
4	1.0	0.7	0.7	0.3	0.13	0.8	0.8	10.5	16.0	15.8	11.4	22.6	29.3	20.9	GravelLoam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

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P.O. Box 6566, Orange, California 92613-6566/(714) 282-8777/FAX (714) 282-8575
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P.O. Box 1648, Bellevue, Washington 98009-1648/(425) 746-6665/FAX (425) 562-9531

H T HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Santa Clara Office
Lab No. 26396
LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
5	22	5.3	0.5	6	11	8	430	2290	506	5.6	25	106	142	7.2	Coast Live Oak Undisturbed
	167			0.4		0.3	2.1	1.0	1.6	2.0	3.6	6.9	2.1		0.8201-A10614 23 4
6	16	6.9	0.3	5	6	7	70	1620	856	1.4	3	33	23	0.6	RH 1 Fill
	155	None		0.3		0.3	0.4	0.8	3.3	0.6	0.5	2.5	0.4		0.7801-A10615 23 4
7	15	7.3	3.2	4	6	1	120	1430	896	3.3	5	18	39	0.6	RH 2 Fill
	136	None		0.3		0.1	0.8	0.8	3.9	1.6	0.9	1.5	0.8		0.7801-A10616 23 4
8	17	6.7	0.5	4	5	4	90	3290	2300	2.2	1	24	23	0.6	Top Soil 1
	358	Low		0.3		0.2	0.3	0.9	4.7	0.5	0.1	1.0	0.2		0.6401-A10617 23 4

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
5	1.8	1.1	1.0	0.6	0.34	1.6	0.8	6.2	10.6	21.2	12.8	18.8	23.3	23.9	Gravelly Sandy Clay Loam
6	1.0	0.8	1.1	0.1	0.13	0.6	1.2	11.0	14.5	13.4	10.0	21.7	30.0	24.9	Gravelly Loam
7	18.2	25.5	1.9	0.2	0.09	47.1	0.4	11.1	16.1	18.1	16.1	30.4	18.5	16.9	Gravelly Sandy Loam
8	1.7	2.0	1.0	0.1	0.07	1.0	0.7	3.9	13.2	15.0	14.8	27.3	24.4	18.5	GravelSandy Loam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

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H T HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Santa Clara Office
Lab No. 26396
LEONA QUARRY

Samples Taken: Samples Rec'd: 5/ 7/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
9	20	7.3	0.7	4	6	16	110	2870	830	2.4	4	18	52	1.7	Top Soil 2
	217	Low		0.2		0.7	0.4	1.0	2.1	0.6	0.4	0.9	0.6		0.8601-A10618 23 4
10	20	7.3	0.7	11	14	20	190	2330	668	2.4	8	27	27	1.6	Broom Soil
	175	None		0.6		0.8	0.8	0.9	1.9	0.7	1.0	1.5	0.3		0.9401-A10619 23 4

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
9	2.8	2.0	2.7	0.1	0.14	1.4	1.7	9.7	8.8	6.0	6.5	30.6	30.4	26.5	Gravelly Loam
10	3.4	2.7	1.1	0.3	0.14	1.3	0.6	21.5	14.0	11.4	11.7	29.0	21.4	26.5	Very GravSandy Clay Loam

5/10/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half Saturation %=approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

Soil and Plant Laboratory, Inc.

www.soilandplantlaboratory.com

352 Mathew Street
Santa Clara, CA 95050
408-727-0330 phone
408-727-5125 fax

SANTA CLARA OFFICE
June 12, 2001
Lab. No. 26149

H. T. HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

Attn: Ernst Strenge

RE: LEONA QUARRY – PROJ. NO. 1950-01, P. O. NO. 01-429

BACKGROUND

It is understood that displacement of the tuff soil from the upper portion of the slope will be used to fill the lower part to create a more gently grade. It was also indicated that some of the rhyolite soil evaluated 5/18 may be blended with this.

Specific questions raised in your 5/24 letter are addressed at the end of this report.

REFERENCE SITE - TUFF

Characteristics are similar to reference sites represented by samples 2 through 5, which apparently are of rhyolite origin. Characteristics that may be particularly important in establishing the desired plants are the moderate acidity, low phosphorus and abundance of potassium.

TUFF FILL

Reaction is just a little lower than the moderately acidic level seen in the reference sample. Fertility characteristics that need adjustment include correcting the extremely low calcium level and increasing potassium and organic content.

Texture may initially be coarser than the reference material but should break down with weathering. The presence of organic matter will also help compensate for this.

DISCUSSION

Comparing the tuff fill and the rhyolite fill to the reference soil, similarities include low potassium, high magnesium and low organic content. The two fill materials differ from each other in that the tuff is a little more acidic than the target and is extremely low in calcium. The rhyolite is more alkaline than desired but does show the desired calcium content.

H. T. HARVEY & ASSOCIATES
June 12, 2001
Lab. No. 26149

RECOMMENDATIONS

In order to most closely match characteristics of the tuff reference soil amendment needs would be:

	Amount Per 10 Cubic Yards	Amount / 1000 Square Feet to 6 inches	
100% Tuff Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	5 pounds	10 pounds	Calcium Carbonate Lime
	22 pounds	45 pounds	Agricultural Gypsum
70% Tuff Fill 30% Rhyolite Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	22 pounds	40 pounds	Agricultural Gypsum
100% Rhyolite Fill			
	2 cubic yards	3.8 cubic yards	Nitrogen Stable Organic
	5 pounds	10 pounds	Potassium Sulfate (0-0-50)
	16 pounds	30 pounds	Agricultural Gypsum
	7 pounds	13 pounds	Soil Sulfur

One of the items raised in your list of questions was the rate for amending an individual pit 2 feet in diameter by 1-foot depth. From the above rates listed for 10 cubic yards multiplying by 0.186 would result in units of ounces weight per pit.

MISCELLANEOUS QUESTIONS

Responses are numbered to correspond with your numbered questions.

1. Rh1 needs potassium and calcium and would still have much higher magnesium than the reference material. Rh2 would not need as much potassium but still needs calcium and would still have high magnesium and higher soluble salts.

2. The high magnesium in both makes it even more important to address the potassium and calcium levels. This balance of the cations may be playing a significant role in determining the plant population.

