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KEN C. KAWAHARA, P.E.
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

March 18, 2009
Honolulu, Hawaii

Request to Amend the Contract for Job No. G55CM18B
for the
Waihee Deep Monitor Well (Well No. 5631-09), Waihee, Maui

SUMMARY OF REQUEST:

Amendment of the contract for Job No. G55CM18B is required to install approximately 500 feet of PVC screen in the open hole portion of Waihee Deep Monitor Well. The PVC will prevent wall materials from falling into and generating obstructions in the well; thereby rendering the well useable and safe for deployment of monitoring equipment. Since this is a modification to the existing contract, the existing drilling contractor, Wailani Drilling, Inc., will perform the installation of the PVC screen. Performance of this work by the existing contractor will eliminate additional costs for mobilization and demobilization of the drilling rig, reduce potential logistical problems, and ensure timely completion of the work.

Additional construction funds for this project, totaling $9,000.00, are available for the Waihee Deep Monitor Well through Act 41, SLH 2004, Item D-2.01. These funds were set aside at the start of the project for exigencies, such as this. Supplementary funds are also available from the remaining balance of the original funds authorized for construction of Waihee Deep Monitor Well.

WELL LOCATION AND GEOLOGIC MAP: See Exhibit 1.

BACKGROUND:

CWRM operates a statewide network of ten deep monitor wells. The purpose of the deep well monitoring program is to collect water level and salinity data that can be used for scientific, regulatory, and planning purposes. Data collected from the wells are used to characterizing local and regional groundwater hydrology, develop and test numerical groundwater models, establish and refine sustainable yields estimates for individual aquifer systems, and manage the

groundwater resource. The parameters monitored in the wells change through time, primarily because the resource is being impacted by and responding to natural factors, such as climate and hydrological recharge system, and human-induced stresses, such as pumping and land development. Management of a network of monitoring wells provides data on the temporal and spatial variability of the monitored parameters both within and between aquifer systems and sectors. This information is critical for identifying the nature and extent of natural and anthropogenic impacts to the groundwater resource and enables staff to make informed decisions regarding management of the resource. Data generated from this monitoring network are being used to update the statewide Water Resource Protection Plan, particularly the sustainability of the resource.

On June 21, 2006 the Commission authorized the release of $431,000 as funds for the construction of a deep monitoring well in Waihee, Maui. The well was to be included in the CWRM deep monitor well network of the Wailuku Aquifer Sector for the purpose of providing critical, long-term data on water levels, changes in the thickness of the freshwater basal lens, and movement of the transition zone in the Waihee Aquifer System.

On May 14, 2007 the drilling contract, Wailani Drilling, Inc. was given a notice to proceed. On August 8, 2007 the permit to construct this well was approved and issued to Wailani Drilling, Inc. with an expiration date of August 8, 2009. Late September 2007, drilling of the well and installation of the solid casing was completed. In 2008, additional construction related activities were conducted, including but not limited to (1) fencing the site, (2) video logging the well, and (3) establishing the benchmark at the well.

Prior to CWRM's acceptance of the well, it was determined from video logs that the geology of the well below the solid steel casing consists of alternating layers of moderately competent basalt and weakly consolidated ash and cinders, or highly fragmented basalt. The weakly consolidated layers have exhibited erosional features that modified the original borehole, creating rough, ledge-studded walls. The weakly consolidated and fragmented materials are prone to collapse, causing high rates of sedimentation and high levels of suspended materials in the well. In addition, on two occasions, a rock fragment large enough to block the entire open hole had to be cleared from the borehole with a drilling tool.

ANALYSIS/ISSUES:

In its current condition, the Waihee Deep Monitor Well cannot be used by CWRM for its intended monitoring purposes. Material spalling off the sides of the well and blocking the borehole will prevent the lowering of well logging equipment to the bottom of the well, a necessity for monitoring purposes. Even if the borehole is cleared prior to deployment of monitoring instruments, the likelihood of the equipment triggering spalling events while being lowered or retrieved is still high, and we cannot be assured that expensive monitoring equipment will not become trapped in the well. Furthermore, the rough, ledge-studded walls pose hazardous deployment conditions for monitoring instruments, possibly trapping equipment between ledges or causing severe abrasion to the instruments and their deployment lines.

