MANUFACTURER'S CERTIFICATE OF COMPLIANCE

02270-3

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO: RICHARDSON RESIDENT OFFICE
U.S. ARMY ENGINEER DIST., AK
P.O. BOX 0898
ANCHORAGE, AK 99506-0898

FROM: CONTRACTOR
RED SAMM CONSTRUCTION INC
PO BOX 3097
BELLEVUE, WA 98009

CONTRACT NO: DACW85-99-C-0003

CHECK ONE:
✓ THIS IS A NEW TRANSMITTAL
___ THIS IS A RESUBMITTAL OF TRANSMITTAL ___________

SPECIFICATION SEC. NO. (Cover only one section with each transmittal)
02270

PROJECT TITLE AND LOCATION
HARBOR IMPROVEMENTS, KING COVE

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG. OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT: SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
a.	b.	c.	d.	e.	f.	g.	h.	i.
4	ROCK QUALITY - DATA	DATA	5	2.2				F
5	ROCK QUALITY - REPORTS	REPORTS	5	2.2				F

RECEIVED MAR 31 1999

REMARKS

RECEIVED MAR 09 1999

I certify that the above submitted items have even reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

NAME AND SIGNATURE OF CONTRACTOR
CLAYTON W. ARTERBURN

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY
Original Signed by
WALTER D. WOOD
Authorized Representative
of the Contracting Officer

DATE
MAR 26 1999

ENG FORM 4025, MAY 1991

SHEET ____ OF _____

RED SAMM CONSTRUCTION, INC.

P.O. BOX 3097
BELLEVUE, WASHINGTON 98009

BELLEVUE (425) 827-29
FAX (425) 827-02

CONTRACTOR SUBMITTAL
RED SAMM CONSTRUCTION, INC.
This Document is approved for submittal as follows:
✓ Approved without correction by RSC
__ Approved with corrections as noted by RSC
Reviewed by: CWA
Title: PROJ MGR
Date: 3/8/99
Signature: Clayton W. Arterburn
Subcontractor / Supplier
Submittals may require resubmittal for any items not in compliance with the contract. All materials must conform to the plans and specifications regardless of the submittal review by the contractor.

March 5, 1999

Administrative Contracting Officer
US Army Engineer District, Alaska
Richardson Resident Office
PO Box 898
Anchorage, Alaska 99506-0898

Re: DACW85-99-C-0003, Harbor Improvements, King Cove, AK; Quarry Data and Reports for Dome Quarry

Gentlemen:

Red Samm will be mining rock from Dome Quarry at Sand Point, Alaska. The quarry has been tested and approved for quality by the Corps of Engineers. Red Samm will only be mining rock in the Dome Quarry "plug" of fresh to slightly altered basalt. According to Woodward Clyde's report (see enclosures) this plug of basalt runs from the surface of the quarry to nearly sea level. If the rock changes from what was previously tested and approved by the Corps, then Red Samm will halt mining operations and move to another area of the quarry which does not differ from the approved rock.

If there are any questions regarding the above subject, please do not hesitate to contact me at (425) 827-2955.

Sincerely,

Clayton W. Arterburn

Clayton W. Arterburn
Project Manager

3.1 Dome Quarry Geology

Dome Quarry is the proposed source of armor stone for the runway project. The quarry is located in a Tertiary basalt intrusive structure forming a prominent knob one mile north of the airport. The basalt is a fresh to slightly altered pipe- or mushroom-shaped body bounded by less competent andesitic volcanic rocks. The rock outside the fresh basalt intrusive has been moderately to highly altered and weathered. The basalt intrusive in Dome Quarry dips steeply to the southwest.

4.4.5 Quarry Investigation

Subsurface investigation of Dome Quarry was accomplished between March 20 and April 9 using the same drill rig and techniques described in Section 4.4.4. The quarry investigation consisted of drilling six borings, two to 150 ft depth and four to 100 ft depth. The borings were ultimately extended to 235 ft depth under a separate contract between WCC and the U.S. Army Corps of Engineers, with the permission of the City of Sand Point and USKH. The purpose of the additional footage was to determine the extent of competent basalt available for subsequent use in the proposed expansion of the Sand Point small boat harbor. The complete core logs to full depth are presented in this report.

Six drill sites were located near accessible portions of the perimeter of the Dome Quarry basalt outcrop. The borings were cored continuously with an NQ wireline system using 1.875-in.-ID diamond bits, and single-tube corebarrels.

