Good morning. Attached is the information you requested, ORIGINALS to follow via mail once the completed video log is ready to go.

Thanking you in advance for your continued patience in this matter.

If you have any questions, please feel free to contact me directly for assistance.
Valley Well Drilling  
91-235A Oihana Street  
Kapolei, Hawaii 96707  

June 30, 2005  

Gentlemen:  

SUBJECT: WELL ELEVATION  
WAIMALU DEEP MONITORING WELL  
At Waimalu, Ewa, Honolulu, Hawaii  
TMK: (1) 9-8-11: 006  

The undersigned hereby certifies that the following are the results from our survey of the well site on May 23, 2005:

Well Elevation:  
Top benchmark (brass disk): 74.95 ft.  
Top well cap: 78.53 ft.  
Top well casing: 77.06 ft.  

Well Location:  
21° 23' 51" N  (NAD 83)  
157° 56' 05" W  

Robert K.Y. Lee  
Licensed Professional Land Surveyor  
Certificate Number 5075  

TOWILL, SHIGEOKA & ASSOCIATES, INC.
Well Elevation

Benchmark Elevation 74.95

TOC, Top Of Coupling

78.37'

Attach photos of completed well and concrete pad showing benchmark location.

I certify that the elevation shown above:

1) Was done in accordance with acceptable surveying practices
2) Is accurate to the nearest 0.01 ft.
3) Is referenced to mean sea level

[Signature]

Surveyor

License No.

June 30, 2005

Date
State of Hawaii
COMMISSION ON WATER RESOURCE MANAGEMENT
Department of Land and Natural Resources

WELL COMPLETION REPORT - PART I
Well Construction

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96805. The Commission may not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at [number]. For updates to this form or additional information, please visit our website at http://www.state.hi.us/dlnr/wrm/

1. State Well No.: 2456-05  Well Name: Waimalu Deep Monitor  Island: Oahu
2. Address: Kilinoe Street  Tax Map Key: 9-8-11-006
3. Drilling Company: Valley Well Drilling
4. Drilling method used during construction: 0 Rotary 0 Percussion 0 Other (describe) Reverse Circ.
5. Date Well Construction (drilled, cased, grouted) completed: 4/29/05
   In addition to the driller’s log, if a geologic log was prepared, please submit with this form.
6. Was the subject well cored? 0 Yes 0 No
7. Initial water-level encountered 54.8 ft. below ground  Date and time of measurement: 3/15/05 0700
8. Step-Drawdown Test completed? 0 No 0 Yes  Attach Step-Drawdown Test form (12/17/97 SDPTD Form)
9. Constant Rate Aquifer Test completed? 0 No 0 Yes  Attach Constant Rate Aquifer Test form (12/17/97 CRPTD Form)
10. Parameters prior to pump test:
    a. Water-level: ____________ ft. above msl  Date and time of measurement: ____________
    b. Chloride: ____________ ppm  Date and time of sampling: ____________
    c. Temperature: ____________ °F  Date and time of measurement: ____________
11. Fill in the as-built section on the other side of this sheet.
12. Attach photograph of well and concrete pad showing benchmark on concrete pad.
13. Fill in attached surveyor’s report.
14. If a pump is not planned to be installed, please describe (below in the remarks section) how well is secured to prevent unauthorized access (example: lockable cover, threaded coupling, etc.)
15. Remarks:
   Lockable cover

Licensed Driller (print) Valley Well Drilling  C-57 Lic. No. 21358
Signature  Date 6/20/05
13. AS-BUILT WELL SECTION (Please attach as-built if different from diagram provided below)

**Solid Casing Material:**
Carbon Steel: compliant with (check one or more): □ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A63 □ ASTM A129
And compliant with (check one or more): □ ASTM A242 or A656 □ Type E □ Type S □ Grade B □ Other
Stainless Steel: (check one):
□ ASTM A409 (production wells) □ ASTM A312 (monitor wells)
ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and ASTM D1785 or ASTM D2241: (check one) □ Schedule 40 □ Schedule 80 □ Schedule 120

**Thermoset Plastic:** (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996 □ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

**Open Casing Material:**
Carbon Steel: compliant with (check one or more): □ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A63 □ ASTM A129
And compliant with (check one or more): □ ASTM A242 or A656 □ Type E □ Type S □ Grade B □ Other
Stainless Steel: (check one):
□ ASTM A409 (production wells) □ ASTM A312 (monitor wells)
ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and ASTM D1785 or ASTM D2241: (check one) □ Schedule 40 □ Schedule 80 □ Schedule 120

**Thermoset Plastic:** (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996 □ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

---

*msl = mean sea level*
<table>
<thead>
<tr>
<th>Depths (ft.)</th>
<th>Rock description, Water level, etc.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 8</td>
<td>large basalt boulders w/dark brown silty sand</td>
<td>2/24/05</td>
</tr>
<tr>
<td>8 to 40</td>
<td>large basalt boulders w/dark brown silty sand</td>
<td>2/25/05</td>
</tr>
<tr>
<td>40 to 50</td>
<td>blue gray basalt mixed w/clay</td>
<td>2/28/05</td>
</tr>
<tr>
<td>50 to 75</td>
<td>soft brown clay mixed w/weathered basalt</td>
<td>2/28/05</td>
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<tr>
<td>75 to 95</td>
<td>saphrolite reddish brown</td>
<td>2/28/05</td>
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<tr>
<td>95 to 105</td>
<td>blue gray basalt, med hard</td>
<td>2/28/05</td>
</tr>
<tr>
<td>95 to 105</td>
<td>blue gray basalt med hard</td>
<td>3/1/05</td>
</tr>
<tr>
<td>105 to 125</td>
<td>weathered basalt med</td>
<td>3/1/05</td>
</tr>
<tr>
<td>120 to 130</td>
<td>light brown weathered rock</td>
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<td>130 to 140</td>
<td>dark brown vesicular basalt</td>
<td>3/14/05</td>
</tr>
<tr>
<td>140 to 150</td>
<td>greenish gray basalt, very hard</td>
<td>3/15/05</td>
</tr>
<tr>
<td>150 to 170</td>
<td>light brown, vesicular, med hard</td>
<td>3/15/05</td>
</tr>
<tr>
<td>170 to 180</td>
<td>light gray, weathered soft</td>
<td>3/15/05</td>
</tr>
<tr>
<td>180 to 240</td>
<td>dark gray basalt, very hard</td>
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<td>240 to 250</td>
<td>basalt olive gray, very hard</td>
<td>3/16/05</td>
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<td>basalt olive gray, very hard</td>
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</tr>
<tr>
<td>250 to 280</td>
<td>weathered, light brown, med hard</td>
<td>3/16/05</td>
</tr>
<tr>
<td>260 to 280</td>
<td>greenish gray, dense, very hard</td>
<td>3/16/05</td>
</tr>
<tr>
<td>280 to 295</td>
<td>light gray basalt, very hard</td>
<td>3/17/05</td>
</tr>
</tbody>
</table>

Remarks:
page 1 of 3
**State of Hawaii**
**COMMISSION ON WATER RESOURCE MANAGEMENT**
**Department of Land and Natural Resources**

**DRILLER’S LOG**

**Well Number:** 2466-05

<table>
<thead>
<tr>
<th>Depths (ft.)</th>
<th>Rock description, Water level, etc.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>470 to 480</td>
<td>light brown, weathered, med</td>
<td>3/21/05</td>
</tr>
<tr>
<td>480 to 490</td>
<td>olive gray basalt, weathered, med hard</td>
<td>3/21/05</td>
</tr>
<tr>
<td>490 to 510</td>
<td>olive gray basalt, weathered med hard</td>
<td>3/21/05</td>
</tr>
<tr>
<td>510 to 520</td>
<td>olive gray, dense, very hard</td>
<td>3/21/05</td>
</tr>
<tr>
<td>520 to 530</td>
<td>dark gray basalt, hard</td>
<td>3/22/05</td>
</tr>
<tr>
<td>530 to 540</td>
<td>dark gray, weathered, med</td>
<td>3/22/05</td>
</tr>
<tr>
<td>540 to 557</td>
<td>dark brown vesicular</td>
<td>3/22/05</td>
</tr>
<tr>
<td>567 to 560</td>
<td>dark gray, dense, hard</td>
<td>3/22/05</td>
</tr>
<tr>
<td>560 to 560</td>
<td>dark gray, med hard</td>
<td>3/22/05</td>
</tr>
<tr>
<td>580 to 590</td>
<td>light brown, weathered</td>
<td>3/22/05</td>
</tr>
<tr>
<td>590 to 600</td>
<td>olive gray, very hard</td>
<td>3/22/05</td>
</tr>
<tr>
<td>610 to 615</td>
<td>dark gray hard, basalt</td>
<td>3/23/05</td>
</tr>
<tr>
<td>615 to 630</td>
<td>dark gray, weathered, med hard</td>
<td>3/23/05</td>
</tr>
<tr>
<td>630 to 640</td>
<td>dark gray, very hard</td>
<td>3/23/05</td>
</tr>
<tr>
<td>640 to 650</td>
<td>dark brown vesicular, med</td>
<td>3/23/05</td>
</tr>
<tr>
<td>650 to 660</td>
<td>olive gray vesicular, med</td>
<td>3/23/05</td>
</tr>
<tr>
<td>660 to 670</td>
<td>dark brown vesicular</td>
<td>3/23/05</td>
</tr>
<tr>
<td>670 to 680</td>
<td>dark gray, very hard</td>
<td>3/23/05</td>
</tr>
<tr>
<td>680 to 690</td>
<td>dark gray, weathered</td>
<td>3/23/05</td>
</tr>
</tbody>
</table>

**Remarks:**
page 2 of 3
### Driller's Log

**Well Number:** 2456.05

<table>
<thead>
<tr>
<th>Depths (ft.)</th>
<th>Rock Description, Water Level, etc.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>895 to 900</td>
<td>light brown clay med</td>
<td>3/26/05</td>
</tr>
<tr>
<td>900 to 910</td>
<td>dark gray weathered basalt</td>
<td>3/29/05</td>
</tr>
<tr>
<td>910 to 920</td>
<td>dark gray, hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>920 to 930</td>
<td>dark brown mix w/dark gray, hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>930 to 940</td>
<td>olive gray med hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>940 to 957</td>
<td>cinders dark brown, med</td>
<td>3/29/05</td>
</tr>
<tr>
<td>957 to 970</td>
<td>dark gray vesicular</td>
<td>3/29/05</td>
</tr>
<tr>
<td>970 to 990</td>
<td>olive gray, dense, hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>990 to 1000</td>
<td>dark gray, hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>1000 to 1010</td>
<td>dark gray mix w/dark brown</td>
<td>3/29/05</td>
</tr>
<tr>
<td>1010 to 1020</td>
<td>dark brown vesicular</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1020 to 1030</td>
<td>dark gray vesicular</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1030 to 1040</td>
<td>dark brown weathered</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1040 to 1050</td>
<td>dark gray basalt mix w/light brown</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1050 to 1060</td>
<td>dark gray, very hard</td>
<td>3/30/05</td>
</tr>
</tbody>
</table>

**Remarks:**

page 3 of 3
**TRANSMITTAL/REVIEW/APPROVAL**

<table>
<thead>
<tr>
<th>JOB NO: G55C018B</th>
<th>TITLE: Waimalu Deep Monitor Well</th>
<th>SUBMITAL NO: 2</th>
</tr>
</thead>
</table>

FROM (CONTRACTOR)(ADDRESS)  
VALLEY WELL DRILLING  
91-235A OI'HANA STREET  
KAPOLEI, HAWAII 96707  
TO: STATE OF HAWAII DEPT OF LAND & NATURAL RESOURCES  
ENGINEERING DIVISION  
ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

ENCL. NO. | MIN. NO. OF COPIES (6) | FOR RECORD ONLY (4) |
|----------|-------------------------|--------------------|

DESCRIPTION  
Well Completion Report  
Compaction Test Report  
Plumbness Survey  
Video Log  
Surety Release  
Tax Clearance

TRANSMITTED for:  
☑ APPROVAL  
☐ CLARIFICATION  
☐ SELECTION  
☐ CONTRACT DEVIATION

It is hereby certified that the material submitted herein conforms to contract requirements and will fit in the allocated spaces.

CONTRACTOR, SIGNATURE:  

FROM: DLNR, ENGINEERING DIVISION  
SIGNATURE:  
DATE:  
RETURN BY ___________ (DATE)  
For review/comments: ____ copies of enclosures forwarded. MUST RETURN WITHIN 10 CALENDAR DAYS unless submittal is for record/info purpose only and there are no adverse comments.

