First 5-Year Beneficial Reuse Plan for Makakilo Quarry, 2014-2032

In compliance with Condition 10,
Special Use Permit (SUP), Docket SP73-147
November 19, 2008

Makakilo Quarry
TMK (1) 9-2-03: por. 74 and por 82
Makakilo, District of ʻEwa, Oʻahu, Hawaiʻi

Prepared for:

STATE LAND USE COMMISSION
Prepared in compliance with section 205-6, Hawaiʻi Revised Statutes and sections 15-15-95 and 15-15-96, HAR and Condition 10, Special Use Permit (SUP), Docket SP73-147, November 19, 2008

and

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
Prepared in compliance with sections 25.5.520 and 21-2.90, Revised Ordinances of Honolulu,
Conditional Use Permit (Major) 72/CUP-15
and SUP, Docket SP73-147

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November 2013

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Makakilo Upper Quarry Beneficial First Reuse Plan (2014-2018)

DRAFT November 12, 2013

I. Purpose of the First Beneficial Reuse Plan, 2014-2032

The purpose of this plan is to present the landowner's long-term reuse objectives and strategy, and operational plans for the next five years, and a timeline for implementation in accordance with the conditions as stipulated by the Special Use Permit (SUP) approved by the Land Use Commission (SLUC), State of Hawai'i, in 2008. These requirements are to be consistent with regulations and long-range land use plans established at this writing.

The 2014-2018 Beneficial Reuse Plan will be followed by three additional five-year plans covering the periods 2019-2023, 2024-2028 and 2029-2032.

Project Location

The Makakilo Upper Quarry is located in the 'Ewa District on the island of O'ahu (see Figure 1. Location Map and Figure 2). The quarry site is identified o the parcel tax map key shown on Figure 3.

II. Impetus for the First Beneficial Reuse Plan, 2014-2032

The Beneficial Reuse Plan has been prepared to comply with Special Use Permit, Docket SP73-147, Decision and Order Condition 10, dated November 19, 2008, which states:

> *10. The Applicant shall provide a beneficial re-use plan for lands disturbed by its quarry operations. The plan shall include planning and preparation of design and implementation scenarios for the beneficial re-use of the pit area consistent with established land use policies for the site and surrounding area. The re-use planning document and accompanying scenarios and drawings shall be submitted to the Department of Planning and Permitting, for review and approval within the fifth (5th) year after the date of the Land Use Commission's Decision and Order approving this expansion. An updated re-use plan shall be submitted to the DPP for review and approval every five (5) years thereafter.*
>
> *The beneficial re-use planning and design document shall be an ongoing document prepared by a professional qualified in re-use planning and contain objectives, implementation and funding strategies for reclamation of the pit area for the purpose of achieving the area's long term land use policies. The Applicant will update the plan, as may be required by the Director of Planning and Permitting, to respond appropriately to any changes in the surrounding area's land use policies.*

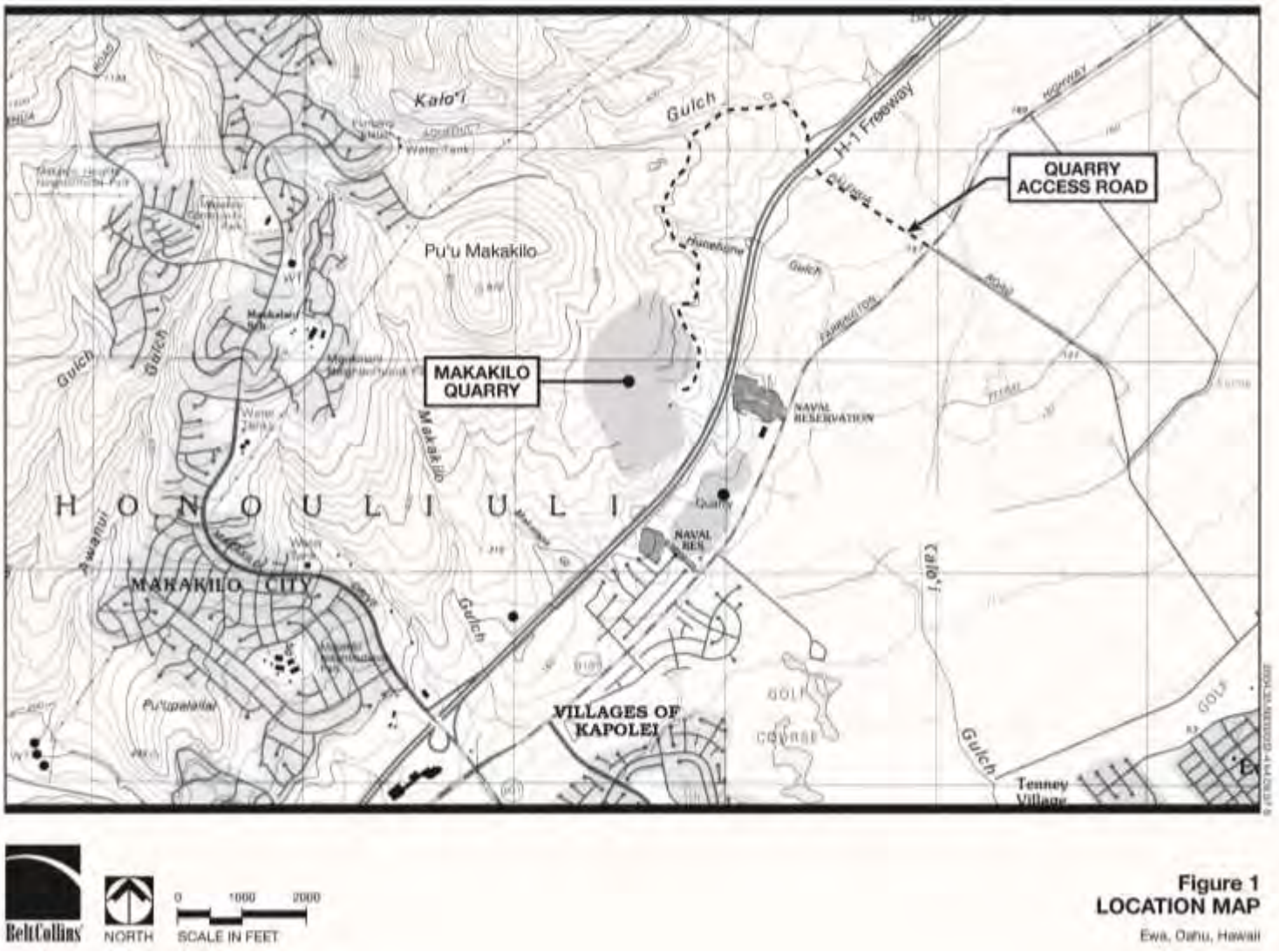


Figure 1
LOCATION MAP
Ewa, Oahu, Hawaii

BeltCollins

Figure 2
EXISTING QUARRY AND PROCESSING SITE
Ewa, Oahu, Hawaii

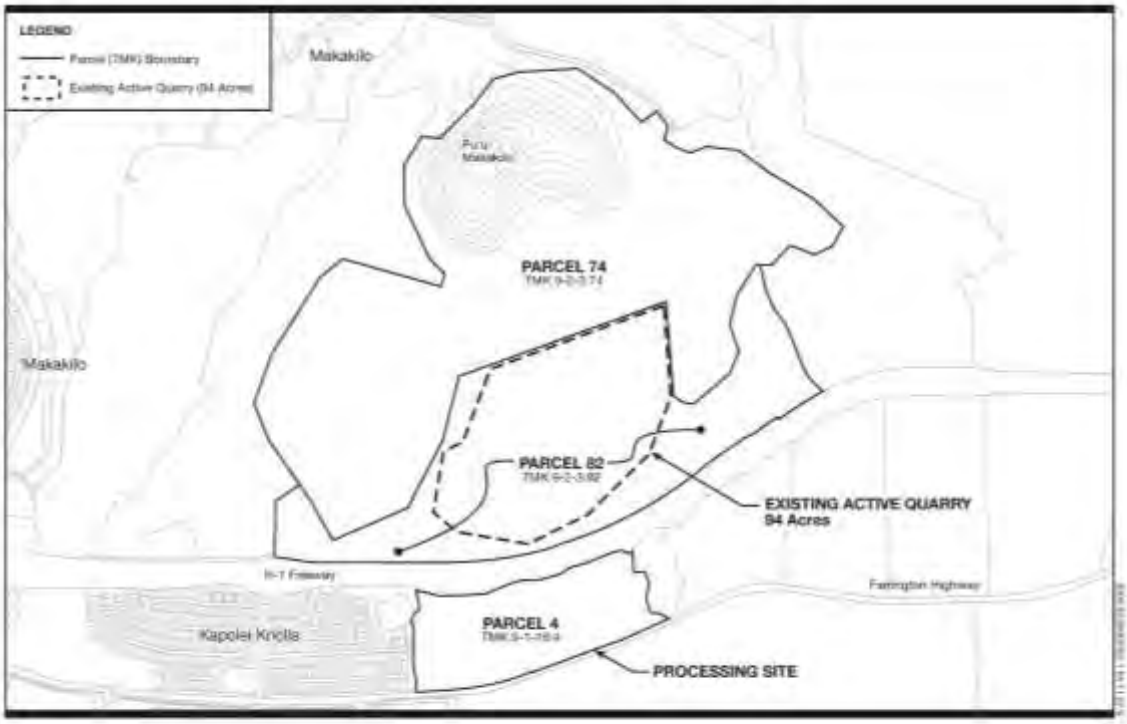


Figure 3
PARCEL MAP

The beneficial re-use plan shall include at least one public access across Tax Map Key: 9-2-03: 74, connecting Tax Map Key: 9-2-03: 81 and the extension of Makakilo Drive, across the project in which safe pedestrian/bicycling passage can be established. Access requirements, such as but not limited to, subdivision, nature of improvements, routing, hours accessible, shall be established as part of the final beneficial re-use plan. Suggested routing of the public access is shown on Exhibit A.

III. Regulations and Approved Land Use Plans Governing Makakilo Quarry Resource Extraction

A. Hawai‘i Revised Statutes (HRS), Chapter 205

The Makakilo Quarry is located within the State Agricultural District. This land use district was established under HRS, Chapter 205, *Land Use Commission*, often referred to as Hawai‘i’s “State Land Use Law.” Section 205-6 and the supporting Hawai‘i Administrative Rules (HAR), Sections 15-15-95 and 15-15-96, provide guidelines for approval of an “unusual and reasonable” use such as resource extraction within the State Agricultural District. In accordance with the November 2008 SLUC Conclusions of Law for the State Special Use Permit, Item 2, resource extraction at the Makakilo Quarry site is a permitted use that “generally meets the guidelines for determining an ‘unusual and reasonable’ use within the State Land Use Agricultural District.”

B. Revised Ordinances of Honolulu (ROH), Chapter 21, Land Use Ordinance (LUO), Section 21.5.520, *Resource Extraction*

The City and County of Honolulu’s Land Use Ordinance, ROH Chapter 21, provides the framework for granting Conditional Use Permits for resource extraction land use on O‘ahu in accordance with Section 21.5.520, entitled *Resource Extraction.* Section 5.520(b)(2) also outlines contents of the Beneficial Reuse Plan as detailed below:

Sec. 21-5.520 Resource extraction.

(a) Blasting operations shall be restricted to Mondays through Fridays between 8 a.m. and 5 p.m.

(b) The plan to be submitted with the application for a conditional use permit shall include a plan for development of the property which shall consist of two phases: the exploitation phase and the reuse phase.

(1) The plan for the exploitation phase shall show the proposed development as planned in relation to surrounding property within 300 feet, and shall include topographic surveys and other materials indicating existing conditions (including drainage) and the conditions (including topography, drainage and soils) which shall exist at the end of the exploitation phase. Contour intervals for topography shall be five feet in areas where slope is greater than 10 percent, two feet in areas where slope is 10 percent or less.

(2) The plan for the reuse phase shall indicate how the property is to be left in a form suitable for reuse for purposes permissible in the district, relating such reuses to uses existing or proposed for surrounding properties. Among items to be included in the plan are feasible circulation patterns in and around the site, the treatment of exposed soil or subsoil (including measures to be taken to replace topsoil or establish vegetation in excavated areas) in order to make the property suitable for the proposed reuse, treatment

of slopes to prevent erosion and delineation of floodways and floodplains (if any) to be maintained in open usage. In the plan for reuse, intermittent lakes and marshes shall not be allowed, except in areas included in flood hazard districts and if situated more than 1,000 feet from the nearest residential, apartment, apartment mixed use or resort zoning district boundary.

C. General Plan of the City and County of Honolulu (General Plan)

Among the land use planning and policy statements prepared by the City and County of Honolulu, Department of Planning and Permitting (DPP), the General Plan sets the most comprehensive guidelines. As stated in the introduction to the General Plan (revised 2002):

> *The General Plan for the City and County of Honolulu is a comprehensive statement of objectives and policies which sets forth the long-range aspirations of Oahu's residents and the strategies of actions to achieve them. It is the focal point of a comprehensive planning process that addresses physical, social, economic and environmental concerns affecting the City and County of Honolulu. This planning process serves as the coordinative means by which the City and County government provides for the future growth of the metropolitan area of Honolulu.*

The planning framework for the quarry is provided in discussion of the "Natural Environment." The quarry is considered a mountain and will be restored to a natural-looking state following 2032. Further, Pu‘u Makakilo is considered a scenic resource of O‘ahu. The General Plan states:

> *III. Natural Environment*
>
> *Objective A, To protect and preserve the natural environment.*
>
> *Policy 2, Seek the restoration of environmentally damaged areas and natural resources.*
>
> *Policy 6, Design surface drainage and flood-control systems in a manner which will help preserve their natural settings.*
>
> *Objective B, To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.*
>
> *Policy 1, Protect the Island's well-known resources: its mountains and craters; forests and watershed areas; marshes, rivers, and streams; shoreline, fishponds, and bays; and reefs and offshore islands.*
>
> *Policy 2, Protect Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.*

D. ‘Ewa Development Plan (2013), City and County of Honolulu

A "development plan" is a plan document for a given geographic area which consists of conceptual schemes for implementing and accomplishing the development objectives and policies of the General Plan for the several parts of the City and County of Honolulu (Article 3, Chapter 24, ROH). The quarry site is located within the ‘Ewa Development Plan area.

The stated objectives of the ‘Ewa DP is "*The [2013 ‘Ewa Development] Plan protects prime agricultural lands; supports development of the Secondary Urban center at Kapolei; establishes a regional open space network; protects natural, historical and cultural resources; promotes*

master planned communities; and requires provisions of adequate infrastructure to meet current and anticipated needs."

Pu‘u Makakilo, including the quarry area, is included in the 2013 ‘Ewa Development Plan in the contexts of open space, public facilities, visual resources and historic/cultural resources. As stated in the plan:

- Open Space. *A network of Open Space and Greenways will link the Secondary Urban Center and associated employment centers, new master planned residential developments and revitalized established communities, an ‘Ewa shoreline park, and a major regional park at Kalaeloa (Sec. 2.2.3).* Pu‘u Makakilo is part of Open Space and Greenways Network as a "mountain and agricultural area" intended for preservation and enhancement as a visual landmark and part of significant vista from Kapolei (Sec. 2.2.3, Table 2.2).
- Public Facility. Pu‘u Makakilo is included as a Public Facility because its present land use is resource extraction.
- Cultural and Historic Resources. ‘Ewa's Historic and Cultural Resources will be preserved and enhanced by preserving significant historic features from the plantation era and earlier periods, including Pu'u Makakilo. Pu'u Makakilo is considered one of the "significant historic and cultural resources" within the ‘Ewa Development Plan area.
- Visual Resources. Plans for retaining visual landmarks and significant public views and vistas, include views of na pu‘u at Makakilo; and views of central Honolulu and Diamond Head, particularly from Pu'u o Kapolei and Pu'u Makakilo.

E. Permits and Approvals for Operation of Makakilo Quarry

Since the original 1973 regulatory approvals for resource extraction at the site, there have been five approvals from the State Land Use Commission (Special Use Permits for land use in the State Agricultural District) and DPP (Conditional Use Permits (Major) and (Minor), and Zoning Variances). Approved permits include:

Date of Approval	Type of Permit	Identification Number	Granting Authority	Approved Land Use
February 28, 1973	Special Use Permit	File No. 72/CUP-15	Planning Commission	Rock quarrying operations on the southeastern slopes of Pu‘u Makakilo to produce basalt for concrete production and fill rock
March 23, 1973	Special Use Permit	Docket No. SP73-147	LUC	Rock quarrying operations on the southeastern slopes of Pu‘u Makakilo to produce basalt for concrete production and fill rock See Figure 4
April 17, 1973	Conditional Use Permit	72/CUP-15	City Council Resolution	Establishment of quarry and related facilities; 72 acres mauka

			No. 95	H-1; 35 acres Makai of H-1
October 19, 1998	Satisfaction of Condition No. 2	72/CUP-15	DPP	Accept engineering report and grading plans prepared by Parametrix, July 1998
September 13, 2002	Zoning Variance	No. 2002/VAR-51	DPP	Establishment of an asphalt and concrete recycling facility in the quarry pit
April 23, 2004	CUP Minor Modification	72/CUP-15	DPP	Specific revisions to grading and revegetation plans
April 27, 2007	Conditional Use Permit (Minor)	No. 2007/CUP-47	DPP	Joint development of lots 82 and 74 to allow quarry expansion of excavation and buffer areas
November 7, 2008	Special Use Permit	Docket SP73-147	LUC	Extend the life of Makakilo Quarry extraction and processing to 2032, and expand the extraction and buffer areas of the quarry
July 17, 2009	Conditional Use Permit	File No. 2007/CUP-91	DPP	Expand the excavation and buffer areas of the Makakilo Quarry and extend its use and operations to 2032
December 27, 2011	Zoning Variance	No. 2011/VAR-28	DPP	Allow various structures and equipment for existing quarry to exceed height limit and increase nonconformity

S.U.P. KEY MAP
1"=300'
FARRINGTON HIGHWAY

IV. Beneficial Reuse Plan

A. Documents Forming Plan

This document is the initial Beneficial Reuse Plan (2014-2018) prepared to satisfy Condition 10 of the LUC's D&O (2008). The Reuse Plan, as described herein, is best described as an open space plan with landscaping elements. The basis for this document is found in prior applications, plans and correspondence.

1) Closure Grading Plan

The Closure Grading Plan, attached to this Plan as Exhibit 1, illustrates the end view at 2032. Actions to be taken (resource extraction and land-forming) between 2014 and 2032 are directed at achieving this end-state. This Plan was included with the 2009 Annual Compliance Report as Appendix J. The objective of the grading plan is to conform the land to match the general contours of Puʻu Makakilo. When observed from the freeway or Farrington Highway, one would observe a continuous slope from the freeway to the top of Puʻu Makakilo.

2) Renaturalization Plan

The Renaturalization Plan is a complement to the Closure Grading Plan as detailed in Exhibit 2. The Plan describes actions to be taken to revegetate areas exposed as a result of the quarrying activities. The objective of the revegetation plan is to introduce plant material that reflect the current character of Puʻu Makakilo. Plant material to be introduced will generally be drought-tolerant and native to Hawaiʻi. The plan has not been approved by DPP and is awaiting resolution of the extent and method of naturalizing the buffer zone. This Plan was included with the 2009 Annual Compliance Report as Appendix C.

3) Other Relevant Documents

The May 2008 Engineering Report prepared by Belt Collins and attached as to this Plan as Exhibit 3. The engineering report addresses grading, drainage and revegetation of the land disturbed by quarrying. This report was included as Exhibit 21 of the Planning Commission's record, as provided by the DPP.

The letter from Belt Collins to DPP dated July 7, 2008 and attached to this Plan as Exhibit 4 recaps the changes that were made to the April 2007 SUP/CUP application in May and June of 2008. Attached to the letter are exhibits 4 (schedule of excavation and naturalization), exhibit 6 (a plan view depiction of the excavation phasing), exhibit 5 (a plan view depiction of the naturalization phasing), and exhibit 7 (designation of areas and acreage). This letter was included as Exhibit 24 of the Planning Commission's record, as provided by DPP.

A Closure Grading Plan with cross sections and profiles dated June 5, 2008 and attached to this Plan as Exhibit 5 and was included in Exhibit 24 of the Planning Commission record.

An illustration of Puʻu Makakilo and the quarry as of 2008 and 2032 dated August 18, 2008 and attached to this Plan as Exhibit 6 was included as Exhibit 34 of the Planning Commission record.

B. History, Development of Plan

The 1973 application for quarrying at Makakilo envisioned a residential community use when the quarrying was complete. Housing would be placed on the benches, and the quarry floor would have a school and commercial area. The slopes of the Puu fronting the H-1 freeway would be removed to provide a distant view of Diamond Head. The application was approved with the condition added where the "applicant shall prepare and submit to the Planning Director for his review and approval a revised grading plan for the quarry area." The recommendation noted "Condition No. 2 was included as a result of the Planning Director's concern over the final configuration of the site after quarrying operations have been completed. He (the director) felt that other alternatives should be considered which would 'maximize the potential for residential development that would be consistent with the surrounding natural areas' In short, it was felt that the concept of a large flat area near the freeway with narrow, upper benches does not allow for flexibility in residential design."

Condition No. 2 was satisfied in October 1998 with the submittal of an Engineering Report prepared by Parametrix Inc. dated July 1998. The end use had not been further refined, and the report discussed an alternative quarry floor reclamation plan. The report noted "If future utilization plans change from residential or commercial development to a park setting or open space use…"

The 1998 Engineering Report was revised in March 2004 by Belt Collins and approved by DPP as a minor modification to the CUP. The Estate of James Campbell, owner and lessor of the quarry site, was concerned about the appearance of the quarry at closure. However, no further definition of end use was given, and the focus was on mitigating the visual impact(s) of the quarried faces.

The March 2004 Belt Collins report was again revised in April 2007 and again in May 2008 and included the conditions of the SUP/CUP application as noted above and attached to this Plan as Exhibit 3, .Makakilo Quarry Conditional Use Permit No 72/CUP-15, Engineering Report Amendment.

The above history and development of the reuse plan is covered in more detail in Exhibit 7 attached to this Plan.

C. Alternative Reuses

As owner of the quarry site from 1973 through 2009, the Estate of James Campbell did not refine their vision for the end use of the site. The Estate's concern was for the visual appearance of Pu'u Makakilo and thus the emphasis on landscaping.

Campbell sold 311 acres of the Pu'u surrounding the quarry to a Japan golf course developer, Chiyoda Pacific, in 1989. Chiyoda abandoned the project in 1992 as economically infeasible.

In presenting the proposed quarry expansion to the Makakilo Kapolei Honokai Hale Neighborhood Board in July and November of 2006, Grace Pacific representatives noted that the Mayor's Commission on Landfill Siting had ruled out Makakilo because it sits above the no-pass line. The residents were strongly opposed to such a use.

V. Beneficial Reuse Plan Objectives Consistent with LUC Decision and Order (D&O), Condition 10

A. Objective 1: Maintain consistency with existing land use regulations and policies to ensure future land use flexibility.

1. The Decision and Order for Conditional Use Permit No. 2007/CUP-91, dated July 17, 2009 (the "CUP") contains conditions which integrate with the reporting required under Condition No. 9 of the State Land Use Commission's Decision and Order dated November 7, 2008 (the "SUP"). Grace Pacific proposed that these reporting obligations be combined into a single report covering the period October 1st through September 30th and due on the anniversary of the SUP, November 7th (the "Makakilo Quarry Annual Compliance Report" or "MQACR"). This format of reporting has been accepted by the DPP and SLUC.
2. Given the above form of reporting, Grace Pacific shall prepare and submit the MQACR to the DPP and SLUC in a timely manner and respond to comments and gain approval for the Annual Report.
3. Continue to meet all operational and reporting requirements of existing regulatory permits, including:
    a. Covered/Temporary Covered Source Permit No. 0045-01-C/CT - Aggregate Crushing and Screening Plants
    b. Temporary Noncovered Source Permit No. 0445-01-NT - 377 HP Caterpillar Diesel Engine Generator
    c. Solid Waste Management Permit No. RY-0041-12 – Makakilo Quarry Recycling Facility

B. Objective 2: Assess actual changes in topography over the previous five years and the formulate projections of extraction to achieve the 2032 final landform.

1. Review and update assumptions about pace of resource extraction and modify assumptions according to actuals from 2009-2013.

    The rock extraction operation deals with benches and faces. The benches are typically 50' to 200' wide and allow equipment to operate on the benches safely. The faces are typically 25' to 50' tall and are vertical as a result of blasting. The vertical faces are also a function of the type of material (rock) that comprises the rock face. At Makakilo, the operator will have a series of benches and faces, starting at the upper elevations and successively working each face makai to mauka, and then starting a new face at the lower makai face, again working mauka until reaching the permitted limit. What will be unique at Makakilo is that as the quarrying activities approach the permitted limit (upper limit of the quarry), the operator will, with GPS technology, anticipate the elevations of the final landform, which is sloped at an average of 1.5 H to 1 V. The operator will then excavate this final slope with specialized equipment and before access is no longer available because of the slope, the operator will renaturalize that portion of the quarry face. This

action will result of the slopes being renaturalized as the quarrying proceeds downwards. This surface is called the "landscape grading" in Grace Pacific's reporting. It is the slope from the toe on the "floor" to top of the slope as it transitions into native (undisturbed) terrain.

Please refer to Exhibit 4 (Figure 6 Excavation and Landscape Phasing) and Exhibit 7 (designation of areas and acreage) mentioned earlier as being attached to this Plan as Exhibit 4. The areas noted were identified as such in 2008 as a possible excavation pattern. In July of 2008, a surface to surface comparison was done between the existing 2008 landform and the proposed 2032 landform. A total of 12.1 million cubic yards were calculated to be excavated for the quarry area and 4.3 million cubic yards calculated to be excavated from the landscape grading area, for a grand total of 16.4 million cubic yards of 'cut'. Offsetting these amounts were 1.2 million cubic yards of fill for the landscape grading area and 0.4 million cubic yards for the quarry area, a total of 1.6 million cubic yards of 'fill', and when netted against the excavation, and net 'cut' position of 14.8 million cubic yards by 2032. The detail behind these numbers (see Tables in Exhibit 4 showing schedule of excavation) were used to complete the grading and renaturalization schedule. The uppermost portion of the table depicts the excavation of thousands of tons by area and five year period. The second panel suggest when final elevations will be reached, again by area and by five year period, The third panel looks to when the final elevations are to be addressed in landscaping, and the fourth panel looks at water consumption for renaturalization.

In 2008, Grace Pacific's deep well had an allocation of .162 mgd and the larger part of that was used for dust control. The Commission on Water Resources Management granted an increase in Grace Pacific's allocation to .256 mgd, taking off the earlier constraint on getting to the renaturalization effort.

2. Modify projections based on updated extraction information and forecast.

   The methodology described above to complete the excavation and renaturalization schedule was performed again as of September 2013. The summary results by area and cut/fill are shown in Exhibit 8 attached to this Plan. A detailed analysis of the 2008-2032, 2013- 2032 and 2008-2013 periods are presented in Exhibit 9 to this Plan. With more information, we can now advance plans for the siting of the new crushing equipment, and the approach to a top down excavation plan to begin the renaturalization plan, and the excavation of material in cubic yards apportioned between work areas and in five year periods. Note that in the 2008 schedule the 2009-2012 period was a four year period. We are using five year period 2009-2013 in this update. Similarly, the 2008 schedule used five years for the 2013-2017 period, the update uses the four year 2014-2017. The revised 2013 cubic yards are shown along with the 2008 figures in each of the four panels on the schedule. See Exhibits 10a and 10b to this Plan for the complete schedules. Also, see Exhibit 11 to this Plan for an overlay of the areas onto the September 2013 aerial photo of the quarry and landscape grading areas.

3. Modify the Closure Grading Plan to reflect changes in the actual and projected excavation volume.

Based upon the analysis, it does appear that the volumes needed to achieve the final landform are achievable, and no change or modification to the Closure Grading Plan appears necessary.

4. Modify visualizations to reflect updated information reflecting 2013 and five-year periods ending in 2032.

   Exhibit 12 illustrate cross sections of the quarry in 2013 and the proposed final grades as illustrated in the Grading Closure Plan, Exhibit 1.

5. Using a GPS map of cut and fill, report progress toward achieving the final land form in Annual Reports to DPP on the Conditional Use Permit.

   Grace Pacific is updating the cross sections and profiles from 2008 and attached as Exhibit 5 (figures 5a and 5b (1-9)). The September 2013 elevations are drawn in on Exhibit 12 to this Plan,

C. Objective 3: Complete gradual "Renaturalization" of vegetation approved for the period 2014-2032.

1. Gain approval for the November 2009 Renaturalization Plan.

   a) Implement revegetation trial as agreed upon with DPP. [reference 2/2/12 correspondence with DPP).

      Work is ongoing. See annual report for 2013.

   b) Report results of revegetation trial to DPP in November 2013 Annual Report on Conditional Use Permit.

      Work is ongoing. See annual report for 2013.

2. Implement actions of the approved Renaturalization Plan for the period 2014-2018.

   Funding. In the past, Grace Pacific accrued $.10 per ton sold towards final closure cost, which would include renaturalization. As of 2012, the Makakilo Quarry restoration accrual was $2.2 million. With the extension of the upper quarry operations through 2032, Grace Pacific has decided to use the $2.2 million for the lower quarry Voluntary Response Program and renaturalization. At the same time an additional $145,000 was accrued towards the upper quarry 2032 closure.

   As the bulk of the quarry landscape grading areas will be completed and renaturalized (landscaped) by 2032, it will largely be the floor area around the plants that will be dealt with post-closure. The procedure for the renaturalization process is described in Section V.B. above. Grace Pacific's current estimate for floor renaturalization is $1 million, and will be setting aside $.05 per tons sold towards this future cost.

3. Report results of renaturalization effort to DPP in Annual Reports on the Conditional Use Permit.

   Work is ongoing. See annual report for 2013.