3. Initial corrections should bring current conditions to sufficient similarity. Maintenance of those conditions depends on the natural recycling of nutrients from microbial activity. Without organic matter being present this would be slowed significantly. Fungal innoculum referred to in 9 may also be beneficial in this respect.

H. T. HARVEY & ASSOCIATES
June 12, 2001
Lab. No. 26149

4. Check with Northern California Fertilizer Co. 408-453-7907.

5. Check with TMT Enterprises 408-432-9040.

6. Using less will just leave results farther from the target. Impact of that on maintaining the desired plants is not known.

7. If materials are only applied to the surface rates of sulfur and gypsum should be reduced by 30%. While the effectiveness of organic matter would be severely reduced if not incorporated, there would still be a long term benefit from applying some just as a top mulch if that is all that is possible.

8. As noted above 0.186 times the 10 cubic yard rate equals ounces weight per pit.

9. Mycorrhizal fungi use would not alter the amendments suggested and based on work done by others this may be beneficial. I do not have sufficient experience with their use and direction should be based on consultation with others.

10. Without organic matter these soils will be subject to consolidation which would mean less water penetration and more likely surface erosion concerns. Organic matter would help this a great deal.

11. The comment about phosphorus was only with respect to organic matter derived from yard waste. This is not a concern with sawdust.

12. Here again it is only the addition or organic matter than can create a condition similar to the reference soil. The organic matter will result in better water penetration and the ability to retain a better reserve for the plants. Estimated infiltration rates noted are not at field capacity. I have no familiarity with rain patterns.

Jim West

JIM WEST

Fax 4 pages and mail.

Soil and Plant Laboratory, Inc.

P.O. Box 6566, Orange, California 92613-6566/(714) 282-8777/FAX (714) 282
P.O. Box 153, Santa Clara, California 95052-0153/(408) 727-0330/FAX (408)
P.O. Box 1648, Bellevue, Washington 98009-1648/(425) 746-6565/FAX (425)

H T HARVEY & ASSOCIATES
3150 Almaden Expressway, Suite 145
San Jose, CA 95118

COMPREHENSIVE SOIL ANALYSIS
(AO5-1, AO5-2 or AO5-3)

Santa Clara Office
Lab No. 26149
Leona Quarry
1950-01

Samples Taken: Samples Rec'd: 5/30/01

Sample #	Half Sat%/ TEC	pH/ Qual Lime	ECe	NO3 N	NH4 N	PO4 P	K	Ca	Mg	Cu	Zn	Mn	Fe	Organic % dry wt.	Sample Description & Log Number
				Parts Per Million Parts Dry Soil											
1	22	5.5	0.4	7	6	2	250	1450	388	4.6	8	22	85	3.7	Tuff Reference
	111			0.3		0.1	1.6	0.8	1.6	2.1	1.4	1.8	1.6		1.0101-A12162 25 4
2	16	5.3	0.4	6	13	6	90	190	828	2.4	2	9	32	0.1	Tuff Fill Soil
	87			0.6		0.3	0.9	0.2	5.2	1.7	0.6	1.1	0.9		0.8001-A12163 25 4

Sample #	Saturation Extract Values: Ca me/l	Mg me/l	Na me/l	K me/l	B ppm	SO4 me/l	SAR	Percent of Sample Passing 2 mm Screen: Gravel Coarse 5-12	Gravel Fine 2-5	Sand Very Coarse 1-2	Sand Coarse 0.5-1	Sand Med. to V. Fine 0.05-.5	Silt .002-.05	Clay 0-.002	USDA Soil Classification
1	1.2	0.9	0.7	0.3	0.08	0.9	0.7	12.4	13.8	11.0	10.4	19.7	34.4	24.5	Gravelly Loam
2	0.3	0.4	1.9	0.1	0.08	0.7	3.1	21.7	21.0	19.3	16.7	24.6	17.1	22.3	Very GravSandy Clay Loam

6/ 5/01

Sufficiency factor (1.0=sufficient for average crop) below each nutrient element. N factor based on 200 ppm constant feed. Half saturation =approx field moisture capacity. Salinity ECe (dS/m at 25 deg.C.) by sat ext method. Major elements by sodium chloride extraction (phosphorus by sodium bicarbonate extraction). Cu, Zn, Mn & Fe by DTPA extraction. SAR=Sodium adsorption ratio. Na=Sodium (meq/l). TEC (listed below Half Sat.)=Estimated Total Exchangeable Cations (meq/kg) Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

APPENDIX C

GEOBRUGG

Service/Maintenance Manual
Rockfill Barrier - 30 ft-ton
June 28, 2002

Service/Maintenance Manual
Rockfill Barrier - 74 ft-ton to 295 ft-ton
July 1, 2002

Service / Maintenance Manual – 30 ft-ton Rockfall Barrier
GEOBRUGG Technical Department

GEOBRUGG

NOTE: Rockfall, Landslides, Debris Flows or Avalanches are sporadic and unpredictable. Causes range from human (construction, etc.) to environmental (weather, earthquakes, etc.) Because of the multiplicity of factors affecting such an event, it is not and cannot be an exact science that guarantees the safety of individuals and property. However, by the application of sound engineering principles to a predictable range of parameters, and by the use of properly designed protection measures in identified risk areas, the risk of injury and property loss can be substantially reduced. Inspection and maintenance of such systems is necessary to insure the desired protection level. It can also be degraded by impact damage, which exceeds the design limits of a particular system or by corrosion caused by pollution or other man-made factors.

SERVICE / MAINTENANCE OF ROCKFALL PROTECTION BARRIERS:

GEOBRUGG Rockfall Protection Barriers are designed to require little or no maintenance when impacted by rocks with kinetic energy within the design load rating of the system (please refer to the GEOBRUGG Impact Load Chart). However, minor maintenance is occasionally required after such impacts, depending on frequency. Other repairs may be necessary if rock impacts with kinetic energy beyond the design load rating are experienced. The most common (though infrequent) maintenance tasks required are outlined below. Please refer to the layout and design drawings for the particular installation for specific detail on assembly as needed.