RECOMMENDED:  
☐ APPROVAL, Subject to contract requirements  
☐ APPROVAL, As noted, subject to contract requirements  
☐ RETURN, For correction and submission  
☐ DISAPPROVAL

REMARKS:  

SIGNATURE:  
CONSULTANT

FROM: DLNR, ENGINEERING DIVISION  
TO: CONTRACTOR VALLEY WELL DRILLING  
DATE:  

Enclosure(s) is(are):  

RECOMMENDED:  
☐ APPROVED, Subject to contract requirements  
☐ APPROVED, As noted, subject to contract requirements  
☐ RETURNED, For correction and resubmission  
☐ DISAPPROVED  
☐ CONFORM TO REMARKS BY CONSULTANT (ABOVE)

REMARKS:

SIGNATURE:  
CONSULTANT

Distribution:  
Contractor  
File  
Inspector (Ranceford Yoshida)  
Parks
STATE OF HAWAII — DEPARTMENT OF TAXATION
TAX CLEARANCE APPLICATION
PLEASE PRINT TYPE OR PRINT CLEARLY

1. APPLICANT INFORMATION: (PLEASE PRINT CLEARLY)
Applicant’s Name: Valley Well Drilling
Address: 91-235A Olbana St.
City/State/Zip Code: Kapolei, HI 96707
DBA/Trade Name:

2. TAX IDENTIFICATION NUMBERS: (Complete applicable ID numbers)
HAWAII GENERAL EXCISE #: 10623746
FEDERAL EMPLOYER ID #: 93-1123721
SOCIAL SECURITY #: 000-00-0000

3. APPLICANT IS AINN: (CHECK ONLY ONE BOX)
☐ CORPORATION ☐ CORPORATION ☐ TAX EXEMPT ORGANIZATION ☐ TRUST
☐ INDIVIDUAL ☐ PARTNERSHIP ☐ ESTATE ☐ LIMITED LIABILITY COMPANY
☐ SINGLE MEMBER LLC DESIGNATED AS A PERSONAL FIRM

4. THE TAX CLEARANCE IS REQUIRED FOR:
☐ CITY, COUNTY, OR STATE GOVERNMENT CONTRACT IN HAWAII
☐ REAL ESTATE LICENSE
☐ FINANCIAL CLOSING ☐ PROGRESS PAYMENT
☐ HAWAII STATE RESIDENCY ☐ FEDERAL CONTRACT
☐ SUBCONTRACT ☐ OTHER
☐ LIQUOR LICENSE
☐ BULK SALES
☐ PERSONAL
☐ LOAN

* THIS APPROVAL STAMP IS ONLY FOR PURPOSES INDICATED BY ASTERISK.

5. NO. OF CERTIFIED COPIES REQUESTED: 10

6. SIGNATURE:

Mike Saltz
PRINT NAME
Operations Manager
PRINT TITLE: Corporate Office, General Manager, Individual (State President), Treasurer, Payroll
SIGNATURE
DATE: 8/17/05
PHONE: (808) 682-1767 (808) 682-1768
FAX:

POWER OF ATTORNEY: If submitted by someone other than a Corporate Officer, General Manager, or Member, Individual (State President), Treasurer, or Evgue, a power of attorney (State of Hawaii, Department of Taxation, Form 8-216) must be submitted with this application. If a Tax Clearance is required from the Internal Revenue Service, IRS Form 8821, or FB Form 4849 is also required. Applications submitted without proper authorization will be sent to the address of record with the ending authority. UNSIGNED APPLICATIONS WILL NOT BE PROCESSED.

PLEASE TYPE OR PRINT CLEARLY — THE FRONT PAGE OF THIS APPLICATION BECOMES A CERTIFICATE OF APPROVAL. SEE PAGE 2 OR REVERSE A SEPARATE INSTRUCTIONS. Failure to provide required information on page 2 of this application or as required in the separate instructions to this application will result in a denial of the Tax Clearance request.

(Page 1 of 2)

ID: DOTAX T S ANDP PAGE: 004 R=96%
ID: DOTAX T S ANDP PAGE: 005 R=96%
REPORT OF CONCRETE CYLINDER TEST
CONSTRUCTION ENGINEERING LABS, INC.

Report Date: 6/15/05

Project Number: 05194
Project: DIANR Deep Monitoring Well - Waimalu
Client: Valley Well Drilling
Address: 91-235A Oihana Street
Kapolei, HI. 96707

FIELD TEST CONDITIONS AND RESULTS (ASTM C 39)

Date Placed: 4/18/2005
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 3500
Time Batched: Time Placed: 1:30pm / 1:35pm
Batch Size:
Slump: (AASHTO T 119)
Concrete Temp:
Water Added:

LABORATORY TEST RESULTS (ASTM C 31)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Test Date</th>
<th>Age</th>
<th>Load</th>
<th>Diameter</th>
<th>Area</th>
<th>Strength</th>
<th>Percent of Design</th>
<th>Type of Fracture</th>
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<tbody>
<tr>
<td>1</td>
<td>4/25/2005</td>
<td>7</td>
<td>42870</td>
<td>4.00</td>
<td>12.57</td>
<td>3410</td>
<td>97%</td>
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<tr>
<td>2</td>
<td>4/25/2005</td>
<td>7</td>
<td>39385</td>
<td>4.00</td>
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<td>3130</td>
<td>89%</td>
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<td>3</td>
<td>6/13/2005</td>
<td>56</td>
<td>54560</td>
<td>4.00</td>
<td>12.57</td>
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<td>4.00</td>
<td>12.57</td>
<td>4095</td>
<td>117%</td>
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</tbody>
</table>

Remarks:

Copies to:

TYPES OF FRACTURES

A. Cone
B. Cone & Cone & Split
C. Shear
D. Columnar
E. 

Reported by: Ronald A Pickering II
Vice President Operations
CONSENT OF SURETY TO FINAL PAYMENT
AIA DOCUMENT G707 - ELECTRONIC FORMAT

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification. Authentication of this electronically drafted AIA document may be made by using AIA Document 806.

TO OWNER: State of Hawaii
(Name and address)

PROJECT: Waimalu Deep Monitor Well
(Name and address) #G550018B

ARCHITECT'S PROJECT NO.:

CONTACT FOR: Waimalu Deep Monitor Well
#G550018B

CONTRACT DATED: June 17, 2005

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the

Surety, Travelers Casualty & Surety Company of America
2000 S Colorado Blvd., Ste 2-480
Denver, CO 80222-7910

on bond of

Valley Well Drilling
91-235A Oihana St., Kapolei HI 96707

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to

Owner, Hawaii Department of Land & Natural Resources
PO Box 373, Honolulu HI 96809
as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:

June 10, 2005

Attest: Candy Win.\[signature\]

(Signature of authorized representative)

Darren W Hart / Attorney In Fact
(Printed name and title)
State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
for
COMMISSION ON WATER RESOURCE MANAGEMENT
Honolulu, Hawaii

BOARD OF LAND AND NATURAL RESOURCES
Peter T. Young
Chairperson

CONTRACT SPECIFICATIONS AND PLANS

Job No. G55CO18B
Waimalu Deep Monitor Well
Aiea, Oahu, Hawaii

Consultant: URS Corporation

January 2004
State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
for
COMMISSION ON WATER RESOURCE MANAGEMENT
Honolulu, Hawaii

CONTRACT SPECIFICATIONS AND PLANS

Job No. G55CO18B
Waimalu Deep Monitor Well
Aiea, Oahu, Hawaii

Approved: __________________________
ERNEST Y. W. LAAU
Deputy Director
Commission on Water Resource Management

Approved: __________________________
ERIC T. HIRANO, P.E.
Chief Engineer
Engineering Division

January 2004
CONTENTS

NOTICE TO BIDDERS ........................................................................................................ iii
INFORMATION AND INSTRUCTIONS TO BIDDERS ............................................... I-1
PROPOSAL ...................................................................................................................... P-1
SPECIAL PROVISIONS ................................................................................................... SP-1
DETAILED SPECIFICATIONS ....................................................................................... S-1
CONTRACTOR FORMS ................................................................................................... F-1
PLANS (Bound Separately)

DEPARTMENT OF LAND AND NATURAL RESOURCES
INTERIM GENERAL CONDITIONS, DATED OCTOBER 1994
(Included on project CD, or bound separately)
NOTICE TO BIDDERS
(Chapter 103D, HRS)

SEALED BIDS for Job No. G55CO18B, Waimalu Deep Monitor Well, Aiea, Oahu, Hawaii, will be received at the Engineering Division office, 2nd floor, Kalanimoku Building, Room 221, 1151 Punchbowl Street, Honolulu, up to 2:00 p.m., April 8, 2004 at which time and place they will be opened and read publicly. The bidder shall be responsible for the prompt delivery of the proposal.

The Department of Land and Natural Resources Interim General Conditions dated October 1994 shall be made a part of the specifications.

Plans and specifications may be examined and obtained at the aforesaid place.

The work shall generally consist of drilling an 8-inch cased well.

The estimated cost is $225,000.00.

Due to the nature of work contemplated, bidders must possess a valid State Contractor's license, classification C-57. All prospective bidders must submit a written intent to bid at least ten (10) calendar days prior to the date designated for the bid opening. If the tenth day is on a Saturday, Sunday or State Holiday, the notice of intent to bid is due on the last working day prior to the due date. Submittal of the intent to bid via facsimile is acceptable (fax number is [redacted]). It is the bidder's responsibility to ensure that the notice of intent to bid is submitted on time and in a legible condition. All bidders must attach a current Tax Clearance Certificate from the State Department of Taxation and Internal Revenue Service to their bid proposal.

The job is subject to preference for Hawaii Products established by Section 103D, Hawaii Revised Statutes. The Hawaii Product List may be examined at the State Procurement Office.

The award of the contract, if it be awarded, will be subject to the availability of funds.

Should there be any questions, please call (808) 587-0230.

PETER T. YOUNG, Chairperson
Department of Land and Natural Resources

PNS: March 8, 2004
# INFORMATION AND INSTRUCTIONS TO BIDDERS

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INFORMATION AND INSTRUCTIONS TO BIDDERS

A. SCOPE OF WORK: The work shall generally consist of drilling and installing a deep monitor well in Waimalu, Aiea, Hawaii. The upper portion of the well shall consist of a 14-inch drill hole and shall be cased with 8-inch casing to a depth of approximately 10 feet below the groundwater table. Groundwater is estimated at approximately 40 feet below ground surface (bgs). The cased portion of the well is estimated to extend to a depth of approximately 80 feet bgs. The uncased portion of the well shall be a 7.5-inch open hole and shall extend approximately 920 feet below the casing. Total well depth is estimated at 1000 feet bgs. The actual depth of well shall be determined in the field by the Engineer.

B. LOCATION OF PROJECT: The project is located in Waimalu, Aiea, Oahu, at the end of the paved section of Kilinoe Street, approximately 1.3 miles northeast of the mouth (East Loch of Pearl Harbor) of Waimalu Stream. Access to the project area is by a dirt road continuation of Kilinoe Street, approximately 0.9 miles west northeast of the intersection of Kilinoe and Kahele Streets. The Tax Map Key parcel location is 9-8-11:006.

C. SEALED PROPOSALS: All proposals for the work shall be enclosed in a sealed envelope showing the name of the bidder and marked, "Proposal for Job No. G55CO18B, Waimalu Deep Monitor Well, Aiea, Hawaii."

D. GENERAL CONDITIONS: The Department of Land and Natural Resources (DLNR) Interim General Conditions dated October 1994 shall be made a part of these contract specifications and is referred to hereafter as the General Conditions.

E. PROPOSAL FORM: The Bidders shall print a hard copy of the proposal form from the electronic file on the project bid package compact disk, unless a hard copy proposal form is included.

   Bidders shall submit the “Sealed Bid Form” including the completed proposal form, bid bond, required compliance certificates and/or letters, and any other documents required by the bidding documents as part of their bid in a seal envelope, as stipulated in Item C – Sealed Proposals.

F. OMISSIONS OR ERASURES: Any Proposal which contains any omission or erasure or alteration not properly initialed, or conditional bid, or other irregularity may be rejected by the Board.

G. NOTICE OF INTENTION TO BID AND QUESTIONNAIRE: A prospective bidder must file a written notice of his intention to bid in the office of the Chief Engineer at least ten (10) calendar days prior to the date designated for bid opening. If the tenth day is on a Saturday, Sunday or State Holiday, the notice of intent to bid is due on the last working day prior to the due date. Submittal of the intent to bid via facsimile is acceptable (fax number is [REDACTED]. If required by the Chief Engineer, the prospective bidder shall file a completed standard questionnaire form prepared in accordance with Section 103D-310, HRS 1993, as amended. This questionnaire form is available at the office of the Chief
Engineer. The completed form shall be received in the office of the Chief Engineer at least 48 hours prior to the opening of bids. Failure to complete and return the questionnaire as required above will invalidate the proposal.

It is the responsibility of the prospective bidder to ensure that the written notice of intention to bid is received in time and the State assumes no responsibility for failure of timely delivery caused by the prospective bidder or by any method of conveyance chosen by the prospective bidder.

H. BID SECURITY: A Bid Security will be furnished by each bidder as provided in sub-section 2.7 of the General Conditions. The successful bidder's Bid Security will be retained until Contract execution and he has furnished a performance and a payment bond in the amount equal to one hundred percent (100%) of the total contract price, including amounts estimated to be required for extra work.

The Board reserves the right to hold the Bid Securities of the two lowest bidders until the successful bidder has entered into a contract and has furnished the required performance bond. All Bid Securities will be returned after the bid opening and checking of the proposals in accordance with sub-section 3.5 of the General Conditions.

Should the successful bidder fail to enter into a contract and furnish a satisfactory performance bond within the time stated in his Proposal, the Bid Security shall be forfeited as required by law.

I. CONTRACTOR'S LICENSE REQUIRED: The Board will reject all bids received from contractors who have not been licensed by the State Contractors License Board in accordance with Chapter 444, HRS; Title 16, Chapter 77, Hawaii Administrative Rules; and statutes amendatory thereto.

J. IRREGULAR BIDS: No irregular bids or propositions for doing the work will be considered by the Board.

K. WITHDRAWAL OF BIDS: No bidder may withdraw his bid between the time of the opening thereof and the award of contract.

L. SUCCESSFUL BIDDER TO FILE PERFORMANCE AND PAYMENT BONDS: The successful bidder will be required to file performance and payment bonds each; in the amount equal to one hundred percent (100%) of the total contract price, including amounts estimated to be required for extra work, as provided in sub-section 3.6 of the General Conditions.