"On each anniversary date of the Land Use Commission's Decision and Order (SP73-147), the Applicant or its successor shall file with the Department of Planning and Permitting and the Land Use Commission a report and supporting documentation demonstrating the status of compliance with each of the conditions of the Special Use Permit approval. Included in the supporting documentation shall be an updated rectified aerial imagery of the quarry, buffer area and processing site and dust control management plan. The following items shall also be a part of the supporting documentation:

a. Observations of fugitive dust.
b. A report on replanting activities, including the areas replanted, and the type of vegetation planted.
c. A report of any citizen's complaints relating to the operation along with the actions taken to ameliorate those complaints."

D. Objective 4: Make provisions for future public access to the property for pedestrian/bike use.

1. Explain timing relative to the accessway's proposed location.

   Stipulation 10. "The beneficial re-use plan shall include at least one public access across Makakilo Drive, across the project in which safe pedestrian/bicycling passage can be established. Access requirements, such as but not limited to, subdivision, nature of improvements, routing, hours accessible, shall be established as part of the final beneficial re-use plan. Suggested routing of the public access is shown on Exhibit A." (SP73-147, 2008). Tax Map Key: 9-2-03: 74, connecting Tax Map Key: 9-2-03: 81 and the extension of Makakilo Drive.

   The development of the pedestrian access is acknowledged and will be incorporated into the Grading Closure Plan. Alternative being considered include a connection between the proposed Makakilo Drive Extension and Makakilo Road to the west. This access will provide connection to the West O'ahu Campus and Kapolei Town. The access route will not be open to the public until the quarry is closed in 2032 because while the quarry is active it is governed by the Mine Health Safety Administration (MSHA), and having the public on "mine" property is not advised.

   Alternative alignments and segments are currently under study and include: Old Palehua Road alignment and the current access road.

   Grace Pacific will work with DPP to more specifically define the location of the public access.

VI. Implementation Actions

A. Stipulation 14 (SP73-147). Community Hotline
   The Applicant shall, for the life of the Special Use Permit, establish and disclose to the community, a telephone number dedicated to receiving and recording complaints relating

to quarry and recycling operations. A continuous volume of complaints shall warrant reconsideration of the Special Use Permit by the Planning Commission.

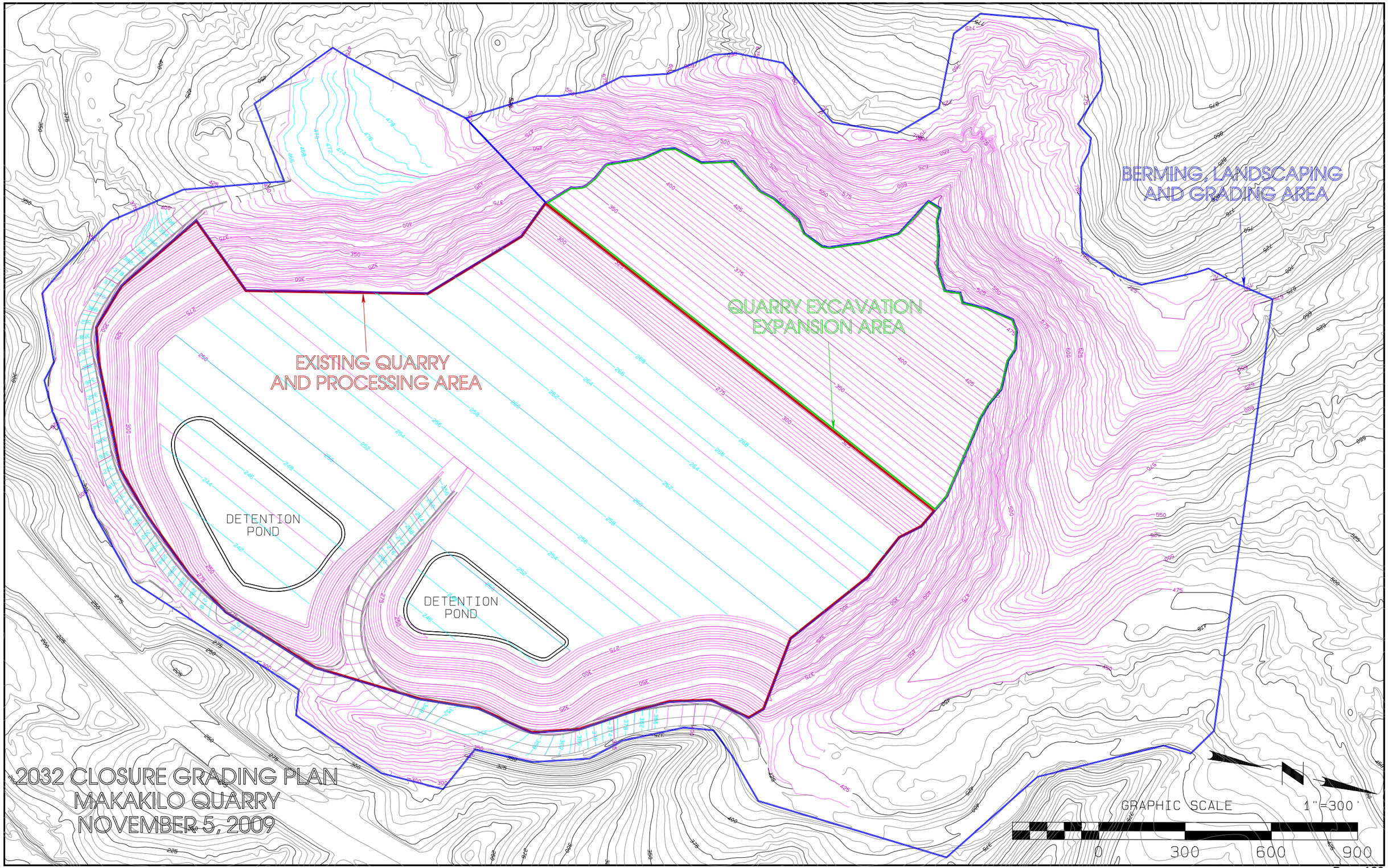
B. Resource Extraction
The uses in the quarry excavation area shall be limited to rock excavation, crushing, stockpiling, a new hot-mix asphalt plant, recycling of concrete rubble, glass, and asphaltic concrete pavement, equipment maintenance, employee support, parking, administration, and a water well and pump. No other uses shall be permitted without the approval of the Land Use Commission.

C. Special Use Permit Condition(s)
The Applicant shall establish the quarry expansion in substantial compliance with the representations made to the Land Use Commission in obtaining the Land Use Commission Special Use Permit. Failure to do so may result in the revocation of the permit.

D. Hours of Operations

The applicant has provided the following information relating to its hours of operations (Table 2). Table 2 -Hours of Operations (2007/CUP-91).

Activity	Existing Hours	Proposed Hours	Comments
Excavation and Crushing	Mon-Sat 6:00 a.m. to 3:30 p.m.	Mon-Sat 6:00 a.m. to 6:00 p.m.	
Blasting	Mon-Fri 8:00 a.m. to 12:00 p.m.	No Change	Frequency of 4 to 5 blasts per week
Recycling	Shift 1: Mon-Sat 6:00 a.m. to 3:00 p.m. Shift 2: Mon-Sat 3:00 p.m. to 11 :00 p.m.	Mon-Sat 6:00 a.m. to 6:00 p.m. Unloading of cold-planed asphaltic	
	Note: Recycling facility is primarily for asphalt and concrete rubble	concrete during re-paving jobs: Sun-Fri 6:00 p.m. to 10:00 p.m.	
Sales at Quarry	Mon-Sat 7:00 a.m. to 4:30 p.m.	Mon-Sat 6:00 a.m. to 6:00 p.m.	
Maintenance	Mon-Sat 3:00 p.m. to 6:00 p.m.	Mon-Sat 6:00 a.m. to 6:00 p.m.	


EXISTING QUARRY
AND PROCESSING AREA
QUARRY EXCAVATION
EXPANSION AREA
BERMING, LANDSCAPING
AND GRADING AREA
DETENTION
POND
DETENTION
POND
2032 CLOSURE GRADING PLAN
MAKAKILO QUARRY
NOVEMBER 5, 2009
GRAPHIC SCALE
1"=300'
0
300
600
900

GRACE PACIFIC CORPORATION

Renaturalization Plan Submittal

Makakilo Quarry, Hawaii

Prepared By:

Grace Pacific Corporation

Belt Collins Hawaii Ltd.

(Aaron A. Akau Director of Landscape Architecture)

11/5/2009

CONTENTS

1.0 INTRODUCTION

S.U.P. Decision and Order # 2 (docket # SP73/147 November 7, 2008)

Within one (1) year of the Land Use Commission's Decision and Order approving the Special Use Permit, the Applicant shall submit to the Director of Planning and Permitting for review and approval a renaturalization plan in coordination with the proposed Closure Grading Plan for the quarry site and buffer area mauka of the H-1 Freeway showing landscaping details including plant types, sizing and spacing, irrigation facilities, and distribution systems.

The following sections are for submittal and review in response to the S.U.P Decision and Order # 2 above. (See Appendix A for a copy the Proposed Closure Grading Plan for the Quarry Site).

1.0.1 PURPOSE

This report outlines the necessary steps for the renaturalization of Makakilo quarry along the outer rim, with the end goal of visually integrating the quarry with the surrounding hillside by the time the quarry ceases operation. Obtaining this goal will be by the process of establishing designated planting areas at one end of the quarry and as these plots become established and self sufficient, additional plots will be constructed adjacent to these until the entire site is complete. In order to plant in the designated areas, multiple steps will be needed to construct an environment conducive to plant growth and health. These steps will include the importation of topsoil, installation of irrigation, installation of erosion control devises, and the planting of native shrubs.

1.1 SOILS

A soil analysis will be performed for all potential soil sources before it is acquired. This will insure that the soil will be free from any contaminants that it will inhibit plant growth, and that the amount of any amendments needed to be added will be economically feasible.

1.1.1 ANALYSIS

All potential imported soil shall be tested for nutrient deficiencies prior to being brought on-site. Soil samples shall be submitted to either C. Brewer

Analytical Laboratory or the University of Hawaii, College of Tropical Agriculture and Human Resources, for testing. After testing, soil shall be brought on-site and amended per the soil analysis' recommendations. See Appendix D for a guide to soil testing in Hawaii.

1.1.2 PLACEMENT

After the imported soil has been amended, it shall be placed at the designated planting areas (The maximum number of planting areas in operation at one time will be determined by the available water supply). The soil will be evenly spread across the site to a depth of 8"-12" after settlement (Figure 1).

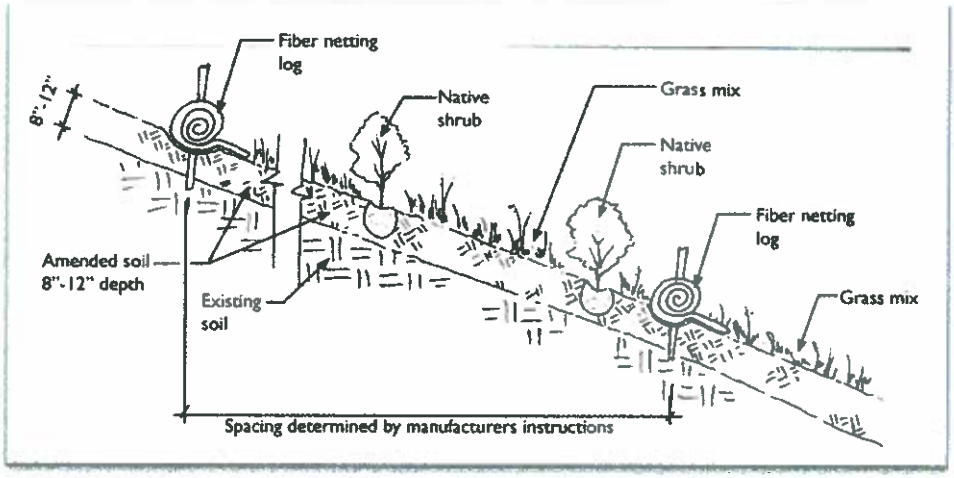


Figure 1: Placement of soils

1.2 EROSION CONTROL

Erosion control will be implemented in planting areas to reduce soil movement. It will be implemented by the placement of fiber netting logs and the application of hydromulch.

1.2.1 FIBER NETTING LOGS

Fiber netting logs will reduce loss of soil caused by water runoff, but will allow water to pass through (See Appendix E for further details of Fiber netting products). The logs will be laid out perpendicular to the slope and the spacing will be determined in the field to effectively deal with varying slopes in the terrain and the manufacture instructions. Examples of a steep grade

condition (Figure 2) and a mild slope condition (Figure 3) have been given for reference.

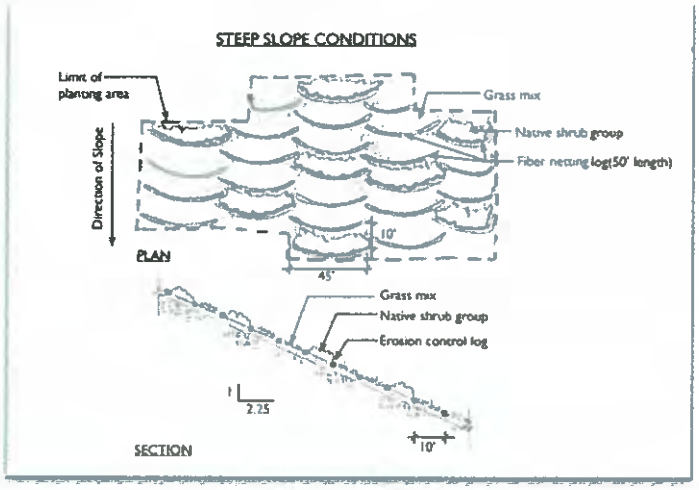


Figure 2: Steep Slope Conditions

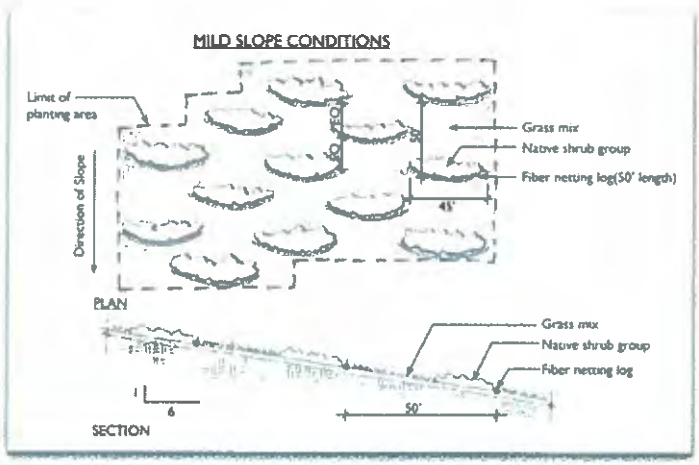


Figure 3: Mild Slope Conditions

1.2.2 HYDROMULCH

The hydromulch is a slurry mixture combination of straw, cotton fibers, seeds, fertilizer and soil tackifiers which is sprayed onto the newly laid topsoil. This application promotes the rapid growth and establishment of grasses for renaturalization (See Appendix F for further details of hydromulch products).

1.3 IRRIGATION

Temporary irrigation will be supplied for the start of each planting area until the vegetation has established itself to the point that it is self sufficient and no longer requires supplemental water for survival. Two types of systems will be needed for each planting area. Spray rotors will be used to irrigate the grass mix, and a drip system will be used to water the native shrub groups (see Figure 4 for graphic example). As the plants grow and become established the amount of water will be cut back to start the process of "weening off". Eventually the plants will be established enough that they will no longer need irrigation, and at this point both irrigation systems for that plant area can be removed for re-use at the next planting area.

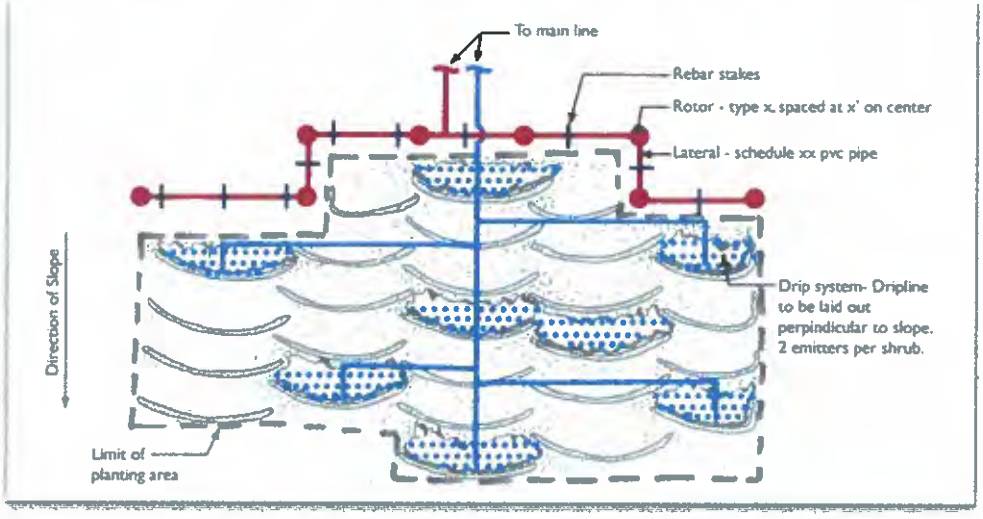


Figure 4: Irrigation System

1.3.1 *IRRIGATION MATRIX*

Table 1 below provides the plant palette for Makakilo Quarry used in the renaturalization plan along with essential irrigation details.

Table 1: Irrigation Matrix

PLANT PALETTE FOR MAKAKILO QUARRY

Type	Manufacturer	Model	Description	Operating Pressure (PSI)	Flow Range	Coverage Radius	Remarks
Rotor	Toro	TG-101-NPT	Gun style sprinkler	40-95	42-248 GPM	91'-178'	Cannot use effluent water supply
Rotor	Rain Bird	2045-PJ Maxi-Bird	Riser mounted impact head	25-60	1.5-8.4 GPM	22'-45'	
Drip							
Dripline	Toro	T-EHD2057-050A	3/4" polethylene hose	59 max			
Emitter	Toro	T-DPJ04-1	Pressure compensating emitter	10-50	1 GPH		Two emitters per shrub
Checkvalve							
Controller	Toro	DDCWP	8-station battery operated controller				
Gate Valve							
Back Flow Preventer							
Quick Coupler							
Valve Box							

1.4 PLANTING

The planting of drought resistant native shrubs, in addition to the hydromulch grasses, will occur on approximately 11.5 acres of enclosed planting areas where slope is suitable as shown in Appendix B. By utilizing these shrubs water demands will be reduced in addition to creating visual integration with the surrounding area.

1.4.1 PLANT MATRIX

Table 2 below provides the plant palette for Makakilo Quarry used in the renaturalization plan along with essential planting details for determining layout and patterns.

Table 2: Plant Matrix

PLANT PALETTE FOR MAKAKILO QUARRY								
Value	Common Name	Botanical Name	Seed Source	+Propagation Techniques	Outplanting Size (hardened to sun and drought)	Average Outplant-ing Spacing	Estimated Outplanting Quantity per Acre	Remarks
1	'A'ali'i	Dodonaea viscosa	*Wild populations on Pu'u Makakilo.	Pgs. 352-353	Mature 6" pot	5'	1,750	Requires well drained soil.
3	Naio	Myoporum sandwi-cense	*Wild populations in Kalaeloa and Campbell Industrial Park.	Pgs. 254-255	Mature 6" pot	10'	450	Requires well drained soil.
1	Ma'o	Gossypium tonen-tosum	*Wild populations in Honokai Hale.	Pgs. 237-238	Mature 6" pot	5'	1,750	Requires well drained soil.
1	'Iliahi (coastal variety)	Santalum ellipticum	*Wild populations on Pu'u Makakilo.	Pgs. 347-349	Mature 6" pot	15'	175	Plant next to a host plant. Requires well drained soil.
2	Pohinahina	Vitex rotundifolia		Pgs. 390-391	Mature 6" pot	5'	1,750	
1	Ilima (shrub form)	Sida fallax	*Wild populations in Makakilo.	Pgs. 248-249	Mature 6" pot	5'	1,750	Requires well drained soil.
1	Uhaloa	Waltheria americana	*Wild populations on Pu'u Makakilo.		Mature 6" pot	5'	1,750	
1	Laredo Buffel grass	Cenchrus ciliaris 'Laredo'	Koolau Seed & Supply Co., Inc.		Un-hulled Seeds		10 lbs. de-hulled seeds	Hydro-seed with bonded fiber matrix (Airtrol Geobinder), fertilizer (450#/acre 10-30-10 +2% iron/zinc) and mulch in one mix. Establish mature grass coverage before planting potted materials.
1	Annual ryegrass	Lolium multiflorum	Koolau Seed & Supply Co., Inc.		Seeds		25 lbs. seeds	
1	Common bermuda	Cynodon dactylon	Koolau Seed & Supply Co., Inc.		Hulled Seeds		25 lbs. de-hulled seeds	
			*Seed source information from Shad Kane	+See book: "Growing Hawaii's Native Plants" by Lilleeng-Rosen-berger				

Photos of recommended native shrubs and also grasses for hydromulch mixture can be found in Appendix C.

1.4.2 LAYOUT

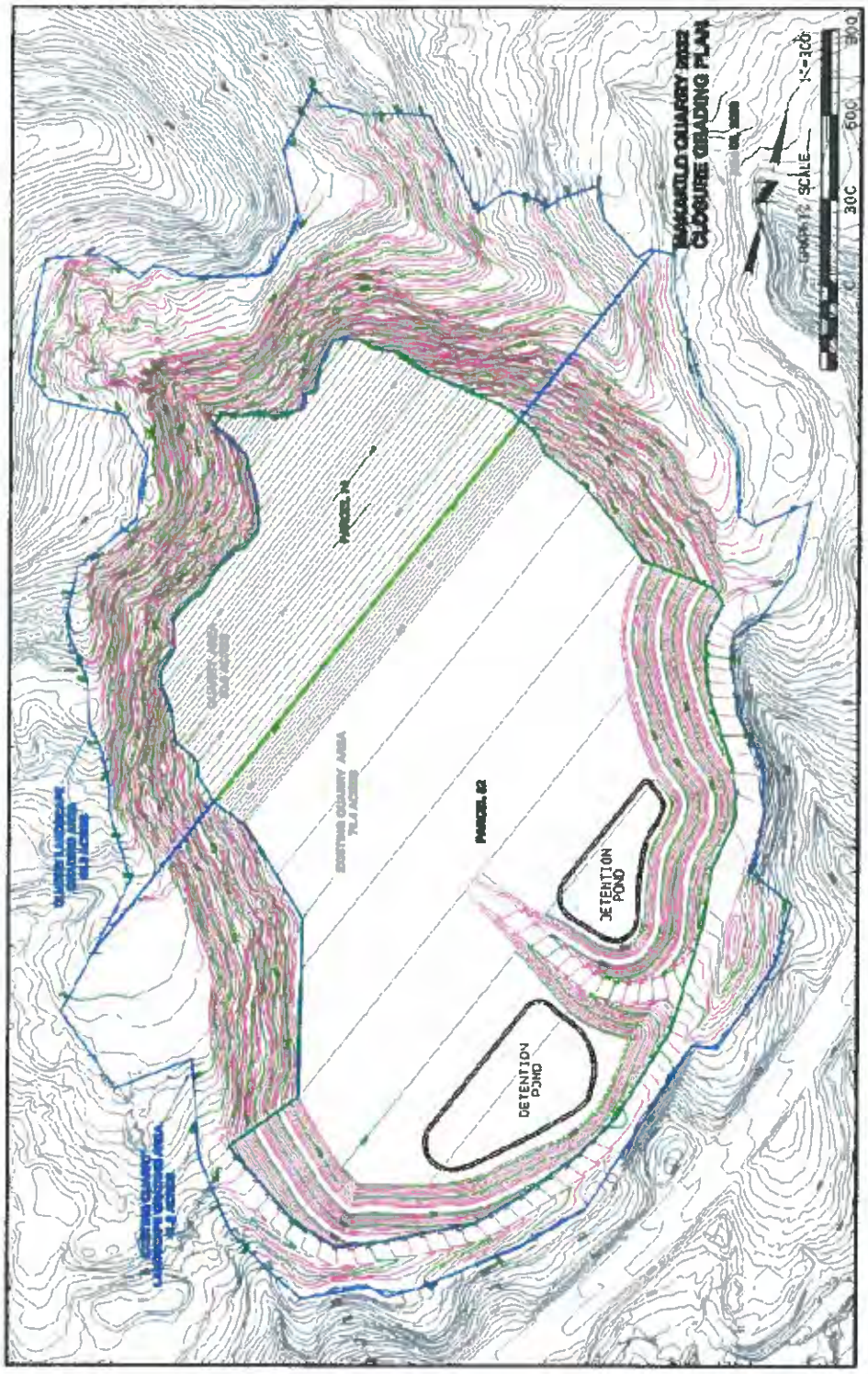
The placement of the native shrubs groups will be random across the planting area to give more of the desired naturalistic look (see Figure 2 & Figure 3 for examples of two different slope conditions). Two methods will need to be tried to find the best overall success of the grass mix and native shrub combination.

Method "A": will consist of applying the hydromulch mix across the entire planting area, with no planting of native shrubs at this time. After the grass mix has been well established and growth is healthy, native shrubs will then be planted in groupings.

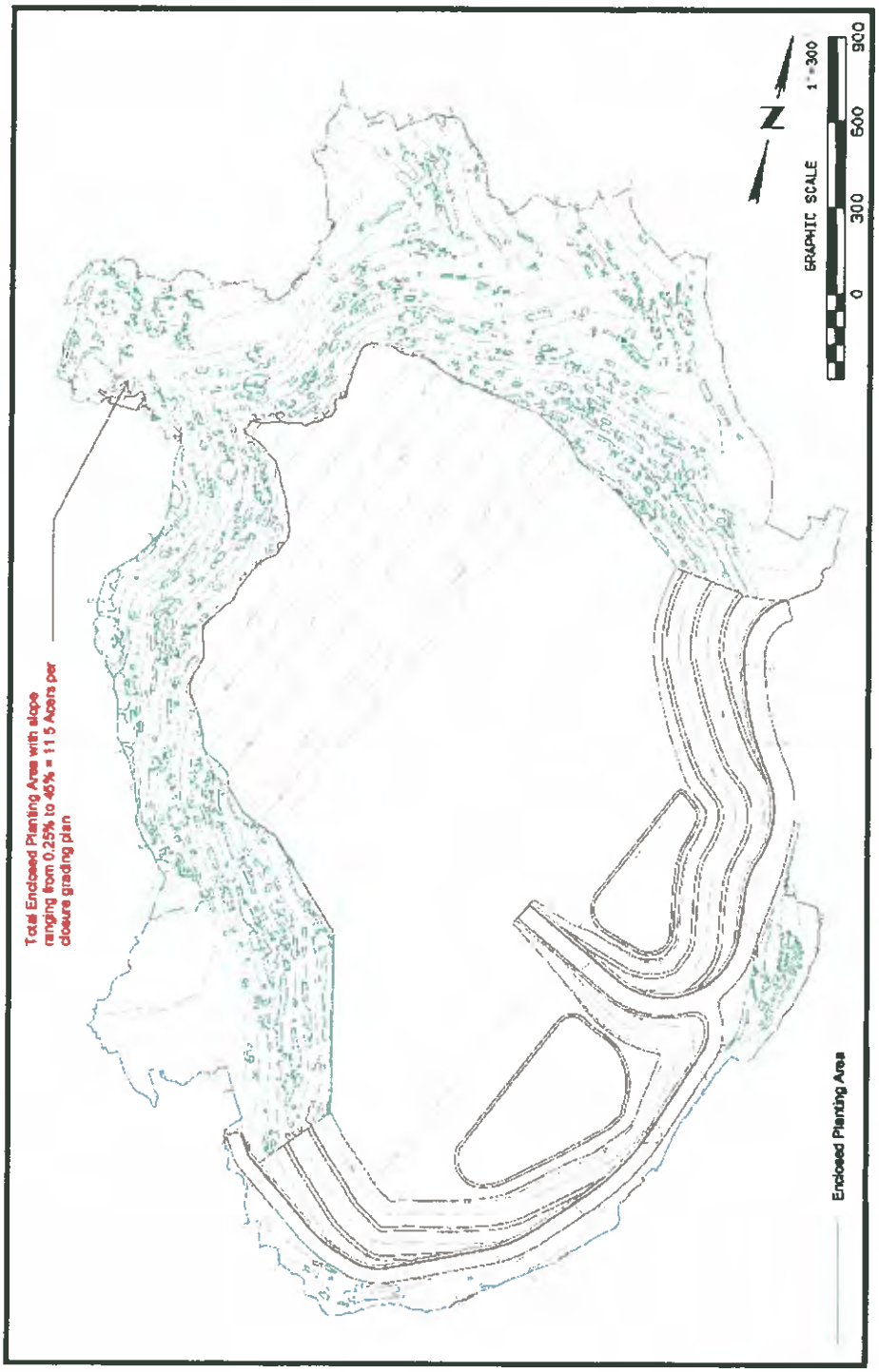
Method "B": native shrub groupings will be installed first, then immediately afterward the hydromulch mix will be sprayed across the entire planting area.

For both methods the size of the native plant groupings will be an area approximately 10'x45'.

APPENDIX A: PROPOSED CLOSURE GRADING PLAN FOR THE QUARRY SITE



APPENDIX B: CLOSURE PLAN PLANTING AREAS



APPENDIX C: PLANT IMAGES

A'ali'i

Ma'o

Pohinahina

Ilima

Naio

'Iliahi

Uhualoa

Hydroseed Mix

Buffel Grass

Common Bermuda

Annual Rye

APPENDIX D: SOIL ANALYSIS

(Hue, Uchida, & Ho, 2009)

Return to Rx for Soils and Crops

Rx for Soils and Crops

Date Last Edited: 09/13/2001

A Guide To Soil Testing For Hawaii's Residents

N. V. Hue, R. Uchida, and M. C. Ho

Department of Tropical Plant and Soil Sciences
and
Agricultural Diagnostic Service Center

College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa

Why have a soil tested?