Drill sites were prepared and the rig was moved hole-to-hole with City of Sand Point bulldozers. A water supply was established near sea level and pumped over 1,000 ft up to the drill. However, this source was subsequently abandoned due to severe cold weather which froze up both the water lines and eventually the source itself. Water was then supplied to the drill from a 1,000-gal-capacity water truck and Bean 35 pump.

Joint spacing, joint angle of dip, and weathering in the joints were carefully recorded during coring operations. Percent core recovery and RQD values were determined for each run. The condition of each joint was classified. The length of the longest intact piece of core recovered from each run was also logged.

Examination of rock cores recovered from investigation of Dome Quarry indicates that fresh basalt is present in a restricted formation beneath the existing quarry area. Test borings Q-1 through Q-6 encountered fresh basalt throughout most of the depth cored. Boring locations within Dome Quarry are shown in Figure 6 and logs of Borings Q-1 through Q-6 are presented in Appendix C, Figures C-1 through C-6.

5.3.1 Rock Types

An interpretive geologic map of Dome Quarry is shown on Figure 6 and cross-sections are shown in Figures 7 through 10. The cross-sections are interpreted from the core logs (Appendix C, Figures C-1 through C-6) and from surficial evidence. The basalt intrusive that forms Dome Quarry dips steeply toward the southwest. It appears to be a pipe- or mushroom-shaped structure bounded by altered volcanic rocks and sediments. The altered volcanic rocks appear to be unsuitable for the production of large, high quality armor stone.

5.3.2 Rock Quality

Boring Q-1 encountered competent fresh basalt of high strength to 100 ft below the ground surface. The basalt was moderately altered with moderate strength between 100 to 138.5 ft depth. Boring Q-2 encountered fresh basalt to 173 ft, and was altered and weathered below that depth. Borings Q-3 through Q-6 encountered relatively fresh to slightly altered dark grey basalt to a depth of 230 ft. The competent basalt generally had widespread joints, typically cemented with calcite or a combination of calcite and hard white siliceous material.

5.3.3 RQD/Core Lengths

Core recovery from the borings was high, generally about 98 percent. Rock Quality Designation (RQD)[a] values in the competent basalt were consistently above 90 and generally 100, below the 100 ft depth. However, RQD values were generally lower in Boring Q-1 below 138.5 ft and in Boring Q-2 below 173 ft.

Core runs were generally 120 in. long except in the upper portions of each borehole. Intact pieces of competent basalt core were measured and the average of the longest pieces in each core run were as

Boring	Length
Q-1,	20 in.
Q-2,	30 in.
Q-3,	32 in.
Q-4,	66 in.
Q-5,	64 in.
Q-6,	60 in.

The characteristics of igneous intrusives are typically somewhat unpredictable. However, examination of cores from the six borings at Dome Quarry and an extensive investigation of local bedrock outcrops indicates no continuous geologic features which would limit the size of stone that could be quarried. The borings encountered widely-spaced joints and the recovered cores had high RQD's which indicate a massive formation. Joints and seams are generally filled with hard crystalline materials with strengths near that of the basalt itself but occasionally also contain weaker calcite. Some joints were broken during drilling but some remained intact, even when the core was broken across a joint.

Joint spacing, angle of dip, and weathering in the joints were recorded during the coring operations. Percent core recovery and RQD values were determined for each core run. Joints or non-mechanical breaks in the core were recorded with their measured angle of dip. The condition of the joints was classified as follows:

A - Fresh basalt, unweathered

B - Slightly weathered or cemented

C - Moderately weathered, discolored material or iron staining

D - Highly weathered, loose filling material

E - Completely weathered surface, friable

Joint location classifications and lengths of core recovered are shown on the detailed logs presented in Appendix C.

consolidation test was also performed on the soft silts sampled in Whiskey Bill Creek.

Results of the laboratory tests on soil samples are presented in Appendices A and B.