Infrequent rockfall will obviously require less maintenance than frequent rockfall events. If frequent events (daily) take place well within the energy absorption design load of a system, the service efforts will generally be limited to routine checking as outlined below. Major events such as rockfalls with energies around system design load may necessitate some minor repairs. Major events such as rockfalls beyond system design load may necessitate repairs that are more significant.

ROUTINE CHECKING:

- Periodic "quick" checking of the systems once to twice per year for major events:
  - are any bigger rocks lying in the nets?
  - have any braking elements responded?
  - is the effective height reduced due to sagging ropes?
  - re-checking of the wire rope clips (using a torque wrench)

- Does chainlink have any holes requiring repair? Chainlink material may become tattered from frequent rockfalls or may acquire holes from bigger rockfall events. Any holes or tears should be repaired to prevent rocks smaller than the mesh size of the nets from passing through the nets or to improve the aesthetics of a system.

- Clearing out of soil, rubble, dead leaves, etc. behind a system as necessary to prevent the formation of jump platforms. Such accumulations result in a reduced effective barrier height and reduced system flexibility and thus reduced energy dissipating capability. For such reasons, debris should never be allowed to accumulate behind the systems to more than 1/4 to 1/3 the height of the nets.

- Periodic checking of the anchorage condition after approximately 10 years.

CHECKING MAJOR EVENTS:

If a major event occurs (energy around the design load of the system), the following service work must be carried out:

- Braking Elements. Check whether one or more braking elements have responded. Braking elements need no maintenance unless they are fully deformed, in which case they need to be replaced. Testing has shown that these new braking elements perform as intended up to the point of full activation, even if by several separate events. However, once any single braking element activation has accumulated to ~40 cm. or more, it should be replaced in order to maintain the full energy absorption capacity of the system as a whole. Care must be taken in any case that the additional sagging of the nets caused by the responding of braking elements does not become excessive, as this has a strong influence on the effective height of the barrier. Re-tightening of the appropriate ropes can also be carried out without exchange of the braking elements.

- Support Rope Tightening. Braking element response will result in extra slack in the support ropes and thus sagging of the support rope and net(s). If braking elements have responded, but not enough to warrant replacement, a judgment needs to be made whether or not the sag and consequent reduction in effective height is acceptable. The sag can be reduced or eliminated without replacing the braking element(s) by simply re-tensioning the support rope. Support ropes can be tightened to obtain the original effective height if deemed necessary.

- Support Ropes & Shackles. Examine for possible damage or loss of strength. Crushed or broken rope wires may result from rockfall events. The rope should be repaired or replaced if more than approximately 10% of the rope cross section is affected. Severe buckling of ropes is also a reason to proceed with replacement. Shackles are used to connect adjacent ring net panels and end ring net panels to support rope structure.

- Ring Nets and Anchorages. Examine for possible damage. Damaged rings of the ring net should be repaired. Clips on the rings that have broken or moved significantly should be replaced. Significantly damaged nets should be replaced, though the need for this is quite rare. Examine the anchorages to ensure they do not appear to have been disturbed, weakened, or damaged. If a major event occurs (beyond design load but within the ultimate load), the following service work must be carried out:

- Replacement of braking elements as necessary (as above)

- Support Rope & shackle repair, replacement or tightening (as above)

- Net repair or replacement as necessary (as above)

- Anchorage repair

- Column repair or replacement as necessary. The fundamental function of the columns is to provide the nets with the necessary effective height. Direct rock impacts to the columns may bend or deform the columns, though such deformation is rare. Slightly bent columns do not

have to be repaired or replaced as long as their condition does not mean a significant loss of height or ill-fitting nets, or unless the deformation has aesthetic consequences. If so desired for aesthetic reasons, minor deformation can usually be pounded out and repainted. Column foundations should be examined to ensure that no damage exists and that the connections are sound.

SERVICE / REPAIR WORK:

After performing any repair work to the system, re-assembly should be done in accordance with the original design drawings (i.e. with correct wire rope clip torques, clip orientation on the rope, etc.)

- Cleanout: Cleanout procedures for the systems will depend on the quantity of material in the nets and may require at least partial disassembly to allow material to be removed by hand or with heavy equipment. Some alternatives include:

  1) For systems alongside roads or with easy access, cleanout will be most easily accomplished by driving behind the fence (where space allows) with heavy equipment such as a backhoe or loader.

  2) If there is insufficient space behind the barriers to allow equipment passage, and jersey barriers are used for traffic protection with the nets being elevated off the ground, cleanout may be possible without requiring any degree of fence disassembly. After moving any jersey barrier that may be in front of any particular section, accumulated rocks can be removed through the 2'-8" high gap between the bottom of the nets and the ground, taking care not to "snag" the bottom of the net or bottom support rope with the equipment that is being used.

  3) If better access is still required or desired, varying degrees of partial system disassembly can be undertaken as follows (with or without temporarily moving jersey barrier that may or may not be in place):

     a) loosening the bottom support rope where it is attached to the anchor by removing the wire rope clips, and then sliding the bottom support rope through the affected nets to allow the nets to hang freely. Or,
     b) it may be possible to unbolt the bottom cable guide assembly(s) from the columns, thereby allowing the bottom support rope and bottom of the nets to swing outward and/or be lifted.
     Please note that the nets can withstand being driven over with rubber tires, but should not be driven over with track rigs.

- Chainlink: Holes or tears in the chainlink fabric can be patched or entire panels can be replaced. Chainlink should be reattached to the nets with galvanized hog rings.

- Braking Element replacement: If the braking element tube is not too badly deformed, the tube can simply be slid off the rope and a new tube can be slid onto the rope and into place. If the rope will no longer freely slide through the tube, the braking element will need to be cut out and a new braking element (tube with a prefabricated sling with presses at both ends) is spliced back into place.

- In a top support rope: First secure the support rope from moving through the cable guides by attaching one end of a come-along to the rope between the column and the braking element, and the other end to the anchor. Alternatively, a vise-grip or cable clip can be applied to the rope at the column cable guide, whatever works, to prevent the rope from passing through the cable guide when tension on the rope is relieved. Next, detach the support rope from the anchor by removing the wire rope clips. Finally, slide the old tube off the rope, slide a new tube onto the rope, and re-secure the rope to the anchor, and remove whatever restraining device was used. If the tube does not want to stay in place and instead wants to slide down the rope, a small piece of baling wire can be tied around the rope at the end of the tube to prevent it from sliding.