Having a soil tested is an integral part of good farming/gardening because it will let you know if your soil needs any fertilizer, what kind and how much so that your crop can grow better. In this factsheet, we will show you how to obtain a good soil test. Because laboratory analyses are performed on a small sample of soil from an entire field or garden, the analytical results are useless if the sample submitted does not represent the soil you intend to grow your plants in. A properly collected sample makes test results valid, and will produce correct recommendations that enhance yields, make efficient use of resources, and/or preserve quality of the environment.

How to take a representative soil sample

When sampling home gardens, one composite sample consisting of 5-10 subsamples per 100 sq. ft. collected over the planting area should be taken. For larger areas like pastures or tree orchards, first make a detailed map of your area, then divide your map into smaller uniform soil-test areas of a few (1-5) acres each. Label each area clearly on the map by using a combination of letters/numbers that make sense and thus are easy to remember. Each test area should be uniform with regard to soil type or condition. Fields with different slope, soil color, drainage, apparent texture (for example, heavy, light, or A'a) or cropping history should be sampled separately. A soil-test sample for each area should be a composite of 10-15 subsamples.

Soil subsamples consist of 1-inch thick slices of the soil taken to a

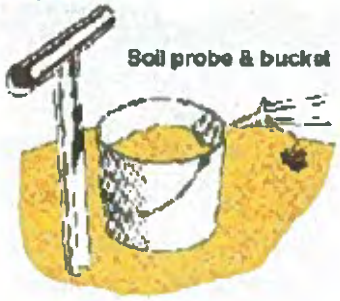
specified depth, normally 4 inches for no-till fields or established pasture, lawn and turf and 8 inches for conventionally tilled fields. For tree crops (forests, nuts, tree fruits), where possible, collect a surface sample to a depth of 8 inches and a sub-soil sample from 8-24 inches deep. Each sample to be tested should be a thorough mix of the cores taken randomly, say, in a zigzag pattern as shown in Figure 1.

Figure 1. Sampling soil using a zigzag pattern.

Such a sampling technique minimizes the variability that may be present in your field or garden, and allows you to obtain a reasonably representative soil sample.

A specially designed soil probe is often used for collecting soil subsamples (called cores). However, if you do not own a probe, then use a steel or plastic garden spade or shovel to collect soil cores as follows. Dig a hole to the sampling depth, then cut a 1-inch thick slice from the top to bottom of the hole. Take a 1" wide by 1" thick segment of the slice, and place it in a clean mixing bucket, preferably made of plastic.

Plan to collect soil samples two to three months before planting so you will get your test results in plenty of time to plan your timing and fertilization. Depending on workload, the turnaround time at the lab can be up to two-three weeks. Soil in fields or gardens should be tested at least once every two years.



Soil probe & bucket

Submitting samples and providing relevant information

After collecting the soil samples, take them to the county extension office in your area or send them directly to the Agricultural Diagnostic Service Center (ADSC) in the College of Tropical Agriculture and Human Resources, University of Hawaii (*University of Hawaii, Agricultural Diagnostic Service Center, 1910 East-West Road, Rm 134, Honolulu, HI 96822*). To get the most accurate recommendations from your soil test, be sure to fill out a soil information sheet, which is available from your county extension office or the ADSC. A blank soil information sheet is shown in Figure 2.

Figure 2. Soil information sheet used by the ADSC, Univ. of Hawaii.

Agricultural Diagnostic Service Center
College of Tropical Agriculture & Human Resources
1910 East-West Rd., Honolulu, HI 96822
Phone: 956-6706/7980 Fax: 956-2592

Department of Agronomy and Soil Science
University of Hawaii at Manoa
1910 East-West Rd., Honolulu, HI 96822
Phone: 956-7530 Fax: 956-6539
email: agrss@hawaii.edu

DATE:_____

Name:	Address:		City:
State:	Zip:	Phone:	Fax:
Client ID:	Sample Type:	Sample Location:	
Agent:	Address:		City:
State:	Zip:	Phone:	Fax:
Job Control No.:	Sample ID:	*Serial No.:	*Date (m/d/y):
Soil or Mix:	Size of area: sq. ft.:		Acres:
Soil Depth (inches):	Map unit:	Series:	Apparent density: heavy, light, or Aa
Elevation:	Annual rainfall (inches):	Drainage	Slope (%):	Irrigation:
Lime used:	Yr.of application:	Rate:	Type of Lime:
Fertilizer used:	Analysis:	Rate:	Method:
Manure type:	Rate:	Compost:	Rate of compost:
Has rock phosphate been applied?	Plant grown:	Plant to be grown:	
Can you till in fertilizer 4-6 inches if necessary?	Bottom land:	Rolling:	
Describe the problem &	Send copies to:	Objectives for this sample:	

observations:	NRCS ASCS	Diagnosis only

Complete information will provide you with the best possible recommendation. Fertilizer and lime requirements vary with soils and crops; therefore, the soil's apparent density, namely heavy (most Hawaii's soils), light (volcanic ash-derived soils on the Big Island) or A'a land (irregular pieces of lava), crop to be grown and crop previously grown are among the most important items of information needed to make correct recommendations.

How are soil samples tested?

The ADSC provides all residents of Hawaii with a reasonably priced soil and plant tissue testing service. Routine analyses of soils include acidity/alkalinity (pH), extractable phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg). Soil organic carbon (organic matter), total nitrogen, extractable aluminum (Al), boron (B), and other micronutrients (e.g., zinc, manganese, copper) are measured on request. Detailed descriptions of the analytical procedures are given in the *Soil Fertility Manual*, 1996, published by the College of Tropical Agriculture and Human Resources, University of Hawaii.

Soil test results and fertilizer recommendations

Within two to three weeks after you submit your samples to the ADSC, you should receive the test results for your soil along with fertilizer recommendations for your garden or field. The results should include at least pH, and levels of P, K, Ca and Mg in ppm (or mg per kg). A brief interpretation of these levels is also provided as either: very low, low, sufficient, high, very high, or extremely high. An example of the form for the analytical results and interpret-ations is shown in the upper half of Figure 3.

Figure 3. ANALYTICAL RESULTS AND FERTILIZER RECOMMENDATIONS PROVIDED BY THE ADSC

Analytical Results / Interpretations

*Soil Lab No:	Interpretation	Plant Lab No:	Interpretation
Soil pH:		Nitrogen (%N):	

Phosphorus (ppm) MT or OL:	Phosphorus (% P):
Potassium (ppm K)	Potassium (% K):
Calcium (ppm Ca)	Calcium (% Ca):
Magnesium (ppm Mg)	Magnesium (% Mg)
Salinity (EC, mmhos/cm)	Sulfur (% S)
Zinc (ppm Zn)	Iron (ppm Fe)
Manganese (ppm Mn)	Manganese (ppm Mn)
Copper (ppm Cu)	Zinc (ppm Zn)
Boron (ppm B)	Copper (ppm Cu)
Total N (%)	Boron (ppm B)
Org. C (%)	Molybdenum (ppm Mo)
NH4-N (ppm)	Aluminum (ppm Al)
NO3-N (ppm)	Nitrate (ppm NO3-N)

Fertilizer Recommendation

Total nutrient requirement (lbs/A):	Nitrogen(N):	Phosphorus (P):	Potassium (K):
Fertilizer/Material Options	Fertilizer Amount		Est. Cost
	lbs/1000sq.ft./Crop	lbs/1000sq. ft./mo.	$/1000sq. ft.
Lime			
Fertilizer selection			
Micronutrient			
Other Fertilizers			
Comments:			

Note: The interpretations are based on the Fact Sheet No. 3 "Adequate Nutrient Levels in Soils and Plants in Hawaii".

Did the recommendation help? To help improve future recommendations, please answer the following questions, photocopy this form and return it to above address (ADSC).

1. Did you need to modify the recommendations? If so, how?
2. Did your plants improve? Please give unit area yield before and after the recommendation was applied.

Although these results and interpretations are essential to making fertilizer recommendations, they may not be very helpful to you. That's why we also provide fertilizer recommendations for your garden or field as shown in the lower half of Figure 3. These include amounts of lime (in either lbs/1000 sq. ft. or tons/acre), and its estimated cost, fertilizer type (for example, 21-0-0, 21-0-32, 10-30-10), and its amount and cost.

At the bottom of the form, we ask you to give us some feedback in terms of how your crop performed as a result of our fertilizer recommendations. Such information would allow us to fine-tune our recommendations so that we can better serve you in the future.

We hope that with this information you can make your garden or field more productive as well as help protect the quality of our environment.

...Return to Rx for Soils and Crops...

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APPENDIX E: FIBER NETTING LOG

(Green, SedimentSTOP, 2008)

the Versatile

SEDIMENT CONTROL SOLUTION

North American Green's SedimentSTOP® Biodegradable Filtration System is a temporary sediment filtration device that provides highly effective sediment control for a wide range of applications.

SedimentSTOP consists of a 70% straw / 30% coconut fiber matrix reinforced with a 100% biodegradable netting that is rolled from edge to edge to create a seamless temporary, water-permeable three-dimensional sediment filtration structure.

A Best Management Practice that reduces soil loss caused by stormwater runoff, SedimentSTOP traps soil particles while allowing water to pass through, protecting waterways, sidewalks and roads from sediment accumulation.

SedimentSTOP assists engineers, specifiers and contractors in complying with many NPDES Phase II rules and other environmental regulations.

SedimentSTOP saves soil, time, and money in applications that include:

- Forest Fire Rehabilitation
- Bioengineering Projects
- Active Jobsites – Commercial/New Home Construction
- Ski Slopes
- Highway Construction
- Industrial Sites
- Pipeline Revegetation
- Steep Slopes
- Wet Areas
- Edging/Perimeter Control

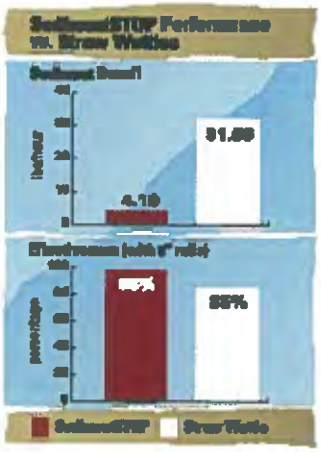
VERSATILE

the SedimentSTOP® ADVANTAGE

SedimentSTOP dramatically reduces surface sheet erosion, and offers significantly greater filtration capabilities and sediment retention than wattles, straw bales or silt fences. And unlike wattles, which use a single netting on the outside to encapsulate the fiber fill, SedimentSTOP utilizes multiple layers of netting to eliminate the possibility of failure if the outer netting is ever damaged.

SedimentSTOP is more porous than a wattle, allowing it to perform as a buffer strip that slows water and filters sediment. In the event that water does flow over the top, SedimentSTOP has an attached Splash Apron, which reduces rill formation and potential down slope erosion.

Wattles create a dam-like structure that causes water to back up and flow over the top, resulting in potentially severe erosion on the down slope side of the wattle.



SedimentSTOP was put to the test against straw wattles in research recently conducted at Utah State University's Water Research Facility.

Three 20-ft. long plots of sandy loam soil were set at a 2:1 gradient. SedimentSTOP rolls with a 9-inch diameter were placed at the mid-point and 2 ft. from the bottom of one plot, straw wattles of the same diameter were similarly placed on a second plot, and one plot was left unprotected as the control. Sediment runoff was then collected and measured as each plot was exposed to 4 inches of rainfall over a one-hour period.

The sediment control effectiveness of SedimentSTOP versus the wattles was significant. While 31.66 lbs. of sediment was collected from the plot with straw wattles, only 4.16 lbs. of sediment was collected from the plot protected by SedimentSTOP. Compared to the bare soil control plot, the straw wattles were only 85% effective, while the SedimentSTOP was independently proven to be 98% effective at reducing sediment runoff!

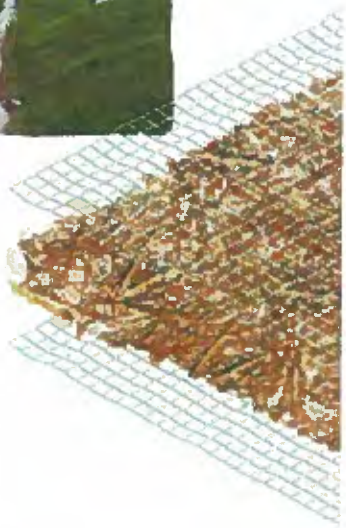
EFFECTIVE

Biofriendly

SEDIMENT CONTROL

SedimentSTOP is an environmentally friendly, 100% biodegradable product. It can be incorporated with a variety of planting techniques such as: live planting, live staking and seed incorporation. The leno woven net enables its jute strands to move independently of each other, allowing the net openings to expand as necessary. This flexibility, combined with the 100% biodegradability, minimizes the risk of accidental wildlife entrapment.

Because it leaves absolutely no synthetic residues on site, SedimentSTOP is ideal for use in bioengineering projects, wetland mitigation, riparian area protection, shaded areas, stream bank restorations and environmentally-sensitive areas where synthetic-netted products may pose a threat to wildlife. By eliminating the need to return to the jobsite to remove the sediment control structure, SedimentSTOP saves you time, money and potential headaches.



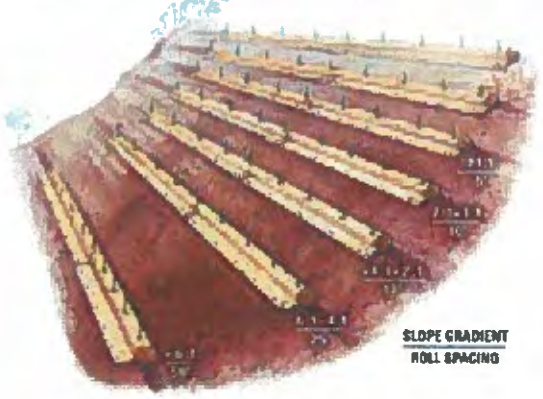
NATURAL

SediментSTOP® is EASY TO INSTALL

SedimentSTOP is easy to install, and features a two to three year functional lifespan. The structurally sound net-reinforced layers prevent failures – even if the outer netting wrap is damaged during or after installation.

SedimentSTOP is easily field fabricated for greater flexibility to specific site requirements. It is extremely flexible and readily conforms to the ground surface, minimizing undercutting. Longer, 50-foot finished roll length reduces the number of overlaps, and its leno woven natural jute net allows easier contouring to the soil. The short, lightweight packaged rolls are easily transported over difficult terrain and to remote areas.

Finished roll diameter can also be increased, if necessary, by simply adding other organic materials such as grass clippings, pine needles, straw, or leaves.



This illustration provides general guidelines to assist in the design, installation and spacing of SedimentSTOP. These guidelines may require modification due to variation in soil type, rainfall intensity or duration, and amount of runoff affecting the application site. As slope gradient increases the spacing between the SedimentSTOP structures should decrease. For example, on a slope with a gradient of 8:1 – 4:1 (H:V), the SedimentSTOP structures should be installed 25 feet apart. However, on a slope with a gradient of 2:1 – 1:1 the spacing should be reduced to 10 feet.

HERE'S HOW IT IS DONE:

Step 1
Dig a 3" deep x 9" wide anchor trench along the contour of the slope or across the swale.

Step 2
Position the SedimentSTOP® packaged roll perpendicular to the trench so the double-netted portion covers the anchor trench and extends downslope one foot beyond the anchor trench. (This forms the Splash Apron™.) Unroll to cover the trench.

Step 3
Secure SedimentSTOP material into the anchor trench with a row of staples, and then secure the downslope edge of the Splash Apron with another row of staples 12" apart.

Step 4
Roll the remaining SedimentSTOP material from the upslope edge into the anchor trench. (If a thicker roll is needed, simply add organic materials across the product width prior to rolling.)

Step 5
Once the product has been rolled up, secure it to the soil surface using wooden stakes 3' on center.

NOTE: The complete installation instructions are printed on each package of SedimentSTOP®

PACKAGED ROLLS
Width - 6.67 ft (2.03 m)
Length - 50.00 ft (15.24 m)
Weight - 65.00 lbs (29.50 kg) ± 10%
Matrix - 70% Straw Fiber
1.225 lbs/yd³ (0.685 kg/m³)
30% Coconut Fiber
0.525 lbs/yd³ (0.285 kg/m³)
Bottom Netting – leno woven jute net
Splash Apron Top Net – 2.00 ft leno woven jute net

FINISHED INSTALLED STRUCTURE
Diameter - Approximately 9.00 in (0.23 m)
Length - 50 linear feet (15.2 m)
Downhill Splash Apron Length -1.00 ft (20 cm)

EASY

If you are thinking about using wattles, you need to STOP and consider

the advantages of using

SedimentSTOP.

SedimentSTOP Benefits Comparison Chart

When you compare the benefits of using SedimentSTOP against other sediment filtration methods, you'll see that there really is no comparison.

	SedimentSTOP	Straw Wattle	Silt Fence
Completely Biodegradable	YES		
Reduces Rill Formation	YES		
Customizable Diameter	YES		
Allows Water Filtration	YES		
Shallow Anchor Trench	YES	YES	
No Special Equipment Needed	YES	YES	
Little to no Risk of Wildlife Entrapment	YES	YES	
Seamless Joints	YES		YES
No Removal Required	YES		
Used on Slopes >2:1	YES	YES	
Multiple Layers of Netting	YES		
Customizable Lengths	YES		YES
Economical Bundles for Shipping	YES		YES

SedimentSTOP is economical, delivers exceptional performance, and is easily installed. Contact North American Green today for even more reasons to stop using wattles and start using SedimentSTOP.

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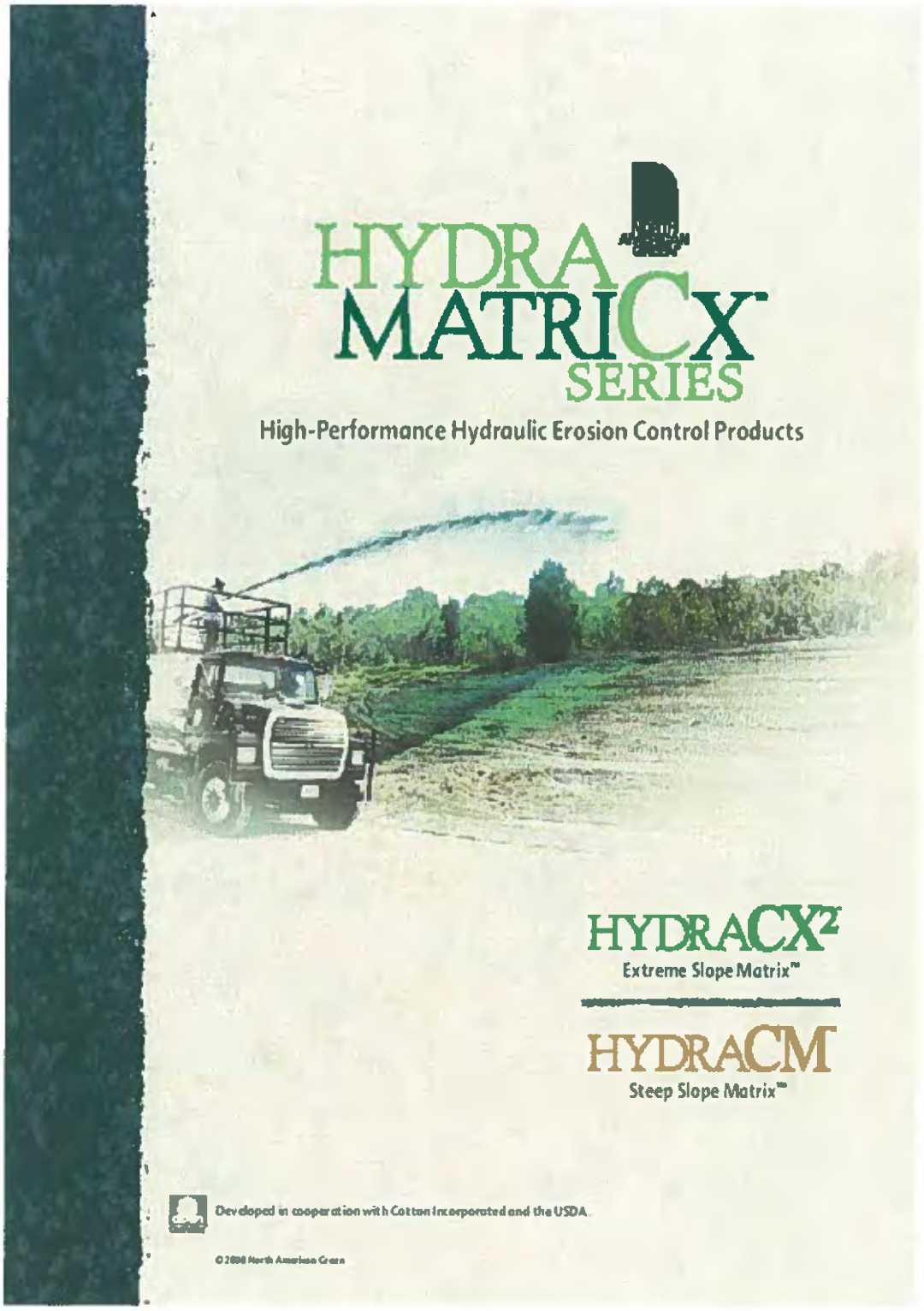
APPENDIX F: HYDROMULCH

(Green, Hydra MatriCx SEries, 2008)



HydraMatriCx™ Series

High-Performance Hydraulic Erosion Control Products

HydraMatriCx™ Series high-performance hydraulic erosion control products are made with a proprietary blend of straw, reclaimed cotton plant material, tackifiers, and polymers.

This exciting line of products from North American Green was developed in cooperation with Cotton Incorporated and the U.S. Department of Agriculture.

Consider the benefits of HydraMatriCx Series products:

- Cost-effective application
- Low water-to-mulch ratio
- One-step application of seed, fertilizer, and mulch
- No synthetic fibers
- Pleasing, deep-green color

In many slope-protection applications, HydraMatriCx products can replace temporary erosion control blankets.

HYDRACX²

HydraCX²™ Extreme Slope Matrix™ is a high-performance hydraulic mulch designed especially for steep to severe slopes, 2:1 to 1:1.

HYDRACM

HydraCM™ Steep Slope Matrix™ is a high-performance hydraulic mulch designed especially for medium-length, moderate to steep slopes, 4:1 to 3:1.

HydraCX²: Proven Performance

The porosity, absorbency, and proprietary blend of tackifiers and polymers of HydraCX² deliver exceptional erosion control and fast vegetation establishment.

San Diego State University Slope Testing

Cover Factor (2, 4, and 6 inches/hour event, 20-minute-duration events)	ASTM D 6459*	0.002*
Percent Effectiveness	ASTM D 6459*	99.8%*
Vegetation Establishment	ECTC Test Method #4	500%

*Modified ASTM D 6459 (Standard Test Method for Determination of Erosion Control Blanket (ECB) Performance in Preventing Hillslope from Rainfall-Induced Erosion) conducted by the Soil Erosion Research Laboratory (SERL) at San Diego State University in December 2007. Test beds utilized by SERL measure 2 m x 8 m. Target application rate was 3,500 pounds per acre.

To push HydraCX² to its performance extremes, one of the test beds received an extended rain event:

Slope	Rainfall	Duration	Extended Intensity	Extended Duration
3H:1V	2, 4, and 6 inches per hour	20 minutes	6 inches per hour	60 minutes

This extended rain event totaled 10 inches of rain over a two-hour time period (an average of 5 inches of rain per hour). The data from this event showed that HydraCX² can reduce sediment loss by as much as 99.7% compared to a non-protected plot.

TRI/Environmental Slope Testing

ASTM D6459†

Cover Factor	Rainfall	Duration	Percent Effectiveness
0.004	2, 4, and 6 inches per hour	20 minutes	99.6%

†Testing pursuant to ASTM D 6459 (Standard Test Method for Determination of Erosion Control Blanket (ECB) Performance in Preventing Hillslope from Rainfall-Induced Erosion) was conducted by TRI/Environmental, Inc. The test used two plots on a 3H:1V slope gradient with an application rate of 4,000 pounds per acre. The plots used were 8 feet wide by 40 feet long. Raindrop size varied as a function of rainfall intensity. Wind speeds were maintained below 3 miles per hour. Rainfall height was a minimum of 15 feet. Each of the plots received an average rainfall of 2.2 inches per hour, 4.75 inches per hour, and 6.5 inches per hour for 20-minute durations. The average sediment loss for both plots was less than 2 pounds each. HydraCX² was determined to be 99.6% effective, with a C factor of 0.004.

HydraMatriCx Series products achieve maximum performance once the matrix has dried.

Cost-Effective Application

- One-step application
- Low water-to-mulch ratio
- Ready to agitate instantly
- Uses convenient, spray-on technology
- Easy to clean up

Low Water-to-Mulch Ratio

HydraCX² and HydraCM require a maximum of only 100 gallons of water per 50 pounds of mulch. Water-to-mulch ratio is important when you consider the costs of water and the time, labor, and fuel consumption for trips to and from the water source.

One-Step Application

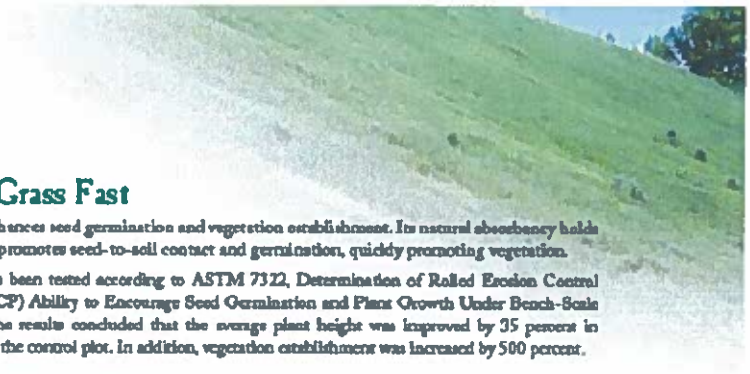
HydraMatriCx products can be applied in one step together with seed and fertilizer. Contractors will appreciate the convenience and the quick, easy tank loading and one-step application of HydraMatriCx products.

No Synthetic Fibers

HydraCX² and HydraCM contain no synthetic fibers.

In multiple toxicity studies conducted according to EPA-821-R-02-123 Methods for Measuring Acute Toxicity of Effluents, the Ceriodaphnia dubia, Daphnia magna, and Pimephales promelas tests of HydraCX² detected no significant toxicity in any of the tests, and control performance criteria were met.

In addition, HydraCX² contains beneficial nitrogen, phosphorous, and potassium, nutrients that are important for plant growth.



Grows Grass Fast

HydroCX² enhances seed germination and vegetation establishment. Its natural absorbency holds moisture and promotes seed-to-soil contact and germination, quickly promoting vegetation.

HydroCX² has been tested according to ASTM 7322, Determination of Rolled Erosion Control Products (RECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions. The results concluded that the average plant height was improved by 35 percent in comparison to the control plot. In addition, vegetation establishment was increased by 500 percent.

Compost Analysis of HydroCX² Extreme Slope Matrix

Item	% Dry Basis	% Wet Basis	lbs./100 cu. ft.	lbs./cu. yd.	lbs./ton
lbs./gal.		0.83			
lbs./cu. ft.		6.24	624	168.5	
Total Solids (TS)		86.62			
Moisture		13.38			
Total Nitrogen (TKN)	1.59	1.38	8.61	2.32	27.60
Available Nitrogen	0.54	0.47	2.93	0.79	9.40
Ammonia Nitrogen	0.04	0.03	0.19	0.05	0.60
Available Ammonia	0.02	0.02	0.13	0.03	0.40
Organic Nitrogen	1.55	1.34	8.36	2.26	26.80
Available Organic N	0.52	0.45	2.81	0.76	9.00
Phosphorous (P)	0.28	0.17	1.06	0.29	3.40
Phosphate (P2O5)	0.46	0.40	2.50	0.67	8.00
Potassium (K)	2.49	2.16	13.48	3.64	43.20
Potash (K2O)	2.99	2.59	16.16	4.36	51.80
Calcium (Ca)	0.50	0.43	2.68	0.72	8.60
Carbon: Nitrogen Ratio		29:1			

These analyses are representative samples. Percentages may vary from sample to sample. Calculations are approximate and are not guaranteed.

Unlike some wood-based mulches that may have carbon-to-nitrogen (C:N) ratios of more than 300:1, HydroCX² has a carbon-to-nitrogen ratio that is typically less than 40:1. HydroCX² requires less nitrogen from the soil for decomposition, leaving more of that nutrient available for plant growth.

HydroCX² Content

65% ± 3%	Mechanically processed straw
25% ± 3%	Mechanically processed cotton fibers and byproducts
10% ± 1%	Proprietary hydrocolloidal tackifiers and activators

HydroCM Content

75% ± 3%	Mechanically processed straw
15% ± 3%	Mechanically processed cotton fibers and byproducts
10% ± 1%	Proprietary hydrocolloidal tackifiers and activators

MAKAKILO QUARRY
(Tax Map Key 9-2-3: 82)
CONDITIONAL USE PERMIT NO. 72/CUP-15
ENGINEERING REPORT AMENDMENT

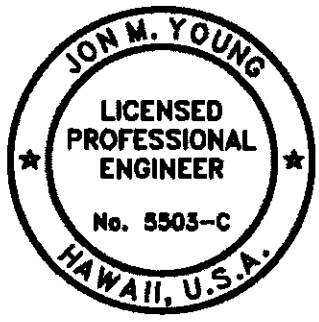
Prepared for:

GRACE PACIFIC CORPORATION
P.O. Box 78
Honolulu, Hawaii 96810

Prepared by:

BELT COLLINS HAWAII, LTD.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

April 2007
and Amended May 2008



This work was prepared by me or under my supervision.
April 30, 2008
Expiration Date of the License

ENGINEERING REPORT AMENDMENT

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

1.1 PURPOSE

This Makakilo Quarry Engineering Report, dated April 2007 and amended May 2008 (the "April 2007 Report"), is prepared to assist Grace Pacific Corporation in its application for a modification to use permits 72/CUP-15 and 73/SUP-147, to allow the relocation and continuation of quarrying activities at Pu'u Makakilo (the "Application").