6.2 Quarry Stone

Selected rock cores recovered from the six test borings in Dome Quarry were subjected to laboratory testing. The testing was to determine the rock's potential for producing armor stone of appropriate size and quality for use in the offshore embankments. Tests carried out on the rock cores were conducted by Pittsburg Testing Laboratory and included:

• Specific Gravity and Absorption	ASTM C-128
• Unconfined Compression	ASTM D-2938
• Freeze-Thaw	CRD C-144
• Los Angeles Abrasion	ASTM C-535
• Ethylene Glycol Soak	CRD-C-148 (modified)

The testing program was designed to evaluate the resistance of the rock to three common types of armor stone failure or alteration: abrasion, spalling of the surface, and breaking of the stones. Petrographic analyses were also made on selected thin sections of the rock. Results of the laboratory tests and petrographic analyses on rock core samples from Dome Quarry are presented in Appendix E.

6.2.1 Specific Gravity and Absorption

Specific gravity is a key property of basalt since this type of rock can have a wide range of values of specific gravity depending on the environment in which the rock formed. Our test results show that this particular formation of basalt is relatively uniform with an average specific gravity of 2.72, ranging from 2.64 to 2.78. Both our minimum and the average values are higher than the 2.6 minimum value specified by the Alaska District Corps of Engineers.

Damage to armor stone can occur through spalling of the surface which may result from salt attack, freeze/thaw, and/or clay mineral expansion. Since this type of damage results when chemicals or water get into the rock, more absorptive rocks tend to be more susceptible to this type of damage. The results of our absorption testing indicate that this rock is not very absorptive, in all cases tests indicate an absorption of about 0.1 percent.

6.2.2 Unconfined Compression

Armor stone can be damaged with resulting failure of individual stones as a result of improper transportation, placement, or storm wave impacts. Compressive strength of the rock was determined by unconfined compression testing to determine the rock's potential for failure due to shear. The test results indicate that the rock has high compressive strength (16 to 41 ksi) but is moderately to highly brittle. Application of rapid or instantaneous loads (impact) causes failure where slowly applied loads do not.

6.2.3 Freeze-Thaw

Where water is able to penetrate into individual stones, the alternate freeze/thaw cycles tend to split the stones which may reduce their effective size. The cyclic freezing and thawing test is used to determine the rock's resistance to disintegration or surface spalling due to expansion of ice during freezing in surface irregularities or cracks. Selected core samples were subjected to 20 cycles of freezing and thawing. Volume loss observed was very slight (0.5 to 1.4%).

6.2.4 Los Angeles Abrasion

Abrasion is usually caused by the sand in the surf as it washes over the surface of the armor stone. Estimation of the rock's resistance to size loss by abrasion was based on results of the Los Angeles abrasion test. Three typical rock samples were tested. Wear loss at conclusion of the test indicated about 23 percent volume lost in the samples. The Alaska District Corps of Engineers usually specifies a maximum loss of 20 percent in riprap and armor stone. However, the Alaska DOT/PF Standard Specifications allow use of rock for riprap which has abrasion loss of up to 50 percent.

Resistance of rock from Dome Quarry was also evaluated subjectively from observation of the armor stone that is in place at the exposed south end of the existing runway. Some minor rounding of corners and loss of stone volume are apparent for stone located within the surf zone. However, little rounding of the stone is apparent above the surf zone. These stones were placed prior to 1974, although the exact date of placement and their original size is unknown. Therefore, precise wearing rates and total amount of wear cannot be determined. However, many of the stones in the surf zone were at least 3 ft across and are still blocky in shape, with no obvious size loss due to abrasion.