M. RIGHT-OF-ENTRY PERMIT FOR SUCCESSFUL BIDDER: The Engineering Division will obtain for the successful bidder the right-of-entry for entry into the proposed well construction site. The right-of-entry will be obtained from the administrator (Land Division) for the landowner (DLNR), whose land the proposed well site is located.
N. **NUMBER OF EXECUTED ORIGINAL COUNTERPARTS OF CONTRACT DOCUMENTS:** If requested by the Board, six copies of the contract proper, performance and payment bond shall be executed.

O. **CHANGE ORDERS:** No work of any kind in connection with this work covered by these plans and specifications shall be considered as change order work, or entitle the contractor to extra compensation, except when the work has been ordered in writing by the Engineer and in accordance with sub-section 4.2 of the General Conditions.

The contractor shall clearly identify and inform the Engineer in writing of any deviations from the contract documents at the time of submission and shall obtain the Engineer's written approval to the specified deviation prior to proceeding with any work.

P. **WAGES AND HOURS:** The attention of all bidders is called to sub-sections 7.3 to 7.9 of the General Conditions relative to hours of labor, minimum wages and overtime pay.

The latest minimum wage rates as promulgated by the Department of Labor and Industrial Relations shall be paid to the various classes of laborers and mechanics engaged in the performance of this contract on the job site. The minimum wages shall be periodically increased during the performance of the contract in an amount equal to the increase in the prevailing wages for those kinds of work as periodically determined by the Department of Labor and Industrial Relations.

The Department will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the said minimum wage rates. The possibility of wage increase is one of the elements to be considered by the Contractor in determining his bid, and will not, under any circumstances, be considered as the basis of a claim against the Department under this Contract.

No work shall be done on Saturdays, Sundays, legal State holidays, and/or in excess of eight (8) hours each day without the written consent of the Engineer. Should permission be granted to work at such times, the contractor shall pay for all inspectional administrative costs thereof. No work shall be done at night unless authorized by the Engineer.

Q. **PERMITS:** The State will process permit applications whenever possible, and the Contractor shall procure the pre-processed permits and pay the required fees. If permit applications are not processed by the State, the Contractor shall process the permit applications, permits and licenses, and pay all charges and fees. In all cases, the Contractor shall give all notices necessary and incident to the due and lawful prosecution of the work.

R. **PROPERTY DAMAGE:** It shall be the responsibility of the Contractor to respect State property and to preventing damage to existing improvements. The Contractor will be responsible for damages resulting from construction operations. Immediately upon discovery, the Contractor shall repair such damage to the satisfaction of the Engineer.

All trees and shrubbery outside the excavation, embankment or construction limits
shall be fully protected from injury.

S. TIME: The time of completion is specified in the Proposal. It is the intention of the Board to insist that the contractor diligently prosecute the work to completion within the time limit specified.

Prospective bidders are reminded that the State has the option to proceed with a project or abandon it, depending on whether or not the project can be definitely completed for occupancy by the specified completion time.

The bidder is responsible for checking the availability of all materials before bidding. Accordingly, it is absolutely necessary that the bidder selects sub-contractors and suppliers who can warrant the availability as well as the delivery of all SPECIFIED or QUALIFIED materials within sufficient time to complete the project within the specified time of completion.

The successful bidder must assume all risks for completing the project by the specified date. Absolutely no extension of time will be given FOR ANY REASON except for delays caused by Acts of God, labor disputes involving unions, or actions of the State. If for any reason the contractor falls behind schedule, he shall at his own cost take necessary remedial measures to get the project back on schedule, i.e., working overtime, air freighting all materials, etc. In addition, if he fails to fully complete the project by the completion date, he will be required to make the facility usable at his own cost.

T. BIDDER'S RESPONSIBILITY TO PROVIDE PROPER SUPERINTENDENCE:
The successful low bidder shall designate in writing to the Engineer the name of their authorized superintendent, who will be present at the job site whenever any work is in progress. The authorized superintendent shall be responsible for all work, receiving and implementing instructions from the Engineer in a timely manner. The cost for superintendence shall be considered incidental to the project.

If the Superintendent is not present at the site of work, the Engineer shall have the right to suspend the work as described under sub-section 5.5 e. and 7.20 - Suspension of Work of the General Conditions.

U. LIQUIDATED DAMAGES: The liquidated damages in the amount specified in the Proposal will be assessed for each and every calendar day from and after the expiration of the time period stated in the Contract for the completion of the project.

V. HIRING OF LOCAL LABOR: The Contractor shall hire local labor whenever practicable.

W. WATER AND ELECTRICITY: The Contractor shall make all necessary arrangements for and pay all expenses for water and electricity used in the construction of this project.
X. PUBLIC CONVENIENCE AND SAFETY: The Contractor shall conduct his construction operations with due regard to the convenience and safety of the public at all times. No materials or equipment shall be stored where it will interfere with the safe passage of public and agricultural traffic. The contractor shall provide, install, and maintain in satisfactory condition, all necessary signs, flares and other protective facilities and shall take all necessary precautions for the protection of the work and the convenience and safety of the public. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the General Conditions.

Y. WORK TO BE DONE WITHOUT DIRECT PAYMENT: Whenever it is specified in the Contract that the Contractor is to do work or furnish materials of any kind for which no price is fixed in the contract, it shall be understood that he is to do such work or furnish such materials without extra charge or allowance or direct payment of any sort, and that the cost of doing such work or furnishing such material is to be included by him in a unit price for the appropriate item unless it is expressly specified that such work or material is to be paid for as extra work.

Z. AS-BUILT DRAWINGS: As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required. All authorizations given by the Engineer to deviate from the plans shall be drawn onto the job site plans. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded on the as-built drawings.

AA. ASBESTOS CONTAINING MATERIALS: The use of asbestos containing materials or equipment is prohibited under this contract. The Contractor shall ensure that all materials and equipment incorporated in the project are asbestos-free.

BB. WORKER SAFETY: The Contractor shall provide, install and maintain in satisfactory condition all necessary protective facilities and shall take all necessary precautions for the protection of and safety of the workers in accordance with the Occupational Safety and Health Standards for the State of Hawaii. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the General Conditions.

CC. TAX CLEARANCES: The Contractor shall attach a certified copy tax clearance certificate from both the State Tax Office (DOTAX) and the Internal Revenue Service (IRS) with the bid proposal submitted on the bid opening date. The tax clearance shall be dated no more than one hundred eighty (180) days prior to the solicitation legal ad date indicated in the Notice to Contractors.

If you have submitted Form A-6 requesting a tax clearance but have not received the tax clearance you may submit SPO Form TEMP B (7/1/96) - DLNR REV. (6/12/97) with your bid proposal packet. If you are the lowest responsible bidder selected by the Board of Land and Natural Resources you will be required to submit the original or certified copy tax clearance prior to the award of the contract. Failure to submit the required tax clearances in a timely manner may invalidate your bid proposal.
If you are unable to obtain a tax clearance, you may submit a special letter from the DOTAX, the IRS, or both, in lieu of the tax clearance certificate. The special letter(s) are valid for 45 days.

DD. **TOILET FACILITIES:** All toilet facilities constructed at the project site shall be in accordance with the Public Health Regulations of the State Department of Health (DOH). All necessary precautions shall be observed at the project site. The use of sanitary facilities shall be strictly enforced and workers violating these provisions shall be promptly discharged.

EE. **SIGNS:** Whenever the project involves closing or obstructing any public thoroughfare, the Contractor shall provide traffic signs conforming to the applicable provisions of the current edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", published by the Federal Highway Administration as directed by the Engineer for the purpose of diverting or warning traffic prior to reaching the construction area. All traffic signs shall bear proper wording stating thereon the necessary information as to diverting or warning traffic.

The Contractor shall also provide a project sign, size 4'-0" x 7'-0" to be placed as directed by the Engineer. The sign shall be constructed in accordance with Section 01581 - Project Sign of these specifications and approved by the Engineer. All wording, type and size of lettering and color selection shall be as specified in these specifications or as approved by the Engineer.

All signs shall be kept neat and clean, and properly erected at all times.

FF. **FIELD OFFICE AREA FOR DEPARTMENT:** The Contractor shall provide a housed working area of at least 100 square feet adjacent to the Contractor's office for the Department's use. This area will be used by the Engineer to perform tests and to store equipment. As a minimum, the field office shall include the following: standard sized office desk and chair, lighting, ventilation, window-type air conditioning rated at 5,000 BTU, door and window with locking hardware, electrical outlets, and working communications facilities (a cellular telephone is acceptable). The Department will pay for all long distance toll charges made by the Engineer.

GG. **QUANTITIES:** All bids will be compared on the basis of quantities of work to be done as shown in the Proposal; the quantities shown in the Unit Price items are estimated, being given as a basis for comparison of bids. The Board reserves the right to increase or decrease the quantities given under the items or delete items entirely as may be required during the progress of the work.

HH. **OTHER HEALTH MEASURES:** Forms of work site exposure or conditions which may be detrimental to the health or welfare of workers or of the general public shall be eliminated or reduced to safe levels as required by the DOH codes, standards, and regulations. Suitable first aid kits and a person qualified to render first aid, as specified in
the DOH regulations, shall be provided at all times when work is scheduled.

II. HAWAII BUSINESS OR COMPLIANT NON-HAWAII BUSINESS REQUIREMENT:
Bidders (Contractors) shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR.

JJ. COMPLIANCE WITH §3-122-112 HAR:
As a condition for award of the contract and as proof of compliance with the requirements of 103D-310(c) HRS, the apparent low bidder shall furnish the required documents to the Department within ten (10) calendar days from the bid opening date. If a valid certificate is not submitted on a timely basis for award of a contract, a bidder otherwise responsive and responsible may not receive the award. Bidder is responsible to apply for and submit the documents by the required deadlines.

A. Department of Labor (DLIR) “Certificate Of Compliance”. (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers’ Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date if issue; certificates must be valid on the date received by the Department.

B. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) “Certificate Of Good Standing”. Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.
PROPOSAL

For

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
State of Hawaii

Job No. G55C018B
Waimalu Deep Monitor Well
Aiea, Oahu, Hawaii

_______, 2004

Chief Engineer
Engineering Division
Department of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Dear Sir:

The undersigned, having carefully examined the local conditions and all available records and information covering conditions which may affect the cost of the work to be performed, and having carefully examined the Plans and Specifications, and other contract documents, hereby proposes to furnish and pay for all materials, tools, equipment, labor and other incidental work necessary to construct and install in place complete a deep monitor well and all appurtenances as required or called for in this Proposal, all according to the true intent and meaning of the Notice to Bidders, Information and Instructions to Bidders, Proposal, Detailed Specifications, Special Provisions, Interim General Conditions, Plans, and any and all addenda for:

Job No. G55C018B
Waimalu Deep Monitor Well
Aiea, Oahu, Hawaii

on file in the office of the Engineering Division for the TOTAL SUM BID (Items 1 to 16) of:

____________________________________________________________ DOLLARS ($__________)

and will fully complete all work under this contract within 180 consecutive calendar days from the date of written notice to proceed, including date of said order, said total sum being itemized on the following pages.
## PROPOSAL

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Quantity</th>
<th>Unit</th>
<th>Description</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>L.S.</td>
<td>Mobilization</td>
<td></td>
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<tr>
<td>2</td>
<td>1</td>
<td>L.S.</td>
<td>Demobilization</td>
<td></td>
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<tr>
<td>3</td>
<td>80</td>
<td>L.F.</td>
<td>Drilling 14-inch diameter hole from the ground surface to the bottom of the cased section of well</td>
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<tr>
<td>4</td>
<td>920</td>
<td>L.F.</td>
<td>Drilling 7.5-inch diameter open hole below cased section of well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>80</td>
<td>L.F.</td>
<td>Furnishing and installing 8-inch I.D., 5/16-inch wall thickness, steel well casing</td>
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<tr>
<td>6</td>
<td>1</td>
<td>L.S.</td>
<td>Furnishing, installing, and painting above-ground 8-inch I.D., 5/16-inch wall thickness, steel casing with lockable steel plate cap, in place complete</td>
<td></td>
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<tr>
<td>7</td>
<td>1</td>
<td>L.S.</td>
<td>Furnishing, installing, and painting 18-inch I.D., 5/16-inch wall thickness, steel casing junction box with lockable steel plate cap, access pipe, welded eye strap, including concrete plug, in place complete</td>
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<tr>
<td>8</td>
<td>80</td>
<td>L.F.</td>
<td>Cement-grouting the annular space, including grout seal</td>
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<tr>
<td>9</td>
<td>1</td>
<td>L.S.</td>
<td>6’x8’x4” reinforced concrete slab</td>
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<tr>
<td>10</td>
<td>62</td>
<td>L.F.</td>
<td>6-foot high chain link fence with 3 strands barbed wire, in place complete</td>
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<tr>
<td>11</td>
<td>1</td>
<td>Each</td>
<td>2’ - 6” wide walk gate</td>
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<td>12</td>
<td>1</td>
<td>L.S.</td>
<td>Project Sign, in place complete</td>
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<tr>
<td>13</td>
<td>1</td>
<td>Allowance Field Office</td>
<td></td>
<td>$5,000.00</td>
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<tr>
<td>14</td>
<td>1</td>
<td>L.S.</td>
<td>Clearing and Grubbing</td>
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<tr>
<td>15</td>
<td>1</td>
<td>L.S.</td>
<td>Tree Trimming</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>1</td>
<td>L.S.</td>
<td>Grading</td>
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<td></td>
<td><strong>Total Sum Bid (Items 1 to 16, inclusive)</strong></td>
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<td>$54,000.00</td>
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</table>
HAWAII PRODUCTS PREFERENCE AND/OR USE OF HAWAII PRODUCTS

It is understood that certain Hawaii products as described in the schedule below are acceptable to be used in this work and that, pursuant to Sections 103D-1002, Hawaii Revised Statutes, which provides preference for Hawaii Products, the bidder proposing to use such Hawaii products must fill in the schedule below.