The original Makakilo Quarry Engineering Report was approved by the City and County of Honolulu Department of Planning and Permitting on October 19, 1998 (the "1998 Report"). The 1998 Report was prepared to satisfy Condition no. 2 of City Council resolution 95. An amendment was made to the 1998 Report in March of 2004 (the "2004 Report"). The 2004 Report dealt largely with the retention of run-off within the property, visual mitigation and landscaping.

While this report is written to be a free-standing document, a review of the 1998 Report and the 2004 Report is of value in understanding the current operations. These reports are included as Exhibit J of the Application.

1.2 SITE DESCRIPTION

The James Campbell Company owns the land under the Makakilo Quarry (Tax Map Key 9-2-3:82), and licenses it to Grace Pacific Corporation for quarry operations. The license agreement expires in the year 2017. Subject to the approval of the Application, Grace Pacific has negotiated with Campbell for an extension of the license to 2032.

The quarry is situated on the slopes of Pu'u Makakilo. The west bound lanes of the H-1 Freeway front the southeast side of the property. The area makai of the H-1 Freeway is used as a processing site for quarry, but its operations are not included in this report.

Pu'u Makakilo Inc., a subsidiary of Grace Pacific Corporation, owns the property surrounding the existing quarry. The land is characterized as dry-range land with poor, scrub-type vegetation on greater than 10 percent slopes.

2. GRADING PLAN

2.1 GRADING

The attached grading plan (Figure 4, Appendix B) shows the proposed final grades prior to reclamation of the quarry in the year 2032. The plan maximizes the excavation of the known basalt reserve while minimizing visual and environmental impacts to the surrounding community.

The southeast boundary of the quarry, which consists of undisturbed ridges and gullies, parallels the H-1 freeway. This area serves as a buffer and will remain undisturbed,

providing a noise and visual barrier from the freeway. The quarry sides and mauka face will utilize slopes averaging flatter than 1.5 (horizontal) to 1 (vertical) and undulating faces to minimize the appearance of a man-made landform. The existing quarry floor will gently slope from the back and sides to the front at approximately a 2% grade. The floor of the proposed mauka quarry area will be steeper, at 15% to 25%, matching the gradients of the existing Pu'u formation.

Restoration grading recommendations prepared by a geotechnical engineer are attached as Appendix A. Several key methods are recommended to provide an adequate foundation for access roads, residential and light loaded commercial development. Excess stockpile material, 1 inch minus, may be used for landscape restoration provided the material contains or is amended with proper portions of organics, sand and silts.

The proposed relocation of the quarry extends up the Pu'u from existing lower elevations between 500 feet to 550 feet to an upper elevation of 700 feet. An access road running across the 350 foot elevation of Parcel 82 will be constructed to allow vehicle access from the southwest portion of the 312 acre parcel (TMK 9-2-3-74) to the northeast portion of the parcel.

As part of this proposal, two drainage basins will be constructed within the lower active pit for runoff retention. There is only minimal additional run-on arising from this proposal, representing runoff from the southwestern portion of the berm that is to be constructed on the northeast boundary. Today, approximately one-half of the runoff in the vicinity of the proposed berm finds its way into the Kaloi Gulch watershed.

Two new landforms will be created from the 475 foot to 700 foot elevations in conjunction with the relocation of quarrying activities. On the southwest boundary, the ridgeline of the Puu will be cut and graded by up to 50 feet to reduce the visual impact of the quarrying, as seen from the H-1 freeway on the approach to Kapolei. For the same reason, Grace Pacific will construct a ridge-like berm extending from the northeastern ridge of the Puu. This berm will range in height from 15 feet to 100 feet above the existing ground. The berm will be constructed with flatter than 2:1 horizontal to vertical slopes. In addition, the bowl of the Puu, in the 700 foot to 800 foot elevation, will be restored to its pre-golf, gullied appearance.

The quarry sides and mauka face will consist of slopes of averaging greater than a 1.5 to 1 horizontal to vertical proportion to reach the desired depths of approximately 200 feet below the existing ground surface. Quarrying to such slopes arguably leaves good material in the ground, but success in achieving visual mitigation in the land forming and revegetation processes is deemed a greater benefit. Over-excavation on the quarry floor will be necessary in some areas to follow rock deposits. Such over-excavation will be filled and compacted to achieve the desired final grades. See Figures 4, 5a and 5b of Appendix B for a detailed look at the slopes along the sides and mauka face of the proposed quarry area.

2.2 ALTERNATIVE FLOOR RECLAMATION

If post-closure development plans deem it desirable, the quarry can be indirectly reclaimed to increase infiltration. After the quarry has been shaped to match the grading plan, the pit floor can be regraded to produce a rough, irregular surface. This method will increase water infiltration and slow erosion by keying the replaced soil into the substrate. This can be achieved by either blasting or ripping the pit floor. Since this quarry is hard rock quarry, blasting is the appropriate method to fracture the pit floor so that water can drain slowly and roots can penetrate. A good technique is to blast an extra 10 feet during the last production round and leave some of the fractured material in place.

2.3 BENCH RECLAMATION

Under the May 2008 Revised Grading Plan several areas of the existing quarry will be left with traditional 25 foot wide benches and 50 foot high faces. In these cases, the benches will be sloped toward the high wall to help trap moisture and soil. Topsoil will be placed on the benches and planted. Other methods may be used to break up the linear features including performing post-production blasting to form staggered benches. Strategic blasting can create chutes, spurs, and rough vertical cliff faces can be created. The desired effect depends on the rock type, structural geology, and blasting agent from a choice of blast patterns, delays, and stemming depths. The appropriate methods will be chosen only when final quarry grades are achieved and rock faces can be evaluated. Appendix E presents the current revegetation plan for screening and restoration of the quarry.

3. DRAINAGE PLAN

3.1 DRAINAGE PLAN

3.1.1 METHOD

The intent of the Makakilo Quarry drainage plan is to reduce the amount of stormwater run-on and minimize the impacts of run-off on the quarry as well as downstream. Elements of the drainage plan are detailed in Appendix C.

The method used in this report to calculate required storage uses the total rainfall depth from the design storm. This number is multiplied by the drainage area to yield the total required storage. See Appendices C-1 through C-4 for rainfall storage calculations.

The depth of recorded rainfall for a 100-year storm with a 24-hour duration was extracted from the State Hawaii Department of Land and Natural Resources, Division of Water Land Development, "Rainfall Frequency Study for Oahu, Report R-73", 1984. The applicable page from this reference is included in Appendix B, as figure 1.

3.1.2 EXISTING DRAINAGE

The existing upper quarry covers 94 acres of the Makakilo Pu'u. The slopes of Pu'u Makakilo generate approximately 148 acres of rainfall into the existing quarry area. Figure 2 of Appendix B shows the extent of the existing drainage area.

Twoe existing drainage basins located near the bottom elevation of the quarry create the necessary storage capacity for a design 100-year 24-hour storm. They are DB#1 and DB#2. The required storage was calculated to be 151.9 ac-ft. See Appendix C-1 for required storage calculations. The volume capacity of the three drain basins is 175 ac-ft.

3.1.3 QUARRY DRAINAGE WITH RELOCATION OF QUARRY

The relocated quarry extends mauka within the northeast and southwest trending ridges of Pu'u Makakilo. See Figure 4 of Appendix B for the proposed relocation of quarrying activities. The total proposed area plus the offsite area contribution totals 170.0 acres. This includes the rainfall from the southwestern face of the new berm. See Figure 3 of Appendix B for the developed drainage arising from the proposed relocation of the quarry. On-site storage capacity of 174.3 ac-ft is needed for the increased runoff surface. Free board at this rainfall capacity will be 2 feet. See Appendix C-2 for calculations.

The limit of grading runs along the outer ridge of the Pu'u on the southwest side of the quarry. Runoff generated outside the limit of grade will fall away naturally from the quarry. On the northeast, a new berm will be constructed. As a result, no measures are necessary to divert offsite runoff from the northeast and southwest limits of the relocated quarry. Subsequently, run-on generated from the northwestern edge of the relocated quarry will be handled by the three drainage basins.

The flow off of the northeastern berm face is 18.33 cfs and will continue to flow along the existing flow patterns.

3.1.4 CONCLUSION

The intent of the Makakilo quarry drainage plan is to reduce the amount of storm water entering the site and fully retain all the storm water runoff within the upper quarry.

The two existing basins (DB#1 and DB#2) with capacity of 175 ac-ft sufficiently store the 174.3 ac-ft (100-yr storm) of required by the expansion. A 100-yr storm at 174.3 ac-ft of rainfall will reach hydrological water levels of 253 ft. The surrounding berm height at the 96" culvert is at elevation 255 ft. This results in 2' of freeboard. The existing slopes along the southwestern edge of the quarry will convey runoff away along its natural existing flow pattern preventing offsite runoff from entering the site.

The berm on the northeastern edge of the proposed quarry will serve as an offsite runoff diversion. The southwestern face of the berm will produce approximately 18.33 cfs of runoff and will follow existing flow patterns. The existing area (under the site of the proposed berm) generates approximately 18.33 cfs, therefore there is no net increase in runoff generated by the construction of the berm. The direction of flow of this 18.33 cfs of runoff will continue along the same direction as the existing flows.

Overall, no additional flows will be added to outside drainage patterns. Runoff will be contained within the quarry limits. The quarry relocation project will have no adverse impact on adjacent properties or existing downstream drainage systems.

3.2. EROSION CONTROL PLAN

Minimizing or eliminating water-quality problems by mechanical or operational means is generally described as a *best management practice* (BMP). BMPs can be classified as either short- or long-term with considerable overlap existing between the two. Also, erosion controls at a site will likely change over time as the configuration of the site changes. The best strategy for stormwater control is to divert stormwater around the quarry and into an existing drainage. However, in the absence of such diversion, once stormwater has entered a quarry, a very effective control technique during ongoing operations is to develop numerous sumps or low areas to disperse stormwater. These low areas collect sediments and allow stormwater to infiltrate into the ground.

The runoff created within the Makakilo quarry expansion will be retained, therefore no soil loss is expected within the quarry expansion.

Proper erosion control measures will be implemented during the construction of the new berm. The northeastern face of the berm measures to be approximately 5.7 acres. Flow generated during a 10-year storm for this area would be 18.33 cfs.

Silt fences will be installed along the toe of the berm slope down stream of drainage pattern flow. Geotextile fabrics will be installed along the berm slopes, in order to stabilize the bare slopes while the grassing is being established. Other methods include mulching, straw bales, silt fences, jute matting, and plastic coverings. Mulching, matting, and plastic covering are good methods to reduce rain drop erosion especially on slopes; while straw bales and silt fences are designed to prevent fully or rill erosion of long overland areas such as swales.

The quarry is exempted from complying with the *City and County of Honolulu, Soil Erosion Standards and Guidelines, November 1975. (Chapter 23. Grading, Soil Erosion and Sediment Control).* However, Grace Pacific. will use the guidelines, as appropriate, in its erosion control activities at the site.

3.3. WATER QUALITY

No discharge is expected from the quarry. The site has been designed to fully contain runoff for a 100-year storm event.

The newly constructed berm will produce runoff that will flow towards Kaloi Gulch but the quantity of flow will not be in excess of what was already conveyed in the same area. Industrial activity will not take place within the berm area.

4. 2007 REVEGETATION PLAN

4.1 PURPOSE OF THE PLAN

The purpose of the Plan is to address the visual mitigation and revegetation of the areas affected by the proposed relocated quarry while operating (2007-2032), and the post-closure revegetation efforts beginning in 2032.

The Plan assumes the final landforms described in the Grading Plan section of this report. See Figures 4, 5a, 5b, and 6 of Appendix B.

The tools of the Plan are landforms and re-naturalization (or "revegetation"). The key elements of the Plan are:

1) the use of the existing ridges and man-made berms as effective visual screens of quarry activities and quarry faces;

2) for quarried faces not able to be screened, minimizing the man-made appearance of the final contours is preferable from a visual standpoint; and

3) the re-naturalization of man-made berms and quarried faces with drought tolerant vegetation, mixed and placed to blend with that existing on the Puu, is the most water-efficient and effective approach to long term landscape management.

The Proposed Use affords an opportunity an opportunity to improve upon several aspects of the 2004 Revegetation Plan. The existing excavation area is completely screened from view from the Kapolei Regional Park towards Ko Olina by a ridge on the southwest boundary. This aspect will be retained. A ridge and berm along the H-1 freeway at the 275 foot elevation screens the close-in views from Farrington Highway in the vicinity of Kapolei Knolls around to Palehua Road. This aspect will also be retained.

The intermediate and distant views from the Villages of Kapolei and Kalaeloa (formerly BPNAS) presently are that of a 2,400 foot wide active quarry face with a visible height of 250 feet (from elevation at 275 feet to 525 feet). The proposed excavation activity will quarry upslope through this quarry face and leave a bowl-shaped landform 700 feet further mauka, complementing the existing bowl of the Puu. The exposed face of the bowl (prior to revegetation) will be 200 feet in height (from elevation at 500 feet to 700 feet). The top of the Pu'u is at an elevation of 980 feet. What is presently the quarry face will become the quarry floor (from elevation at 275 feet to 500 feet), which as a landform, will be readily revegetated.

The intermediate and distant views from Ewa and Waipahu, while not viewing the existing active face head-on, will benefit from the move mauka and the bowl-shaped final landform.

The weak ridge on the northeast boundary of the proposed excavation area will expose the southwest quarry face on the approach to Kapolei on the H-1 Freeway from Kunia Road to the vicinity of the proposed North South Road Interchange. To mitigate this visual impact, Grace Pacific is proposing to lower the southwest ridgeline by approximately 50 feet

in elevation and to build a berm on the northeast ridgeline of approximately 75 feet in height. The net effect of these actions will be to leave no more than 100 feet of the southwest face unscreened. Further, it is planned to grade the unscreened face with slopes averaging flatter than 1.5 to 1 (horizontal to vertical slope) to facilitate the revegetation effort.

4.2 GOALS AND OBJECTIVES

Minimize or eliminate the visual recognition of the quarry from off-site locations. Through the re-establishment of plant material and careful excavation of exposed rock areas, it is the intent of this Plan to either screen or "visually blend" wherever possible exposed areas of the site. "Visual blending" is based on the use of appropriate plant material and grow-in procedures.

Screen the quarry machinery and equipment from public view. Placing the quarry machinery and equipment on the Quarry floor effectively screens it from the public view. The quarry floor will be at a 245-foot elevation, which will be at least 70 feet below the quarry rim.

Minimize the long-term use of irrigation water. Although all plant materials require water for establishment and to survive, this plan recommends a minimum of water consumption through the use of drought-tolerant species and growth in procedures that are designed to acclimate plants to dry conditions.

Minimize long-term maintenance in the re-naturalized areas. On the same basis in which irrigation water use is being minimized, recommendations are geared towards the long term, low maintenance requirements of the quarry environment. Plant materials will be selected based on ability to survive with minimal maintenance for the two-year establishment period. These plants ultimately will naturalize into the existing vegetation and survive without regular maintenance. See Exhibits 3 of Appendix E for the Recommended Plant Palette. See Exhibits 4 and 5 of Appendix E for the Revegetation Matrix and Revegetation Phasing Plan arising from the Proposed Use.

Avoid an "engineered appearance" to the completed project. In regards to the arrangement and appearance of the plant materials and rock walls, it is the intent of this plan to convey the importance of using irregular forms wherever possible. No straight row plantings will occur anywhere within the site or at the site boundary, including the benches. Clusters of plant materials and benches of varying shapes, orientation and dimension will be used to create a more natural appearance.

Quickly establish a re-naturalized appearance. Plant materials that are currently surviving on the site without irrigation provide a guide to those plants that will survive in the hot, windy and dry climate of the site and should be considered for use. Plant materials with a fast growth rate and hardy nature will be used so that screening and slope stabilization can occur as quickly and effectively as possible. Plant materials that have strong colors and textures and would not visually blend in with the

naturally occurring grasses and lightly textured and colored trees found in neighboring areas will not be used. See Exhibit 3 of Appendix E for recommended Plant Palette.

Activities will not disturb protected areas of the site. All areas, which are not intended for quarry development, will be left undisturbed. These areas will serve as the benchmark and guide for the appearance of the quarry re-naturalized areas when that work is done. See Exhibit 1 of Appendix E for photos of undisturbed lands on the surrounding Puu Makakilo slopes.

Minimize costs associated with the re-naturalization efforts. The plan strives to minimize short and long-term costs associated with the re-naturalization. Seed or seedlings of many of the plant materials recommended can be propagated directly on-site and most are considered easy to grow. Many of the plant materials used will reseed themselves and spread on their own eliminating the potential need for periodic follow-up plantings. Typically smaller container size trees will be planted because they more readily adapt to site conditions and because they are available at a relatively low cost. The irrigation system contemplated for use will require an initial cost and some on-going costs for maintenance but will lower the potential long-term costs of replanting during extremely dry periods. Test plots will be used on-site to test varying seed mixes and maintenance practices to improve the chances of success and to fine tune a cost effective planting and low maintenance approach.

4.3 Site Opportunities and Constraints

Site opportunities and constraints are summarized below:

Natural ridgelines screen views. The ridge on the Makakilo side of the quarry completely screens distant, intermediate and close-up views of the quarry from the Makakilo residential neighborhood (Exhibits 2-1 and 2-2 of Appendix E) to the Kapolei Regional Park; The ridge on the Waipahu side of the quarry screens intermediate and close-up views of the quarry face, as seen from the intersection of Farrington Hwy and the old Palehua Road (Exhibit 2-3 of Appendix E). The western quarry face is visible from the distant view at the H-1/Kunia intersection (Exhibit 2-4 of Appendix E). The lowering of the elevation of the southwest ridge and construction of a berm on the northeast ridge will mitigate the effects of the proposed excavation area on this distant view. See Exhibit 2-0 of Appendix E for a map of screening zones and photograph vantage points.

Berm above H-1 freeway screens views into Upper Quarry. The existing H-1 freeway cut faces and the intervening gullies of Puu Makakilo serve to screen close-up views of the quarry from the H-1 and Farrington Hwy (Exhibit 2-5 of Appendix E). The quarry face is visible from intermediate views such as Kapolei Golf Course (Exhibit 2-6 of Appendix E) and the Villages of Kapolei (Exhibit 2-7 of Appendix E) and from distant views, such as the Ewa Golf Course (Exhibit 2-8 of Appendix E). See Exhibit 2-0 of Appendix E for a map of screening zones and photograph vantage points.

Puu Makakilo screens views from Upper Makakilo. Puu Makakilo completely screens views of the quarry from the residents of upper Makakilo (Exhibit 2-9 of Appendix E).

The variation of colors of the quarry face rock and surrounding natural vegetation. Distant views of the quarry are indistinct due to moving cloud shadows and the mottled appearance of the quarry rock and cinder. Much of the existing quarry face rock and surrounding vegetation has an uneven gray-brown to blue color from a distance. This unevenness helps to break up the line of the quarry faces and benches.

Color/Texture. During the dry season, the surrounding area vegetation is brown to yellow in color. During the rainy season, the plants are grayish-green with occasion splashes of yellow. Textures vary among the vegetation found on site, but generally smaller, finer textured plants appear to predominate visually rather than broad-leafed ones. Brightly colored plants, such as Bougainvillea, should be avoided, as they attract attention, rather than diffuse it.

Types of plants. The plants existing on site have volunteered naturally. These plants include a wide variety of shrubs, groundcovers, and grasses. None of the established plants on site receive any permanent irrigation. Therefore, only the hardiest and drought tolerant plants tend to survive. All proposed plants should be extremely drought-tolerant, and require minimal water after establishment. See Plant Palette, Exhibit 3 of Appendix E.

Volunteer/Natives. Many volunteered or native plants are very drought tolerant and hardy. Many are considered "weeds" in ornamental landscapes, but on this site they cover the ground and minimize erosion. However, there are a few noxious weeds and toxic plants that should be eliminated. An example of this is the Tree Tobacco (Nicotiana glauca), which is poisonous to man and to livestock.

Source of irrigation water. Grace Pacific Corporation has a well at its Processing Site with an allocation of 168,000 GPD. Water from this well is pumped to the Upper Quarry and stored in tanks near the primary crusher. Portable water tanks may be located on the upper benches and supplied by water wagons.

The Revegetation Matrix and Revegetation Phasing Plan (Exhibits 4 and 5 of Appendix E) assume the availability of approximately .200 mgd of water for all quarry purposes (Processing Site well plus Board of Water Farrington Hwy meters). Of this amount, the Revegetation Plan targets .050 mgd or less for revegetation purposes. This limitation on supply serves as a constraint on the speed by which quarried land and land graded for visual mitigation purposes may be revegetated.

Climate. Rainfall is historically less than 20 inches per year, and usually occurs between the months of December and February. Prevailing trade winds are from the northeast and can be quite strong. Temperatures are very high, with summer

average highs in the mid to high 90's and winter average highs in the lower 80's. The average annual humidity ranges from 65% in the summer to 75% in the winter.

Agricultural soils analysis. Soil tests on quarry benches and the slopes surrounding the quarry suggest that existing site soils are high in sodium and magnesium, and low in calcium, phosphorous, iron and zinc. With proper amendments re-naturalization can occur readily given the soils present on-site. Toxic concentrations of boron and magnesium have been found in certain areas of the site. These areas will require the addition of Gypsum to bind the toxic materials in the soil.

4.4 LANDSCAPE DEVELOPMENT PLAN

Quarry Floor. The quarry floor will encompass an area of approximately 107 acres. This area makes up the lower ground plane or base of the quarry. It is understood that this base area of the quarry may be developed in the future, however until the specific development plan has been determined, the area will be planted with grasses and ground covers to control dust and erosion. The floor of the quarry with elevations below 300 feet will be hidden from view and will have no visual impact from off-site locations.

Upon removal of Grace Pacific's plant and equipment in 2032, the first priority will be to establish a natural appearing grass/ground cover mix. The species already growing on site provide a good indication of species that will tolerate the harsh site conditions occurring in Makakilo. A carefully selected combination of grass/ground cover species that are fast growing, drought tolerant and will reseed or otherwise spread is recommended. Species will be combined to ensure that plants will establish within all of varying microclimates present on-site. The quarry floor soil materials may also need to be amended to provide nutrients and drainage. The ultimate planting plan for the quarry floor will depend upon the final land use determined by the James Campbell Company and Grace Pacific. For this reason no large landscape materials will be introduced within the quarry floor area.

Irrigation will be required to establish grasses and ground covers in the quarry floor area. Rotary impact heads will be used to establish the plantings for a period of approximately two years. Irrigation lines will be buried in shallow 4" trenches to protect then from UV and other damage and lengthen the usable life of the system. The irrigation system will be turned on periodically in times of drought to minimize potential fire hazards.

Mauka Quarry Faces. The most visible aspect of the quarry at its completion will be the faces above the 400 foot elevation up to the mauka perimeter. To mitigate the appearance of these faces, an undulating landform and a slope averaging flatter than 1.5 to 1 but allowing for significant variation will be created to render a more natural appearance than straight benches and slopes..

Because of the high exposed elevations that will be exposed, it not the intent of the revegetation plan to screen the entire face with trees but rather to soften the

exposed surfaces with grasses and shrubs. This treatment will create the illusion that these faces are naturally formed and aged. The excavation pattern for the quarry will emphasize the uppermost benches first. It will be very important to complete landscape work in conjunction with the quarrying process to ensure the landscape installation is not hindered due to conflicts with mining procedures. Soil and amendments will be added to the surfaces immediately after completion, as it may be difficult to add any soil later. Soils used in the work will come from on-site stockpiles where possible. If imported soils are used, they will be matched with the structure and characteristics of on-site soils and will be inspected to prevent the introduction of noxious weeds and insects.

The plant materials used would be fast growing, drought tolerant and self-spreading varieties. Random placement of tree and shrub groupings will be under the direction of a Landscape Architect to select appropriate variation and density of clusters. Clusters of larger plants such as Kiawe and Opiuma will be planted in specific areas. Large tree or shrub plantings will not be planted along the entire length of benches to avoid reinforcing unnatural horizontal lines.

Irrigation is required to establish plant material on the faces. It will be particularly critical that a sturdy system is in place (even though considered of temporary quality) because of the potential future access problems. A PVC line system is recommended with lower trajectory and narrower coverage area impact heads due to the strong prevailing winds. Where adjacent benches occur within 25' of elevation change of each other, it is possible that one row on the upper bench could irrigate both levels. This would be determined on a case-by-case analysis in the field. Irrigation will be implemented for a two-year grow-in period. Irrigation mainlines will be buried in shallow 4" trenches to protect from UV and lengthen the usable life of the system. The irrigation system will be turned on periodically in times of drought to minimize potential fire hazards. As field stock materials will be used on the benches, no drip irrigation will be required. See Exhibits 4 and 5 of Appendix E for the re-naturalization schedule.

Access Road. From the existing Quarry, the access road skirts the lower edge of the adjacent Puu Makakilo property, and then turns into Old Palehua Road, crossing under the H-1 and terminating at Farrington Highway. The visibility of the access road varies depending on where it is being viewed from and the particular segment of the road being viewed. Wherever possible undulating re-naturalized berms of 6 feet in height planted with grasses, groundcovers, trees and shrubs will be maintained to screen the access road from view. Earth mounds and rock material laid in natural patterns should be used in certain areas where highest visibility exists. A continuous landscape treatment along the road is not desirable (such as a row of trees or a long berm) and would serve to draw more attention to the roadway. A limited number of field stock trees are recommended to soften the most critical areas immediately. The irrigation system provided will consist of a rotor head system, which will remain in place for the duration of the use of the access road use to revitalize plant materials, which are affected, by heavy vehicle use. A temporary drip irrigation system will be used to establish the field stock materials for an approximate 12-month period.

Existing Buffer at H-1, the "Adjacent Area". The portions of the existing Quarry parcel flanking the quarry, but not used for quarrying, are termed the "Adjacent Area" in the license agreement with the James Campbell Company. The Adjacent Area for the most part is untouched and has a natural appearance with kiawe, hauole koa and naturally occurring grasses. It is the intent of this Plan to maintain this area in its entirety as it currently exists and to a substantial degree emulate this "look" as much as possible in the surrounding areas to be naturalized.

BeltCollins

July 7, 2008
2004.33.8000 / 08P-244

Mr. Henry Eng, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, HI 96813

ATTN: Raymond Young

Dear Mr. Eng:

Application to Amend Special Use Permit File No. 72/SUP-1
Makakilo Quarry – Response to Comments

On behalf of Grace Pacific, we are providing the following items as discussed with Mr. Raymond Young on June 24 and June 27, 2008:

1) Recap of Recent Submittals. A brief recap of how the content of the recent submittals of April 21st, May 23rd, June 6th and June 20th differs from the original application.

   The Application as accepted as complete on November 9, 2007, contemplated the following:

   - New Excavation Area - Use of a total of 48 acres of Parcel 74 for two purposes: active quarrying (33 acres) and visual mitigation landscaping (15 acres).
   - Expanded Buffer Zone - Set aside of a total of 393 acres as a buffer zone between active quarrying and the adjacent properties; (Parcel 82, 115 acres and Parcel 74, 278 acres). Existing buffer zone is 178 acres. Net increase in buffer area = 215 acres.
   - No Change to Operations on Parcel 82 - Continued use of Parcel 82 for excavation, hauling and primary crushing; along with continued operation of concrete and asphalt recycling plant.
   - No Change to Operations on Parcel 4 - Continued use of Parcel 4 for finish crushing, hot-mix asphalt production, ready-mix concrete production, scale house, maintenance shop and administrative office.
   - Dump Truck Traffic - Parcel 4 = 80-85 round trips daily, accessing Farrington Highway at the entrance to Parcel 4. Parcels 82 and 74 = 80-85 round trips daily accessing Farrington Highway at Palehua Road. Upon completion of the North-South/H-1 Interchange, Parcels 82 and 74 would have direct freeway access.

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EXHIBIT 24

- Visual Mitigation - Balancing the ridges of the Pu'u by lowering the Makakilo ridge by 75 feet and constructing a 75-foot-high berm on the Kunia ridge. The quarry "face" on the Makakilo side would be gently sloped to appear non-man-made, while the mauka and Kunia quarry faces would be of the traditional bench and vertical face appearance of a quarry.

- Duration of Operations - The operations on Parcels 4, 82 and 74 would continue for 25 years, or to the year 2032. Thereafter, several years would be necessary for removal of plant and equipment and the renaturalization of those areas.

Subsequent to November 2007, Grace Pacific's discussions with DPP and Grace Pacific's residential neighbors focused on the impact to residential neighborhoods from the operations on Parcel 4 and the visual appearance of the final quarried landform. Grace Pacific and DPP have agreed that conditions be placed upon the approval of the Application to give effect to the following:

- New Excavation Area - Use of a total of 65 acres of Parcel 74 for active quarrying (21 acres of quarry floor, with a large portion of the difference from the 33 original acres now characterized as mitigation landscaping) and visual mitigation landscaping (44 acres).

- Expanded Buffer Zone - The area of the proposed buffer zone remains the same, a total of 393 acres.

- Operations on Parcel 82 - In addition to the continued use of Parcel 82 for excavation, hauling, primary crushing and aggregate recycling, within three years of approval, the following operations from Parcel 4 would be set up on Parcel 82: finish crushing, weekday operation of the hot mix asphalt plant, a maintenance shop for quarry equipment and an operations field office.

The hours of operation on Parcel 82 will remain the same after the relocation of the operations presently conducted on Parcel 4. Typically, excavation and crushing occurs from Monday through Saturday between the hours of 6 a.m. to 3:30 p.m. Blasting typically occurs four or five times a week between the hours of 8 a.m. and 12 noon. Sales from Parcel 82 will be limited to the hours of 7 a.m. to 4:30 p.m. Cleanup and maintenance will be scheduled from 3 p.m. to 6 p.m. Occasional night shift paving jobs will require incoming hauling (6 p.m. to 1 a.m.) for asphalt pavement rubble.