6.2.5 Ethylene Glycol Soak

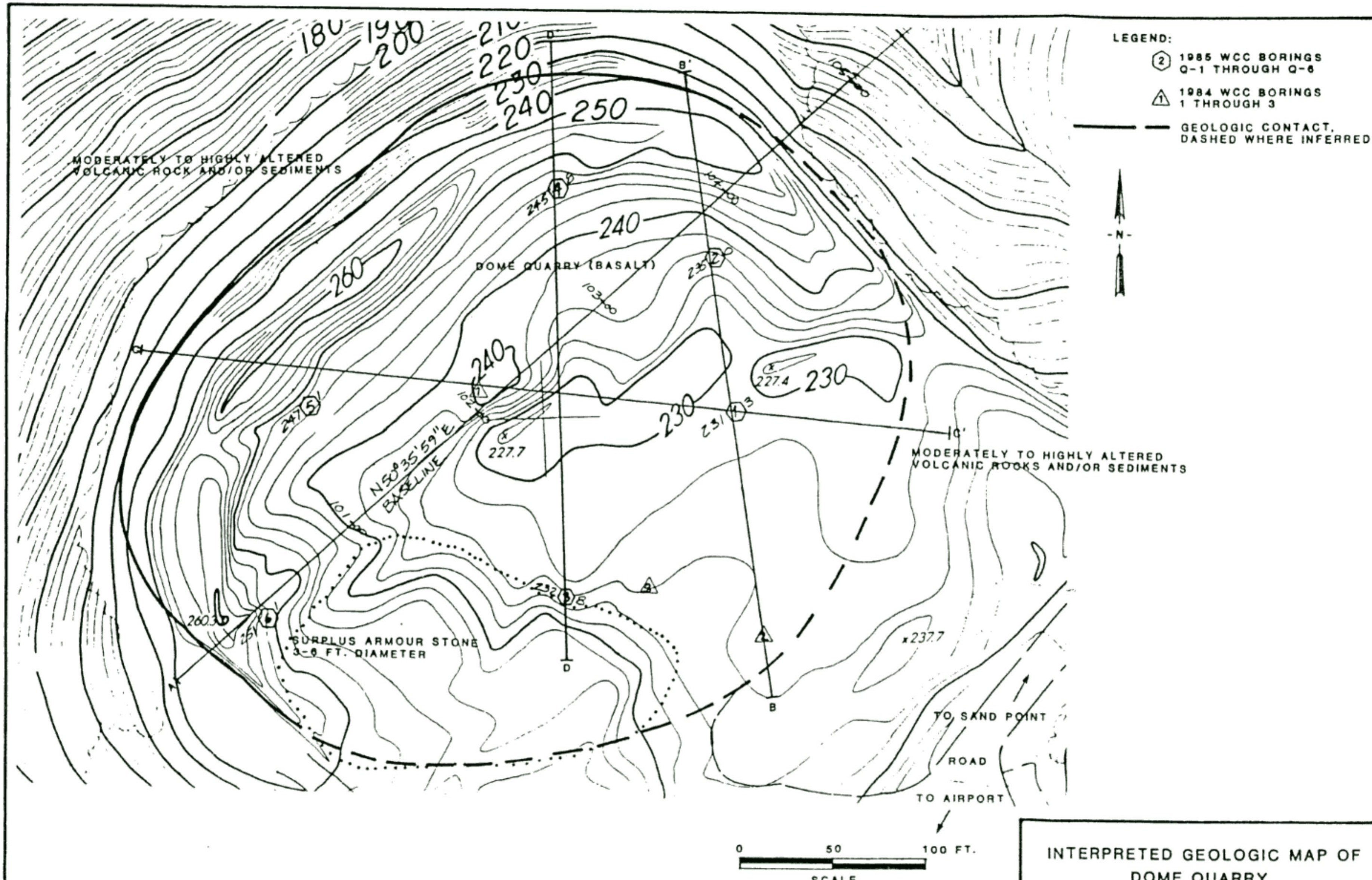
Potential for clay mineral expansion in the rock was tested by a modification of the Corps of Engineers ethylene glycol soak test. This test involves comparing the unconfined compressive strength of rock cores taken from the field with the strength of the rock after being soaked in ethylene glycol for two weeks. We found that the unsoaked rock had high compressive strength, typical of a dense basalt, averaging about 25 ksi and ranging from about 16 to 41 ksi. After being soaked in ethylene glycol, the joints seem to be affected in most of the samples. Most of the Dome Quarry rock core samples were affected only at the joints. One sample was pitted but only to a depth of a few millimeters. Three samples lost strength and failed along joints during the post-soaking unconfined compression test. One sample was pitted in appearance and a section of that sample failed along a joint prior to being tested for unconfined compressive strength.

The test results are consistent with limited petrographic analyses available on the Dome Quarry rock and our observations of weathering on the existing runway armor stone. The petrographic analyses indicate that clay and feldspar minerals occur in the rock, particularly in some of the joint fillings. Armor stones that are in the surf zone at the south end of the existing runway commonly show joints which looked eroded.