However, where there are a number of qualifying classes of Hawaii products of a given description, the bidder must indicate on the schedule which class will be furnished by circling the class of the particular Hawaii product that will be used. Otherwise, preference will be given based on the class with the lower percentage.

If the bidder proposes to use Hawaii products, the bidder must so designate in said schedule by entering the cost of such product in the appropriate space provided. Failure on the part of the bidder to designate the use of a Hawaii product will void any preference for that product.

<table>
<thead>
<tr>
<th>ACCEPTABLE HAWAII PRODUCTS</th>
<th>HAWAII PRODUCTS TO BE USED</th>
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<tbody>
<tr>
<td>Description</td>
<td>Class</td>
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The bidder agrees that preference for Hawaii products shall be taken into consideration to determine the low bidder in accordance to said Sections and rules promulgated; however, the award of contract will be in the amount of the bid offered exclusive of any preferences.

The bidder will be given the Hawaii Products Preference for bid evaluation purposes provided that the bidder has completed the required information in the Schedule of Acceptable Hawaii Products and Designation of Hawaii Products to be used. Failure to designate use of a Hawaii Product and fails to provide the product, the contract will become void and no payments will be made.

RECYCLED PRODUCTS PREFERENCE

This project allows a 10% price preference for recycled products in accordance with HRS 103D-1005. Bidders are required to complete this section. Failure to complete this section may be sufficient cause for rejection of the bid.
Only the following products are being considered for the recycled product preference. Please indicate your selection of recycled or nonrecycled product by indicating its cost FOB jobsite unloaded in the schedule below, including applicable General Excise & Use Taxes.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>RECYCLED PRODUCT COST</th>
<th>NONRECYCLED PRODUCT COST</th>
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<tbody>
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</table>

The bidder requesting a recycled product preference by his selection above, shall also complete and submit the form "CERTIFICATION OF RECYCLED CONTENT" as shown in the Interim General Conditions and provide all supporting information with this proposal. Additional information may be requested to qualify a product.

The following definitions are applicable to the CERTIFICATION OF RECYCLED CONTENT form:

"Post-consumer recovered material" means any product used by a consumer, including a business that purchases the material, that has served its intended end use, and that has been separated or diverted from the solid waste stream for the purpose of use, reuse, or recycling.

"Product" includes materials, manufactures, supplies, merchandise, goods, wares, and foodstuffs.

"Recovered material" means waste material and by-products that have been separated, diverted, or removed from the solid waste stream after a manufacturing process for the purpose of use, reuse, or recycling. Recovered material does not include those materials and by-products that are generated and normally reused on-site or within original manufacturing processes (such as mill broke, in the case of paper products).

"Recycled content" means the percentage of a product composed of recovered material, or post-consumer recovered material, or both.

"Recycled product" means a product containing recovered material, or post-consumer recovered material, or both.

The bidder agrees that preference for recycled products shall be taken into consideration to determine the low bidder in accordance with said Section and the rules promulgated, however, the award of contract will be in the amount of the bid offered exclusive any preference.
CONDITION OF AWARD

It is understood that the award of the contract will be made on the basis of the lowest responsible Total Bid (Items 1 to 16) selected by the Board of Land and Natural Resources.

It is understood and agreed that the Board of Land and Natural Resources reserves the right to reject any and/or all bids and waive any defects when, in the Board's opinion, such rejection or waiver will be for the best interest of the State of Hawaii.

In the event all bids exceed available funds certified by the appropriate fiscal officer, the head of the purchasing agency responsible for the procurement in question is authorized in situations where time or economic considerations preclude resolicitation of work of a reduced scope to negotiate an adjustment of the bid price, including changes in the bid requirements, with the low responsible and responsive bidder, in order to bring the bid within the amount of available funds. It is understood and agreed upon that the head of the purchasing agency may delete a portion or all of any item(s) in the proposal at the stated unit or lump sum price as necessary to stay within the available funding. The bidder is responsible to make an earnest effort to represent the actual cost of each item, including all materials, labor, equipment, overhead and profit in their bid proposal to preclude claims of anticipated profit or loss of profit because of an unbalanced bid proposal.

It is also understood that if a mutually agreeable cost for the reduced scope of work necessitated by a lack of available funds cannot be agreed upon between the bidder and the head of the purchasing agency within 14 calendar days after the bid opening, then the bid may be rejected in the best interest of the purchasing agency, and the head of the purchasing agency may negotiate in progressive order (lowest to highest) with the next lowest responsible and responsive bidder.

It is also understood and agreed that the award of the contract shall be conditioned upon funds being made available for this project and further upon the right of the Board of Land and Natural Resources to hold all bids received for a period of sixty (60) days from the date of the opening thereof, unless otherwise required by law, during which time no bid may be withdrawn.

It is also understood that Notice to Proceed may be delayed up to one (1) year after the bid opening date, and that no additional compensation will be provided for any claim for escalation or delay for issuance of Notice to Proceed on or before that date.

It is also understood and agreed that the quantities given herewith are approximate only and are subject to increase or decrease, and that the undersigned will perform all quantities of work as either increased or decreased, in accordance with the provisions of the Contract Specifications.

It is also understood and agreed that the estimated quantities shown for the items for which a UNIT PRICE is asked in this Proposal are only for the purpose of comparing on a uniform basis, bids offered for the work under this contract, and the undersigned agrees that he is satisfied with and will at no time, dispute said estimated quantities as a means of claims for anticipated profit or loss of profit, because of a difference between the quantities of the various classes of work done or the materials and equipment installed, and the said estimated quantities. On UNIT PRICE bids, payment will be made only for the actual number of units incorporated into the finished project at the contract UNIT PRICE.

It is also understood and agreed that if the product of the UNIT PRICE bid and the number of units in the proposal does not equal the total amount stated by the undersigned in the Proposal for any item, the
bid will be revised to indicate the correct total amount. The bid will be evaluated based on the total
sum of these corrected totals. It is the Bidders responsibility to check their bids prior to the
submission of their bids.

It is also understood and agreed that should the total amount stated be adopted or if the bidder fails to
state a unit price, the UNIT PRICE shall be the amount arrived at by dividing the total amount by the
number of units.

It is also understood and agreed that liquidated damages in the amount of __One Hundred Fifty and
No/100 ($150)___ for each and every calendar day in excess thereof prior to completion of the contract
shall be withheld from payments due to the Contractor.

It is also understood and agreed that if this bid is accepted, the successful bidder must enter into and
execute a contract with the Board of Land and Natural Resources and furnish a Performance and
Payment Bond, as required by law. These bonds shall conform to provisions of Section 103D-324 and
325, Hawaii Revised Statutes and any law applicable hereto.

It is also understood and agreed that the successful bidder will provide all necessary labor, materials,
tools, equipment, and other incidentals necessary to do all the work and furnish all the materials
specified in the contract in the manner and time herein prescribed, and according to the requirements
of the Engineer as therein set forth.

It is understood that by submitting this proposal, the undersigned is declaring that his firm has not been
assisted or represented on this matter by an individual who has, in a State capacity, been involved in
the subject matter of this contract in the past two years.

It is understood that by submitting this proposal in accordance with HAR 3-122-192, the undersigned
is declaring that the price submitted is independently arrived without collusion.

It is also understood that by submitting this proposal, a Certification for Safety and Health Programs
for bids in excess of $100,000 (in accordance with HRS 396-18), the undersigned certifies that his
organization will have a written safety and health plan for this project that will be available and
implemented by the Notice to Proceed date of this project. Details of the requirements of this plan
may be obtained from the Department of Labor and Industrial Relations, Occupational, Safety and
Health Division (HIOSH).

It is further understood and agreed that the successful bidder shall comply with paragraph 3.1.a
"SUBCONTRACTING" of the General Provisions which requires that the contractor shall perform
with his own organization and with the assistance of workmen under his immediate superintendence,
work of a value not less than twenty percent (20%) of the value of all work embraced in the Contract,
except that certain contract items of work, if specifically referred to in the special provisions, will be
exempted from said twenty percent requirement.

Compliance with §103-310 HRS. As a condition of award all bidders shall comply with all
laws governing entities doing business in the State, including Chapter 237 HRS (general
excise tax); Chapter 383 HRS (employment security – unemployment insurance); Chapter
386 HRS (workers compensation); Chapter 392 HRS (temporary disability insurance); and
Chapter 393 HRS (pre-paid health care), and shall produce all documents to the State
(DLNR, Engineering Division) required to demonstrate compliance with these subsection.
Any bidder making a false affirmation or certification under this subsection shall be suspended and may be debarred from further offerings or awards pursuant to §103D-702 HRS.

RECEIPT OF ADDENDA

The bidder also acknowledges receipt of any and all addenda issued by the Engineering Division, by recording the date of receipt of the respective addenda in the space provided below:

<table>
<thead>
<tr>
<th>Addendum</th>
<th>Date Received</th>
<th>Addendum</th>
<th>Date Received</th>
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<tbody>
<tr>
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<td>No. 5</td>
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<td>No. 2</td>
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<td>No. 3</td>
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<td>No. 4</td>
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It is understood that failure to receive any such addendum shall not relieve the Contractor from any obligation under this Proposal as submitted.

It is also understood and agreed that if this Proposal is accepted and the undersigned should fail or neglect to contract as aforesaid, the Board may determine that the bidder has abandoned the Contract, and thereupon, forfeiture of the security accompanying his proposal shall operate and the same shall become the property of the Board.
The Bidder agrees that the following is a complete listing of all joint contractors or subcontractors covered under Chapter 444, Hawaii Revised Statutes (HRS), who will be engaged by the Bidder on this project to perform the required work indicated pursuant to Section 103D-302, HRS. The Bidder certifies that it and its listed subcontractors or joint contractors together hold all licenses necessary to complete the Work, and understands that failure to comply with this requirement may be just cause for rejection of the bid.

"A" General Engineering Contractors and "B" General Building Contractors are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd v. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the general contractor to act as a specialty contractor in any area in which the general contractor has no license. Although the "A" and "B" contractor may still bid on and act as the "prime" contractor on an "A" or "B" project (See, HRS § 444-7 for the definitions of an "A" and "B" project.), respectively, the "A" and "B" contractor may only perform work in the areas in which they have the appropriate contractor's license (An "A" or "B" contractor obtains "C" specialty contractor's licenses either on its own, or automatically under HAR § 16-77-32). The remaining work must be performed by appropriately licensed entities. It is the sole responsibility of the contractor to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project.

The Bidder shall include the complete firm name, license number and nature and classification description of each Joint Contractor or Subcontractor listed below. For projects with Alternate(s), Bidders shall fill out the supplemental schedule and list the Joint Contractor or Subcontractor who will be engaged for the respective Alternate Work. Do not include any Joint Contractor or Subcontractor previously listed.

Bidders shall list only one Joint Contractor or Subcontractor per required specialty contractor's license.

<table>
<thead>
<tr>
<th>Class</th>
<th>Classification Description</th>
<th>License No.</th>
<th>Complete Firm Name Joint Contractor or Subcontractor</th>
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</table>
Enclosed with this BID FORM:

(BIDDER'S INSTRUCTIONS: Cross out those items that are not applicable. State in words and numerals the Bid Bond dollar amount.)

<table>
<thead>
<tr>
<th>Surety Bond (*1)</th>
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<tr>
<td>Cashier's Check (*3)</td>
<td>Certificate of Deposit (*3)</td>
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<tr>
<td>Certified Check (*3)</td>
<td>Official Check (*3)</td>
</tr>
<tr>
<td>Share Certificate (*3)</td>
<td>Teller's Check (*3)</td>
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<tr>
<td>Treasurer's Check (*3)</td>
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</tbody>
</table>

In the amount of:


Dollars ($______________) as required by law.

COMPLIANCE WITH (§3-122-112 HAR)

The undersigned represents: (BIDDER'S INSTRUCTIONS: check √ one only)

☐ A Hawaii Business incorporated or organized under the laws of the State of Hawaii, or

☐ A Compliant Non-Hawaii Business not incorporated or organized under the laws of the State of Hawaii, but registered at the State of Hawaii, Department of Commerce and Consumer Affairs, Business Registration Division to do business in the State of Hawaii.

BIDDER IS:

☐ Sole Proprietor  ☐ Partnership  ☐ Corporation  ☐ Joint Venture  ☐ Other ______________________________

OFFERED AND AGREED TO BY THE BIDDER:

<table>
<thead>
<tr>
<th>Legal Name of Company, Joint Venture or Partnership (*5)</th>
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<tbody>
<tr>
<td>By</td>
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<tr>
<td>Date</td>
</tr>
<tr>
<td>Authorized Signature (*4)</td>
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<tr>
<td>Print Name</td>
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<tr>
<td>Title</td>
</tr>
<tr>
<td>Payment Address</td>
</tr>
<tr>
<td>City, State, Zip Code</td>
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<tr>
<td>Business Address (*6)</td>
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</tbody>
</table>

(Corporate Seal)

<table>
<thead>
<tr>
<th>City, State, Zip Code</th>
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</thead>
<tbody>
<tr>
<td>Telephone Number</td>
</tr>
<tr>
<td>Facsimile Number</td>
</tr>
<tr>
<td>General Excise Tax I.D. No.</td>
</tr>
<tr>
<td>Federal Tax I.D. No. (*7)</td>
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</table>

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BIDDERS INSTRUCTIONS - NOTES FOR COMPLETING SIGNATORY PAGE

1. Surety bond underwritten by a company licensed to issue bonds in this State;
2. Legal tender; or
3. A certificate of deposit; share certificate; or cashier's, treasurer's, teller's, or official check
drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a
savings institution, or credit union insured by the Federal Deposit Insurance Corporation or
the National Credit Union Administration.
   A. These instruments may be utilized only to a maximum of $100,000.
   B. If the required security or bond amount totals over $100,000, more than one instrument
      not exceeding $100,000 each and issued by different financial institutions shall be
      accepted.
4. MANUAL SIGNATURE REQUIRED: attach to this page evidence of the authority of this
   officer to submit bids on behalf of the Company, and also the names and residence addresses
   of all officers of the company.
5. If Bidder is a “dba” or a “division” of a corporation, furnish the exact legal name of the
   corporation under which the awarded contract will be executed.
6. Hawaii Street Address.