  If the tube will not freely slide off the rope, the old braking element will need to be cut out of the rope and replaced with a spare. This is accomplished by cutting the support rope on each side of the old braking element and removing the old braking element. A new braking element is then spliced into place using loop splices (as shown in the design drawings) on each side of the replacement. Then, re-secure the rope to the anchor, and remove whatever restraining device was used.

- In a bottom support rope: Same as above, except the support rope does not need to be secured prior to disconnecting it from the anchor.

- Required material / tools:
  - spare braking element
  - wire rope cutter
  - wire rope clips of appropriate size
  - come-along (or vise-grips, cable clips),
  - set of socket wrenches with torque setting ability
  - ladder

- Repairing damaged Support Ropes: Broken or damaged support ropes can be spliced back together using wire rope clips and a small length of the same diameter wire rope, per the splicing detail in the design drawings. First, remove the net section in question from the support rope. Next, attach the ends of a come-along to the support rope on each side of the damaged section of rope, and tension. Cut the support rope on either side of the damaged section. Attach a new piece of wire rope to the two cut ends of the support rope by using a clipped splice per the design drawings. Remove the come-along and shackle the net(s) to the support rope. Alternatively, the repair cable can be spliced over the damaged section of cable without cutting out the damaged section.

  Replacement of a support rope will necessitate removal of the net(s) from the support rope section in question. The support rope is then removed by unfastening the cable guides from the columns, and removing the wire rope clips from the anchors. The new rope is then installed (per design drawings) by putting it into place, re-attaching the cable guides, tensioning the rope as necessary and re-attaching to the anchors.

- Support Rope tightening. If the net sag is undesirable, and no braking elements are fully activated, the sag can be eliminated by re-tightening the support rope where it is attached to the anchor. First, attach a come-along to the anchor at one end and to the rope at the other end. Using the come-along, apply more tension to the rope as necessary. Next, detach the support

rope from the anchor by removing the wire rope clips. Refasten the clips at the attachment to the anchor after removing any of the resultant slack. Remove the come-along.

Tension on these ropes should be such that it is only enough to eliminate the undesirable sag. Any more tension will inhibit the proper operation of the system.

- Repairing or replacing damaged Nets: Single rings that are broken can be replaced. Damaged rings should be cut and a new ring spliced back into place, eliminating the damaged portion.

  If an entire net needs to be replaced, the chainlink mesh material must first be removed and carefully stored. Next, proceed as in section "Cleanout – 3a" (above)(top and bottom support ropes). The new net is now fastened again by sliding the support ropes through the ring nets. The support ropes are then fastened to the anchors with cable clips. Adjacent nets are shackled together. Finally, the chainlink is fastened to the new net again using galvanized hog rings on 2' centers vertically and horizontally.

- Column replacement or repair: Columns can be detached from the foundations after removal of support ropes, retaining ropes and nets by removing the four base plate nuts and lifting the column up off the foundation bolts.

NOTE: Rockfall, Landslides, Debris Flows or Avalanches are sporadic and unpredictable. Causes range from human (construction, etc.) to environmental (weather, earthquakes, etc.) Because of the multiplicity of factors affecting such an event it is not and cannot be an exact science that guarantees the safety of individuals and property. However, by the application of sound engineering principles to a predictable range of parameters, and by the use of properly designed protection measures in identified risk areas, the risk of injury and property loss can be substantially reduced. Inspection and maintenance of such systems is necessary to insure the desired protection level. It can also be degraded by impact damage, which exceeds the design limits of a particular system or by corrosion caused by pollution or other man-made factors.

SERVICE / MAINTENANCE OF ROCKFALL PROTECTION BARRIERS:

GEOBRUGG Rockfall Protection Barriers are designed to require little or no maintenance when impacted by rocks with kinetic energy within the design load rating of the system (please refer to the GEOBRUGG Impact Load Chart). However, minor maintenance is occasionally required after such impacts, depending on frequency. Other repairs may be necessary if rock impacts with kinetic energy beyond the design load rating are experienced. The most common (though infrequent) maintenance tasks required are outlined below. Please refer to the layout and design drawings for the particular installation for specific detail on assembly as needed.

Infrequent rockfall will obviously require less maintenance than frequent rockfall events. If frequent events (daily) take place well within the energy absorption design load of a system, the service efforts will generally be limited to routine checking as outlined below. Major events such as rockfalls with energies around system design load may necessitate some minor repairs. Major events such as rockfalls beyond system design load may necessitate more significant repairs.

ROUTINE CHECKING:

- Periodic "quick" checking of the systems once to twice per year for major events:
  - are any bigger rocks lying in the nets?
  - have any braking elements responded?
  - is the effective height reduced due to sagging ropes?
  - re-checking of the wire rope clips (using a torque wrench)

- Does chainlink have any holes requiring repair? Chainlink material may become tattered from frequent rockfalls or may acquire holes from bigger rockfall events. Any holes or tears should be repaired to prevent rocks smaller than the ring diameter of the nets from passing through, or to improve the aesthetics of a system.

- Clearing out of soil, rubble, dead leaves, etc. behind a system as necessary to prevent the formation of jump platforms. Such accumulations result in a reduced effective barrier height and reduced system flexibility and thus reduced energy dissipating capability. For such reasons, debris should never be allowed to accumulate behind the systems to more than 1/4 to 1/3 the height of the nets.

- Periodic checking of the anchorage condition after approximately 10 years.

CHECKING MAJOR EVENTS:

If a major event occurs (energy around the design load of the system), the following service work must be carried out:

- Braking Elements: Check whether one or more braking elements have responded. Braking elements need no maintenance unless they have been fully deformed, in which case they need to be replaced. Testing has shown that these new braking elements perform as intended up to the point of full activation, even if by several separate events. However, once any single braking element activation has accumulated to ~40 cm. or more, it should be replaced in order to maintain the full energy absorption capacity of the system as a whole. Care must be taken in any case that the additional sagging of the nets caused by the responding of braking elements does not become excessive, as this has a strong influence on the effective height of the barrier. Re-tightening of the appropriate ropes can also be carried out without exchange of the braking elements.