In order to prevent materials from collapsing into the open hole, and to render Waihee Deep Monitor Well useable for monitoring purposes, the open hole portion of the well (approximately 500 linear feet) needs to be lined with well screen. The well is currently lined with solid steel casing to a depth of approximately 406 feet, with open hole extending from the base of the casing to the bottom of the well. The Hawaii Well Construction and Pump Installation Standards (HWCPIS) recommend the use of steel screen, which is not practical in this case as it will easily corrode in the brackish and saline water found in the lower portions of the well. Instead, staff plans to use Schedule 80 PVC screen, which is not only resistant to corrosion, but also approximately one-third the cost per linear foot of stainless steel.

Section 2.4 of the HWCPIS cautions the use of PVC at depths exceeding 200 feet, but would allow it on a case-by-case basis. In the case of Waihee Deep Monitor Well, PVC screen is the only practicable and cost-efficient alternative to stabilizing the borehole. Besides its resistance to corrosion, staff have determined that the use of PVC below 200 feet in Waihee Deep Monitor Well is acceptable for the following reasons: (1) the area around the well screen will not be grouted, therefore the potential for thermal-failure of the PVC that is associated with grouting is not an issue, (2) Schedule 80 PVC has sufficiently high collapse strength to withstand the hydraulic pressures at the maximum depth of the well, (3) the well shall be used for monitoring purposes only and no pumps shall be installed, and (4) no drilling tools are contemplated to re-enter the well after installation of PVC casing.

Because instability of the borehole was not anticipated, based on geologic assessments conducted prior to well construction, lining of the well with screen was not included in the scope of the original contract. Therefore, the contract for Job No. G55CM18B needs to be amended to include installation of PVC screen from the base of the solid casing to the maximum depth of the well. Installation of the well screen will make the well useable for monitoring purposes and safe for deployment of monitoring equipment.

RECOMMENDATION:

Staff recommends that the Commission approve the amending of the contract for DLNR Job No. G55CM18B, Waihee Deep Monitor Well (Well No. 5631-09), Waihee, Maui, Hawaii to include lining the open hole portion of the well with of PVC screen. Staff also recommends that the Commission authorize the Chairperson, subject to review and approval by the Attorney General, to modify the original contract and sign appurtenant documents that authorize the additional work with the Contractor, Wailani Drilling, Inc.

Respectfully submitted,

Ken C. Kawa

KEN C. KAWAHARA, P.E.
Deputy Director

Exhibits:

1. Location and Geologic Map of Deep Monitor Wells and Geology of the Wailuku Aquifer Sector Area, West Maui

2. June 21, 2006 Staff Submittal, "Authorization to Award Construction Contract for Job No. G55CM18B, Waihee Deep Monitor Well, Waihee, Maui

3. March 4, 2009 Letter From Wailani Drilling Services, Inc.

APPROVED FOR SUBMITTAL:

LAURA H. THIELEN
Chairperson

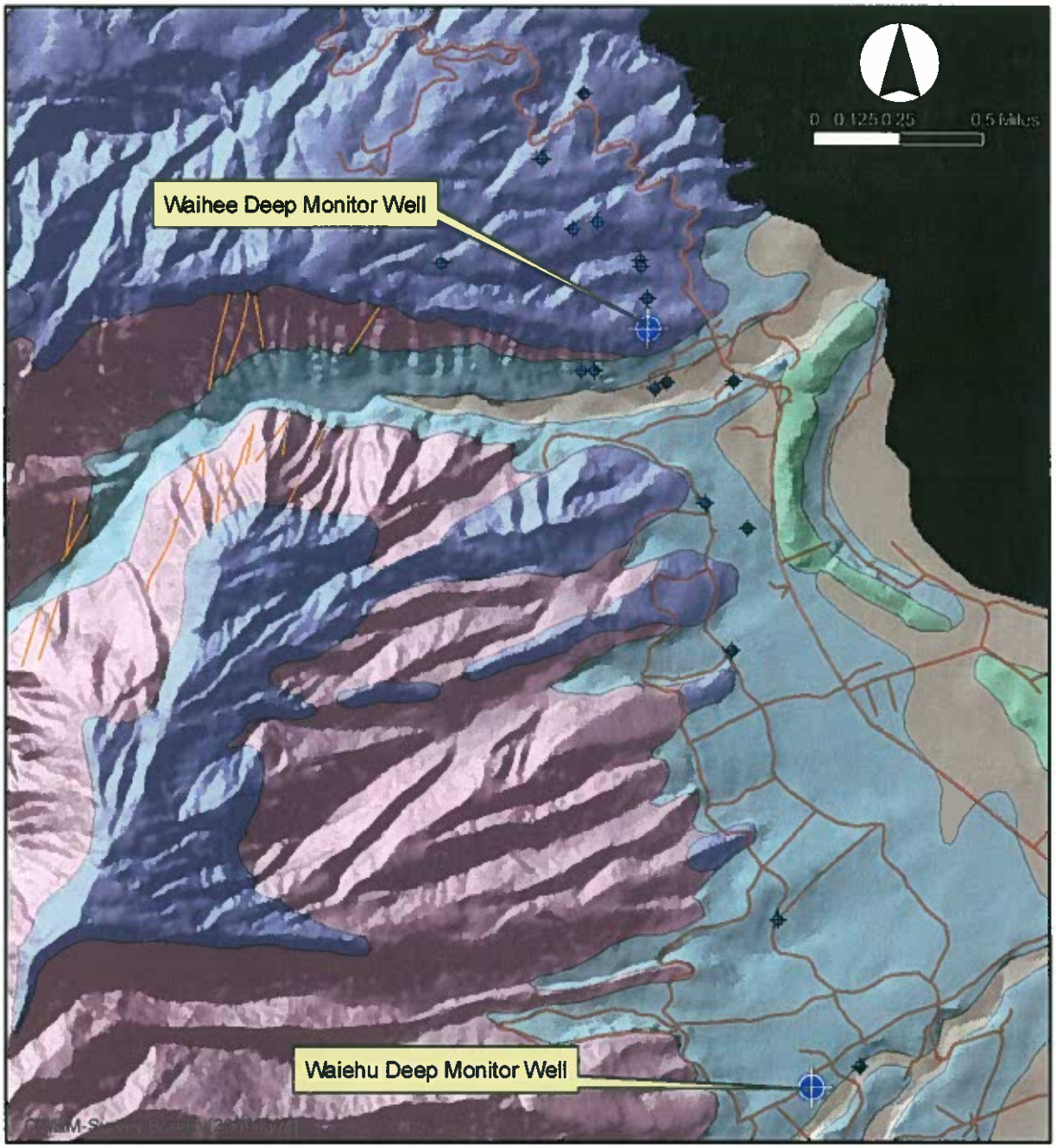

EXHIBIT 1: Location and Geology of Waihee Deep Monitor Well, West Maui

1:30,000

Other Wells
Deep Monitor Wells
roads
Dikes

Site Geology
NAME
Alluvium
Older dune deposits
Older alluvium
Honolua Volcanics
Wailuku Volcanics

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DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

June 21, 2006
Honolulu, Hawaii

Authorization to Award the Construction Contract for
Job No. G55CM18B, Waihee Deep Monitor Well, Waihee, Maui

BACKGROUND:

Capital Improvement Program (CIP) funding for the subject project in the amount of $431,000 was appropriated to the Department of Land and Natural Resources under Act 41, SLH 2004. Funding was provided for planning ($25,000), land ($10,000), design ($25,000), construction ($321,000), and equipment ($50,000) to construct a deep monitor well to collect hydrologic and geologic data from the Waihee Aquifer System on the island of Maui.

The proposed justification for the monitor well is as follows:

a. Long-term ground water monitoring is necessary for the Waihee Aquifer System. The proposed deep monitor well will be used to observe long-term changes in water levels and in the thickness of the basal lens and transition zone.

b. Proceedings to designate Waihee as a ground water management area have been deferred. However, the adjacent Iao aquifer system was designated as a ground water management area on July 21, 2003.

c. CWRM has two deep monitor wells in the Iao Aquifer System. An additional well in Waihee will provide better monitoring coverage for the region.