FILL IN INFORMATION IN ALL BLANK SPACES OR THE BID MAY BE INVALIDATED.
BID FORM MUST BE INTACT; MISSING PAGES OR ANY ALTERATIONS MAY
INVALIDATE THE BID. TYPE OR WRITE ALL INFORMATION IN INK. USE INK FOR
MANUAL SIGNATURE.

End of Proposal
SPECIAL PROVISIONS

Amend INTERIM GENERAL CONDITIONS, dated October 1994, as follows:

Section 2 – Proposal Requirements and Conditions

1. AMEND 2.1 Qualification of Bidders by revising the 10th paragraph to read as follows: “The required tax certificate or certified letter must be filed along with the bidder’s Bid Proposal.”

2. ADD Section 2.4a, Pre-Bid Conferences
   Required Pre-bid Conferences: For construction and design-build projects with an estimated value of $500,000 or more and solicited under the competitive sealed bid method (103D-302 HRS); and for construction and design-build projects with an estimated value of $100,000 or more and solicited under the competitive sealed proposal method (103D-303 HRS); a pre-bid conference is required.

   Other Pre-Bid Conferences: The Department may require a pre-bid conference for construction or design-build projects that are below the dollar threshold listed in above or when projects have special or unusual requirements.

   Other Conditions: The Department may require the prospective Bidders to make a physical inspection of the project site and make attendance at the pre-bid conference a condition for submitting an offer.

   Nothing stated at the pre-bid conference shall change the solicitation unless a change is made by written addendum.

3. DELETE Section 2.5, Addenda and Interpretations, in its entirety and replace with the following:

   “Discrepancies, omissions, or doubts as to the meaning of drawings and specifications should be communicated in writing to CHIEF ENGINEER, ENGINEERING DIVISION, P.O. BOX 373, HONOLULU, HAWAII, 96809 for interpretation and must be received by the Engineering Division no later than fourteen (14) calendar days prior to the date fixed for bid opening. Any interpretation, if made, and any supplemental instructions will be in the form of written addenda to the plans and specifications available no later than eight (8) calendar days prior to the date fixed for the opening of bids. It shall be prospective bidders sole responsibility to verify and obtain any said addenda from the office of the Engineering Division. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.”

Section 5 – Control of Work

AMEND 5.8 Value Engineering Incentive by deleting “$100,000” and replacing with “$250,000” in the first paragraph.

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Section 6 – Substitution of Materials and Equipment

ADD the following to Section 6.3 Sub-paragraph b:

4. If the substitution meets all the requirements of the specifications and plans.

Section 7 – Prosecution and Progress

1. DELETE Section 7.2d in its entirety and replace with the following:

“d. Insurance Requirements

1. Obligation of Contractor

The Contractor shall not commence any work until it obtains, at its own expense, all require insurance. Such insurance must have the approval of the Department as to limit, form and amount and must be maintained with a company authorized by law to issue such insurance in the State of Hawaii.

All insurance described herein will be maintained by the Contractor for the full period of the contract and in no event will be terminated or otherwise allowed to lapse prior to written certification of final acceptance of the work by the Department.

Certificate(s) of Insurance acceptable to the Department shall be filed with the Engineer prior to commencement of the work. These certificates shall contain a provision that coverages afforded under the policies will not be canceled or changed until at least thirty days written notice has been given to the Engineer by registered mail. The insurance policies shall name the State of Hawaii, its officer's and employee's as an additional insured and such coverage shall be noted on the Certificate. Should any policy be canceled before final acceptance of the work by the Department, and the Contractor fails to immediately procure replacement insurance as specified, the Department, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

Nothing contained in these insurance requirements is to be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from its operations under this contract, including the Contractor's obligation to pay liquidated damages, nor shall it affect the Contractor's separate and independent duty to defend, indemnify and hold the Department harmless pursuant to other provisions of this contract. In no instance will the Department's exercise of an option to occupy and use completed portions of the work relieve the Contractor of its obligation to maintain the required insurance until the date of final acceptance of the work.
All insurance described herein shall cover the insured for all work to be performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside the work area and all change order work.

The Contractor shall, from time to time, furnish the Engineer, when requested, satisfactory proof of coverage of each type of insurance required or a copy of the actual policies covering the work. Failure to comply with the Engineer’s request may result in suspension of the work, and shall be sufficient grounds to withhold future payments due the Contractor and to terminate the contract for Contractor’s default.

2. Types of Insurance

The Contractor shall purchase and maintain insurance described below which shall provide coverage against claims arising out of the Contractor’s operations under the contract, whether such operations be by the Contractor itself or by the subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

(a) Worker’s Compensation. The Contractor and all subcontractors shall obtain full worker’s compensation insurance coverage for all persons whom they employ or may employ in carrying out the work under this contract. This insurance shall be in strict conformity with the requirements of the most current and applicable State of Hawaii Worker’s Compensation Insurance laws in effect on the date of the execution of this contract and as modified during the duration of the contract.

(b) Commercial General Liability Insurance and Automobile Insurance. Contractor’s commercial general liability insurance and automobile liability insurance shall both be obtained in a combined, single limit of not less than $1,000,000 per occurrence that shall include coverage for bodily injury, sickness, disease or death of any person, arising directly or indirectly out of, or in connection with, the performance of work under this contract.

The Contractor’s property damage liability insurance shall provide for a single combined limit of not less than $1,000,000 for all damages arising out of injury to or destruction of property of others including the Department’s, arising directly or indirectly out of or in connection with the performance of the work under this contract including explosion or collapse.

The Contractor shall either:

i. Require each of its subcontractors to procure and to maintain during the life of its subcontract, subcontractor’s comprehensive general liability, automobile liability and property damage liability insurance of the type and in the same amounts specified herein; or
ii. Insure the activities of its subcontractors in its own policy.

The Contractor will be permitted, in cooperation with its insurers, to maintain a self insured retention for up to 25% of the per occurrence combined single limits of the commercial general liability and the automobile liability policies. The existence of the self insured retention must be noted on the certificate of insurance coverage submitted to the Department or else it will be understood that the insurer is providing first dollar coverage for all claims. For all claims within the self-insured retention amount, the rights, duties and obligations between the Contractor and the Department shall be identical to that between a liability insurer and the Department, as an additional insured, as if there was no self-insured retention.

(c) Builder’s Risk Insurance

Unless excluded by the Special Provisions of this contract, the Contractor shall provide builder’s risk insurance during the progress of the work and until final acceptance by the Department upon completion of the contract. It shall be “All Risk” (including but not limited to earthquake, windstorm and flood damage) completed value insurance coverage on all completed work and work in progress to the full replacement value thereof. Such insurance shall include the Department as an additional named insured. The Contractor shall submit to the Engineer for its approval all items deemed to be uninsurable. The policy may provide for a deductible in an amount of up to 25% of the amount insured by the policy. With respect to all losses up to any deductible amount, the relationship between the Contractor and the Department shall be that of insurer and additional insured as if no deductible existed.

2. DELETE Section 7.16 in its entirety and replace with the following:

"RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY - The Contractor shall indemnify the State and the Department against all loss of or damage to the State’s or the Department’s existing property and facilities arising out of any act or omission committed in the performance of the work by the Contractor, any subcontractor or their employees and agents. Contractor shall defend, hold harmless and indemnify the Department and the State, their employees, officers and agents against all losses, claims, suits, liability and expense, including but not limited to attorneys’ fees, arising out of injury to or death of persons (including employees of the State and the Department, the Contractor or any subcontractor) or damage to property resulting from or in connection with performance of the work and not caused solely by the negligence of the State or the Department, their agents, officers and employees. The State or the Department may participate in the defense of any claim or suit without relieving the Contractor of any obligation hereunder. The purchase of liability insurance shall not relieve the Contractor of the obligations described herein.

SP-4
The Contractor agrees that it will not attempt to hold the State and its Departments and Agencies and their officers, representatives, employees or agents, liable or responsible for any losses or damages to third parties from the action of the elements, the nature of the work to be done under these specifications or from any unforeseen obstructions, acts of God, vandalism, fires or encumbrances which may be encountered in the prosecution of the work.

The Contractor shall pay all just claims for materials, supplies, tools, labor and other just claims against the Contractor or any subcontractor in connection with this contract and the surety bond will not be released by final acceptance and payment by the Department unless all such claims are paid or released. The Department may, but is not obligated to, withhold or retain as much of the monies due or to become due the Contractor under this contract considered necessary by the Engineer to cover such just claims until satisfactory proof of payment or the establishment of a payment plan is presented.

The Contractor shall defend, indemnify and hold harmless the State and its Departments and Agencies and their officers, representatives, employees or agents from all suits, actions or claims of any character brought on account of any claims or amounts arising or recovered under the Worker's Compensation Laws or any other law, by-law, ordinance, order or decree.

Section 8 – Measurement and Payment

1. DELETE Section 8.7a in its entirety and replace with the following:

   a. Tax Clearances from the Department of Taxation and Internal Revenue Service to the affect that all delinquent taxes levied or accrued under State Statutes against the contractor have been paid.
      1. Tax Clearance Certificates from the director of taxation and the Internal Revenue Service, subject to section 103D-328, HRS, current within two months of issuance date;
      2. Clearance Certificate (Income Assessment and Audit Division)

2. ADD Section 8.7d, Certificate of Compliance:

   d. A Certification from the Contractor affirming that the Contractor has, as applicable, remained in compliance with all laws as required by Section 103D-310, HRS, and Section 3-122-112, HAR. A contractor making a false affirmation shall be suspended and may be debarred pursuant to section 103D-702, HRS.
## DETAILED SPECIFICATIONS
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SECTION 01019
GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

Work shall consist of furnishing all labor, tools, materials and equipment necessary and required to construct in place complete all work as indicated on the drawings and as specified herein.

1.2 GENERAL

A. Construction Lines, Levels and Grades: The Contractor shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer, and any change shall be made in accordance with his instruction. The Contractor shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.

B. Examination of Premises: The Contractor shall contact the Engineer and obtain permission before visiting the site.

C. Notices: The Contractor shall call the Engineer (as indicated in the DETAILED SPECIFICATIONS) and give at least three (3) working days notice before starting any work.

D. Conditions at Site: Every person bidding on this project is expected to visit the site and examine the conditions and satisfy himself as to the character and amount of the work to be performed as indicated on the drawings and called for by the specifications. No additional allowance will be granted because of the lack of knowledge of such conditions.

E. Disruption of Utility Services: All work related to the temporary disconnection of electrical system shall be pre-arranged with the Engineer (as indicated in the DETAILED SPECIFICATIONS) so that any disruption of such services will be kept to a minimum. In the event temporary power hook-up is required, the Contractor shall provide the necessary services.

F. Contractor's Operations: The Contractor must employ, insofar as possible, such methods and means of carrying out his work so as not to cause any interruption or interference to the facility's operations. Where the Contractor's operations would result in interruptions which would hamper the operations of the facilities, the
Contractor shall rearrange his schedule of work accordingly.

G. Protection of Property: The Contractor shall continually maintain adequate protection of all his work from damage and shall protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. The Contractor shall repair, replace or pay the expense of repair of damages resulting from his operations.

H. Safety

1. The Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, as amended, is applicable and made a part of the Contract.

2. The Contractor shall carefully read and strictly comply with its requirements.

I. Clean Up Premises: The Contractor shall clean up and remove from premises all debris accumulated from operations from time to time and as directed. See also Section 7.25 of the GENERAL CONDITIONS.

J. Responsibility

1. The State of Hawaii will hold the Contractor liable for all the acts of Subcontractors and shall deal only with him (the prime Contractor) in matters pertaining to other trades employed on the job. The Contractor shall be responsible for coordinating the work of all trades on the job.

2. Should he discover any discrepancy in the plans or specifications, the Contractor shall immediately notify the Engineer before proceeding any further with the work, otherwise, he will be held responsible for any cost involved in correction of work placed due to such discrepancy.

K. Cooperation With Other Contractors: The State reserves the right at any time to contract for or otherwise perform other or additional work within the contract zone limits of this Contract. The Contractor of this project shall to the extent ordered by the State, conduct his work so as not to interfere with or hinder the progress or completion of the work performed by other contractors.

L. Division of the Work: The Divisions and Sections into which these Specifications are divided shall not be considered an accurate or complete segregation of work by trades. This also applies to all work specified within each Section.

M. Drawings and Specifications

1. The Contractor shall not make alterations in the drawings and specifications. In the event he discovers any errors or discrepancies, the Contractor shall immediately notify the Engineer in accordance with the GENERAL CONDITIONS.

General Specifications
01019-2
2. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.

3. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the Contractor shall", "as shown on the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

N. Required Submittals

1. Required submittals as specified in the Technical Sections of these specifications include one or more of the following: Shop drawings; color samples; material samples; technical data; schedules of materials; schedules of operations; guarantees; operating and maintenance manuals; and as-built drawings.

2. Contractor shall make a comprehensive list of the required submittals, by Specification Section, and submit this list to the Engineer within 15 days after notice to proceed.

3. As-Built Drawings: When as-built drawings are required for submittal, the following shall apply:
   a. As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required.
   b. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded in red on the as-built drawings.
   c. The following procedure shall be followed:
      1) Immediately after these changes are constructed in place, the Contractor shall record them on the field office plans. This is to assure that changes are recorded before they are forgotten.
      2) Within two weeks after final inspection of the project, the Contractor shall transfer the changes marked on the field office plans onto a clean copy of plans using a red pencil. Any deletions shall be so noted and redrawn as necessary. The Contractor shall stamp or mark the tracings "AS-BUILT", and also sign and date each drawing so marked.
      3) The Contractor shall submit the as-built drawings together with the marked-up field office plans to the Engineer.
4) Any as-built drawing which the Engineer determines does not accurately record the deviation shall be corrected by the State and the Contractor shall be charged for the services.

END OF SECTION
SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Shop drawings shall be required as called for in the plans, specifications, or by the Engineer.

B. Other required submittals shall include:

1. Piping Layout.

2. Manufacturer's Data.

3. Certificates of Warranty.

4. Any others as called for in the plans, specifications, or by the Engineer.

1.2 BIDDER'S SPECIAL RESPONSIBILITY FOR COORDINATING CONTRACTUAL WORK AND SUBMITTALS:

A. The Contractor is responsible for the coordination of all contractual work and submittals.

B. The Contractor shall have a rubber stamp made up in the following format:

CONTRACTOR NAME

PROJECT: ________________________________

________________________________________________________________________

JOB NO: ________________________________

________________________________________________________________________

THIS SUBMITTAL HAS BEEN CHECKED BY THIS GENERAL CONTRACTOR. IT IS CERTIFIED CORRECT, COMPLETE, AND IN COMPLIANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS. ALL AFFECTED CONTRACTORS AND SUPPLIERS ARE AWARE OF, AND WILL INTEGRATE THIS SUBMITTAL INTO THEIR OWN WORK.

DATE RECEIVED _______________________

SPECIFICATION SECTION ___________________
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Rubbish Disposal

1. No burning of debris and/or waste materials shall be permitted on the project site.

2. No burying of debris and/or waste material except for materials which are specifically indicated elsewhere in these specifications as suitable for backfill shall be permitted on the project site.

3. All unusable debris and waste material shall be hauled away to an appropriate off-site dump area. During loading operations, debris and waste materials shall be watered down to allay dust.

4. No dry sweeping shall be permitted in cleaning rubbish and fines which can become airborne from floors or other paved areas. Vacuuming, wet mopping or wet or damp sweeping is permissible.

5. Enclosed chutes and/or containers shall be used for conveying debris from above to ground floor level.

6. Clean-up shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of clean-up shall coincide with rubbish producing events.

B. Dust

1. The Contractor shall prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 60 - Air Pollution Control.

2. The method of dust control and costs shall be the responsibility of the Contractor. Methods of dust control shall include the use of water, chemicals or asphalt over surfaces which may create airborne dust.

3. The Contractor shall be responsible for all damage claims in accordance with Pollution Control

01567-1
Section 7.16 - "Responsibility for Damage Claims" of the INTERIM GENERAL CONDITIONS.

C. Noise

1. Noise shall be kept within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 43 - Community Noise Control for Oahu. The Contractor shall obtain and pay for the Community Noise Permit from the State Department of Health when the construction equipment or other devices emit noise at levels exceeding the allowable limits.

2. All internal combustion engine-powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels.

3. Pile driving operations shall be confined to the period between 9:00 a.m. and 5:30 p.m., Monday through Friday. Pile driving will not be permitted on weekends and legal State and Federal holidays.

4. Starting-up of construction equipment meeting allowable noise limits shall not be done prior to 6:45 a.m. without prior approval of the Engineer. Equipment exceeding allowable noise levels shall not be started-up prior to 7:00 a.m.

D. Erosion

1. During interim grading operations, the grade shall be maintained so as to preclude any damage to adjoining property from water and eroding soil.

2. Temporary berms, cut-off ditches and other provisions which may be required because of the Contractor's method of operations shall be installed at no cost to the State.

3. Drainage outlets and silting basing shall be constructed and maintained as shown on the plans to minimize erosion and pollution of waterways during construction.

E. Construction Dewatering

1. The Contractor shall be familiar with and meet the latest requirements of all applicable National Pollution Discharge and Elimination System (NPDES) and Hawaii State Department of Health's Water Quality Standards. The Contractor shall be responsible to obtain all necessary permits to reflect his method of construction dewatering.

2. Discharge activities shall include trench dewatering; pipeline and reservoir
hydrotesting/chlorination operations; and drilling operations.

3. No construction dewatering will be allowed to discharge into State receiving waters without an approved NPDES permit. Drilling fluids and drill cuttings shall be contained onsite using sumps and/or mud tanks.

4. No compensation will be paid for any reason related to the disposal of waste water created by construction and testing.

F. Others

1. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Waste water shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

2. Trucks hauling debris shall be covered as required by PUC Regulation. Trucks hauling fine materials shall be covered.

3. No dumping of waste concrete will be permitted at the job-site.

4. Except for rinsing of the hopper and delivery chute, and for wheel washing where required, concrete trucks shall not be cleaned on the job-site.

5. Except in an emergency, such as a mechanical breakdown, all vehicle fueling and maintenance shall be done in a designated area. A temporary berm shall be constructed around the area when runoff can cause a problem.

6. When spray painting is allowed such spray painting shall be done by the "airless spray" process. Other types of spray painting will not be allowed.

G. Suspension of Work

1. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Technical Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due the Contractor for remedial measures to correct the offense. Also, no extension of time will be granted for delays caused by such suspensions.

2. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by the Engineer, the State reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by the State in taking such action from monies due the Contractor.
3. The Engineer may also suspend any operations which he feels are creating pollution problems although they may not be in violation of the above-mentioned requirements. In this instance, the work shall be done by force account as described in Subsection 4.2b - "Additional Work" of the INTERIM GENERAL CONDITIONS and paid for in accordance with Subsection 8.4b - "Force - Account Work" therein. The count of elapsed working days to be charged against the contract in this situation shall be computed in accordance with Subsection 7.18 - "Contract Time" of the INTERIM GENERAL CONDITIONS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

Furnish all labor, materials and equipment necessary to construct and install all project sign as specified hereinafter.

1.2 SUBMITTAL

The contractor shall provide the Engineer with six (6) shop drawings of the project sign for review and approval by the Engineer prior to ordering the sign.

1.3 LETTER STYLE

Copy is centered and set in Adobe Type Futura Heavy. If this specific type is not available, Futura Demi Bold may be substituted. Copy should be set and spaced by a professional typesetter and enlarged photographically for photo stencil screen process.

1.4 ART WORK

Constant elements of the sign layout - frame, outline, stripe, and official state information - may be duplicated following drawing measurements, or be reproduced and enlarged photographically using a layout template if provided. The "STATE OF HAWAII" masthead should be reproduced and enlarged as specified, using the artwork provided.

1.5 TITLES

The specific major work of the project under construction is emphasized by using 3-3/4" type, all capitals. Secondary information such as location or buildings uses 2-1/4" type, all capitals. Other related information of lesser importance uses letter heights as indicated on 01581-3, upper / lower case letters.

Design should follow the example on page 01581-3.
PART 2 - PRODUCTS

2.1 MATERIALS

A. LUMBER

1. Panel is 3/4" exterior grade high density overlaid plywood, with resin-bonded surfaces on both sides.

2. 4"x4" sign posts shall be Douglas Fir No. 1 or better.

B. PAINTS & INKS

Screen print inks are matte finish. Paints are satin finish, exterior grade. References to Ameritone Color Key Paint are for color match only.

COLOR: 1. 1BL10A Bohemian Blue  
        2. 2H16P Softly (White)  
        3. 2VR2A Hot Tango (Red)  
        4. 1M52E Tokay (Gray)

C. CONCRETE

Concrete shall be class B with a 2,500 psi 28-day compressive strength.

PART 3 - EXECUTION

3.1 GENERAL

A. The Project Sign shall be constructed with new materials as specified above.

B. The Project sign shall be installed at the location indicated on the drawings or as designated by the Engineer.

3.2 MEASUREMENTS AND PAYMENT

The construction of the project sign, including all equipment, labor and material necessary to furnish and install the project sign will be paid for under the "Project Sign" proposal item.

END OF SECTION

Project Sign
01581-2
SAMPLE TEXT
SAMPLE TEXT (CONT'D.)

Consultant: (Name)
Contractor: (Name)

DEPARTMENT OF LAND & NATURAL RESOURCES
Peter T. Young, Chairperson

Governor Linda Lingle

NOTE: Number of signs required 1
FILL EXCAVATION (8'0" MIN.) W/C.I. 2500 CONCRETE

4' x 4' POSTS

EXCAVATION LINE

4' x 4' POSTS

ATTACH SIGN TO 4' x 4' POSTS W/ WOOD SCREWS @ 12" O.C. FROM FRONT

3/4" PLYWOOD SIGN PANEL

PLAN
NOT TO SCALE
SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

The work to be performed under this section shall include clearing the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completion of the other work included in this contract.

1.2 COORDINATION WITH OTHER SECTIONS

A. Clearing and Grubbing is specified in Section 02110.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. Maintenance of Traffic: The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, passageways, etc.

When necessary, the Contractor shall provide and erect barriers, etc., with special attention to protection of personnel.

B. Protection: Throughout the progress of the work protection shall be provided for all property and equipment, and temporary barricades shall be provided as necessary. Work shall be done in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, and the State of Hawaii's Occupational Safety and Health Standards, Rules and Regulations.

C. Fires: No burning of fires of any kind will be allowed.

D. Reference Points: Bench marks, etc., shall be carefully maintained, but if disturbed or destroyed, shall be replaced as directed, at the Contractor's expense.
E. Disposal: All materials resultant from operations under this Section shall become the property of the Contractor and shall be removed from the site. Loads of materials shall be trimmed to prevent droppings.

3.2 EXISTING UTILITY LINES

A. The existence of active underground utility lines within the construction area is not definitely known other than those indicated in their approximate locations on the Drawings. Should any unknown line be encountered during excavation, the Contractor shall immediately notify the Engineer of such discovery. The Engineer shall then investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Engineer only as he deems necessary.

3.3 CLEAN UP OF PREMISES

A. Clean up and remove all debris accumulated from building operations from time-to-time as directed. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment, scaffoldings, etc., and leave entire job site raked clean and neat to the satisfaction of the Engineer.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for clearing and grubbing, within the areas shown on the plan or as directed by the Engineer. The above work shall include the removal and disposal of designated trees outside the clearing limits. Also included is the protection from injury or defacement of trees and other objects designated to remain and treatment or removal of damaged trees.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING WORK:

A. The area to be cleared shall be to the dimensions shown on the plans or one foot beyond toe of fill and top of cut whichever is greater.

B. All debris, trees, logs, limbs, branches, brush, plants, and other protruding obstructions within the clearing limits shall be removed and disposed of, except the following:

1. Live, sound, and firmly rooted trees with diameter of 4 inches or larger.

2. Live brush, herbaceous plants, and trees between the trailbed and clearing limits that are less than 12 inches in height.

C. Except as provided above, all limbs and branches more than 1/2 inch in diameter that extend into the cleared area shall be cut flush with the tree trunks or stems or cut at the ground surface.

D. Felling, cutting, and trimming methods shall not cause bark damage to standing timber. If damage does occur to standing trees, the injured area shall be treated with a coat of treesurgery asphalt-based paint. Trees with major roots exposed by construction that are rendered unstable shall be felled and disposed of as specified herein.
E. All stumps within the trailbed shall be removed. Stumps located between the edge of the trailbed and clearing limits that cannot be cut flush with the finished slope, or are not tightly rooted, shall be removed.

F. All logs, limbs, lopped tops, brush, and grubbed stumps and roots shall be scattered on the downhill side of and outside the clearing limits, with the following exceptions:

1. Limbs, brush, and lopped tops from trees felled on the uphill side of the clearing limits shall be scattered below the trailway, except where the existing sideslope above the trail is less than 20 percent; such material may be scattered above the trail.

2. Logs may be left on the uphill side of the trail if they are placed so that they will not move into the clearing limits.

G. Debris from clearing and grubbing operations shall not be placed in streams, water courses or at locations that will impede flow of the natural drainage pattern.

END OF SECTION
SECTION 02122
MOBILIZATION AND DEMOBILIZATION
(Well Drilling)

PART 1 - GENERAL

This section covers the requirements for mobilization and demobilization of a well drilling rig at the project site.

PART 2 - PRODUCTS

2.1 MOBILIZATION

Mobilization shall consist of the transporting, assembling, constructing, installing and making ready for use at the well site all equipment, machinery, structures, utilities and incidentals necessary to do the work covered by this contract.

2.2 DEMOBILIZATION

Demobilization shall consist of the dismantling and removal from the project site all of the above-mentioned equipment, machinery, structures, utilities and incidentals not incorporated in or made a necessary part of the completed well.