- Operations on Parcel 4 - Within three years of approval, all operations on Parcel 4 would cease. Both weekday and weekend/night operations of the hot-mix asphalt plant would shift to Campbell Industrial Park (CIP) for the first three years, and thereafter this plant would be used for night and weekend work. The weekday operation of the hot-mix asphalt plant would be re-established in the third year on Parcel 82. The ready-mix concrete plant and the maintenance shop for construction equipment would move

to CIP by the end of the third year. Following the shutdown of operations, an estimated three years would be necessary to dismantle, clean up, grade and establish ground cover on Parcel 4. It is estimated that Parcel 4 would be returned to the landowner, the James Campbell Company, by the year 2015.

- Operations on Parcel 74 - There is no change in the use of Parcel 74, the excavation of rock, under the recent submittals.

- Dump Truck Traffic - With the move of operations from Parcel 4 and the North South/H-1 Interchange being placed in service, within three years of approval, all truck traffic to and from Parcels 82 and 74 would have direct freeway access at the new interchange. Farrington Highway would no longer be used for access to any of the quarry or processing operations.

- Visual Mitigation - The balancing of the ridges of the Pu'u remains central to the visual mitigation plan. In addition, Grace proposes (1) to renaturalize the "bowl" of the Pu'u, an additional six-acre area that the former golf developer had mass graded in anticipation of becoming a driving range, and (2) to extend the berm on the Kunia side to the pad of the former golf clubhouse, an additional area of 9 acres.

The most notable change of the recent submittals is the Revised Grading Plan of June 2008, under which the quarry "face" on all three sides, the Makakilo side, mauka and Kunia, would be gently sloped and textured to appear non-man-made. The gentler slopes would also more readily accommodate renaturalization. The quarrying process will change, taking advantage of highly accurate GPS systems to create the final landform as part of the excavation process. Under the Revised Grading Plan approximately 1 million cubic yards of material is not being excavated, when compared to the original application.

- Duration of Operations - The operations on Parcel 4 would continue for three years, to the year 2011. Thereafter, several years would be necessary for removal of plant and equipment (approximately one year) and the renaturalization of those areas (approximately two years).

The operations on Parcels 82 and 74 would continue for 24 years, or to the year 2032. Thereafter, several years would be necessary for removal of plant and equipment and the renaturalization of those areas.

2) Kunia Berm Use and Extension. Clarification on the storage of explosives and the benefits of extending the berm further mauka.

The berm on the Kunia side, as proposed in the Application accepted November 9, 2007, extended mauka to the 625-foot elevation. Under the latest proposal, the berm continues up the ridgeline to the 725-foot elevation. This is done for visual purposes not related to quarrying; essentially repairing the break in the ridgeline created by the grading cuts for the placement of the former golf clubhouse.

Following a similar line of thinking, the current modifications envision creating landforms in the bowl of the Pu'u, in the elevations from 700 to 750 feet, mimicking the ridges and gullies that existed prior to the golf driving range grading done in the early 1990s.

As to the storage of explosives, the berm will not be used to store explosives. The magazines are being moved from the ridge on the western corner of the existing quarry (Parcel 82) to the floor on the northern corner for security reasons.

3) Truck Traffic Routing. The following describes the truck traffic routing to and from the Quarry Site, Lower Processing Site and Campbell Industrial Park, now, with the North South/H-1 Interchange under construction, and after the Interchange is completed:

- Upper Quarry to CIP (today and in the future) - The truck route from the Upper Quarry (Parcel 82) to Campbell Industrial Park (CIP) today and upon completion of the North South /H-1 Interchange (estimated to be December 2008), will follow Palehua Road to the interchange, then enter the H-1 westbound, exit H-1 at the Palailai (Exit #1) and follow Kalaeloa Boulevard south into CIP.

- CIP to Upper Quarry (through December 2008) - The truck route from CIP to the Upper Quarry today is from Kalaeloa Boulevard onto the H-1 at the Palailai Interchange, then exiting the H-1 at the Kunia Interchange, turning left onto Kunia road, then turning left back onto the H-1 heading westbound, getting off at the North South/H-1 Interchange off ramp to Palehua Road and following Palehua Road to the quarry.

- CIP to Upper Quarry (after December 2008) - The truck route from CIP to the Upper Quarry upon completion of the North South /H-1 Interchange will be from Kalaeloa Boulevard onto the H-1 at the Palailai Interchange, then exiting H-1 at the North South/H-1 Interchange Kunia Interchange, turning left onto Palehua Road, and following Palehua Road to the quarry.

- Upper Quarry to Lower Processing Site (through December 2008) - The truck route from the Upper Quarry to the Lower Processing Site (Parcel 4) will be to take Palehua Road to the North South/H-I Interchange, enter the H-1 westbound, exit at Makakilo Drive (Exit #2), turning left onto Makakilo Drive, then turning left onto Farrington Highway, then turning left into the Lower Processing Site.

- Upper Quarry to Lower Processing Site (after December 2008) - The truck route from the Upper Quarry to the Processing Site, upon completion of the North South /H-1 Interchange, will be from Palehua Road through the North South/H-1 Interchange heading makai to Farrington Highway, right onto Farrington Highway then right again into the Lower Site. Note that traffic on this route will phase out with the move of operations from the Lower Site in three years.

- Lower Quarry to Upper Quarry (through December 2008) The truck route from the Lower Site to the Upper Quarry today is from Farrington Highway towards Waipahu, left onto Kunia Road, then left onto H-1 westbound, getting off at the North South/H-1 Interchange exit, onto Palehua Road to the Upper Quarry.

- Lower Quarry to Upper Quarry (after December 2008) - The truck route from the Lower Site to the Upper Quarry upon completion of the North South /H-1 Interchange, will be from Farrington Highway towards Waipahu, left onto the new North South road heading mauka, under the H-1 Freeway, following Palehua Road to the Upper Quarry. Note that traffic on this route will phase out with the move of operations from the Lower Site in three years.

- CIP to Lower Processing Site (through December 2008, and after December 2008) - The truck route from CIP to the Lower Processing Site today is from Kalaeloa Boulevard, turning right onto Kapolei Parkway, then left onto Kamokila Boulevard, through Kapolei City, following onto Farrington Highway then left into the Lower Site. Note that traffic on this route will phase out with the move of operations from the Lower Site in three years.

4) Description of the Benefits of the Revised Grading Plan. The Revised Final Grading Plan dated June 2008 ("Revised Grading Plan") has the following benefits when compared with the Final Grading Plan included in the Application as accepted in November of 2007 ("November 2007 Grading Plan"):

- Minimizing man-made appearance of final landform.
- Ensuring structural stability of final landform slopes.
- Greater likelihood of success in renaturalization.
- Allows for increased excavation in certain areas of quarry floor areas without affecting integrity of final landform.
- Retains early-on landscape grading and renaturalization efforts, given constraint of available irrigation water.

5) Revised Figures, Exhibits. A "Revised Excavation Phasing" plan, Figure 6 in Appendix B of the Engineering Report, a "Revised Renaturalization Matrix," Exhibit 4 in Appendix E, and a "Revised Renaturalization Phasing" Exhibit 5 in Appendix E of the Engineering Report, are attached, each reflecting changes arising from the Revised Grading Plan of June 5, 2008.

6) New Figure of Areas and Acreages. A new "Designation of Areas and Acreages" as Figure 7 for Appendix B of the Engineering Report is included to assist in reviewing this submittal. It is important to emphasize at this point that the acres, volumes and years depicted in the "Excavation and Landscaping Phasing" (Figure 6), the Renaturalization Matrix (Exhibit 4) and Renaturalization Phasing (Exhibit 5) are for illustrative purposes, and that actual market demand will largely drive the actual excavation phasing. While the initial landscape grading described by Areas 1A and 1B will be take place in the 2009-2012 and 2013-2017 periods due to the availability of irrigation water, thereafter the landscape grading will follow actual quarry excavation.

7) Revised Table of Contents. The Engineering Report Table of Contents "Appendices" page has been updated to reflect the new Figures 5g and 5h included with the June 20th submittal, and the items described in 5) and 6) above. "Red-line" and "clean" copies are attached.

Thank you for the opportunity to respond to your comments. Should you have any questions about the information provided herein, please call me at 521-5361 or Bob Creps at 674-5201.

Very truly yours,

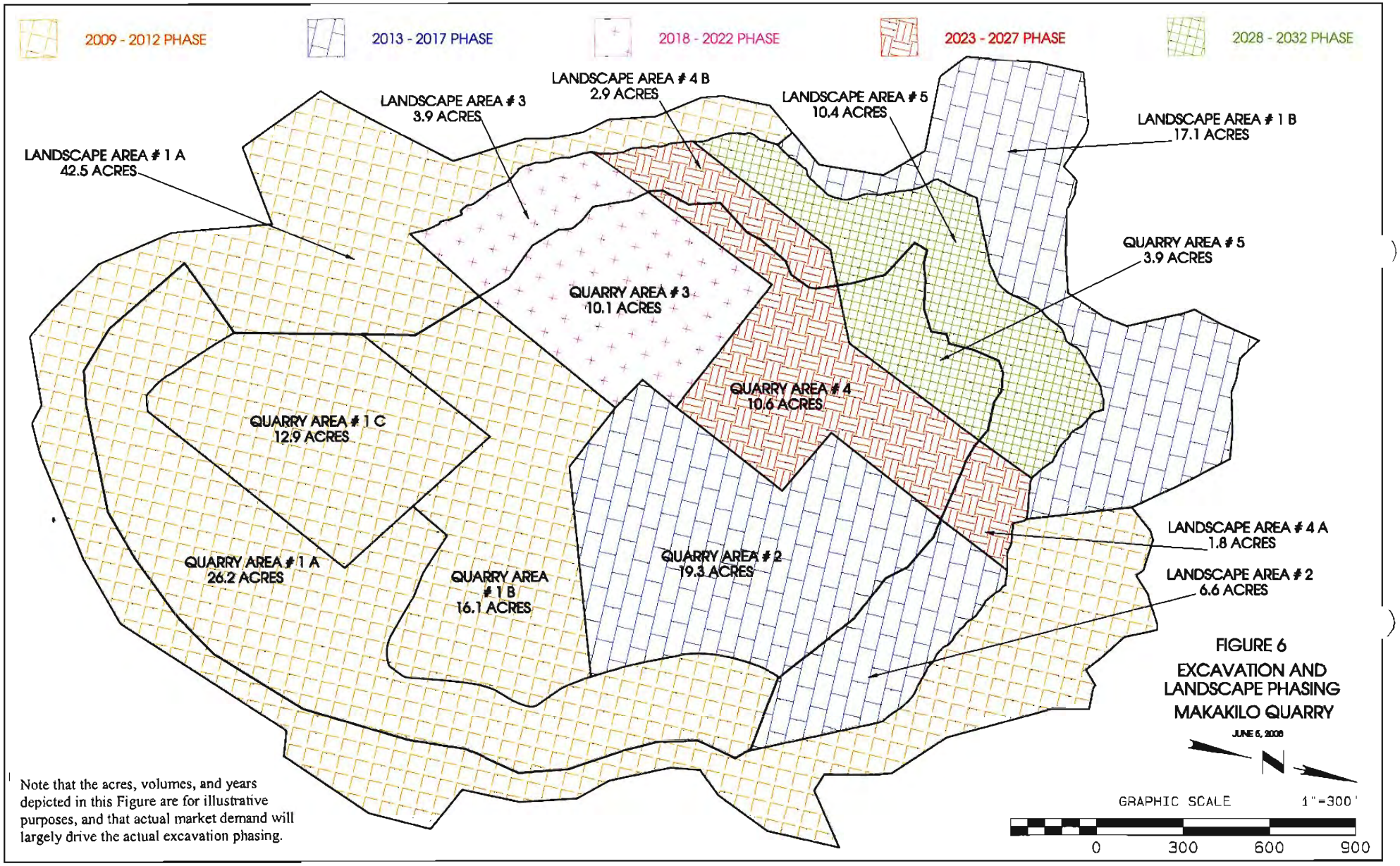
BELT COLLINS HAWAII LTD.

Lee W. Sichter
Principal Planner

LWS:lf

Attachments

cc: Bob Creps



Note that the acres, volumes, and years depicted in this Figure are for illustrative purposes, and that actual market demand will largely drive the actual excavation phasing.

Excavation Plan in 000's of Cubic Yards

		quarry								landscape grading								total quarry and landscape
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	
year																		
2009-2012	cut	516	716	457					1,688	750							750	2,438
	fill	(386)	(14)	(9)					(409)	(913)							(913)	(1,322)
2013-2017	cut				2,878				2,878		81	611					692	3,570
	fill								-		(266)	(1)					(266)	(266)
2018-2022	cut					3,093			3,093				793				793	3,885
2023-2027	cut						3,305		3,305					261	560		822	4,127
2028-2032	cut							1,114	1,114							1,243	1,243	2,357
		130	702	448	2,878	3,093	3,305	1,114	11,669	(163)	(185)	610	793	261	560	1,243	3,120	14,790

Excavation Plan in Acres

		quarry								landscape grading								total quarry and landscape
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	
year																		
2009-2012		26.2	16.1	12.9					55.2	42.5							42.5	97.7
2013-2017					19.3				19.3		17.1	6.6					23.7	43.0
2018-2022						10.1			10.1				3.9				3.9	14.0
2023-2027							10.6		10.6					1.8	2.9		4.7	15.3
2028-2032								3.9	3.9							10.4	10.4	14.3
		26.2	16.1	12.9	21.3	13.1	14.6	8.9	99.1	42.5	17.1	8.6	6.9	1.8	2.9	15.4	85.2	184.3

Renaturalization Plan in Acres

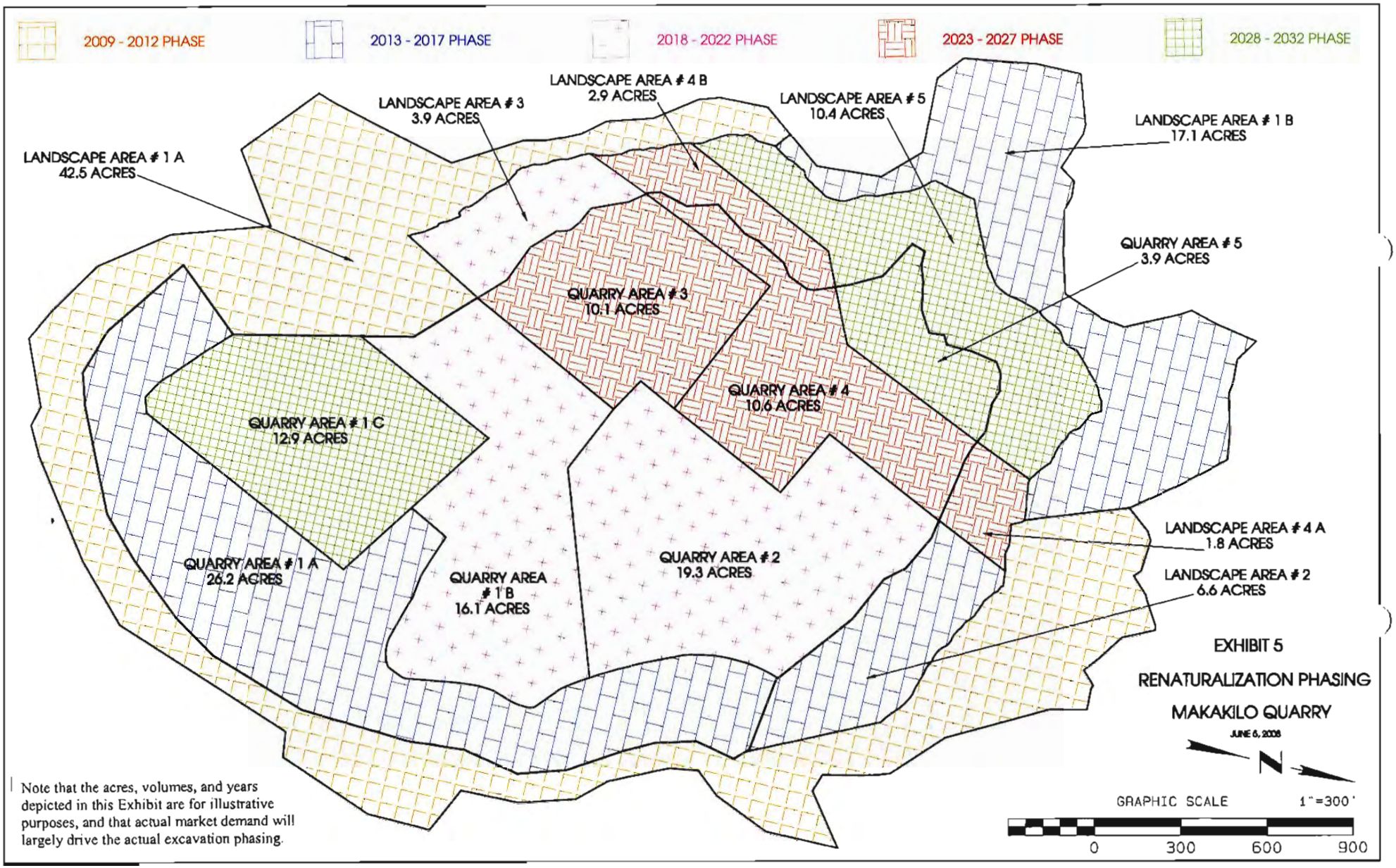
		quarry								landscape grading								total quarry and landscape
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	
year																		
2009-2012									-	42.5							42.5	42.5
2013-2017		26.2							26.2		17.1	6.6					23.7	49.9
2018-2022			16.1		19.3				35.4				3.9				3.9	39.3
2023-2027						10.1	10.6		20.7					1.8	2.9		4.7	25.4
2028-2032				12.9				3.9	16.8							10.4	10.4	27.2
		26.2	16.1	12.9	21.3	13.1	14.6	8.9	99.1	42.5	17.1	8.6	6.9	1.8	2.9	15.4	85.2	184.3

Renaturalization Plan in 000's of gallons per day

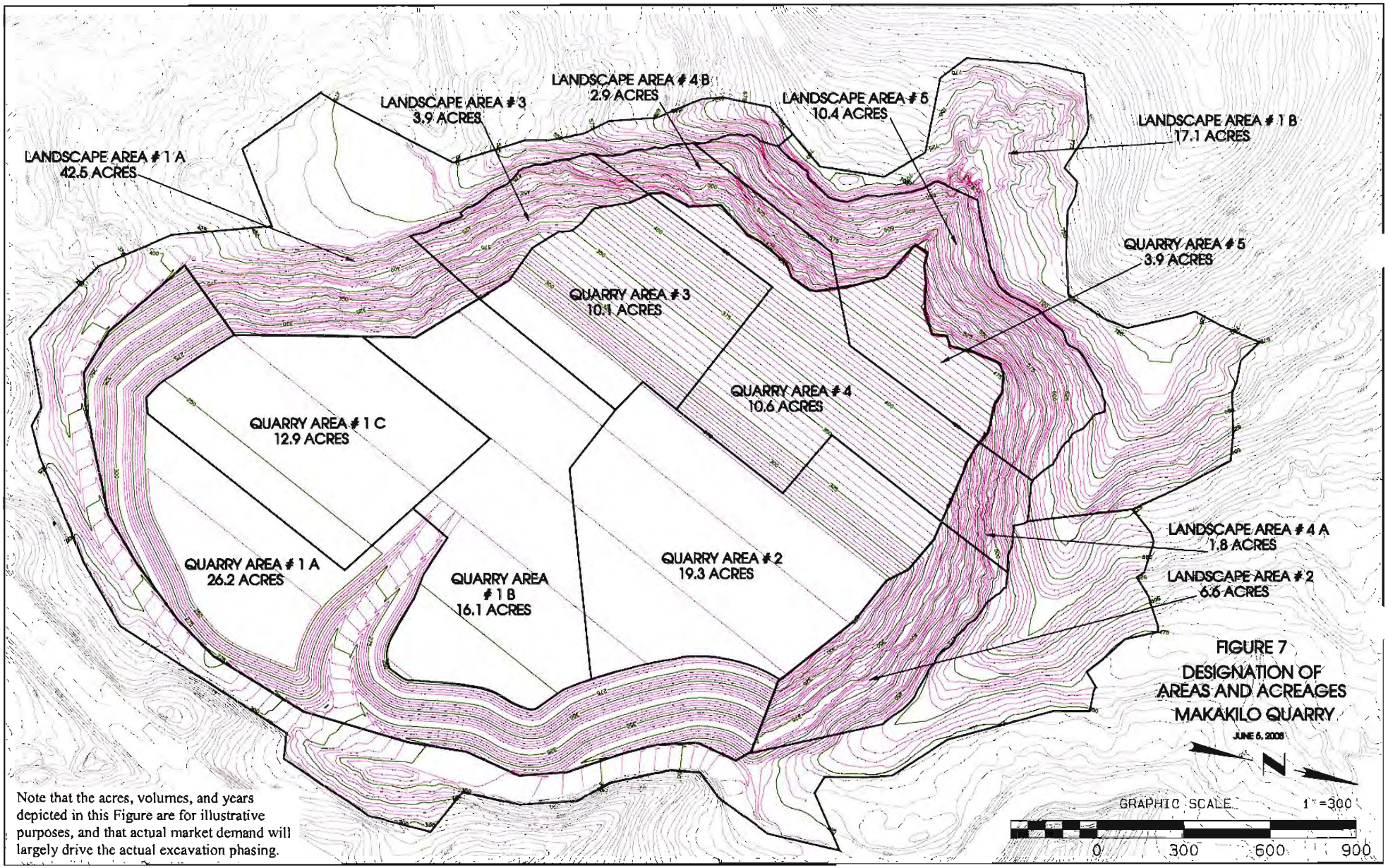
		quarry								landscape grading								total quarry and landscape
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	
year																		
2009-2012									-	106							106	106
2013-2017		52							52		34	13					47	99
2018-2022			32		39				71				8				8	79
2023-2027						20	21		41					4	6		9	50
2028-2032				26				8	34							21	21	55
		52	32	26	41	23	25	13	198	106	34	15	11	4	6	26	191	389

Note that the acres, volumes, and years depicted in this Exhibit are for illustrative purposes, and that actual market demand will largely drive the actual excavation phasing.

Exhibit 4
(Revised)



Note that the acres, volumes, and years depicted in this Exhibit are for illustrative purposes, and that actual market demand will largely drive the actual excavation phasing.



Note that the acres, volumes, and years depicted in this Figure are for illustrative purposes, and that actual market demand will largely drive the actual excavation phasing.

APPENDICES

Appendix A - Restoration Grading Plan Recommendations
Agra Earth & Environmental (from July 1998 Engineering Report)

Appendix B - Grading Figures, Plans and Sections

Map of 100 Year Rainfall, Oahu, Hawaii	Figure 1
Existing Drainage	Figure 2
Developed Drainage	Figure 3
Overall Site Plan (Closure Grading Plan)	Figure 4
Closure Grading Plan with Index	Figure 5a
Cross Sections AA through II	Figures 5b1 - b9
Slope Ratio to Percentage	Figure 5c
Planting Slope Index	Figure 5d
Aerial Photo with Planting Slope Index	Figure 5e
Planting Slope Cross Sections AA through HH	Figure 5f
Landform Profile - Castle Junction Landslide Mitigation	Figure 5g
Illustration of Final Grading - East Kapolei Reservoir	Figure 5h
Excavation and Landscape Phasing	Figure 6
Designation of Areas and Acreages	figure 7

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Appendix C - Storm Drainage Calculations
- C-1 Existing Runoff and Rainfall Storage Calculations
- C-2 Developed Runoff and Rainfall Storage Calculations
- C-3 Berm Surface Water Calculations
- C-4 Storage-Elevation Tables

Appendix D - Not Used

Appendix E - Revised Mitigation/Revegetation Plan

Existing Vegetation	Exhibit 1
Location of View Planes	Exhibit 2-0
Viewplane Exhibits	Exhibits 2-1 - 2-9
Recommended Plant Palette	Exhibit 3
Renaturalization Matrix	Exhibit 4
Renaturalization Phasing	Exhibit 5

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Appendix F - Not Used

APPENDICES

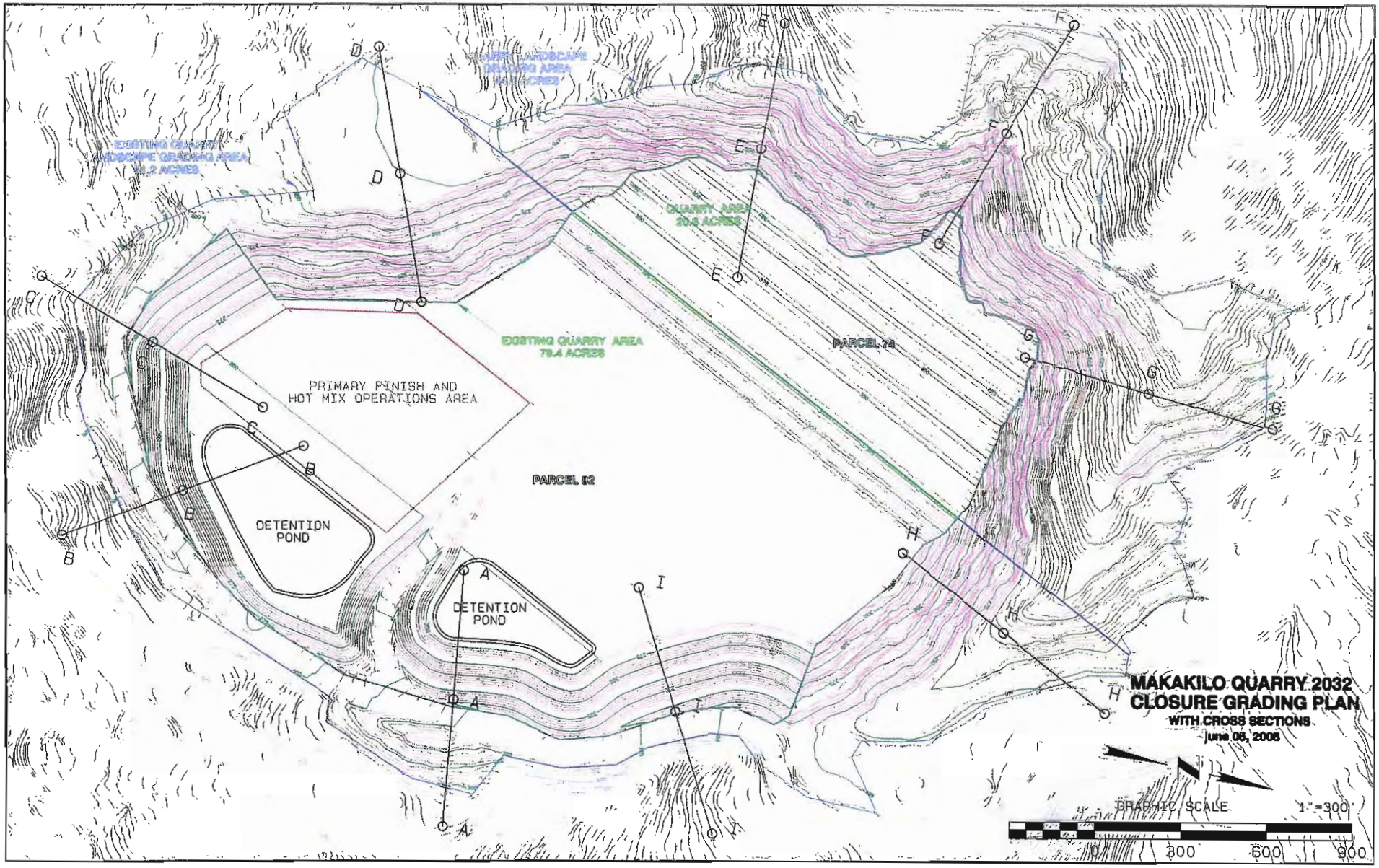


EXHIBIT 8A

Revised Figure 5a

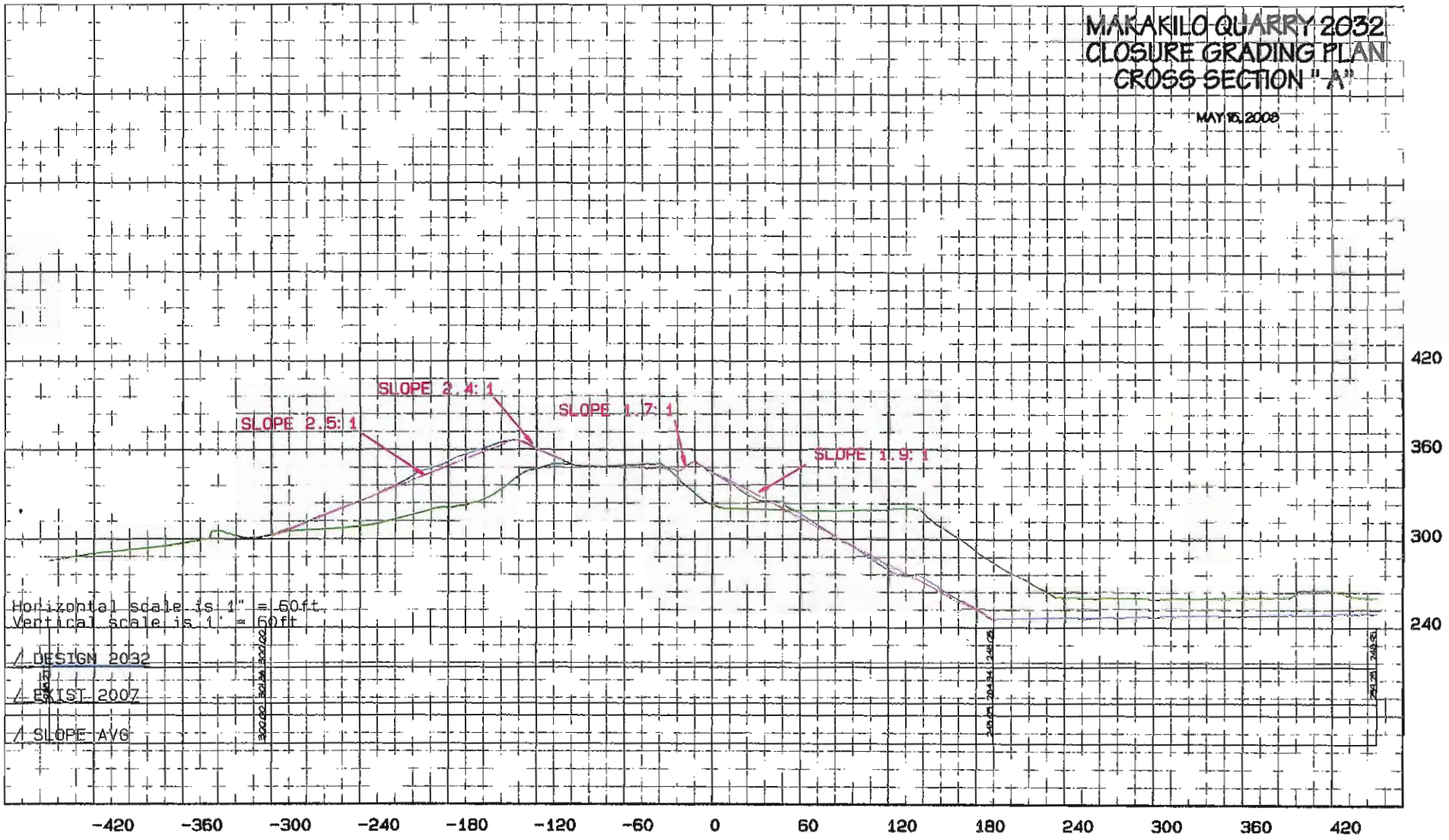


Figure 5b (part 1 of 9)