- Support Rope(s) and Retaining Rope(s) tightening: Braking element response will result in extra slack in the support ropes, and thus sagging of the support rope and net(s). If braking elements have responded, but not enough to warrant replacement, a judgment needs to be made whether or not the sag and consequent reduction in effective height is acceptable. The sag can be reduced or eliminated without replacing the braking element(s) by simply re-tensioning the support rope. Support ropes can be tightened to obtain the original effective height if deemed necessary. Similarly, braking element response in tieback ropes will result in tieback ropes being slack. Slack tieback ropes should always be free of any slack, and thus need to be re-tightened if necessary.

- Support Ropes & Shackles and Retaining Ropes: Examine for possible damage or loss of strength. Crushed or broken rope wires may result from rockfall events. The rope should be repaired or replaced if more than approximately 10% of the rope cross section is affected. Severe buckling of ropes is also a reason to go ahead with replacement. Shackles are used to connect the ring nets to the support rope.

- Ring Nets and Anchorages. Examine for possible damage. Damaged rings of the ring net should be repaired. Clips on the rings that have broken or moved significantly should be replaced. Significantly damaged nets should be replaced, though the need for this is quite rare. Examine the anchorages to ensure they do not appear to have been disturbed, weakened, or damaged. If a major event occurs (beyond design load, but within the ultimate load), the following service work must be carried out:

- Replacement of braking element(s) as necessary (as above)

- Support Rope(s) & shackle repair and Retaining Rope(s) repair, replacement or tightening (as above)

- Net repair or replacement as necessary (as above)

- Anchorage repair

- Column repair or replacement as necessary. The fundamental function of the columns is to provide the nets with the necessary effective height. Direct rock impacts to the columns may bend or deform the columns, though such deformation is rare. Slightly bent columns do not have to be repaired or replaced as long as their condition does not mean a significant loss of height or ill-fitting nets, or unless the deformation has aesthetic consequences. If so desired for aesthetic reasons, minor deformation can usually be pounded out and re-painted.

  For columns with the column breakaway assembly at the base, extremely large impacts may cause the breakaway assembly to engage, allowing the column to rotate (tieback ropes prevent the column from laying all the way down). In this case, the breakaway shear bolts will need to be replaced after the column has been righted, and the retaining rope braking elements will need to be replaced. Foundations should be examined to ensure that no damage exists, and that the connections are sound.

  For columns without the column breakaway assembly at the base, foundations should be examined to ensure that no damage exists, and that the connections are sound.

SERVICE / REPAIR WORK:

After performing any repair work to the system, re-assembly should be done in accordance with the original design drawings (i.e. with correct wire rope clip torques, clip orientation on the rope, etc.)

- Cleanout: Cleanout procedures for the systems will depend on the quantity of material in the nets, and may require at least partial disassembly to allow material to be removed by hand or with heavy equipment. *Some alternatives include:*

  1) For systems alongside roads or with easy access, cleanout will be most easily accomplished by driving behind the fence (where space allows) with heavy equipment such as a backhoe or loader. Prior to driving equipment behind a system, the retaining ropes need to be detached from the top of the columns by opening the top cable guide on the column, and slipping the pressed loop of the rope off the top of the column. Alternatively, the retaining rope can be detached from the anchors by removing the wire rope clips on the clip loop attachments to the anchors.

  2) If there is insufficient space behind the barriers to allow equipment passage, and jersey barriers are used for traffic protection with the nets being elevated off the ground, cleanout may be possible without requiring any degree of fence disassembly. After moving any jersey barrier that may be in front of any particular section, accumulated rocks can be removed through the 2'-8" high gap between the bottom of the nets and the ground, taking care not to "snag" the bottom of the net or bottom support rope with the equipment that is being used.

  3) If better access is still required or desired, varying degrees of partial system disassembly can be undertaken as follows (with or without temporarily moving jersey barrier that may or may not be in place):

a) unshackle the bottom of the net from the bottom support rope, allowing the bottom of net to be raised (please note that the bottom support rope will still be in place, and care must be taken not to "snag" it with the equipment being used). Or,
b) loosening the bottom support rope by removing the wire rope clips at the clipped loop end of the rope with no unshackling, and then pulling up the bottom support rope slightly, net and all. Or,
c) it may be possible to open the bottom cable guide assembly(s), thereby allowing the bottom support rope and bottom of the nets to swing outward and/or be lifted. Or,
d) unshackling the affected net from the support ropes. The net will then fall to the ground, allowing the rock to be removed. Again, please note that the support ropes will still be in place, and care must be taken not to "snag" them with the equipment being used. The net can then be lifted back into place, and be re-shackled to the support ropes and adjacent nets as before. Please note that the nets can withstand being driven over with rubber tires, but should not be driven over with track rigs.

- Chainlink: Holes or tears in the chainlink fabric can be patched or entire panels can be replaced. Chainlink should be re-attached to the nets with galvanized hog rings as necessary.

- Braking Element replacement: Attach the ends of a come-along to the support rope on each side of the old braking element, and tension. Cut the support rope on each side of the old braking element to remove the old braking element. A spare braking element (tube with a prefabricated sling with pressed loops at both ends) is then spliced back into the support rope by using loop splices (as shown in the design drawings) on each side of the replacement. Remove the come-along, re-shackle the net (as necessary) to the support rope.

- In a retaining rope: These braking elements are most easily replaced by simply replacing the entire retaining rope. Alternatively, the retaining rope can be disconnected from the anchor, and if the tube is not too badly deformed, the tube can be slid off the rope. A replacement tube (spare braking element with rope sling removed) is then slid back into place, and the retaining rope is reconnected to the anchor. If the tube does not want to stay in place and instead wants to slide down the rope, a small piece of baling wire can be tied around the rope at the end of the tube to prevent it from sliding. If the tube will not freely slide off the rope, it will need to be cut out and replaced with a braking element spare using loop splices.