Approval by the Governor was received on August 2, 2004, authorizing the release of planning, land, design, construction, and equipment funds totaling $431,000 to complete the Waihee deep monitor well. The Commission authorized the Chairperson to enter into an agreement for consultant services for planning and design of the Waihee Deep Monitor Well on July 28, 2004 and the firm of Shimabukuro, Endo & Yoshizaki, Inc. (SEY Engineers) was selected to provide consultant services. Subsequently, approval by the Governor was received on March 6, 2006, authorizing the transfer of $40,000 in previously released equipment funds to construction. This transfer was necessary in the event that the cost of drilling exceeded the available construction funds.

Approved by Commission on
Water Resource Management
at the meeting held on
JUN 21 2006

Item D1

EXHIBIT 2

Staff Submittal June 21, 2006

PROJECT DESCRIPTION:

The project consists of constructing an 8-inch diameter deep monitor well, approximately 900 feet deep, in Waihee, Maui, located near the County of Maui, Department of Water Supply's North Waihee Reservoir Site, and identified as Tax Map Key: (2) 3-2-01: Portion of 3.

Bids for the subject project were received and opened on May 18, 2006, and the results are as follows:

Bidder	Total Sum Bid
Wailani Drilling Inc.	$333,910.00
Valley Well Drilling, LLC	$395,580.00
Beylik Drilling & Pump Service, Inc.	$426,925.00
Water Resources International, Inc.	$592,190.00

Wailani Drilling submitted the low bid. We have reviewed the bid and found it to be fair.

The construction contract with Wailani Drilling is subject to approval by the Deputy Attorney General.

RECOMMENDATION:

That the Commission authorize the Chairperson to proceed with awarding the contract for Job number G55CM18B, Waihee Deep Monitor Well, Waihee, Maui, to Wailani Drilling, for their low bid of $333,910.00, and execute necessary documents to implement the project subject to the approval by the Deputy Attorney General.