EXHIBIT 8R

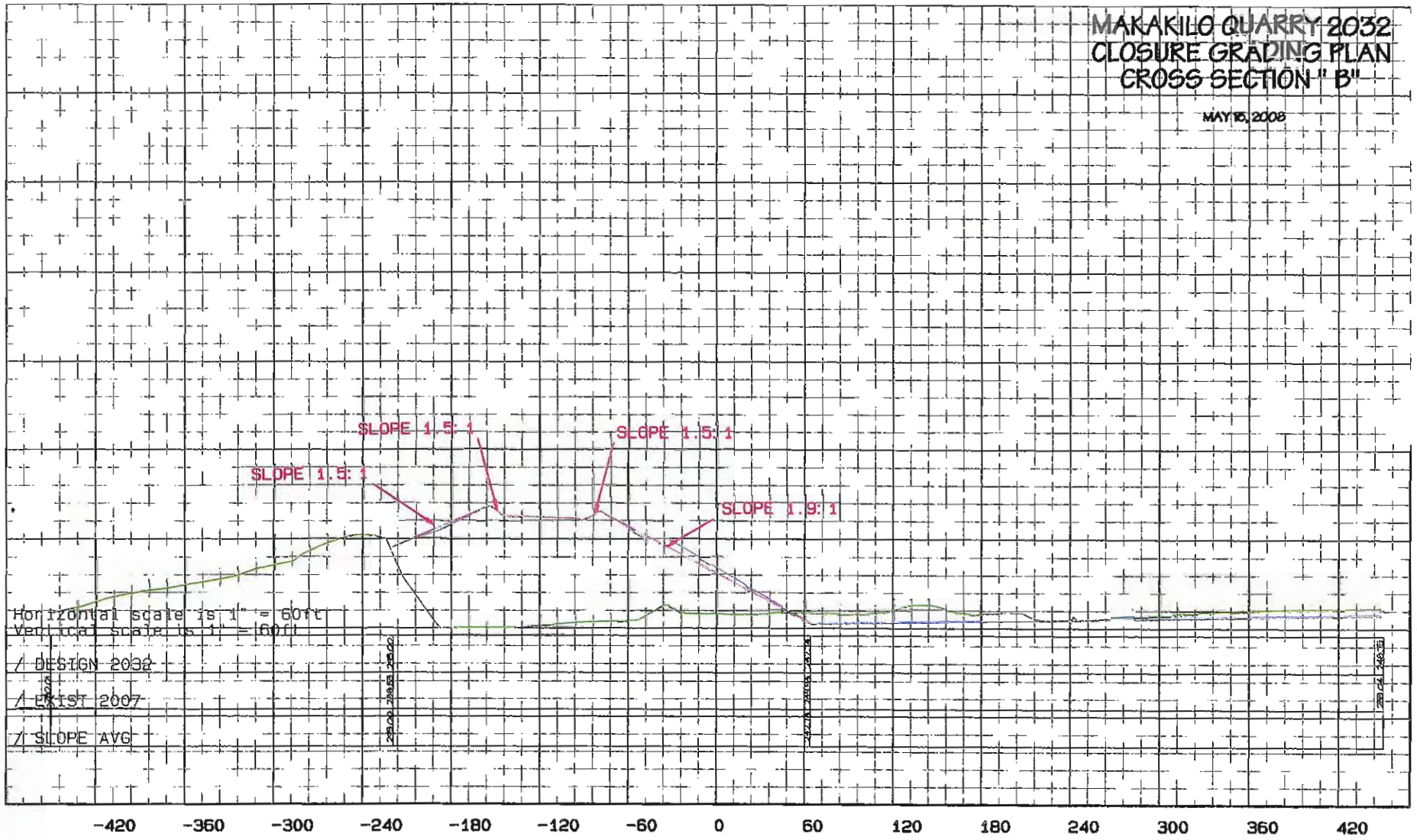


Figure 5b (part 2 of 9)

EXHIBIT 8C

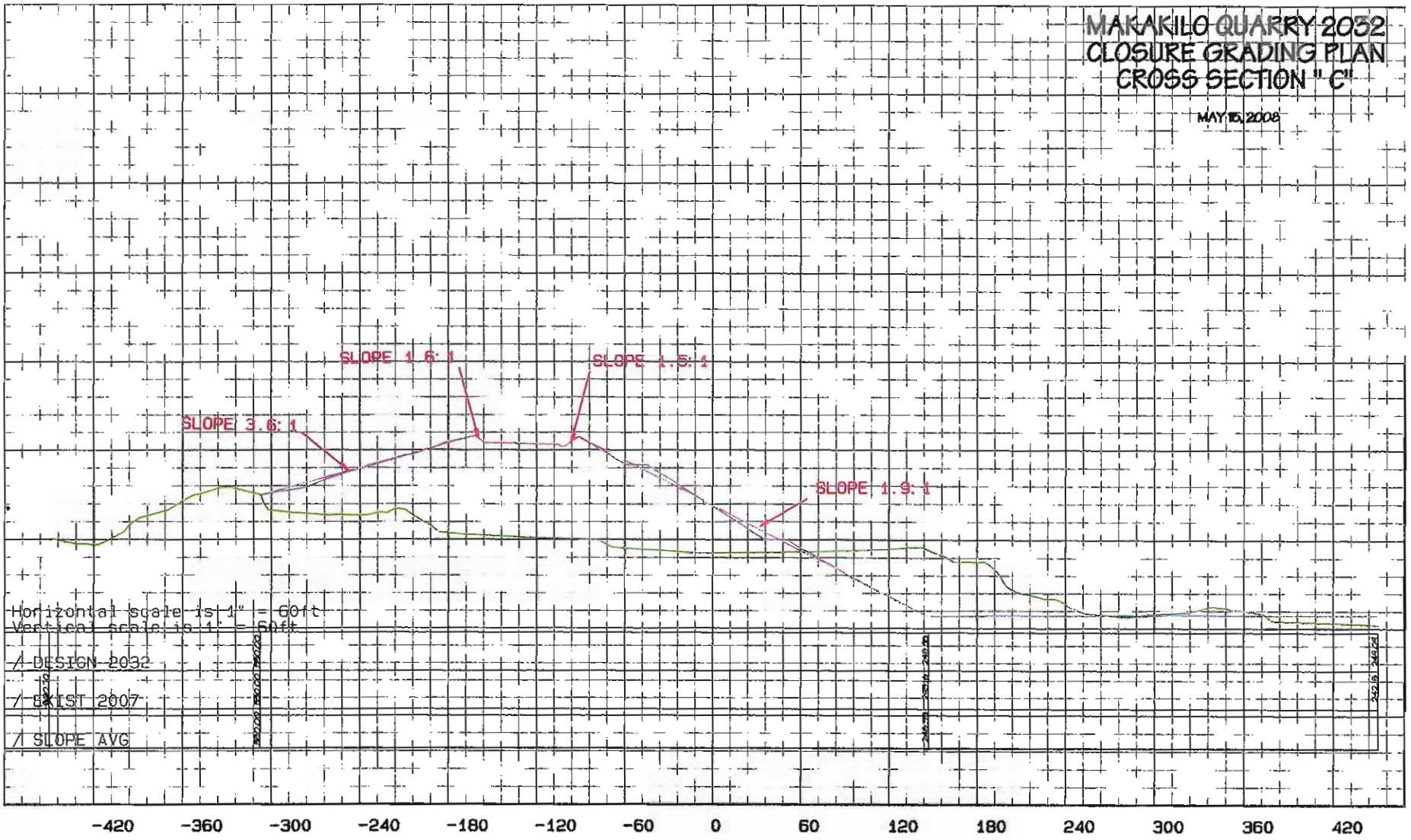


Figure 5b (part 3 of 9)

EXHIBIT 8D

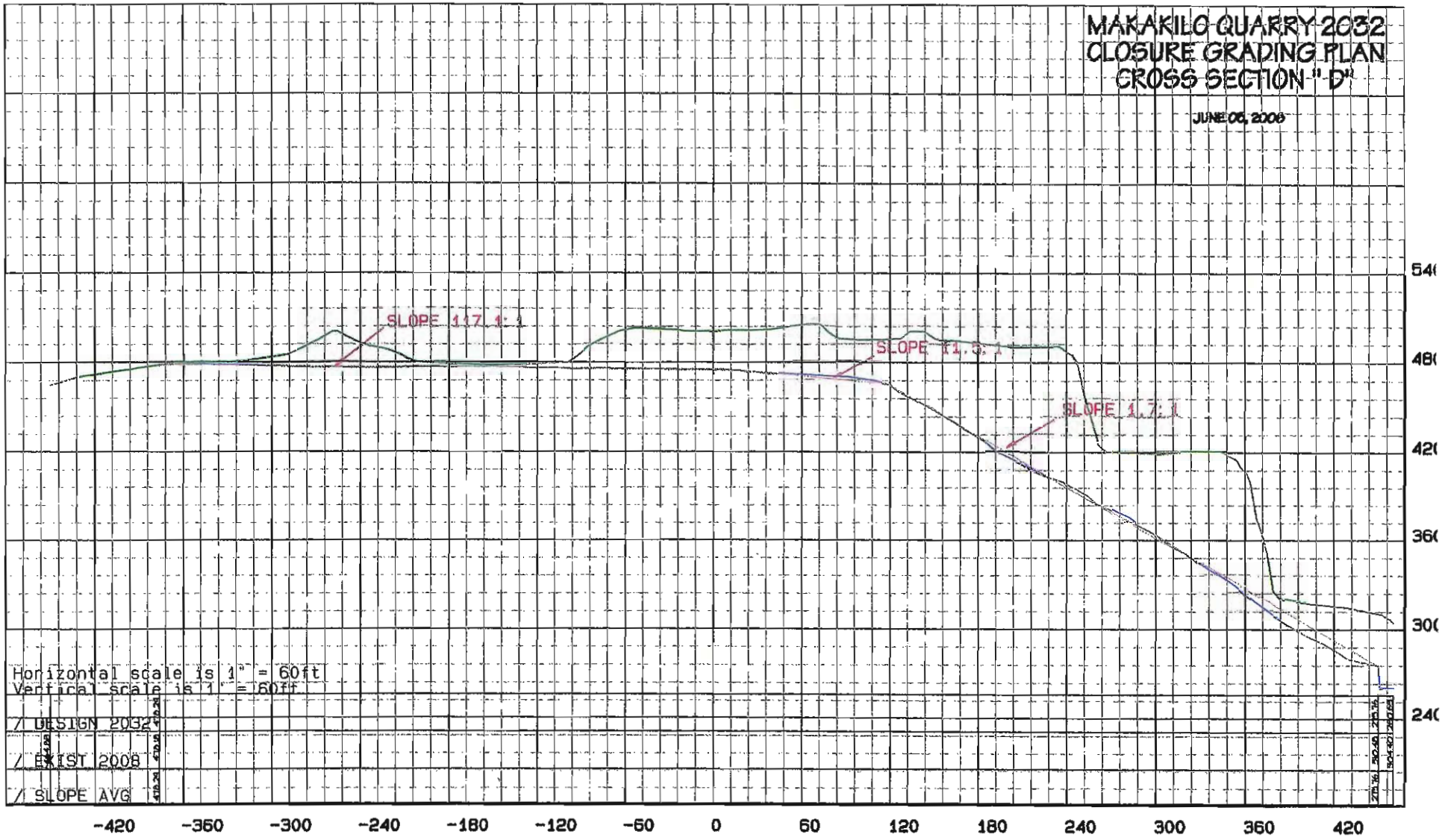


EXHIBIT 8E

Revised Figure 5b (part 4 of 9)

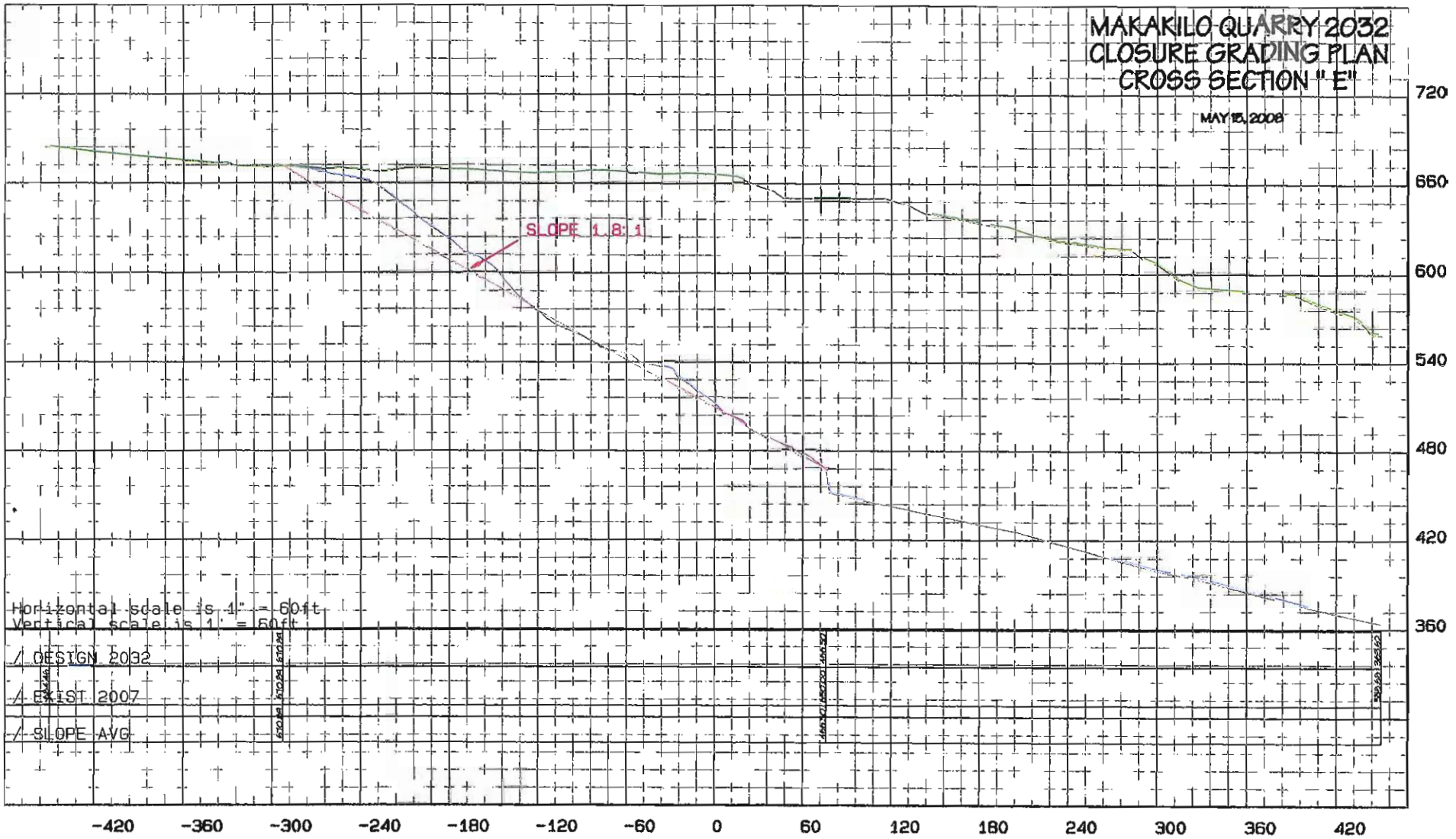


Figure 5b (part 5 of 9)

EXHIBIT 8F

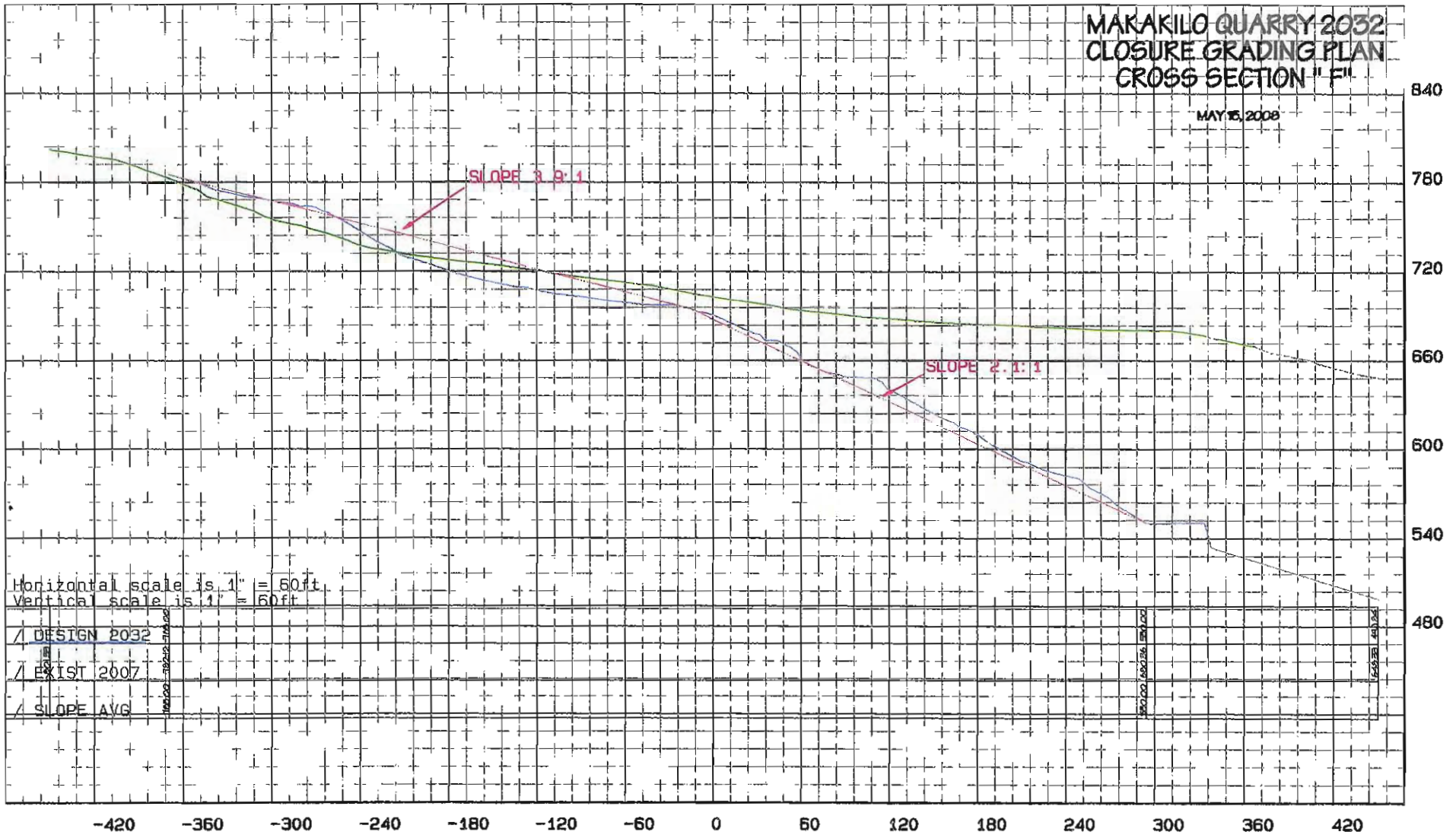


Figure 5b (part 6 of 9)

EXHIBIT 8G

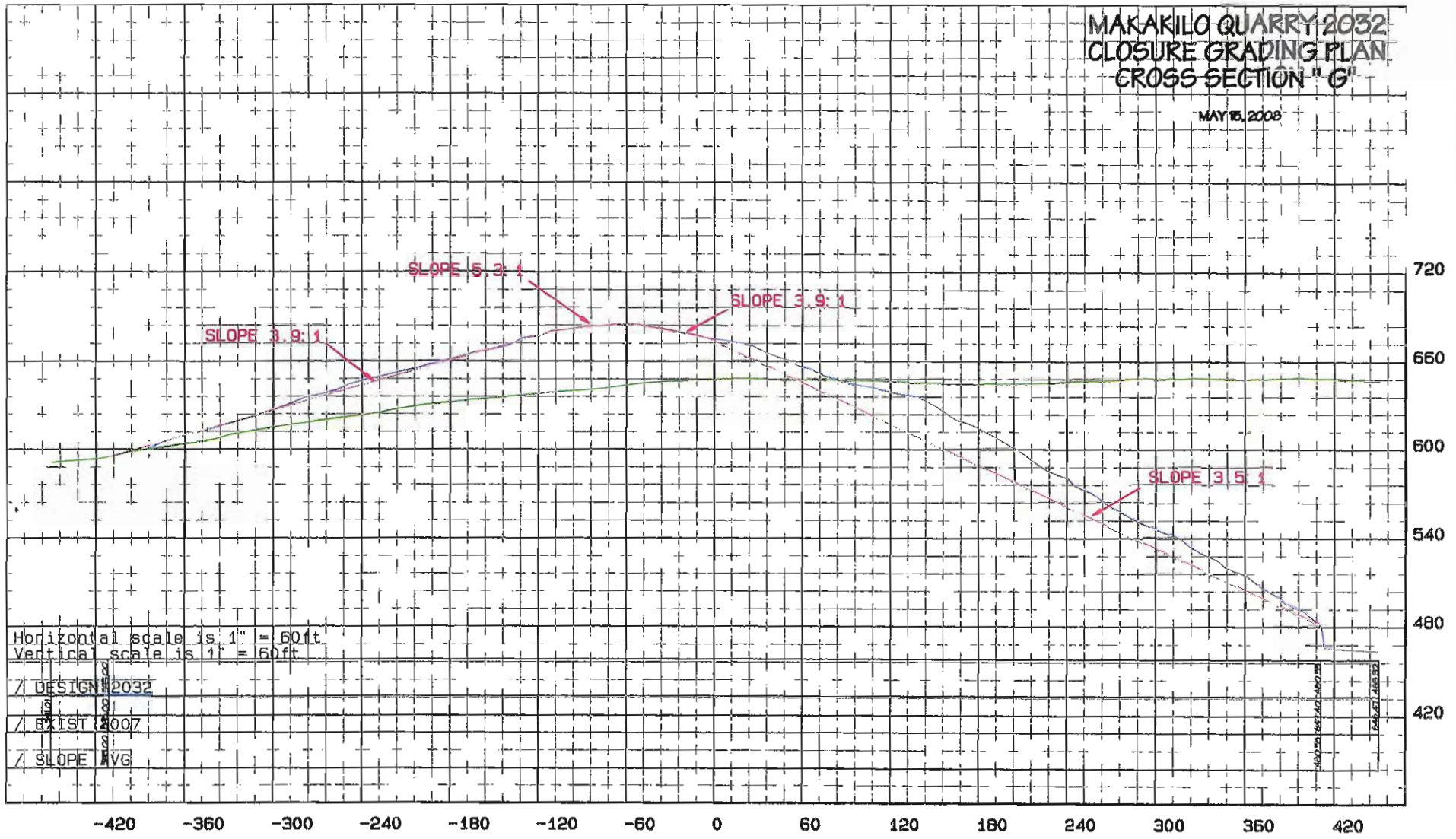
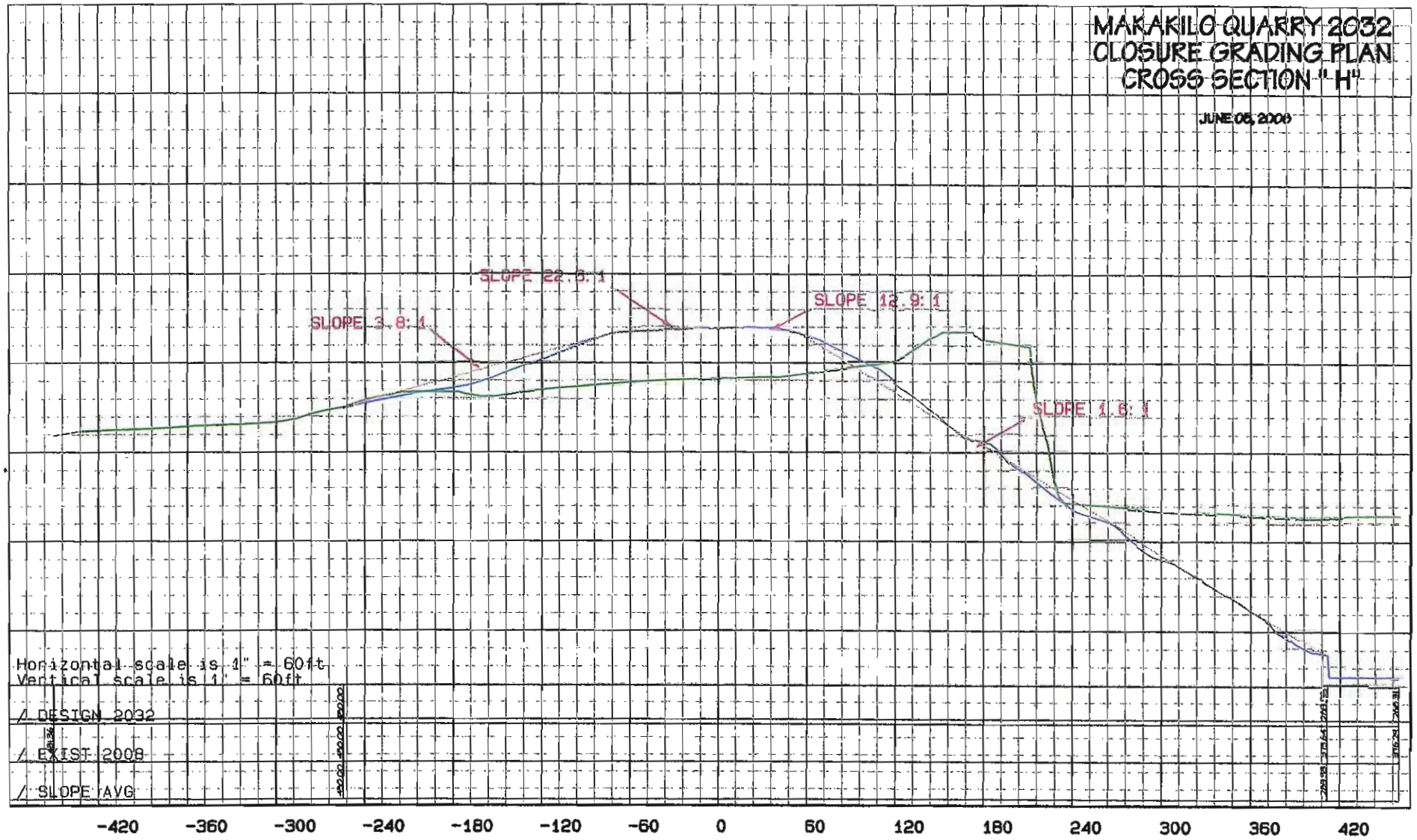


Figure 5b (part 7 of 9)

EXHIBIT 8H



Revised Figure 5b (part 8 of 9)

EXHIBIT 8I

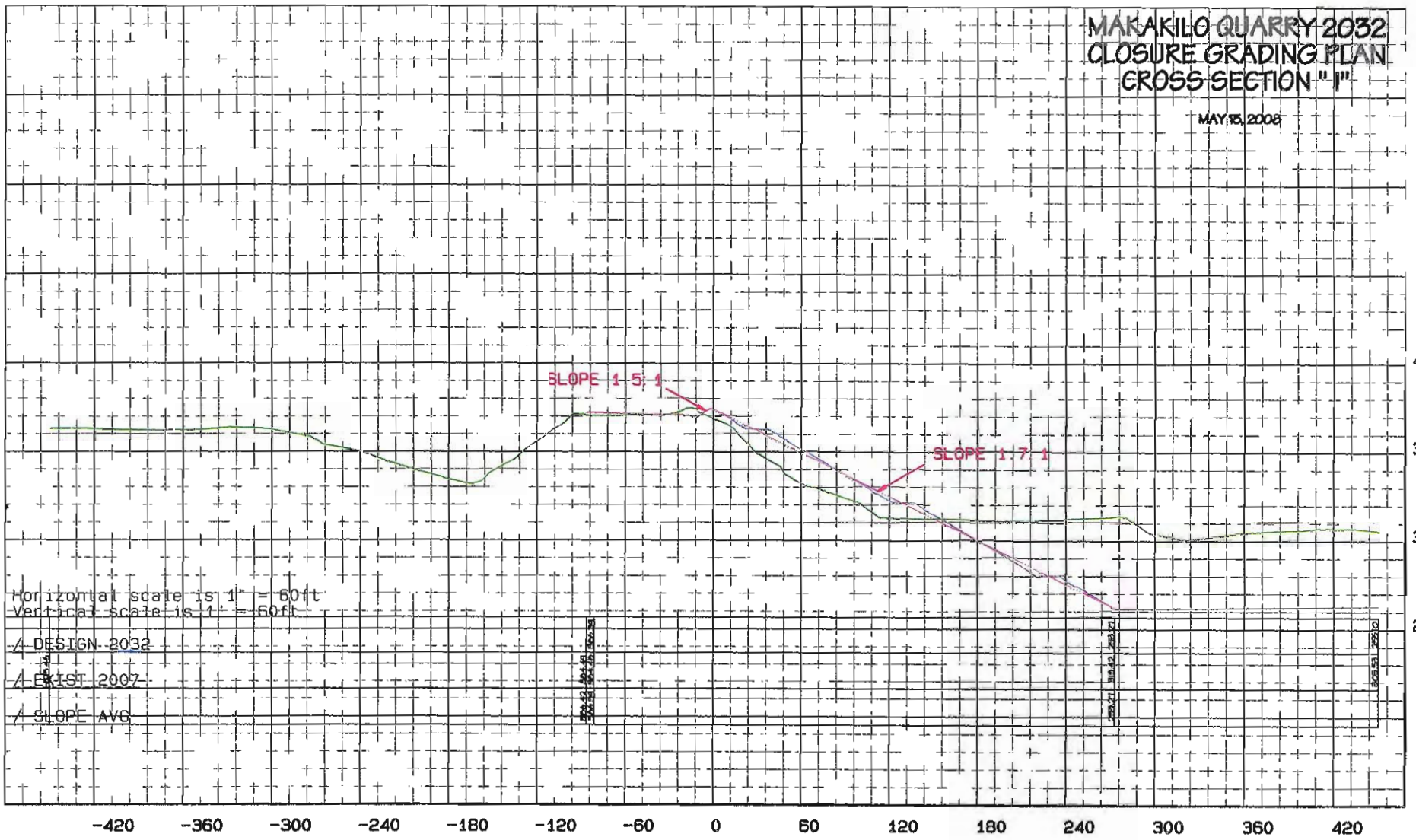


Figure 5b (part 9 of 9)

EXHIBIT 8J

Existing 2008 Revised August 18, 2008 Exhibit 2-8-A

View From Ewa Golf Course

Finish 2032 Revised August 18, 2008 Exhibit 2-8-B

View From Ewa Golf Course

EXHIBIT 34

Grace Pacific LLC

EXHIBIT 7

Makakilo Quarry
Beneficial Re-use Plan
November 11, 2013

Prior Re-use Plans

A review of prior re-use plans is helpful in assessing the current plan. The following is a listing of relevant documents that address the end-use of the upper quarry:

Special Permit SP73-147,
LUC Staff Memo dated March 23, 1973
Area 2 – Rock Quarrying and Allied Operations

"The petitioner states that the area "will have been leveled to a predetermined plan for residential construction in concert with the City's detailed land use map" and that site preparation costs will be nil since all final quarry grades are designed for home and school buildings.