- Required material / tools:
  1. spare braking element
  2. wire rope cutter
  3. wire rope clips of appropriate size
  4. come-along (or vise-grips, cable clips),
  5. set of socket wrenches with torque setting ability
  6. ladder

- Repairing damaged Support Ropes: Broken or damaged support ropes can be spliced back together using wire rope clips and a small length of the same diameter wire rope, per the splicing detail in the design drawings. Attach the ends of a come-along to the support rope on each side of the damaged section of rope, and tension. Cut the support rope on either side of the damaged section of support rope. Attach a new piece of wire rope having the same diameter, to

the two cut ends of the support rope by using a clipped splice per the design drawings. Remove the come-along and re-shackle the net (as necessary) to the support rope.

Replacement of a support rope will necessitate removal of all shackles and netting from the support rope section in question. The support rope is then removed by loosening and opening the cable guide assemblies, and removing the wire rope clips from the clipped loop end of the rope. The new rope is then installed (per design drawings) by putting it into place, re-attaching the clip loop on one end after tensioning the rope as necessary, and re-securing the cable guides.

- Support Rope tightening. If the net sag is undesirable, and no braking elements are fully activated, the sag can be eliminated by re-tightening the top support rope at the clipped loop. First, attach a come-along to the cable, then loosen the clips, and using the come-along, apply more tension to the rope as necessary. Then re-fasten the clips at the clip loop to the cable guide after removing any of the resultant slack. Remove the come-along.

  Tension on these ropes should be such that it is only enough to eliminate the undesirable sag. Any more tension will inhibit the proper operation of the system.

- Repairing or replacing damaged Nets: Single rings that are broken can be replaced. Damaged rings should be cut and a new ring spliced back in place, eliminating the damaged portion.

  If an entire net needs to be replaced, the chainlink mesh material must first be removed and carefully stored. Next, remove the shackles from the net panel. The new net is now fastened again to the support ropes and adjacent nets using the shackles. Finally, the chainlink is fastened to the new net again using galvanized hog rings on 2' centers vertically and horizontally.

- Column replacement or repair: Columns can be detached from the foundations after removal of support ropes, retaining ropes and nets by removing the four base plate nuts and lifting the column up off the foundation bolts.

  If the breakaway assembly has engaged, the column can be placed back in a vertical position and two new shear bolts can be attached in the breakaway assembly per the design drawings. In such an instance, the retaining rope braking elements will also need to be replaced.

APPENDIX D

Legal Description
Geologic Hazard Abatement District (GHAD) Property
Leona Property, Oakland California

AUGUST 11, 2004
JOB NO.: 1020-00

LEGAL DESCRIPTION
GEOLOGIC HAZARD ABATEMENT DISTRICT (GHAD)
LEONA PROPERY
OAKLAND, CALIFORNIA

REAL PROPERTY, SITUATE IN THE INCORPORATED TERRITORY OF THE CITY OF OAKLAND, COUNTY OF ALAMEDA, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

BEING ALL OF THAT CERTAIN PARCEL OF LAND GRANTED TO LEONA, LLC, BY DEED RECORDED JUNE 2, 2004, IN DOCUMENT NO. 2004-244483 OF OFFICIAL RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING ALL OF CROWN RIDGE COURT, AS SAID CROWN RIDGE COURT IS SHOWN AND SO DESIGNATED ON THE AMENDED MAP, TRACT 5018, RECORDED FEBRUARY 11, 1988, IN BOOK 175 OF MAPS AT PAGE 1, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING ALL OF EDENVALE PLACE, AS SAID EDENVALE PLACE IS SHOWN AND SO DESIGNATED ON THAT CERTAIN PARCEL MAP NO. 7106, RECORDED DECEMBER 1, 1997, IN BOOK 232 OF PARCEL MAPS AT PAGE 88, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, AND BEING A PORTION OF MOUNTAIN BOULEVARD, AS SAID MOUNTAIN BOULEVARD IS SHOWN AND SO DESIGNATED ON THAT CERTAIN MAP ENTITLED "LEONA HEIGHTS ADDITION," RECORDED FEBRUARY 27, 1925, IN BOOK 4 OF MAPS AT PAGE 64, IN SAID OFFICE OF THE COUNTY RECORDER OF ALAMEDA COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WESTERN CORNER OF PARCEL THREE, AS SAID PARCEL THREE IS DESCRIBED IN SAID DEED (2004-244483);

THENCE, FROM SAID POINT OF BEGINNING, ALONG THE BOUNDARY LINE, THE FOLLOWING FIFTY-THREE (53) COURSES:

1) NORTH 41°14'29" EAST 110.65 FEET,

2) NORTH 50°02'49" EAST 58.46 FEET,

3) SOUTH 55°28'54" EAST 316.09 FEET,

4) NORTH 41°07'43" EAST 136.86 FEET,

5) NORTH 23°07'33" EAST 261.93 FEET,

6) SOUTH 49°47'02" EAST 298.00 FEET,

7) NORTH 31°20'49" EAST 23.54 FEET,

8) SOUTH 58°07'51" EAST 50.00 FEET,

9) SOUTH 55°34'31" EAST 525.86 FEET,

10) NORTH 49°21'05" EAST 687.70 FEET,

29) ALONG THE ARC OF A TANGENT 730.00 FOOT RADIUS CURVE TO THE LEFT, THROUGH A CENTRAL ANGLE OF 10°22'59", AN ARC DISTANCE OF 132.29 FEET,

30) SOUTH 52°00'20" WEST 1.00 FEET,

31) SOUTH 37°59'40" EAST 371.73 FEET,

32) SOUTH 52°04'51" WEST 349.00 FEET,

33) NORTH 37°59'40" WEST 124.69 FEET,

34) SOUTH 51°57'18" WEST 1,854.61 FEET,

35) SOUTH 51°03'42" EAST 328.48 FEET,

36) SOUTH 37°06'48" WEST 93.00 FEET,

37) NORTH 56°17'57" WEST 346.14 FEET,

38) ALONG THE ARC OF A TANGENT 7,958.61 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 02°46'18", AN ARC DISTANCE OF 385.00 FEET,

39) ALONG THE ARC OF A REVERSE 210.02 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 36°28'21" WEST, THROUGH A CENTRAL ANGLE OF 13°34'36", AN ARC DISTANCE OF 49.77 FEET,