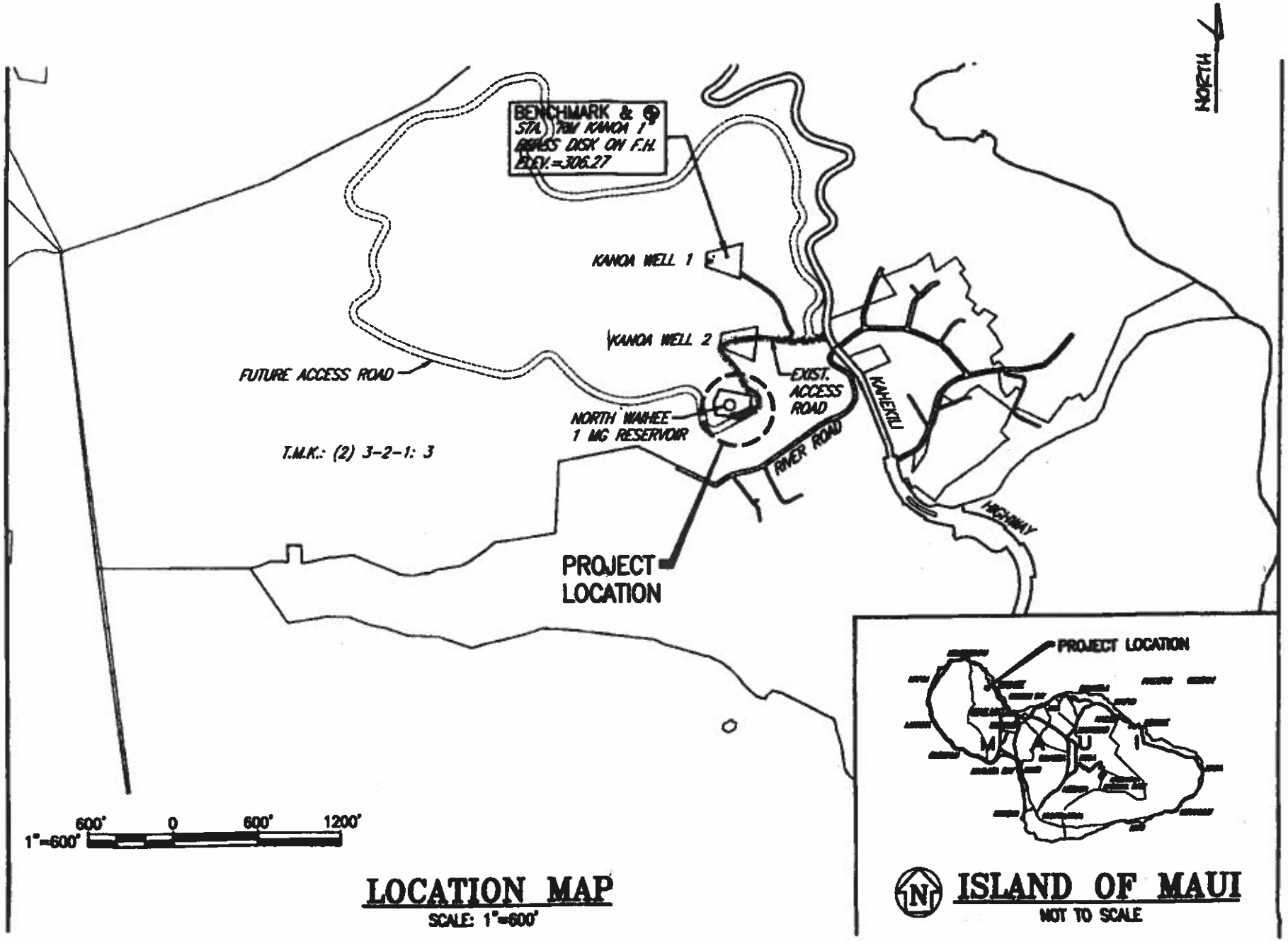
Respectfully submitted,

DEAN A. NAKANO
Acting Deputy Director

Exhibit(s) 1 Location of Proposed Deep Monitor Well
2 Proposed Well Section

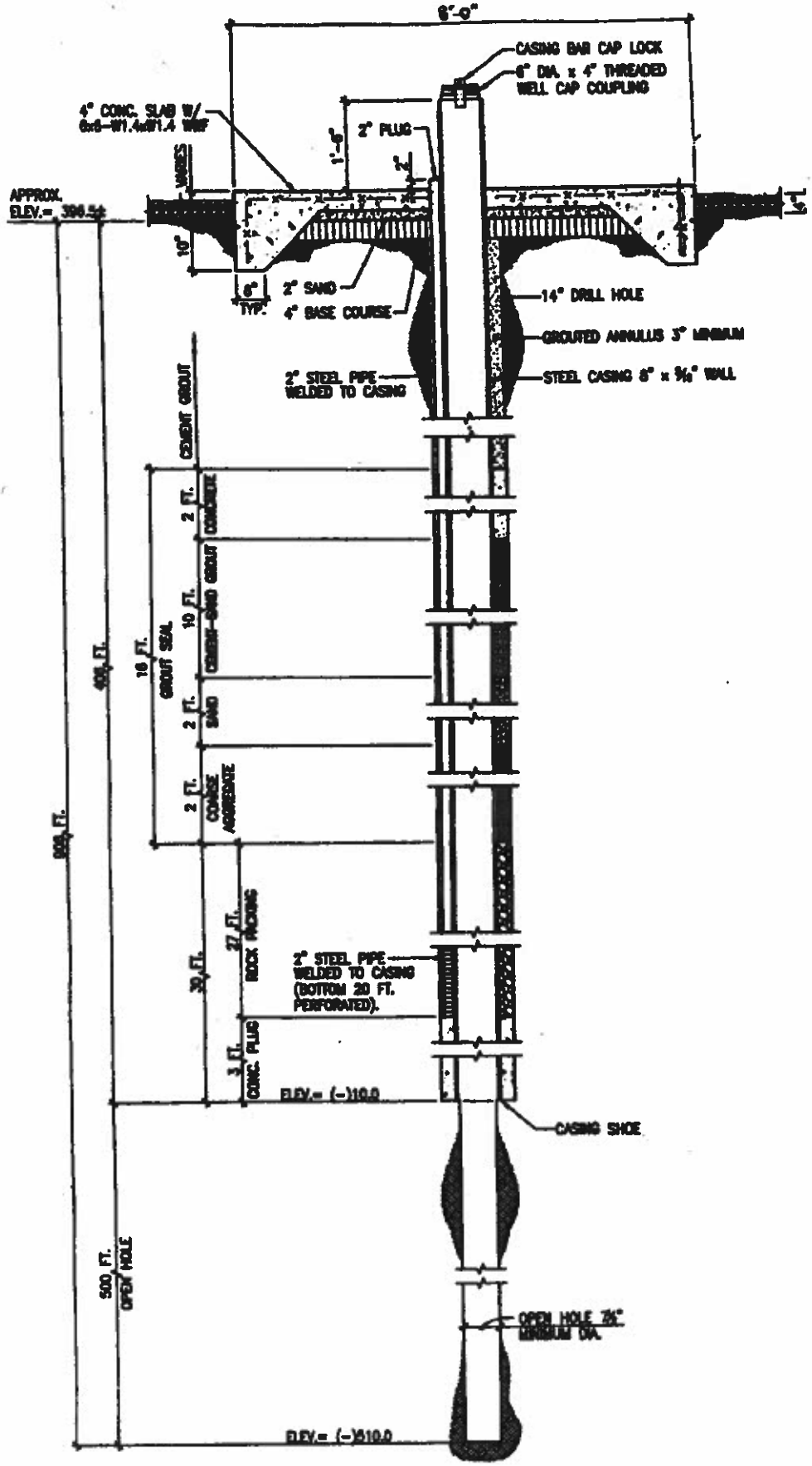
APPROVED FOR SUBMITTAL:

PETER T. YOUNG
Chairperson



LOCATION MAP
SCALE: 1"=600'

EXHIBIT 1



NOTE:
DEPTHS AND ELEVATIONS SHOWN ARE APPROXIMATE. ACTUAL DEPTH TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

SECTION THRU WELL
NOT TO SCALE

EXHIBIT 2

Wailani Drilling Services, Inc.
License #C57-29485
110 West Uahi Way, Wailuku, HI 96793
Phone: 808-249-0149 • Fax: 808-244-4791
E-mail: wailanidrilling@gmail.com

March 4, 2009

Department of Land and Natural Resources
P.O. Box 621
Honolulu 96809

Dear Ronnie Torres,

Please see the timeline below for the recent work on the Waihee Deep Monitor Well #5631-09.

- Late July 2008: Video log requested by Gayson Ching (DLNR – Engineering) We found the well blocked at 415' by loose blue rock boulders.
- Mid November the multiple loose blue rock boulders were moved to 520' with the line winch.
    - Mobilized cable tool rig and broke up loose rock to 906' (bottom of well). While removing cable tools a cave in occurred and caused the equipment to become stuck.
    - We constructed a slide hammer to pull tooling out and videoed the hole and found that the equipment was stuck behind multiple blue rock boulders at 625'.
- Late November: we mobilized our V2000 hydraulic rig with a 6" rock hammer.
    - By the end of November we had successfully hammered drill to 906', purged well from the bottom, and pulled up to bottom of casing and re-drilled to 906'.
    - 2 days later hole was re-videoed and was open without obstruction to 906', but the water was still fairly murky. We rescheduled for final video four weeks later.
- January 22, 2009: the hole was re-videoed showing rock obstruction at 678'.
- February 4, 2009: we met with Gayson Ching and Curtis Powers of DLNR-Engineering at the well site to discuss the geological structure of the open hole of the well and what steps we may want to pursue next including re-lining to the bottom of the well to prevent further cave in on state well monitoring equipment. Gayson was given 2 videos of the well now showing rock obstruction at 678'.

EXHIBIT 3

It has become apparent that we have an issue with the 500' of open hole and the geological structure of that area. The videos are revealing large areas of loose rock and cinders. Any movement of the aquifer, lowering or raising instruments, and seismic activity can cause further rocks to cave in and cause obstruction. For this reason we recommend lining the open hole with perforated casing. Due to potential corrosion issues with steel casing, the use of PVC casing is a practical alternative.

Sincerely,

Will Steele
General Manager