Maps submitted by the petitioner show that the completion of the quarrying operation will result in a series of 4 benches which are proposed for single family residential use. The lowest bench abutting the H-1 is proposed for a school and park site. The elevation ranges from about 250 feet at the lowest level to 365 feet at the uppermost level, with a 30 to 45 feet differences between levels. A 56 foot access road is shown leading to Makakilo City and in the direction of Palehua Road."

County Recommendation
Condition No. 2

"2. The applicant shall prepare and submit to the Planning Director for his review and approval a revised grading plan for the quarry area."
(Notes to County Recommendation)

"Condition #2 was included as a result of the City Planning Director's concern over the final configuration of the site after quarrying operations have been completed. He felt that other alternatives should be considered which would 'maximize the potential for residential development that would be consistent with the surrounding natural areas' In short, it was felt that the concept of a large flat area near the freeway with narrow, upper benches does not allow for flexibility in residential design."

City Council Resolution No. 95 approving Conditional Use Permit 72/CUP-15
Condition No. 2

"2. The applicant shall prepare and submit to the Planning Directors for his review and approval a revised grading plan for the quarry area."

Approval of Condition No. 2 of Resolution No. 95

Letter dated October 19, 1998, Jan Sullivan, Director of Planning and Permitting to Robert Creps, Grace Pacific:

"We have reviewed the engineering report and grading plans prepared by Parametrix Inc. dated July 1998, and determined that they meet Condition 2 of resolution No. 95.

As previously discussed, upon satisfaction of Condition 2, Grace Pacific intended to establish a landfill operation at the above site. However, we understand that plans have changed and land use permits to allow the landfill operation will not be forthcoming. Nevertheless, your efforts to comply with the conditions of Resolution No. 95 are appreciated."

Parametrix Engineering Report dated July 1998 (excerpts from)

"1.1 Purpose. This Makakilo Quarry Engineering Report is to assist Grace Pacific Corporation obtain City approval of the final grading plan, as directed by the Conditional Use Permit No. 72/CUP-15 and Resolution No. 95."

"2.1 Grading. The attached grading plan (Appendix B) shows the final grades prior to reclamation of the quarry. The plan is to maximize quarry operations within the tract of land and then restore the land in a manner suitable for residential or commercial development.

The front of the quarry, which consists of retained rock and constructed berms, parallels the H-1 highway. This buffer will remain undisturbed and will provide a noise and sight barrier from the highway. The quarry sides and back will utilize staggered benches which will help provide a better visual effect yet maximize quarry operations. The pit floor will generally slope from the back and sides to the front at an approximately 2 percent grade.

Restoration grading recommendations prepared by a geotechnical engineer are attached as Appendix A. Several key methods are recommended to provide an adequate foundation for access roads, residential and lightly loaded commercial development."

"2.2 Alternate Floor Reclamation If future utilization plans change from residential or commercial development to a park setting or open space use, the quarry can be indirectly reclaimed to increase infiltration. After the quarry has been shaped to match the grading plan, the pit floor can be regarded to provide a rough, irregular surface. This method will increase water infiltration and slow erosion by keying the replaced soil into the substrate. This can be achieved by either blasting or ripping the pit floor."

"2.3 Bench Reclamation Typically, the benches are 24 feet wide by 36 feet high and will be sloped toward the highwall to help trap moisture and soil. Topsoil will be placed on the benches and planted. However, since the quarry is located in an arid area, the linear features of the benches will probably no be obscured by significant vegetation. Therefore, other methods may be necessary to break up some of the linear features including post-production blasting to form staggered benches. Strategic blasting can create chutes, spurs, and rough vertical cliff faces can be created. The desired effect depends on the rock type, structural geology and blasting agent from a choice of blasting patterns, delays and stemming depths. The appropriate methods will be chosen when final quarry grades are achieved and rock faces can be evaluated.

The quarry reclamation will use a combination of vegetative benches along with staggered benches to create a more natural appearance. Appendix E present the current vegetation plan for screening and restoration of the quarry."

"4.1 Revegetation Plan – Introduction Successful revegetationof a quarry in an arid area depends in adequate soil depth, placement and presence of organic matter, proper plant selection;

appropriate timing of planting; adequate fertilization; and irrigation. Revegetation of the quarry is important because of the following:

Reduces erosion

Reduces stormwater run-off

Provides habitat

Reduces visual and noise impacts

Increase the value of the property

However, even in the best of conditions, plant growth can not be guaranteed immediately after mining and it may take several seasons to establish widespread healthy vegetation."

4.2 Strategies Generally, appropriately selected native plants species cost less, require less labor, and more readily survive on natural precipitation than no-native plants. In addition, native plants often out-compete introduced species over time and offer a preferable natural view with the surroundings. Also, phased or segmented closures are a beneficial method for determining which species will be successful. Those areas in which plants fail to establish or plants requiring intensive labor, can be replanted with more appropriate vegetation. This method proves to be cost effective since it is cheaper to re-establish a segment as opposed to the entire quarry.

Conceptual landscape schemes, recommendations, and specifications prepared by a landscape architect are attached in Appendix E."

Belt Collins Engineering Report dated March 2004 (excerpts from)

1.1 Purpose This is an amendment to Makakilo Quarry Conditional Permit No. 72/Cup-15 Engineering Report prepared by Parametrix, Inc. in July 1998, hereafter referred to as the "Original Report". The Original Report was approved by the City and County of Honolulu Department of Planning and Permitting on October 19, 1998.

Section 2, Grading Plan, was revised to incorporate visual mitigation measures to enhance the natural look of the quarry from offsite locations.

Section 4, Revegetation Plan, is revised to incorporate additional revegetation and visual mitigation measures. A new Revegetation/Mitigation Plan prepared by Belt Collins Hawaii in August 2003 replaces Appendix E of the Original Report.

2.1 Grading The attached revised grading plan (Appendix B) shows the final grades prior to reclamation of the quarry in the year 2017. The plan maximizes quarry operations while minimizing the visual and environmental impacts to the surrounding areas.

Most of the design criteria are from the approved grading plan of Original Report. For instance, the basin floor is still graded at 2%, the same offsite drainage area enters the quarry, and the same drainage area is directed around the site. There are, however, some differences. Namely, there are now three drain basins, instead of the one proposed in the Original Report. These basins were designed such that storm events up to a 100-year storm intensity will be completely retained within the quarry. A more detailed explanation of the site drainage is provided in the next section, Drainage Plan.

The following is a description of the grading plan highlighting the similarities and differences with the original grading plan. The grading plan summary starts with the east side of the property and continues clockwise around the rim of the basin, and ending with the quarry floor.

2.1.1 East (Makai) Rim The front of the quarry parallels the H-1 Freeway. Screening is presently provided by a row of banyan trees at the 275-foot elevation. An additional feature proposed with this grading plan raises the berm to 310 feet to provide a noise and sight barrier from the freeway. The foot on the east side of the berm ties into the existing 225-foot elevation where there is a gully between the berm and the H-1 Freeway. This gully discharges runoff into multiple concrete pipe culverts, which convey storm water under the freeway. The roadway of the H-1 Freeway is between 245 and 250-foot elevation along the quarry property. The difference of 60 to 65 feet between the roadway elevation and the raised berm will ensure that any equipment in the quarry will remain unseen.

2.1.2 Southwest Rim The limits of grading shall be restricted to within the hedge/tree row along the south property line. The existing vegetation is growing on a naturally formed berm and provides a barrier for unwanted off-site runoff. An exception to this rule is the last 300 feet along the access road at the SW property comer near the entrance of the proposed storage bunker. This area already has positive drainage away from the site, so the vegetation is not needed to deflect any runoff.

Adjacent to this tree preservation area will be a 40-foot wide roadway generally graded to a slope of 12 to 15%. From the edge of the road a 2:1 slope is necessary to maximize success in re-naturalizing this face, which is presently visible from the approach to Kapolei on the H-1 Freeway. There will also be two benches at the foot of this 2:1 face; one at elevation 350 and the other at elevation 300. Each will have a vehicle access road connecting to the 40' road at the southernmost ends.

2.1.3 Northwest (Mauka) Rim The 310-foot long hedge/tree row outside of the northwest property comer boundary shall also be preserved just as the row on the southwest side was. This hedgerow is located just uphill of the proposed storage bunker facility and 25' wide access road. The preservation of this hedge/tree row is essential in diverting off-site runoff.

The 25-foot access road will run along the northwest property line. In the midpoint along the side it will meander offsite for about 200-linear feet to circumvent a natural channel, which drops approximately 150 vertical feet into the quarry. The last 500-feet of the access road at the north property comer shall be sloped away from the quarry and toward the high side at a cross-slope of 5%.

As proposed with the original grading plan, the quarry will utilize staggered benches which will help provide a better visual effect yet maximize quarry operations. The grading plan shows benches uniform in height and widths. Actual heights and widths will vary depending upon the material encountered. Varying dimensions will also minimize the engineered appearance and help create a more natural-looking hillside.

2.1.4 Northeast Rim The northeast rim will have benches and two access roads. The access road along the property line should also slope away from the quarry to direct offsite runoff. The lower access road, which leads to the quarry floor, should also slope toward the higher benches and away from the center of the quarry. This is provided simply for the additional safety of the vehicles traversing down the 10% slope. Both of these roads will have a cross slope of 4%.

The existing quarry entrance at Old Cane Haul Road, about midpoint along this side will continue to be used.

2.1.5 Quarry Floor As per the original grading plan, the pit floor will generally slope from the back and sides to the front at an approximately 2% grade. For the Quarry Floor, a tolerance of plus or minus two feet is considered acceptable as long as there is positive drainage toward the retention basins.

An additional measure proposed with this Amendment is the construction of an energy dissipation basin. The basin is to be located on the quarry floor at the midpoint of the northwest rim. An

area 90 feet by 120 feet should be excavated to a depth of 10 feet below the quarry floor. This basin will reduce the erosive velocities of the incoming offsite runoff.

The lowest area of the quarry floor shall be developed with three drainage basins. The drain basins will have bottom elevations of 240-feet with 2: 1 side slopes and top of berm elevation of 245 feet. Above the elevation of245, the available storage is combined between the three basins. The top of the berm surrounding the existing 96" culvert shall be at elevation 255-feet.

2.3 Bench Reclamation Typically, the benches are 25 feet wide and 50 feet high with the horizontal surfaces being flat. To mitigate the engineered appearance of these faces, a series of random benches of various heights and lengths will created to vary the appearance of the sides of the quarry providing a more natural appearance than straight benches and slopes. A technique termed "restoration blasting" will be used to create gullies and talus slopes on the quarry faces. Topsoil will be placed on the benches and planted.

4.1 Revegetation Plan – Introduction The Revegetation Plan included in Appendix E of the Original Report was written by Belt Collins and Associates in January 1990. A new Mitigation/Revegetation Plan prepared by Belt Collins Hawaii in August 2003 is incorporated into this Amendment.

The improvements of this Plan over its predecessor are:

1) the existing gullies of Puu Makakilo along the H-1 freeway will not be excavated to the elevation of the freeway, which would expose the quarry operations to passing traffic;
2) the height of the existing berm along the H-1 Freeway will be increased by 35 feet and be re-naturalized for screening purposes; and
3) the western comer of the quarry will be sculpted with a 2:1 slope above the 350 foot elevation and re-naturalized to enhance the view on the H-1 approach to Kapolei.

The revised Mitigation/Revegetation Plan lists specific measures to:

1) Minimize or eliminate the visual recognition of the quarry from off-site locations.
2) Screen the quarry machinery and equipment from public view.
3) Minimize (and essentially eliminate) the long-term use of irrigation water.
4) Minimize long-term maintenance in the re-naturalized areas.
5) Avoid an "engineered appearance" to the completed project.
6) Quickly establish a re-naturalized appearance.
7) Protect existing vegetation surrounding the site from quarry activities.
8) Minimize costs associated with the re-naturalization efforts.

4.2 Strategies Generally the revegetation recommendations stated in the Original Report are still valid and are still included in this Amendment. For example, it is emphasized that native plant species in the surrounding landscape should be used as they will be more apt to survive in the arid climate.

For full description of specific recommendations, see Appendix E Mitigation/Revegetation plan prepared by landscape architects from Belt Collins Hawaii in August 2003.

Grace Pacific LLC
Makakilo Quarry
Beneficial Re-use Plan
Calculation of cubic yards to be excavated to achieve elevations of 2032 Closure Grading Plan, as of September 2013
November 1, 2013

NOVEMBER 1, 2013 UPDATE **AREA AND TOPO DATE COMPARED TO 2032**	**CUT CUBIC YDS.**	**FILL CUBIC YDS.**	**ACREAGE**
LANDSCAPE AREA # 1 A 20130904	609,699	601,606	43.1
LANDSCAPE AREA # 1 B 20130904	51,266	290,060	17.0
LANDSCAPE AREA # 2 20130904	602,398	82	6.5
LANDSCAPE AREA # 3 20130904	695,683	-	3.9
LANDSCAPE AREA # 4 A 20130904	256,635	1	1.8
LANDSCAPE AREA # 4 B 20130904	518,343	-	2.8
LANDSCAPE AREA # 5 20130904	1,176,332	110	10.1
QUARRY AREA # 1 A 20130904	672,201	218,394	25.9
QUARRY AREA # 1 B 20130904	368,319	108	15.9
QUARRY AREA # 1 C 20130904	353,970	12,036	12.8
QUARRY AREA # 2 20130904	2,261,080	-	19.1
QUARRY AREA # 3 20130904	2,663,287	-	9.9
QUARRY AREA # 4 20130904	2,679,915	258	10.5
QUARRY AREA # 5 20130904	886,990	-	3.8
REMAINDER TO ACHIEVE 2032 CLOSURE DESIGN	**13,796,117.30**	**1,122,653.30**	**183.2**

Grace Pacific LLC
Makakilo Quarry
Beneficial Re-use Plan
November 10, 2013

NEW AREAS JULY 06 2008					
AREA	SQ. FT.	ACREAGE	CUT CU. YDS	FILL CU. YDS.	
LANDSCAPE # 1 A	1,849,900	42.5	750,239	913,248	
LANDSCAPE # 1 B	746,999	17.1	80,961	265,745	
LANDSCAPE # 2	285,647	6.6	610,947	512	
LANDSCAPE # 3	170,286	3.9	792,495	-	
LANDSCAPE # 4 A	78,875	1.8	261,278	-	
LANDSCAPE # 4 B	126,625	2.9	560,402	-	
LANDSCAPE # 5	450,984	10.4	1,243,403	-	
SUB TOTALS	**3,709,317**	**85.2**	**4,299,725**	**1,179,506**	
QUARRY # 1 A	1,139,213	26.2	515,593	385,695	
QUARRY # 1 B	699,578	16.1	715,600	13,509	
QUARRY # 1 C	561,557	12.9	456,959	9,282	
QUARRY # 2	838,733	19.3	2,878,091	-	
QUARRY # 3	439,624	10.1	3,092,598	-	
QUARRY # 4	462,591	10.6	3,305,141	-	
QUARRY # 5	169,043	3.9	1,113,840	-	
SUB TOTALS	**4,310,340**	**99.0**	**12,077,822**	**408,486**	
TOTALS	**8,019,656**	**184.1**	**16,377,548**	**1,587,992**	
			14,789,556	NET TOTAL	

NEW AREAS SEPTEMBER 4, 2013					
AREA	SQ. FT.	ACREAGE	CUT CU. YDS	FILL CU. YDS.	
LANDSCAPE # 1 A	1,849,900	43.1	609,699	601,606	
LANDSCAPE # 1 B	746,999	17.0	51,266	290,060	
LANDSCAPE # 2	285,647	6.5	602,398	82	
LANDSCAPE # 3	170,286	3.9	695,683	-	
LANDSCAPE # 4 A	78,875	1.8	256,635	1	
LANDSCAPE # 4 B	126,625	2.8	518,343	-	
LANDSCAPE # 5	450,984	10.1	1,176,332	110	
SUB TOTALS	**3,709,317**	**85.2**	**3,910,356**	**891,859**	
QUARRY # 1 A	1,139,213	25.9	672,201	218,394	
QUARRY # 1 B	699,578	15.9	368,319	108	
QUARRY # 1 C	561,557	12.8	353,970	12,036	
QUARRY # 2	838,733	19.1	2,261,080	-	
QUARRY # 3	439,624	9.9	2,663,287	-	
QUARRY # 4	462,591	10.5	2,679,915	258	
QUARRY # 5	169,043	3.8	886,990	-	
SUB TOTALS	**4,310,340**	**97.9**	**9,885,762**	**230,796**	
TOTALS	**8,019,656**	**183.1**	**13,796,118**	**1,122,655**	
			12,673,463	NET TOTAL	

VOLUME REMOVED 2008 TO 2013			
AREA	ACREAGE	CUT CU. YDS	FILL CU. YDS.
LANDSCAPE # 1 A	0.6	(140,540)	(311,642)
LANDSCAPE # 1 B	(0.1)	(29,695)	24,315
LANDSCAPE # 2	(0.1)	(8,549)	(430)
LANDSCAPE # 3	(0.0)	(96,812)	-
LANDSCAPE # 4 A	(0.0)	(4,643)	1
LANDSCAPE # 4 B	(0.1)	(42,059)	-
LANDSCAPE # 5	(0.3)	(67,071)	110
SUB TOTALS	**0.0**	**(389,369.1)**	**(287,646.8)**
QUARRY # 1 A	(0.3)	156,608	(167,301)
QUARRY # 1 B	(0.2)	(347,281)	(13,401)
QUARRY # 1 C	(0.1)	(102,989)	2,755
QUARRY # 2	(0.2)	(617,011)	-
QUARRY # 3	(0.2)	(429,311)	-
QUARRY # 4	(0.1)	(625,226)	258
QUARRY # 5	(0.1)	(226,850)	-
SUB TOTALS	**(1.1)**	**(2,192,060.4)**	**(177,689.8)**
TOTALS	**(1.0)**	**(2,581,429.5)**	**(465,336.6)**
		(2,116,092.9)	NET TOTAL

Grace Pacific LLC
Makakilo Quarry
Beneficial Re-use Plan
November 10, 2013

Renaturalization Plan in Acres

	quarry								landscape grading								total quarry and landscape	
	1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	2008 plan	2013 rev
year																		
2009-2012								-	43							43	43	
2009-2013 act								-	13							13		13
2013-2017	26							26		17	7					24	50	
2014-2017 rev	6							6	15	7						22		28
2018-2022		16		19				35				4				4	39	
2018-2022 rev	10			4				14	5	10	3	2	1	1	3	24		38
2023-2027					10	11		21					2	3		5	25	
2023-2027 rev	5			4	6	6		21	5		2	2	1	1	3	14		35
2028-2032			13				4	17							10	10	27	
2028-2032 rev				3	4	5	4	16	5		2		1	1	4	13		29
2032-2035 rev	5	16	13	8				42								-		42
2008 plan	26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85	184	
2013 revision	26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85		184

Renaturalization Plan in 000's of gallons per day

	quarry								landscape grading								total quarry and landscape	
	1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	2008 plan	2013 rev
year																		
2009-2012								-	106							106	106	
2009-2013 act								-								-		-
2013-2017	52							52		34	13					47	99	
2014-2017 rev	16							16	38	18						55		71
2018-2022		32		39				71				8				8	79	
2018-2022 rev	20			8				28	10	20	5	4	1	2	6	48		76
2023-2027					20	21		41					4	6		9	50	
2023-2027 rev	10			8	12	12		42	10		4	4	1	2	6	27		69
2028-2032			26				8	34							21	21	55	
2028-2032 rev				6	8	9	8	31	10		4		1	2	9	26		57
2032-2035 rev	10	32	26	17				85								-		85
2008 plan	52	32	26	39	20	21	8	198	106	34	13	8	4	6	21	191	389	
2013 revision	56	32	26	39	20	21	8	201	68	38	13	8	4	6	21	156		358

Grace Pacific LLC
Makakilo Quarry
Beneficial Re-use Plan
November 10, 2013

Renaturalization Plan in Acres

	quarry								landscape grading								total quarry and landscape	
	1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	2008 plan	2013 rev
year																		
2009-2012								-	43							43	43	
2009-2013 act								-	13							13		13
2013-2017	26							26		17	7					24	50	
2014-2017 rev	6							6	15	7						22		28
2018-2022		16		19				35				4				4	39	
2018-2022 rev	10			4				14	5	10	3	2	1	1	3	24		38
2023-2027					10	11		21					2	3		5	25	
2023-2027 rev	5			4	6	6		21	5		2	2	1	1	3	14		35
2028-2032			13				4	17							10	10	27	
2028-2032 rev				3	4	5	4	16	5		2		1	1	4	13		29
2032-2035 rev	5	16	13	8				42								-		42
2008 plan	26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85	184	
2013 revision	26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85		184

Renaturalization Plan in 000's of gallons per day

	quarry								landscape grading								total quarry and landscape	
	1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	2008 plan	2013 rev
year																		
2009-2012								-	106							106	106	
2009-2013 act								-								-		-
2013-2017	52							52		34	13					47	99	
2014-2017 rev	16							16	38	18						55		71
2018-2022		32		39				71				8				8	79	
2018-2022 rev	20			8				28	10	20	5	4	1	2	6	48		76
2023-2027					20	21		41					4	6		9	50	
2023-2027 rev	10			8	12	12		42	10		4	4	1	2	6	27		69
2028-2032			26				8	34							21	21	55	
2028-2032 rev				6	8	9	8	31	10		4		1	2	9	26		57
2032-2035 rev	10	32	26	17				85								-		85
2008 plan	52	32	26	39	20	21	8	198	106	34	13	8	4	6	21	191	389	
2013 revision	56	32	26	39	20	21	8	201	68	38	13	8	4	6	21	156		358

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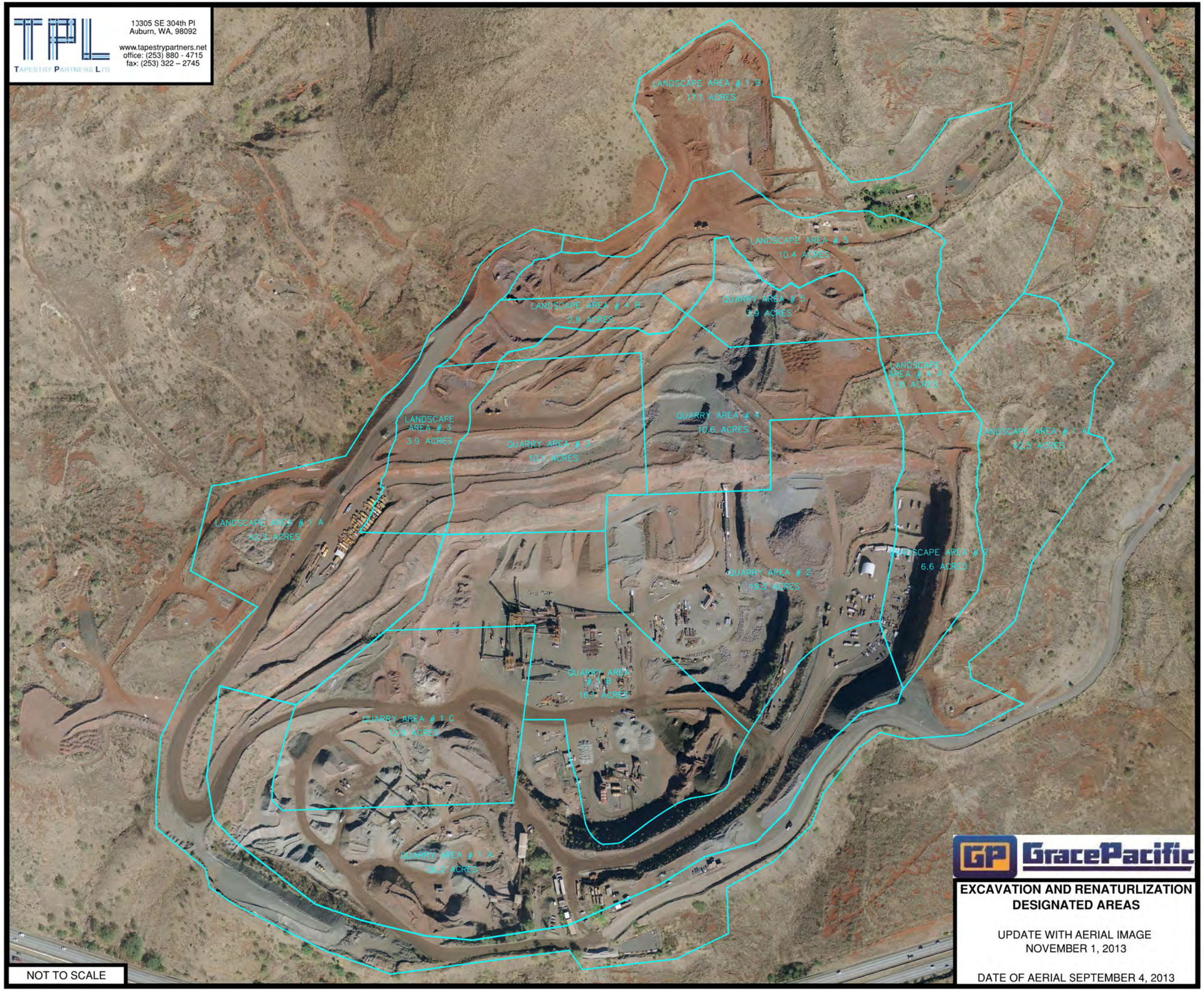

NOT TO SCALE

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EXCAVATION AND RENATURLIZATION DESIGNATED AREAS

UPDATE WITH AERIAL IMAGE
NOVEMBER 1, 2013

DATE OF AERIAL SEPTEMBER 4, 2013

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QUARRY LANDSCAPE GRADING AREA 44.0 ACRES

EXISTING QUARRY LANDSCAPE GRADING AREA 41.2 ACRES

QUARRY AREA 20.8 ACRES

EXISTING QUARRY AREA 78.4 ACRES

PARCEL 74

PARCEL 82

DETENTION POND

DETENTION POND

A A
B B
C C
D D
E E
F F
G G
H H
I I

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MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN

UPDATE NOVEMBER 1,2013
NO CHANGES

GRAPHIC SCALE 1"=300'

0 300 600 900

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QUARRY LANDSCAPE GRADING AREA 44.0 ACRES

EXISTING QUARRY LANDSCAPE GRADING AREA 41.2 ACRES

QUARRY AREA 20.8 ACRES

EXISTING QUARRY AREA 73.4 ACRES

PARCEL 74

PARCEL 82

DETENTION POND

DETENTION POND

A A
B B
C C
D D
E E
F F
G G
H H
I I

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MAKAKILO QUARRY 2032
CLOSURE GRADING PLAN
WITH CROSS SECTION

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013

N

GRAPHIC SCALE 1"=300'