6.2.6 Joint Evaluation

Joints encountered during the boring program were evaluated to estimate the size of the stone that could be expected from this quarry. Each joint was noted on the field boring log with its orientation and condition. The condition was rated from A to E with A being a very fresh break and E being very weathered material at the break. The average joint spacing for each 10-ft interval of each boring was estimated by counting the joints in each 10-ft interval then dividing the number of joints into 10 to get an average joint spacing for the interval. The average joint spacings were plotted against boring depth (see Figures E-1 through E-6). The percentage of the boring length consisting of various joint spacing intervals was estimated by counting the number of 10-ft sections with the same joint spacing interval. For example, a 100-ft boring with four 10-ft sections having an average joint spacing interval of 2 to 3 ft would have 40 percent of its joints at a spacing interval of 2 to 3 ft.

To further refine this procedure, we looked at all joints in a boring at once and then only at the joints that were C-Joints or worse. Using the joint interval distributions for both categories, we assumed we could bound the limits of the armor stone size distributions that could be expected from the quarry. We believe that during blasting and excavation most of the C-Joints will break and that many of the A- and B- Joints will remain intact. Thus the estimated distribution of armor stone sizes indicated on Figure 11 as "All-Joints Line" would be the worst-case situation and the "C-Joint Line" would be the best case.