40) ALONG THE ARC OF A NON-TANGENT 42.00 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 84°42'52" WEST, THROUGH A CENTRAL ANGLE OF 64°33'32", AN ARC DISTANCE OF 47.32 FEET,

41) NORTH 69°50'40" WEST 225.02 FEET,

42) ALONG THE ARC OF A TANGENT 962.07 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 08°56'53", AN ARC DISTANCE OF 150.25 FEET,

43) NORTH 60°53'47" WEST 110.81 FEET,

44) ALONG THE ARC OF A TANGENT 508.04 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 13°20'10", AN ARC DISTANCE OF 118.25 FEET,

45) ALONG THE ARC OF A REVERSE 492.04 FOOT RADIUS CURVE TO THE LEFT, FROM WHICH THE CENTER OF SAID CURVE BEARS SOUTH 42°26'23" WEST,

THROUGH A CENTRAL ANGLE OF 13°27'25", AN ARC DISTANCE OF 115.56 FEET,

46) NORTH 61°01'02" WEST 416.40 FEET,

47) ALONG THE ARC OF A TANGENT 2,008.15 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 04°25'01", AN ARC DISTANCE OF 154.81 FEET,

48) NORTH 56°36'01" WEST 753.45 FEET,

49) ALONG THE ARC OF A TANGENT 1,208.09 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 09°57'19", AN ARC DISTANCE OF 209.91 FEET,

50) NORTH 46°41'34" WEST 135.31 FEET,

51) SOUTH 34°19'40" WEST 32.55 FEET,

52) NORTH 51°50'59" WEST 131.94 FEET,

53) ALONG THE ARC OF A TANGENT 5,959.45 FOOT RADIUS CURVE TO THE RIGHT, THROUGH A CENTRAL ANGLE OF 02°29'06", AN ARC DISTANCE OF 258.47 FEET TO SAID POINT OF BEGINNING.

CONTAINING 134.11 ARCES OF LAND, MORE OR LESS.

END OF DESCRIPTION

Parcel name: GHAD

North: 9456.7293 East : 7597.9310
Line Course: N 41-14-29 E Length: 110.65
North: 9539.9314 East : 7670.8752
Line Course: N 50-02-49 E Length: 58.46
North: 9577.4720 East : 7715.6889
Line Course: S 55-28-54 E Length: 316.09
North: 9398.3533 East : 7976.1296
Line Course: N 41-07-43 E Length: 136.86
North: 9501.4411 East : 8066.1495
Line Course: N 23-07-33 E Length: 261.93
North: 9742.3236 East : 8169.0230
Line Course: S 49-47-02 E Length: 298.00
North: 9549.9132 East : 8396.5801
Line Course: N 31-20-49 E Length: 23.54
North: 9570.0171 East : 8408.8261
Line Course: S 58-07-51 E Length: 50.00
North: 9543.6180 East : 8451.2888
Line Course: S 55-34-31 E Length: 525.86
North: 9246.3373 East : 8885.0548
Line Course: N 49-21-05 E Length: 687.70
North: 9694.3176 East : 9406.8258
Line Course: N 33-51-34 E Length: 95.01
North: 9773.2145 East : 9459.7613
Line Course: S 38-18-32 E Length: 156.87
North: 9650.1217 East : 9557.0052
Line Course: N 51-41-28 E Length: 564.93
North: 10000.3223 East : 10000.2945
Line Course: S 32-37-35 E Length: 401.98
North: 9661.7731 East : 10217.0256
Line Course: N 51-41-28 E Length: 533.65
North: 9992.5831 East : 10635.7702
Line Course: N 38-18-32 W Length: 300.70
North: 10228.5364 East : 10449.3660
Line Course: N 41-34-59 E Length: 296.00
North: 10449.9428 East : 10645.8227
Line Course: S 48-25-01 E Length: 225.00
North: 10300.6092 East : 10814.1214
Line Course: N 84-18-52 E Length: 130.97
North: 10313.5842 East : 10944.4471
Line Course: S 51-31-37 E Length: 41.79
North: 10287.5847 East : 10977.1646
Curve Length: 64.23 Radius: 25.00
Delta: 147-11-42 Tangent: 84.93
Chord: 47.97 Course: N 49-46-20 E
Course In: N 66-10-29 E Course Out: N 33-22-11 E
RP North: 10297.6834 East : 11000.0341
End North: 10318.5619 East : 11013.7851
Curve Length: 14.27 Radius: 10.00
Delta: 81-47-12 Tangent: 8.66
Chord: 13.09 Course: N 82-28-35 E
Course In: N 33-22-11 E Course Out: S 48-25-01 E