PART 3 - EXECUTION

Prior to mobilization on site and drilling the well, the Contractor shall have a survey performed by a surveyor registered in the State of Hawaii to verify the location of the well in relationship to the access road and the boundaries of TMK 9-8-11:006. The required survey will not be paid for directly, but shall be considered incidental to mobilization.

3.1 GUIDELINES

The Contractor shall clear and grade the site prior to moving and setting up the drilling rig at the site.

The Contractor shall be completely mobilized at the project site and begin drilling operations within 30 calendar days after he has been notified, in writing, to proceed under this contract. Any provisions in the Standard Specifications to the contrary is hereby deleted.

If the Contractor utilizes private lands other than the well site and access road for mobilization purposes, the provisions of this section shall still apply, and the

Mobilization and Demobilization
02122-1
mobilization and demobilization work on said private lands shall also be in accordance with the agreement between the Contractor and the land owners.

When the project is completed the Contractor shall clean up the well site and shall be responsible for all grading work required to leave the site in a neat and orderly condition to the satisfaction of the Engineer. Payment for the clean-up work will not be paid for separately but shall be included in the contract unit price for Demobilization subject, however, to all provisions specified hereinabove.

The maximum total amount that will be paid for Mobilization, and for Demobilization shall be as shown in the Proposal. All additional mobilization or demobilization costs in excess of the maximum amounts specified above shall be included in the appropriate unit prices bid in the Proposal. The Contractor shall not be entitled to receive any compensation for mobilization or for demobilization in addition to those specified herein and in the Proposal.

3.2 MEASUREMENT

Measurement for payment of the work under this section of the specifications will be made as follows:

1. The contract lump sum price for Mobilization will be paid when 50 feet of the well has been acceptably drilled and in the Engineer’s opinion the Contractor has fully mobilized.

2. The contract lump sum price for Demobilization will be paid after the well has been completed and accepted by the Board and the project site cleaned to the satisfaction of the Engineer.

Should the Board terminate the contract before 50 feet of the well has been acceptably drilled for reasons other than those specified in the Standard Specifications and in the Engineer’s opinion the Contractor has fully mobilized at the well site, the full amount of the contract unit price for Mobilization shall become due and payable subject, however, to all the provisions specified hereinabove. The full amount of the contract unit price for Demobilization shall also become due and payable after the above-mentioned termination of the contract, subject however, to all the provisions specified hereinabove.

3.3 PAYMENT

Mobilization and demobilization will be paid for at the applicable contract unit prices for:

Mobilization (not to exceed $20,000.00),

Mobilization and Demobilization
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Demobilization (not to exceed $20,000.00), as the case may be, which prices shall be full compensation for all the work specified in this section.

END OF SECTION
SECTION 02733

DRILLING THE WELL

PART 1 - GENERAL

This section covers the requirement for drilling a well at the approximate location shown on the plan. The exact location of the well shall be designated by the Engineer. The Contractor shall comply with all requirements of the Well Construction Permit for the well, the Hawaii Well Construction and Pump Installation Standards, and the State Water Code (Chapter 174, HRS).

PART 2 - PRODUCTS

A deep monitor well drilled 14 inches in diameter and cased with 8-inch casing to a depth of approximately 80 feet, and drilled with a 7.5-inch diameter open hole below the casing an approximate additional depth of approximately 920 feet, for a total well depth of 1000 feet.

PART 3 - EXECUTION

3.1 DRILLING

The cased section of the well shall be drilled plumb and straight as specified herein and shall be large enough to install the well casing specified in Section 02734 Furnishing and Installing the Well Casing and Monitor Tube of the specifications and to provide an annular space of at least 3 inches all around the casing. No deviation from this allowance will be made. All drilling and testing equipment including pipes and tools to be put into the well or open hole shall be first carefully washed and disinfected by chlorination. Only air, clear water, or a mixture of air, water and foam may be used in drilling the cased section of the well.

The exact depth of the well to be drilled shall be determined by the Engineer in the field during the course of the work. Casing shall not be installed until ordered by the Engineer. The drilling of the open hole below the installed casing shall have a minimum diameter of 7.5 inches. The Contractor shall protect the installed casing while drilling the open hole and any damages to the casing shall be repaired at no cost to the State.

The well will cave-in when drilling through loose or fractured rock formations and sandy or cinder layer formations. The well will also cave-in due to earthquake or other causes. The Contractor shall concrete-grout the caved-in portion of the well, redrill the well or use other methods approved by the Engineer to keep the caved-in well.

Drilling the Well
02733-1
open until the project is completed and accepted by the Engineer at no cost to the State.

3.2 WELL DRILLING BELOW CASING

After the permanent casing has been installed and the annular space filled, the open hole section of the well shall be drilled without the use of bentonite or similar drilling muds. Only water and air will be allowed in drilling the open hole below the cased section of the well. Reverse air circulation rotary and cable tool are the preferred methods of drilling.

The well shall be cleansed of cuttings by circulation of the formation water or by bailing until the well is clear of cuttings. If circulation of formation water is used to cleanse the well, the water shall be circulated up the drill pipe and allowed to run down the annular space between the drill pipe and the sides of the borehole. Cleansing will also aid in removing dirt, pipe dope, and rust.

3.3 DISPOSAL OF WATER

In order to avoid NPDES requirements, water from drilling shall be properly disposed of on site. Seepage pits are acceptable. If the seepage rate is insufficient, solids-free fluid may be run into the well. Use of a centrifuge, geofabric filters, temporary berms, barriers, and above-ground detention ponds to confine and rid water of solids may be required. No water, foam, or drill cuttings shall be allowed to leave the site for the duration of this job.

The Contractor understands that no compensation will be paid due to any difficulty encountered incidental to the disposal of waste water and all damages resulting therefrom shall be the responsibility of the Contractor.

3.4 ORDER OF WORK

The Contractor shall not conduct drilling operations in excess of eight hours a day except with the written consent of the Engineer. Not less than 72 hours prior to the commencement of any such overtime work, the Contractor shall submit to the Engineer a written notice of his intention and schedule. Deviation from the vertical for the cased and uncased portion of the well shall be no more than 6 inches per any 100 feet of depth. Only an instrument that can measure both azimuth and inclination to 0.5 degrees and 0.25 degrees, respectively, shall be accepted. A cage will not be accepted in the open hole. The general order of major work shall be as follows:

1. Drill the cased portion of the well using only air, clear water, or a combination of air, clear water, and foam as the circulating medium.

2. Run plumbness test every 20 feet with both azimuth and inclination. If a magnetic device is used, the survey tool shall be extended ahead of the drill bit
according to the manufacturer's recommended distance in a non-magnetic extension rod. A magnetic survey tool may also be used in a non-magnetic section of drill pipe. The Contractor shall provide a report of plumbness in terms of deviation in inches per 100 feet.

3. Install 8-inch well casing as shown on the plans and as specified in Section 02734, *Furnishing and Installing Well Casing and Monitor Tube*.

4. Fill and grout the annular space as specified in Section 02735, *Filling the Annular Space*.

5. Run plumbness test and video log of the cased well. The Contractor shall provide a report of the plumbness and a video log. To assure all small particles are settled at the bottom of the well, the well shall be idled for at least five (5) days prior to performing video logging. Acceptance of the cased portion of the hole shall be contingent on passing the plumbness test.

6. Drill open hole below bottom of installed casing as shown on the plans or as modified by the Engineer, using only water and air.

7. Run plumbness test every 20 feet with both azimuth and inclination. If a magnetic device is used, the survey tool shall be extended ahead of the drill bit according to the manufacturer's recommended distance in a non-magnetic extension rod. A magnetic survey tool may also be used in a non-magnetic section of drill pipe. The Contractor shall provide a report of plumbness in terms of deviation in inches per 100 feet.

8. Cleanse well. The well shall be cleansed of cuttings by circulation of the drilling medium or by bailing the well, until clear of cuttings.

9. Verify well is free of obstructions. The Engineer and/or Department’s representatives will check the well for obstructions to logging tools before demobilization of the drill rig. If obstructions are found in the borehole, the Contractor will ream out the obstructed zone(s) at no cost.

10. Complete well head, concrete slab, and other appurtenances.

11. Demobilize and clean-up. Upon completion of the job, the site shall be cleared of all materials used in or produced by drilling operations. The site shall be restored to a condition equal to or better than original.

3.5 MEASUREMENT, DRILLER'S LOGS, AND SAMPLES

The Contractor shall keep a daily driller's log of all well construction activities on forms acceptable to the Engineer, recording the characteristics of the geologic materials encountered, including (1) depth, (2) thickness, (3) color, (4) hardness, and

Drilling the Well
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(5) All other data which may be helpful in the interpretation of the subsurface geology and hydrology. The log shall indicate the depths where water is encountered and the pertinent facts connected with its occurrence. All other information such as the location of lava tubes and cave-ins shall also be noted in the log. The daily driller's logs shall be kept current and available at the well site for inspection by the Engineer. A copy of the daily driller's log shall be submitted to the Engineer at the end of each day.

Samples of drill cuttings shall be taken at successive intervals of 10 feet of depth and at every change in formation. Samples of drill cuttings shall be obtained by bailing the hole, by screening the circulating medium or by any other method acceptable to the Engineer. These samples shall be collected in 4 1/2" x 6" HUBCO brand Protexo sand sample bags provided by the Contractor and shall be properly labeled and delivered to the Engineer periodically as requested.

Water level measurements shall be taken immediately when water is encountered in the well during the drilling work and after the casing has been installed. An electrical sounding probe with cable calibrated and marked to the nearest one-hundredth of a foot shall be used to make all water level measurements. When ordered and in the manner directed by the Engineer, the Contractor shall obtain water samples.

3.6 PROTECTION

During the progress of the work, the Contractor shall secure the well for safety and to prevent contamination from surface runoff, debris, etc., when the crew is not at the well site. The Contractor shall preserve the well in good condition until the Engineer has accepted the work.

3.7 ABANDONED WELL

A well will be considered abandoned if the Contractor does not complete the well to the depth ordered by the Engineer or if the Contractor should abandon the well due to loss of tools or for any other cause or if the Board does not accept the well due to faulty plumbness and alignment. Such an abandoned well shall be sealed by the Contractor, in compliance with the provisions and requirements of Chapter 174, C-87, HRS, the State Water Code. If casing has been installed, the Contractor, at his own expense, may remove the casing prior to backfilling the abandoned well.

No payment will be made for any work done on an abandoned well. All partial payments received by the Contractor for work done on a well that has been abandoned shall be refunded to the Board and the Contractor shall drill another well in the vicinity of the abandoned well as directed by the Engineer. The cost of moving from the location of the abandoned well to the above-mentioned new site will be at the Contractor's expense and will not be paid for by the Board.

Upon completion of the work the Contractor shall leave the site of the abandoned well.
in a neat and presentable condition free of all debris and in a state comparable to its original condition.

3.8 VIDEO LOGGING

The Contractor shall run a color video log of the well after the casing is installed and grouted. The video logging system shall be a color VHS or digital system capable of recording the video camera's depth in feet in the image. The original and one copy of the VHS tape or DVD disc record shall be delivered to the Engineer upon completion of logging and shall become the property of the State. The well shall not be disturbed for 2 weeks prior to performing the video logging.

3.9 MEASUREMENT

The depth of the cased section of the well to be paid for shall be the actual depth in lineal feet measured vertically from the prepared ground surface to the bottom of the cased section of the well as ordered by the Engineer.

The depth of the open hole section of the well to be paid for shall be the actual depth in lineal feet measured vertically from the bottom of the cased section of the well to the bottom of the open hole section as ordered by the Engineer.

The Contractor shall not receive specific compensation for making the plumbness and alignment tests, video log, and all corrections for plumbness and well diameter, but shall include such costs in the appropriate contract prices for drilling the well.

Prior to final payment, the Engineer and/or Department's representatives will check the well for obstructions to logging tools before demobilization of the drill rig. If obstructions are found in the borehole, the Contractor will ream out the obstructed zone(s) at no cost.

3.10 PAYMENT

The depth of well acceptably drilled and measured, as provided above, will be paid for at the applicable contract unit price per lineal foot for:

1. Drilling 14-inch diameter hole from the ground surface to the bottom of the cased section of well,

2. Drilling 7.5-inch diameter open hole below cased section of well, as the case may be, which price shall be full compensation for drilling; preparing the driller's logs; measuring and recording water levels; obtaining samples of drill cuttings and water; protecting and maintaining the well; measuring the depth of well as required; making all tests and necessary corrections of defects; video logging; all fishing operations; all costs of delays in work due to inclement weather, to lack of equipment and to equipment breakdowns; and for all
equipment, tools, labor and incidentals necessary to complete the work. No payment will be made for abandoned wells.

END OF SECTION
SECTION 02734
FURNISHING AND INSTALLING WELL CASING

PART 1 - GENERAL

This section covers the requirement for furnishing and installing the steel casing in the well.

The casing shall be new and shall be installed in the well only when ordered in writing by the Engineer and as specified herein. The Engineer will specify the total lengths of the casing to be installed. Installation shall be made only during normal daylight working hours.

PART 2 - PRODUCTS

2.1 WELL CASING

The casing to be furnished and installed in the well shall be steel, conforming to ASTM Designation A-606, Type 4, or approved equal. The casing shall have a minimum inside diameter and a minimum wall thickness as called for in the proposal and shall be new, clean, straight and round. The individual lengths of solid casing shall be provided with beveled ends suitable for butt welding. The bottom of the casing shall be supplied with a steel shoe as shown on the Plans.

The top of the casing shall be capped as shown on the Plans.