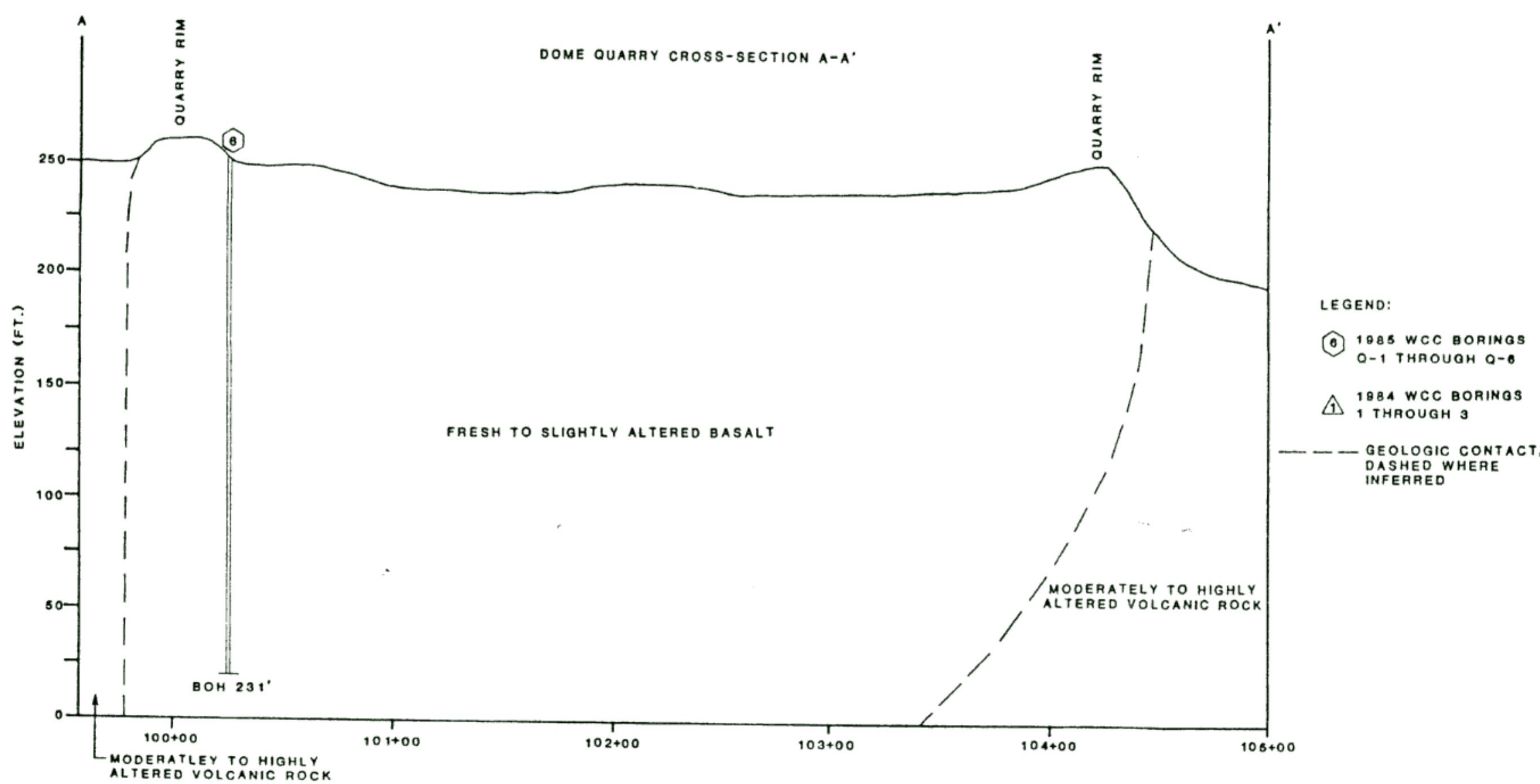


TOPO MAP: USKH SANDPOINT QUARRY SITE TOPO

INTERPRETED GEOLOGIC MAP OF DOME QUARRY

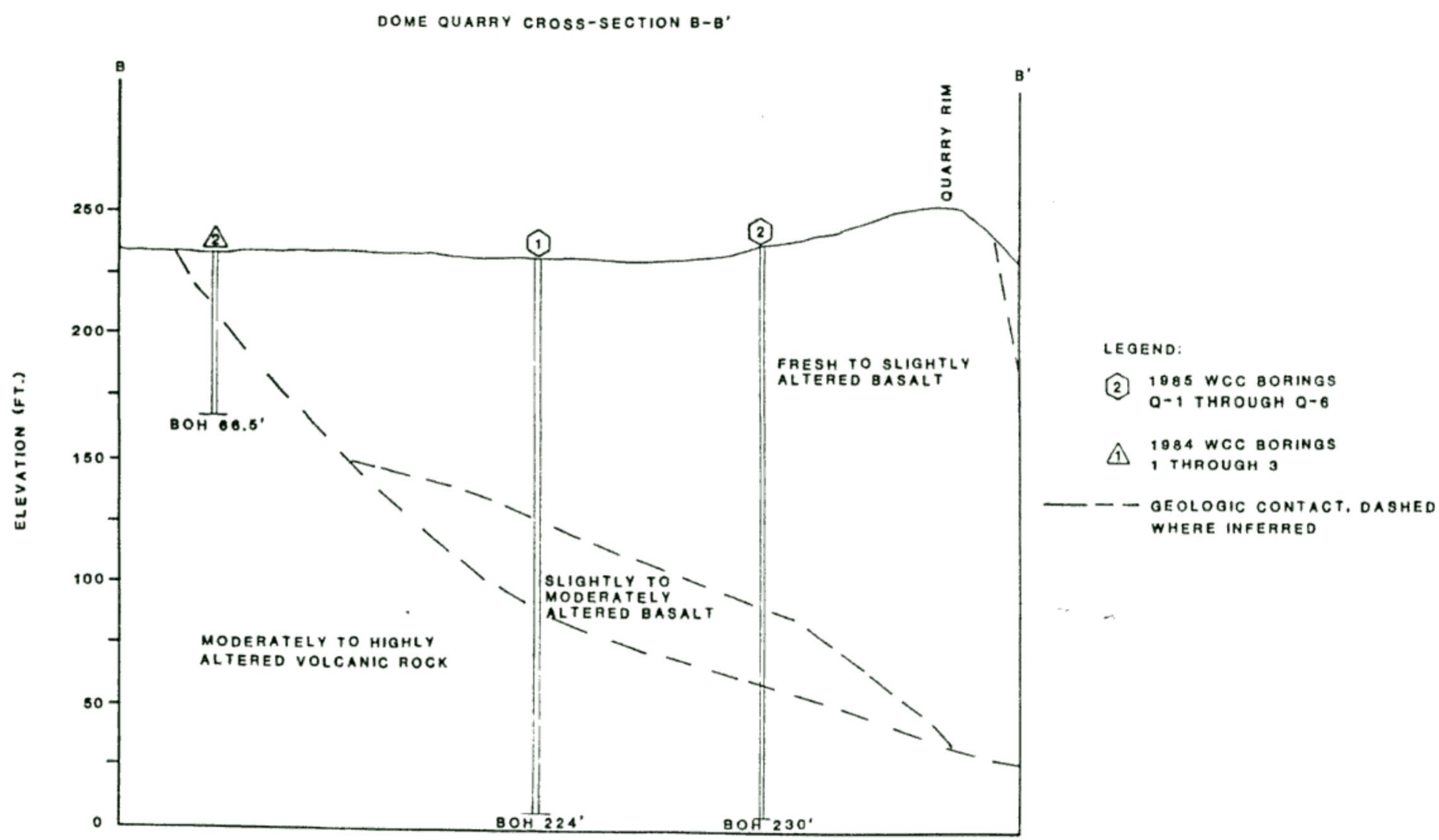