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    RP  North: 10326.9133          East : 11019.2855
    End North: 10320.2762          East : 11026.7654
Line  Course: N 41-34-59 E  Length: 187.36
        North: 10460.4205          East : 11151.1172
Line  Course: S 48-25-01 E  Length: 158.94
        North: 10354.9312          East : 11270.0034
Curve  Length: 151.44              Radius: 770.00
        Delta: 11-16-08           Tangent: 75.97
        Chord: 151.20              Course: S 43-36-57 E
    Course In: S 40-44-59 W     Course Out: N 52-01-07 E
    RP  North: 9771.6037           East : 10767.3813
    End North: 10245.4659          East : 11374.3035
Line  Course: S 37-58-53 E  Length: 646.89
        North: 9735.5803           East : 11772.4031
Curve  Length: 121.26              Radius: 670.00
        Delta: 10-22-12           Tangent: 60.80
        Chord: 121.10              Course: S 32-47-47 E
    Course In: S 52-01-07 W     Course Out: N 62-23-19 E
    RP  North: 9323.2586           East : 11244.3020
    End North: 9633.7850           East : 11837.9967
Line  Course: S 27-36-41 E  Length: 197.00
        North: 9459.2210           East : 11929.3007
Curve  Length: 132.29              Radius: 730.00
        Delta: 10-22-59           Tangent: 66.33
        Chord: 132.11              Course: S 32-48-11 E
    Course In: N 62-23-19 E     Course Out: S 52-00-20 W
    RP  North: 9797.5557           East : 12576.1621
    End North: 9348.1786           East : 12000.8706
Line  Course: S 52-00-20 W  Length: 1.00
        North: 9347.5630           East : 12000.0826
Line  Course: S 37-59-40 E  Length: 371.73
        North: 9054.6136           East : 12228.9140
Line  Course: S 52-04-51 W  Length: 349.00
        North: 8840.1360           East : 11953.5954
Line  Course: N 37-59-40 W  Length: 124.69
        North: 8938.4005           East : 11876.8381
Line  Course: S 51-57-18 W  Length: 1854.61
        North: 7795.4411           East : 10416.2827
Line  Course: S 51-03-42 E  Length: 328.48
        North: 7588.9968           East : 10671.7619
Line  Course: S 37-06-48 W  Length: 93.00
        North: 7514.8345           East : 10615.6663
Line  Course: N 56-17-57 W  Length: 346.14
        North: 7706.8926           East : 10327.6965
Curve  Length: 385.00              Radius: 7958.61
        Delta: 2-46-18            Tangent: 192.54
        Chord: 384.96              Course: N 54-54-48 W
    Course In: N 33-42-03 E     Course Out: S 36-28-21 W
    RP  North: 14328.0267          East : 14743.5832
    End North: 7928.1721           East : 10012.6918
Curve  Length: 49.77               Radius: 210.02
        Delta: 13-34-36           Tangent: 25.00
        Chord: 49.65               Course: N 60-18-57 W
    Course In: S 36-28-21 W     Course Out: N 22-53-45 E
    RP  North: 7759.2861           East : 9887.8482
    End North: 7952.7594           East : 9969.5579
Curve  Length: 47.32               Radius: 42.00
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Delta: 64-33-32 Tangent: 26.53
Chord: 44.86 Course: N 37-33-54 W
Course In: S 84-42-52 W Course Out: N 20-09-20 E
RP North: 7948.8904 East : 9927.7365
End North: 7988.3184 East : 9942.2084
Line Course: N 69-50-40 W Length: 225.02
North: 8065.8535 East : 9730.9685
Curve Length: 150.25 Radius: 962.07
Delta: 8-56-53 Tangent: 75.28
Chord: 150.10 Course: N 65-22-14 W
Course In: N 20-09-20 E Course Out: S 29-06-13 W
RP North: 8969.0069 East : 10062.4691
End North: 8128.4064 East : 9594.5274
Line Course: N 60-53-47 W Length: 110.81
North: 8182.3033 East : 9497.7081
Curve Length: 118.25 Radius: 508.04
Delta: 13-20-10 Tangent: 59.39
Chord: 117.98 Course: N 54-13-42 W
Course In: N 29-06-13 E Course Out: S 42-26-23 W
RP North: 8626.1990 East : 9744.8139
End North: 8251.2717 East : 9401.9813
Curve Length: 115.56 Radius: 492.04
Delta: 13-27-25 Tangent: 58.05
Chord: 115.30 Course: N 54-17-19 W
Course In: S 42-26-23 W Course Out: N 28-58-58 E
RP North: 7888.1522 East : 9069.9458
End North: 8318.5718 East : 9308.3621
Line Course: N 61-01-02 W Length: 416.40
North: 8520.3371 East : 8944.1098
Curve Length: 154.81 Radius: 2008.15
Delta: 4-25-01 Tangent: 77.44
Chord: 154.77 Course: N 58-48-31 W
Course In: N 28-58-58 E Course Out: S 33-23-59 W
RP North: 10276.9972 East : 9917.1523
End North: 8600.4921 East : 8811.7125
Line Course: N 56-36-01 W Length: 472.34
North: 8860.5043 East : 8417.3792
Line Course: N 56-36-01 W Length: 281.11
North: 9015.2488 East : 8182.6944
Curve Length: 209.91 Radius: 1208.09
Delta: 9-57-19 Tangent: 105.22
Chord: 209.64 Course: N 51-40-13 W
Course In: N 33-21-07 E Course Out: S 43-18-26 W
RP North: 10024.3775 East : 8846.8785
End North: 9145.2670 East : 8018.2374
Line Course: N 46-41-34 W Length: 135.31
North: 9238.0775 East : 7919.7742
Line Course: S 34-19-40 W Length: 32.55
North: 9211.1969 East : 7901.4183
Line Course: N 51-50-59 W Length: 131.94
North: 9292.6997 East : 7797.6616
Curve Length: 258.47 Radius: 5959.45
Delta: 2-29-06 Tangent: 129.26
Chord: 258.45 Course: N 50-36-26 W
Course In: N 38-09-01 E Course Out: S 40-38-07 W
RP North: 13979.1710 East : 11478.9699
End North: 9456.7204 East : 7597.9282

Line Course: N 40-38-07 E Length: 0.00
        North: 9456.7204   East : 7597.9282

   Perimeter: 13653.16   Area: 5,841,954 sq.ft. 134.11 acres

Mapcheck Closure - (Uses listed courses, radii, and deltas)
Error Closure: 0.0094   Course: S 17-20-16 W
  Error North: -0.00896   East : -0.00280
Precision 1: 1,452,461.70

ATTACHMENT 3-B

NOTICE OF A PUBLIC HEARING

You are hereby notified that on ____ at _____ in Room ____, Oakland, California, the Leona Quarry Geologic Hazard Abatement District (GHAD) Board of Directors will consider adoption of amendments to the Leona Quarry GHAD Plan of Control pursuant to Division 17 (commencing with Section 26500) of the Public Resources Code of the State of California.

The purpose of the hearing is to receive and consider any and all objections to the proposed amendments to the Plan of Control. Valid objections shall be made in writing, not later than the time set for hearing, by any owner of real property within the boundary of the GHAD. Objections shall contain a description of the land owned by lot, tract and map number, and shall be signed by the owner of such property. Objections shall be mailed or delivered to the address set forth below, and must comply with the provisions of the Public Resources Code section 26564 (copy attached).

Proposed amendments to the Leona Quarry Plan of Control can be reviewed at the City of Oakland's Public Works Department, located at _____, Oakland, California. It may be duplicated for the cost of duplication.

For further details, contact the City of Oakland's Public Works Department, _____ or phone _____.