0 300 600 900

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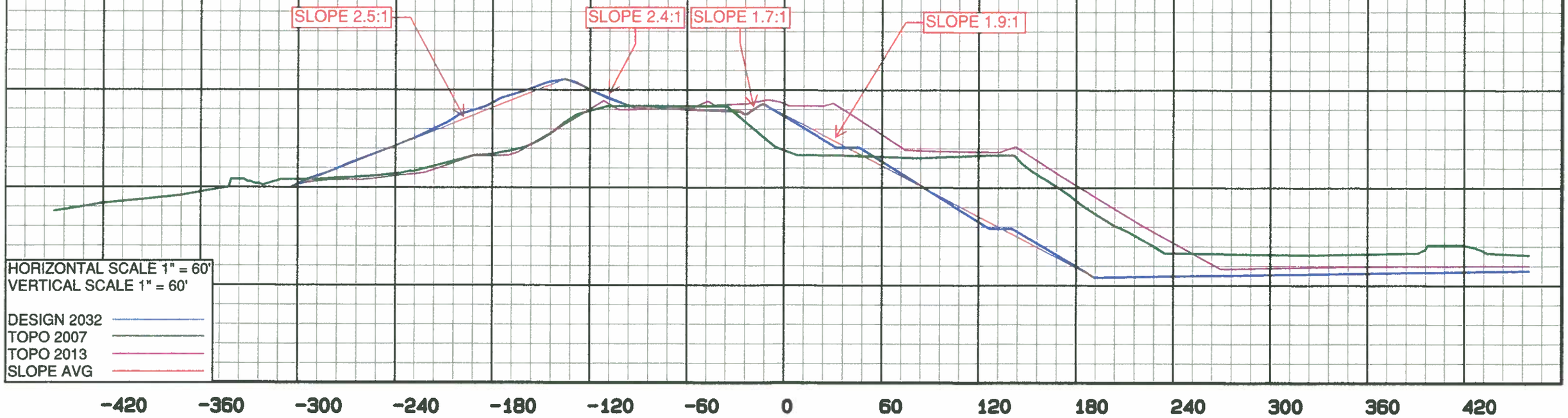
MAKAKILO QUARRY 2032
CLOSURE GRADING PLAN
CROSS SECTION "A"

UPDATE NOVEMBER 1, 2013, TO
SHOW CHANGES AS OF SEPT. 4, 2013



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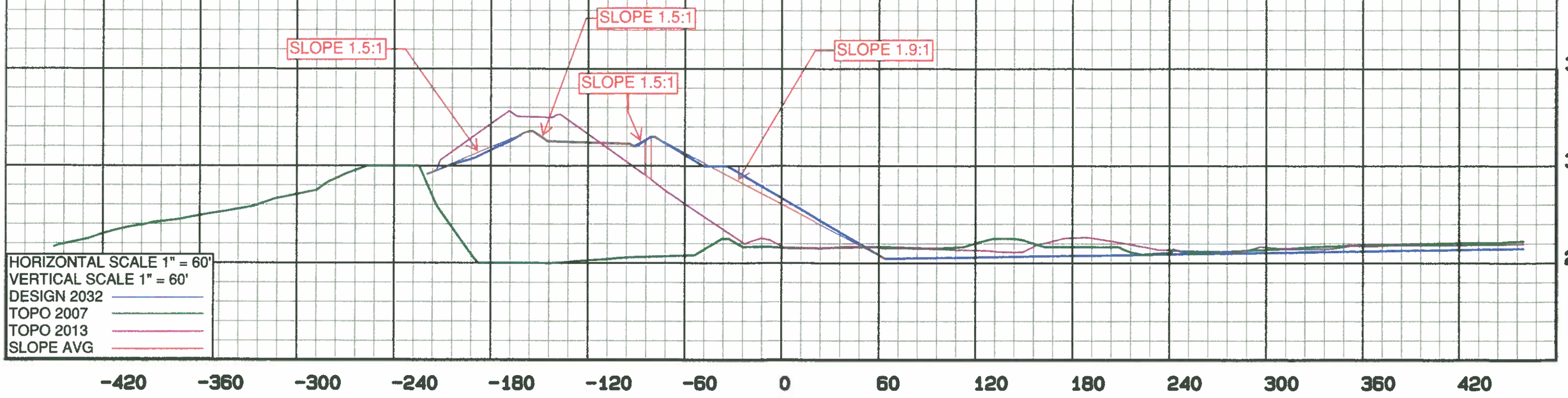
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "B"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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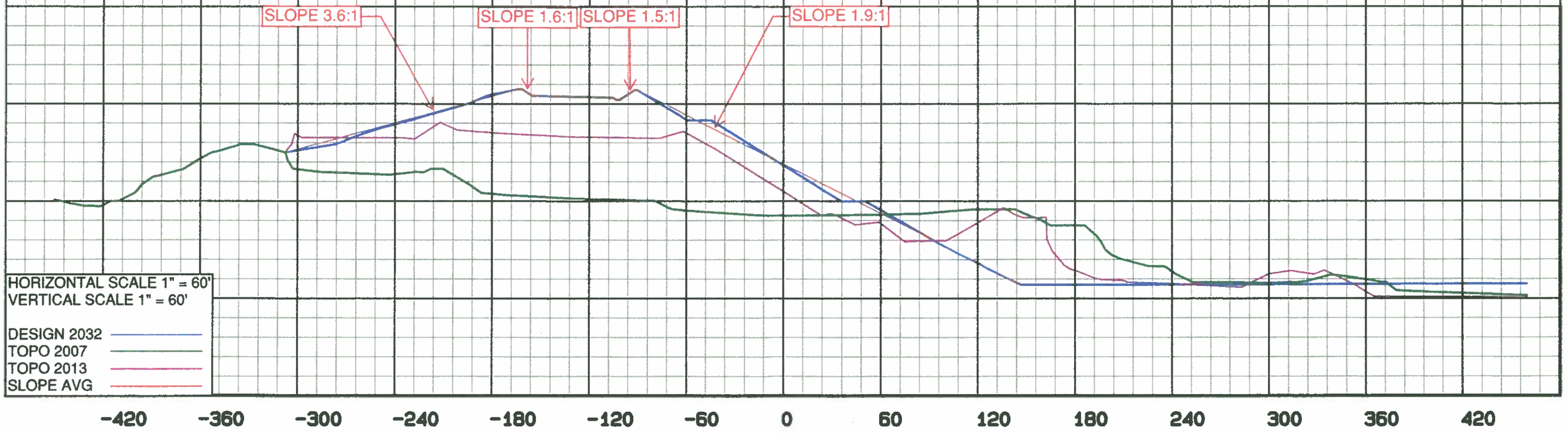
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "C"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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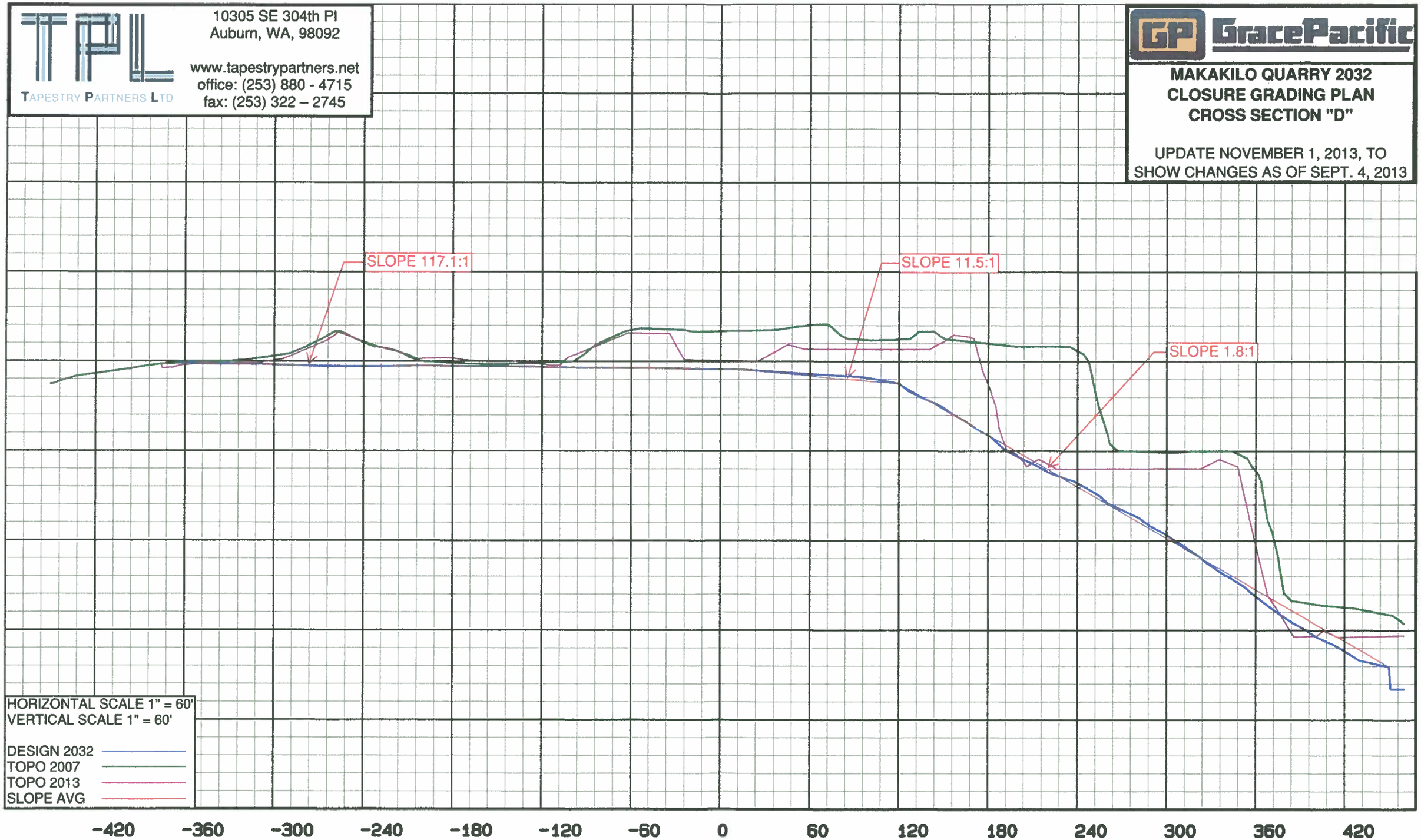
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "D"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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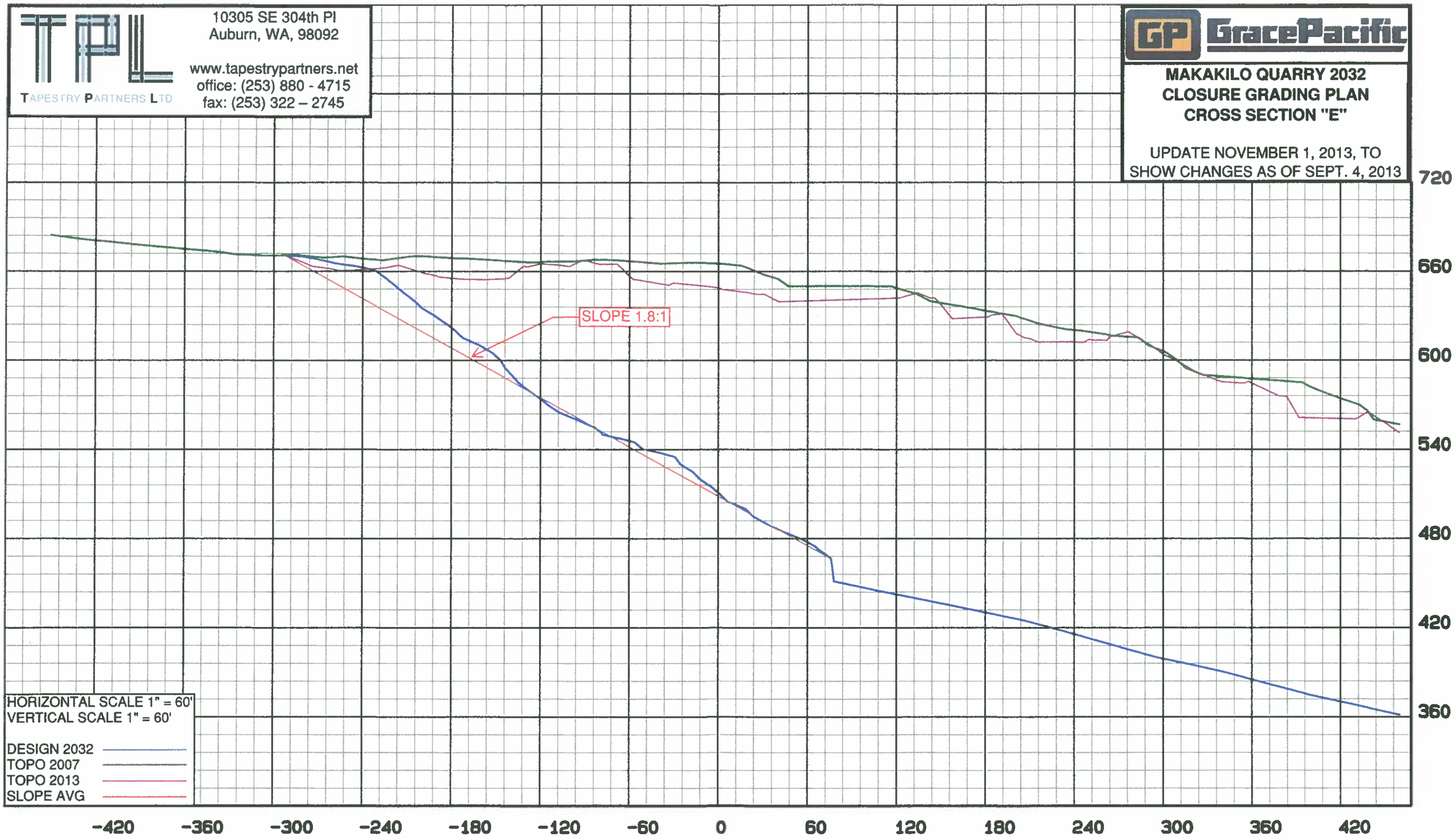
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "E"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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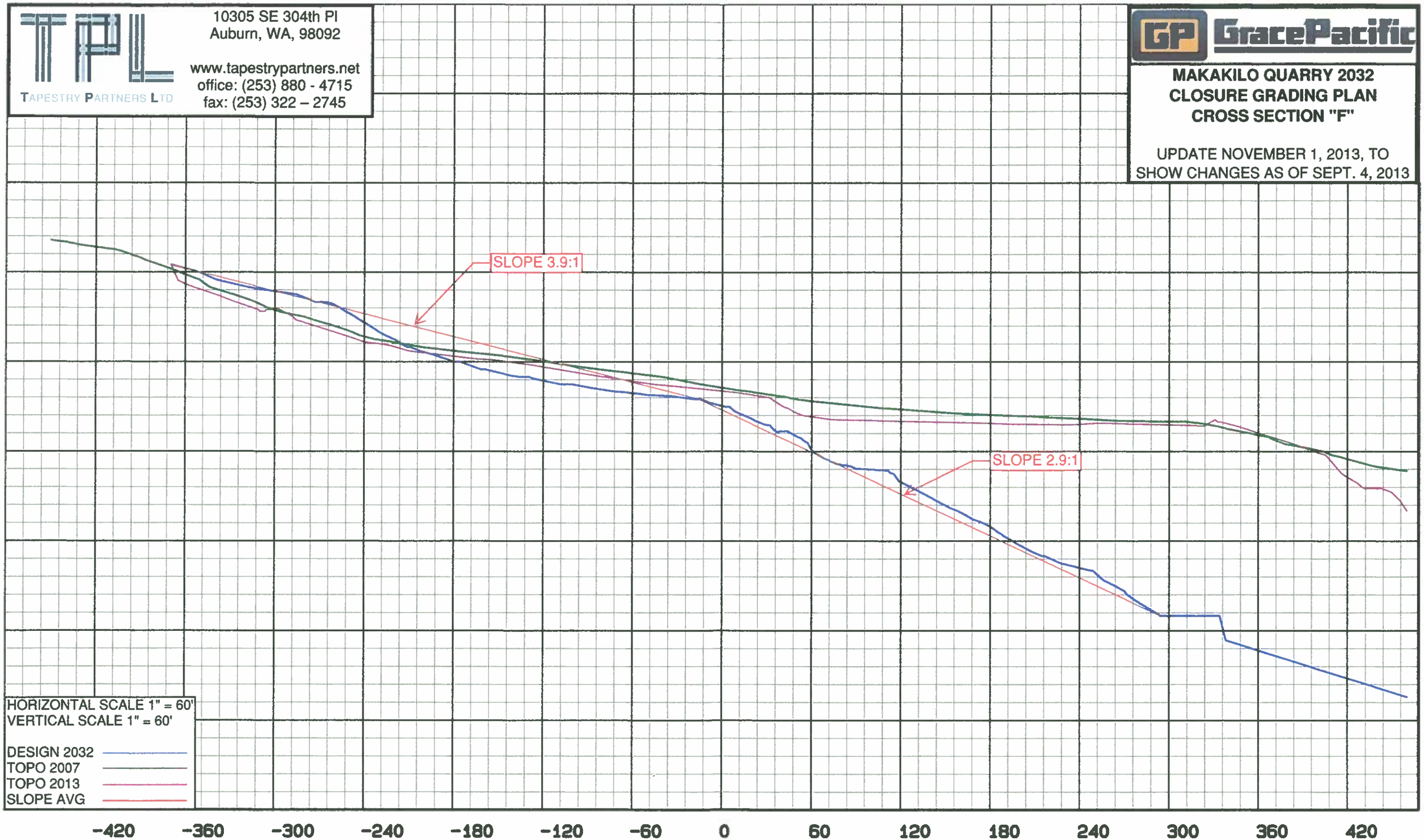
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "F"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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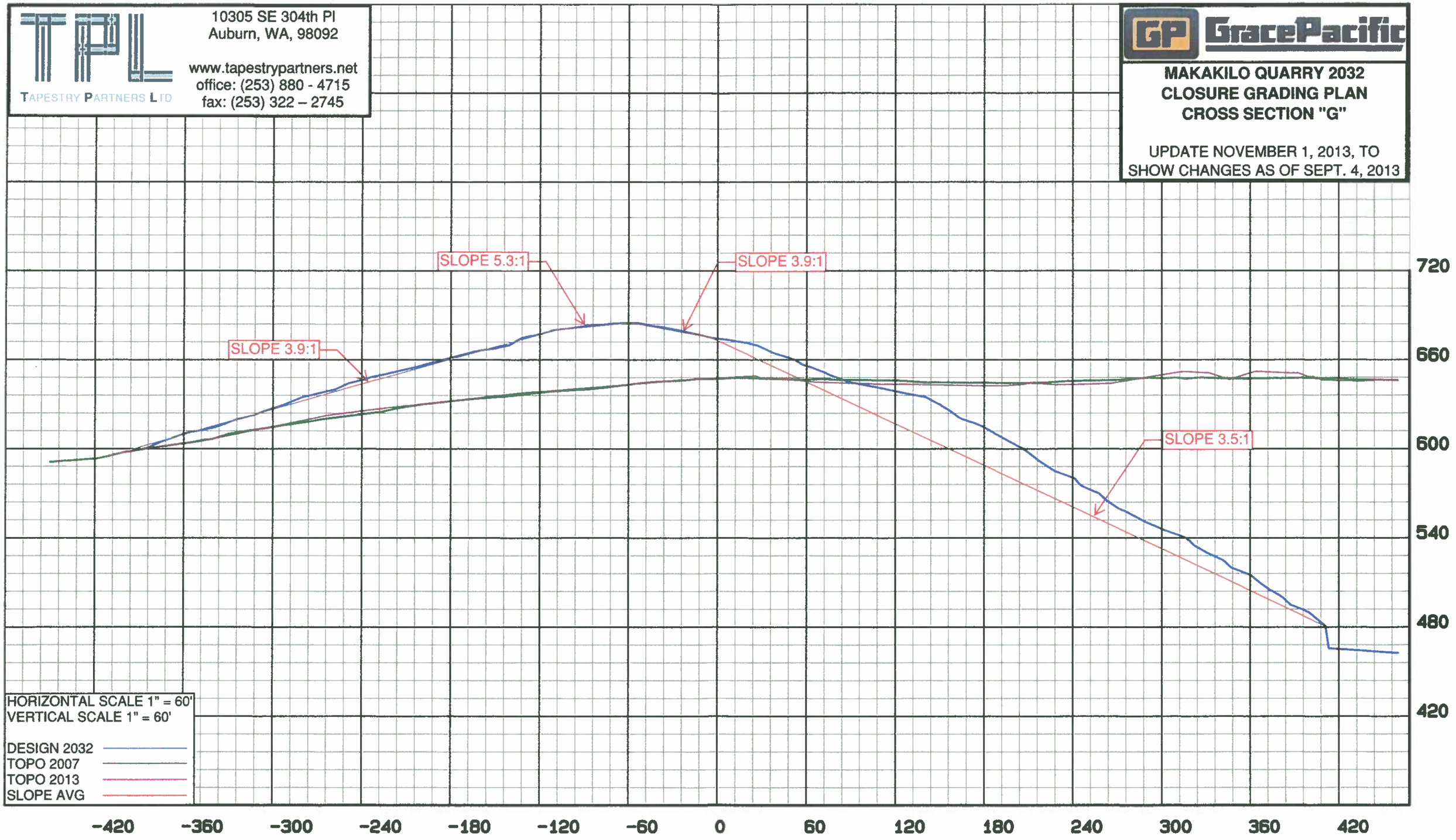
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "G"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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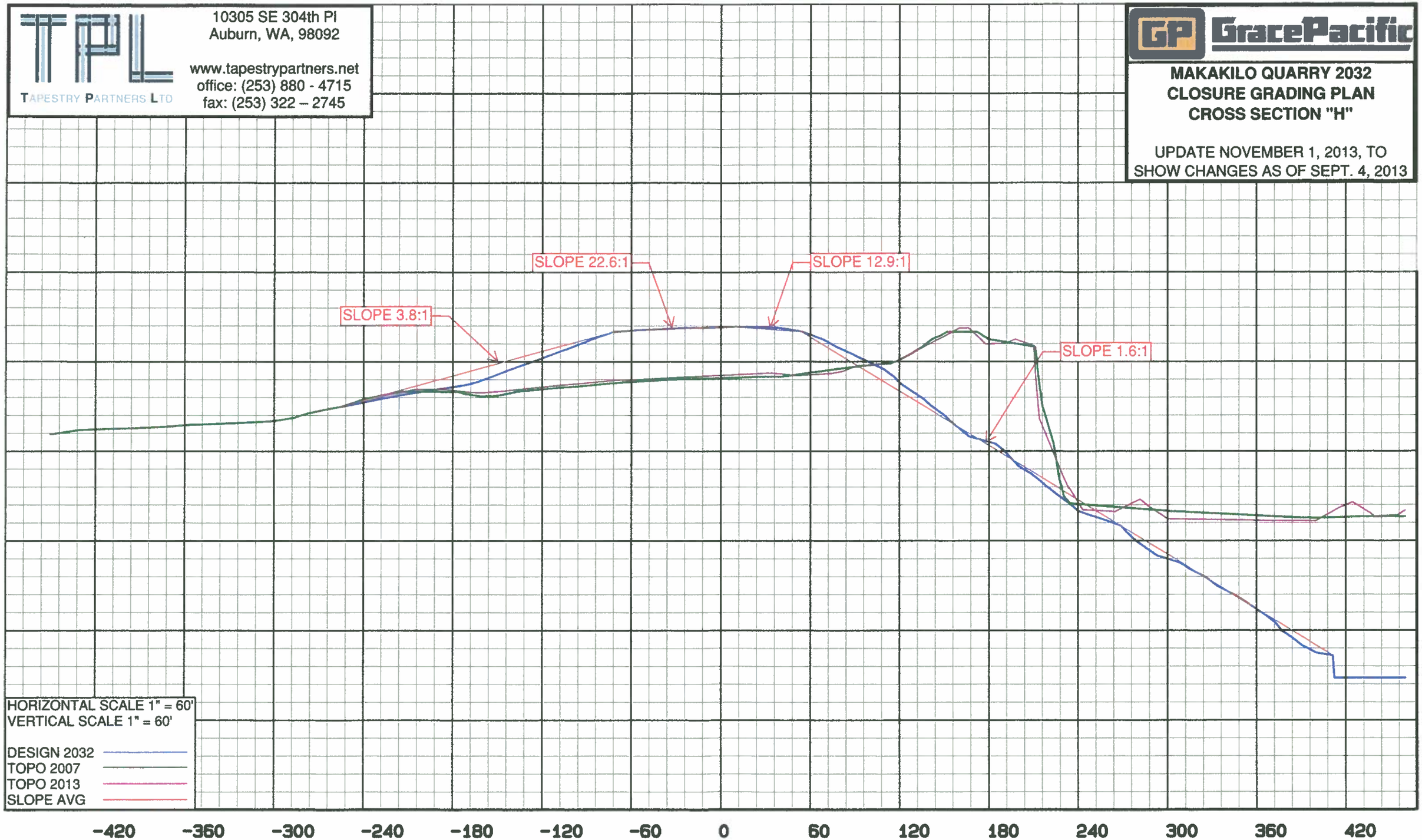
MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "H"

UPDATE NOVEMBER 1, 2013, TO SHOW CHANGES AS OF SEPT. 4, 2013



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MAKAKILO QUARRY 2032 CLOSURE GRADING PLAN CROSS SECTION "I"

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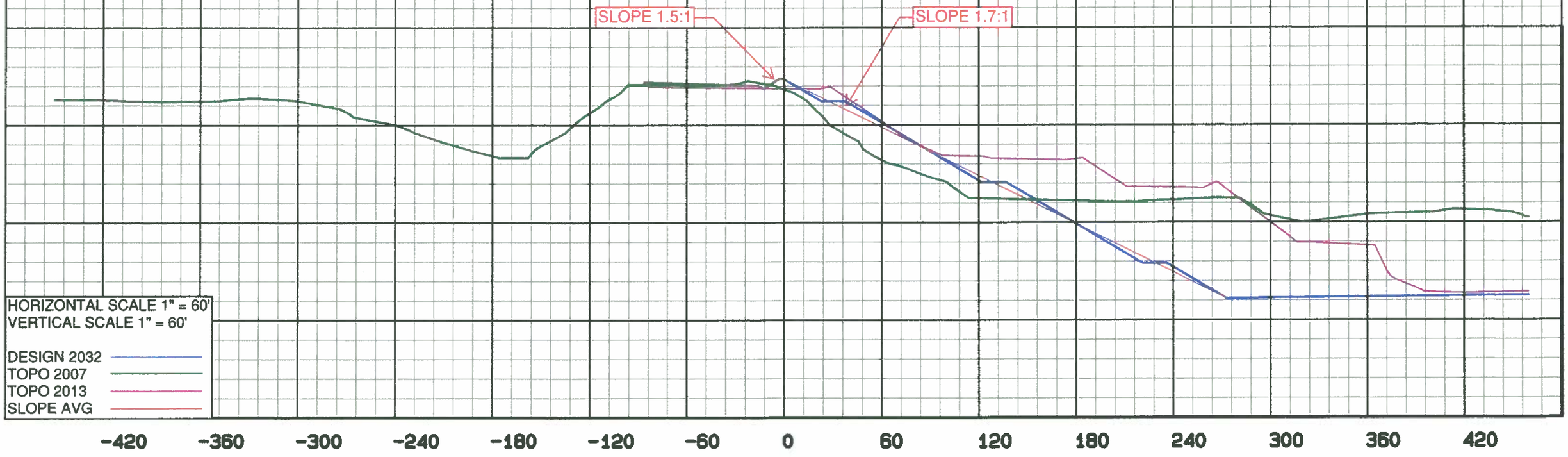

Grace Pacific LLC
Makakilo Quarry
Beneficial Re-use Plan
November 10, 2013

Excavation Plan in 000's of Cubic Yards

		quarry								landscape grading								2008 plan total quarry and landscape	net of cut/fill	2013 plan total quarry and landscape	net of cut/fill
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals				
year																					
plan																					
2009-2012	cut	516	716	457					1,688	750							750	2,438			
	fill	(386)	(14)	(9)					(409)	(913)							(913)	(1,322)			
actual									1,280								(163)		1,117		
2009-2013	cut	(157)	347	103	617	429	625	227	2,192	141	30	9	97	5	42	67	389			2,581	
	fill	(167)	(13)	3			0		(178)	(312)	24	(0)		0		0	(288)			(465)	
									2,014								102				2,116
plan 2008																					
2013-2017	cut				2,878				2,878		81	611					692	3,570			
	fill								-		(266)	(1)					(266)	(266)			
plan rev 2013									2,878								426		3,304		
2014-2017	cut	300	368		500	500	500		2,168	300	51	200	318	75	150		1,094			3,262	
	fill	(218)		(12)					(230)	(602)	(290)						(892)			(1,122)	
									1,938								202				2,140
2018-2022	cut					3,093			3,093				793				793	3,885	3,885		
2018-2022 rev 2013	cut	372		354	300	600	600	200	2,426	100		150	234	75	150	500	1,209			3,635	3,635
2023-2027	cut						3,305		3,305					261	560		822	4,127	4,127		
2023-2027 rev 2013	cut				600	863	700	300	2,463	100		150	144	57	150	400	1,001			3,464	3,464
2028-2032	cut							1,114	1,114							1,243	1,243	2,357	2,357		
2028-2032 rev 2013	cut				861	700	880	387	2,828	110		102		50	68	276	606			3,434	3,434
plan 2008		130	702	448	2,878	3,093	3,305	1,114	11,669	(163)	(185)	610	793	261	560	1,243	3,120		14,790		14,789
plan rev 2013		130	702	448	2,878	3,092	3,305	1,114	11,669	(163)	(185)	610	793	262	560	1,243	3,120				
		(0)	(0)	(0)	(0)	(0)	0	0	(0)	0	(0)	(0)	0	0	(0)	(0)	(0)				

Excavation Plan in Acres - Final Elevations Reached

		quarry								landscape grading								total quarry and landscape	
		1 A	1 B	1 C	2	3	4	5	totals	1 A	1 B	2	3	4 A	4 B	5	totals	2008 plan	2013 rev
year																			
2009-2012		26	16	13					55	43							43	98	
2009-2013 act		6	14	11					31	13							13		44
2013-2017					19				19		17	7					24	43	
2014-2017 rev		15	2		8				25	15	7						22		47
2018-2022						10			10				4				4	14	
2018-2022 rev		5		2	4	4			15	5	10	3	2	1	1	3	24		39
2023-2027							11		11					2	3		5	15	
2023-2027 rev					4	3	6		13	5		2	2	1	1	3	14		26
2028-2032								4	4							10	10	14	
2028-2032 rev					3	3	5	4	15	5		2		1	1	4	13		28
2008 plan		26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85	184	
2013 revision		26	16	13	19	10	11	4	99	43	17	7	4	2	3	10	85		184