Woodward-Clyde Consultants

FIGURE 6



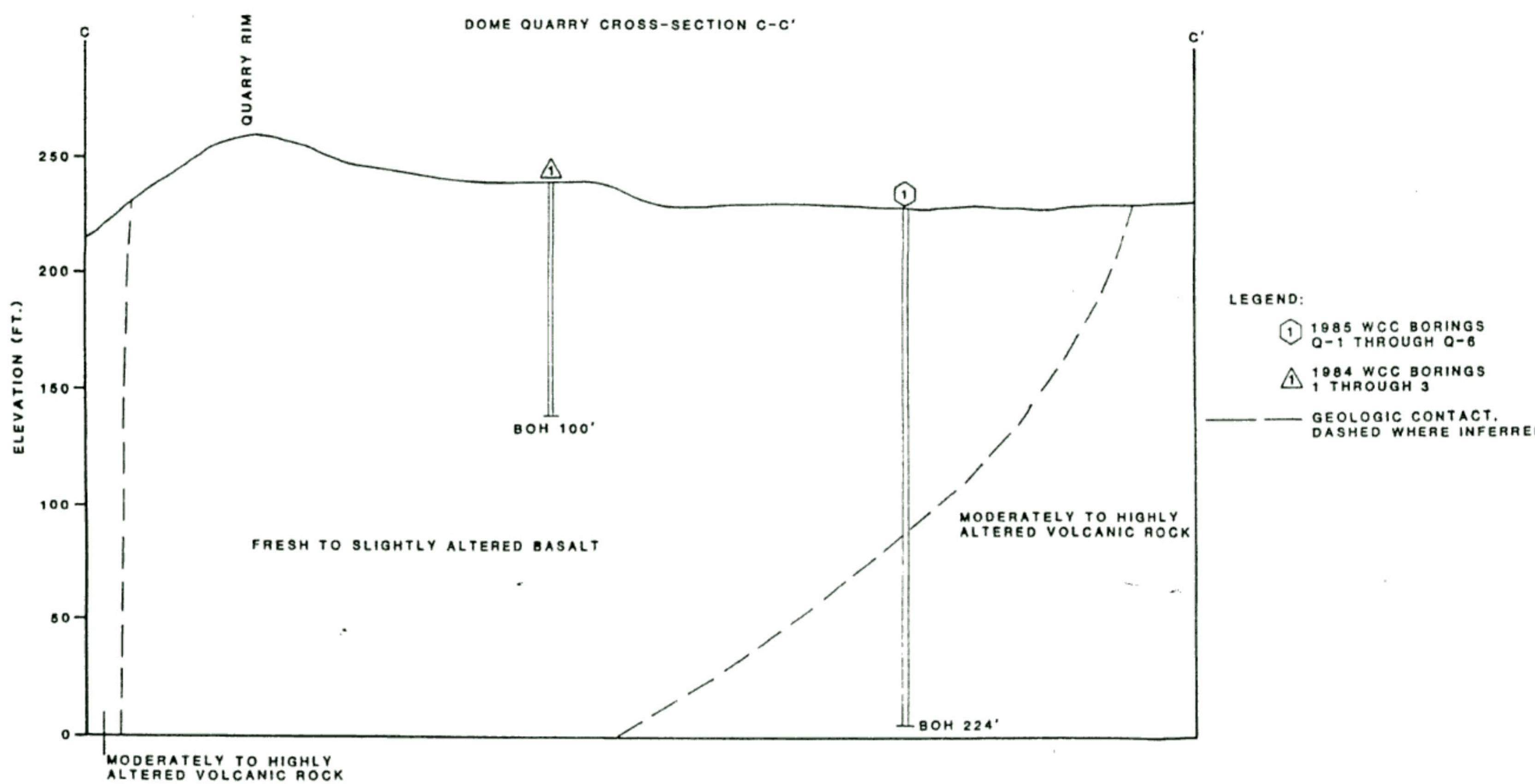
INTERPRETED GEOLOGIC CROSS-SECTION OF DOME QUARRY

Woodward-Clyde Consultants | FIGURE 7



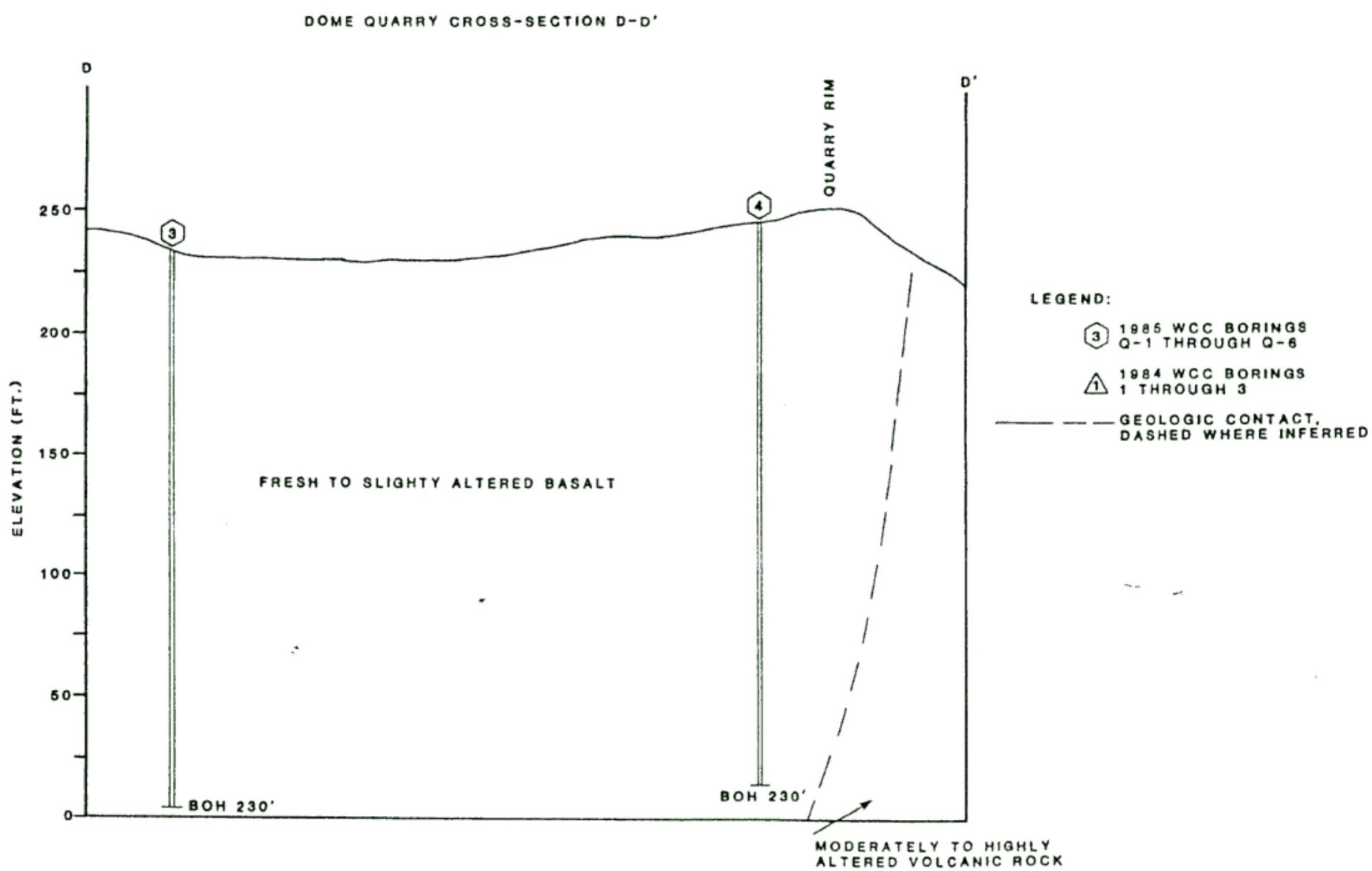
INTERPRETED GEOLOGIC CROSS-SECTION OF DOME QUARRY

Woodward-Clyde Consultants | FIGURE 8



INTERPRETED GEOLOGIC CROSS-SECTION OF DOME QUARRY

Woodward-Clyde Consultants | FIGURE 9



INTERPRETED GEOLOGIC
CROSS-SECTION OF DOME QUARRY

Woodward-Clyde Consultants | FIGURE 10