2.2 WELL CASING MARKINGS

Each length of casing shall be marked by the casing manufacturer with the following information:

1. Manufacturer’s identification

2. Nominal thickness of casing wall

3. ASTM Designation and trade name of the steel used for the manufacture of the casing

All markings shall be clear and legible and shall be within three (3) feet from one end of the casing.
2.3 WELL CASING CERTIFICATION

Prior to the delivery of any casing to the project site, the Contractor shall submit for approval the casing manufacturer's certification to the Engineer. The certificate shall clearly indicate the total footage and number of casing shipped; the name of the customer; and the physical and chemical properties of the casing material. (ASTM Designation and trade name of steel may be used to designate the physical and chemical properties respectively.)

PART 3 - EXECUTION

3.1 ALIGNMENT MARKINGS

Prior to the installation of the well casing, the Contractor shall establish alignment marks on the outside ends of each length of well casing to provide a reference for aligning and installing the water-level monitor tube in a straight line on the outside of the well casing. The alignment marks shall be established by using two fabricated cross-hair sighting devices which can be placed on the ends of a casing length and rotated so that alignment is achieved by sighting through the inside of the casing.

3.2 INSTALLATION OF WELL CASING

The well casing shall be installed in the presence of and as directed by the Engineer. The casing shall be properly aligned and welded by qualified welders and shall also be continuous for its entire length. Every precaution shall be taken to prevent the casing from dropping into the hole. Driving of the casing which is likely to damage the pipe or cause a change in the circular cross section of the pipe will not be permitted.

The Contractor shall cleanse the drilled hole of drill cuttings by bailing or reverse rotary circulation and then carefully lower the casing, with monitor tube attached, in the drilled hole and temporarily secure the casing string three feet above the bottom of the hole. Thereupon, a 3-foot concrete plug shall be tremied in place at the bottom of the hole and the casing lowered to its final depth and secured. After the concrete plug has been allowed to set for 24 hours, the rock packing, grout seal, and cement grouting of the well as called for in Section 02735 - Filling the Annular Space shall then be completed. At no time during the installation of the casing shall the total weight of the casing rest on the bottom of the drilled hole.

The casing shall extend 18 inches above the concrete slab level and shall be capped with a lockable steel cap as shown on the Plans. The Contractor shall supply two keyed alike padlocks with three sets of keys. Padlock shall consist of Abloy 342 steel padlock with raised shoulders or approved equivalent. Padlocks shall be compatible for use with the casing and junction box locking mechanisms.
Upon completion of the well, in the presence of the Engineer, the casing walls shall be swabbed to remove drilling byproducts such as grease or pipe dope.

3.3 JUNCTION BOX

The 18-inch steel casing junction box shall be installed after the well has been drilled to its final depth, but before the 6' x 8' concrete slab is poured. The bottom of the junction box shall not be cemented. A 2-inch pipe shall be welded at an angle through the junction box and well casing for instrument access. The ends of the 2-inch pipe shall be filed smooth to minimize friction on the wire line equipment.

3.4 MEASUREMENT

The lengths of well casing installed below the prepared ground surface shall be measured vertically to the nearest foot from the ground surface.

3.5 PAYMENT

The total footage, measured as provided above, of well casing acceptably installed below the prepared ground surface will be paid for at the contract unit price per lineal foot for:

Furnishing and installing 8-inch I.D., 5/16-inch wall thickness, steel well casing conforming to ASTM A-606, Type 4

and the above-ground well casing and junction box will be paid for at the applicable contract unit price for:

Furnishing, installing, and painting above-ground 8-inch I.D., 5/16-inch wall thickness, steel casing with lockable steel plate cap, in place complete,

Furnishing, installing, and painting 18-inch I.D., 5/16-inch wall thickness, steel casing junction box with lockable steel plate cap, in place complete, as the case may be, which price shall be full compensation for furnishing and hauling the well casing to the well site; for bailing; for cleaning the well; for unloading, handling, cutting, aligning, perforating, welding and setting the well casing; for capping the top of the well casing; and for all other labor, equipment, tools, materials, and incidentals necessary to complete the work.

END OF SECTION

Furnishing and Installing the Well Casing

02734-3
SECTION 02735
FILLING THE ANNULAR SPACE

PART 1 - GENERAL

This section covers the cement-grouting of the annular space between the drilled hole and the casing. All work required in this section shall be done during normal daylight working hours. The Contractor shall notify the Engineer not less than 48 hours prior to cement-grouting.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland cement shall conform to the requirements of ASTM C150, Type I for grout mix.

B. Coarse aggregate shall be crushed fine-grained lava rock meeting the grading requirements of size nos. 67 and 8 (ASTM C33).

C. Fine aggregate shall consist of basaltic sand, meeting the grading requirements of ASTM C33.

D. Water used in mixing cement grout shall be potable.

PART 3 - EXECUTION

3.1 CEMENT-GROUTING THE ANNULAR SPACE

The first 10 feet of the cement grout shall be poured and cured overnight. The remaining annular space shall then be grouted in a manner that will avoid segregation of materials, inclusion of foreign material, bridging of grout materials, collapsing of casing, and contamination of the rock-packed section of the well.

Grout shall consist of Portland cement, or if losses become excessive as determined by the Engineer, a mix of 1 part Portland cement and 1 part rock sand with not more than 6 gallons of water per 94 lb. sack of cement. Further, if the Engineer determines that an interval of annular space cannot be filled with 1:1 cement-sand grout without excessive losses in lava tubes or similar openings, the Contractor may be permitted to fill such intervals, and only such intervals, with fine or No. 8 aggregate. The amount of water to be added shall be subject to the Engineer's approval.
The grout shall be placed in the annular space under pressure by pumping through 1 inch or larger diameter steel flush joint tubing. Grouting shall be placed and allowed to properly set in stages to avoid collapse or deformation of the casing and monitor tube. During placement of the grout, the grout pipe shall extend below the fresh grout level so as to avoid free falling of the grout. It is essential that the annular space be completely filled with grout to prevent contamination of the well and to protect the casing from corrosion.

3.2 MEASUREMENT AND PAYMENT

Acceptable filling of the annular space will be measured and paid for separately at the respective contract unit price for:

"Cement-grouting the annular space, including concrete plug,"

which prices shall include full compensation for cement grouting the annular space; for furnishing, mixing, placing and curing the cement grout; and for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work as specified herein and as shown on the Plans.

END OF SECTION
SECTION 02737
CONSTRUCTION WATER DISPOSAL

PART 1 - GENERAL

A. GENERAL DESCRIPTION

This item of work shall include the furnishing of all labor, materials, tools and equipment necessary for construction water disposal.

B. REGULATIONS

The Contractor shall be familiar with and meet the latest requirements of all applicable National Pollutant Discharge Elimination System (NPDES) and all water discharge requirements of the State Department of Health, City and County of Honolulu, and State Department of Transportation. Effluent discharge into State receiving waters shall not be allowed. Discharge activities shall include well water discharge.

C. PROCEDURES

The Contractor shall review his/her water discharge operations to prevent effluent from reaching State receiving waters. The Contractor shall submit for review and approval his/her intended discharge operations including emergency procedures to address failure of operations. The Contractor shall be responsible for any fines should his/her operations fail and result in any violation of the NPDES requirements.

D. NON-COMPLIANCE

Violation citations for non-compliance shall be the responsibility of the Contractor. The Contractor shall pay all fines and hold harmless the State of Hawaii.

PART 2 - PAYMENT

Payment for the work described herein shall not be made directly but shall be considered incidental and shall be included in the various items in the Bid.

END OF SECTION

Construction Water Disposal
02737-1
SECTION 02831

GALVANIZED CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing galvanized chain link fences and gates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain Link Fence Fabric: Shall be of mesh size shown on plan, be galvanized and conform to ASTM A392, Class 1. The hot-dipped galvanized fabric shall contain not less than 1.2 ounces per square foot of uncoated wire surface as determined by stripping test ASTM A90 and under the PREECE Test (ASTM A239), shall withstand 6 or more one-minute dips before reaching the end point. All fabric shall be free from barbs, icicles or other hazardous projections resulting from galvanizing.

B. Tie Wire: Shall be 12-gauge soft annealed galvanized steel wire.

C. Tension Bar: Shall be 1/4" thick by 3/4" wide mild steel bar for attachment of a fabric to a terminal post.

D. Tension Band and Brace Band: Shall be formed from steel bands at least 12 gauge thick by 3/4" wide.

E. Tension Rod: Shall be a 3/8" dia. mild steel rod threaded at one end and hooked 180° at the other.

F. Fittings: (Note: Pressed steel fittings shall not be allowed)

1. Post cap and eye top shall be of one-piece cast iron or malleable iron construction and shall attach securely onto their respective posts.

2. Coupling for top rails shall be outside sleeve type, at least 6" long and crimped at center.

3. Rail ends shall be snug, one-piece cast iron or malleable iron fittings for top and brace rails with holes to receive 5/16" bolts for securing to rail end bands.
4. Two-hole rail end shall be similar to rail end except for an additional ½” hole to receive the hooked end of a tension rod.

G. Composition and Finish of Metal Parts: All metal parts and fittings, frames and bolts shall be galvanized by the hot-dip process, after fabrication, in conformance with ASTM A153. The coating on all parts shall be continuous and smooth; that is, free from barbs, icicles or other projections.

H. Posts, Rails and Braces: Shall be the standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A120.

I. Selvage Wire: Shall be of 8-gauge galvanized coil spring steel wire of good commercial quality.

J. Barbed Wire: Shall be three lines of 4-point pattern, each composed of two strands of no. 12-1/2 gauge galvanized wire.

K. Extension Arms: Shall be hot-dipped galvanized. Line post arms of pressed steel are to be of one solid piece construction: same and terminal posts to have ball caps. Each arm to carry 3 barbed wires at an angle of 45 degrees.

L. Concrete for post footings shall be Class "B".

PART 3 - EXECUTION

3.1 INSTALLATION AND WORKMANSHIP

A. General

1. Chain link fencing shall be erected in strict conformance with the plans and these specifications. Posts shall be plumb and in line. Welding shall be done in accordance with latest AWS standards. However, no splicing of posts, rails or braces shall be accepted. Where changes in line occur with an angle of deflection of 30 degrees or more, the change point will be considered a corner and a corner post shall be installed thereat. End and corner posts for fences with 5-foot and wider fabric shall be braced to the nearest line post with horizontal braces and tension rods. The horizontal braces shall be spaced midway between top rail and ground and securely fastened to posts as shown on plans. Where fencing is placed along a curve with radius of 50 feet, or less, horizontal braces (and tension rods) shall be installed between all posts in like manner. Pull posts, at maximum intervals of 300 feet, shall be braced and trussed in both directions as specified above.

2. Field Touch-Ups: Field welds shall be cleaned of flux and spatter and all damaged galvanizing removed, all hazardous projections ground off, properly
prepared, and then heavily coated with self-curing inorganic zinc coating. Manufactured coatings shall be applied in strict accordance with manufacturer's printed specifications. Damage to existing painted surfaces shall be touched up.

B. Fence posts, except as otherwise indicated or specified, shall be spaced not more than 10 feet apart. In curved fence sections having a radius of 50 feet or less, the posts shall be spaced as shown on the plans. Line posts shall be set so that the eye top will receive the top rail and fence fabric at the proper height as shown on the plan.

C. Top rails shall pass through and bear firmly on base of eye tops, form a continuous brace from end to end of each stretch of fence, and be securely fastened to terminal posts with rail ends and brace bands. Couplings for top rails shall be installed at intervals of 21 feet maximum.

D. Chain link fabric shall be fastened on the side of the posts as designated and shall be mounted on the posts so that the bottom of the fabric will be no more above the finished grade than called for on the plans. High points of the ground shall be excavated as necessary. The fabric shall be stretched taut and securely fastened to the posts. Ends of wire ties shall be bent back so as not to be a hazard. Between posts the top edge of the fabric shall be fastened to the top rail and the lower edge to the tension wire with tie wire of size and at spacing as called for on the plans. Tension wire shall be stretched tight and shall be installed in a straight line between posts. Tension bars extending the full height of the fence and tension bar bands shall be used for fastening fabric to end, corner, pull and gate posts. Bolted tension bar bands shall be placed at top and bottom of tension bars and spaced at 12" intervals. Fastenings to line posts shall be made with tie wire of size and at spacing as called for on the plans.

3.2 FINAL CLEANUP

A. All exposed metal surfaces shall be clean and free of cement. All surplus earth resulting from fencing work that is not used in the grading work shall be cleaned up and disposed of off site.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and placing of deformed steel bars or welded wire fabric as reinforcement in concrete. The quality, type, size, and dimensions shall be as called for in these specifications and as shown on the plans.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bar reinforcement shall be of grade 40, billet steel deformed type bars made by the open hearth process and shall conform to the requirements of ASTM Designation A615.

B. Welded wire mesh reinforcement shall be galvanized steel, electric welded type and shall conform to the requirements of ASTM Designation A185. The gauge of the wire and dimensions of the mesh shall be given in these specifications or as shown on the plans.

2.2 EPOXY COATING

Epoxy coating for the reinforcing steel shall be applied by the electrostatic spray method conforming to ASTM A-775.

PART 3 - EXECUTION

3.1 CONSTRUCTION

Unless otherwise specified, the installation of reinforcing steel shall conform to the requirements of "ACI Standard Building Code Requirements for Reinforced Concrete" and "Concrete Reinforcing Steel Institute."

A. Protection of Material: Steel reinforcement shall be protected at all times from damage. When placed in the work, all reinforcing steel shall be new, free from dirt, detrimental scale, paint, oil, or other foreign substances. No material cleaned by sandblasting will be allowed. In the absence of manufacturer's quality mark, the
Engineer may require standard ASTM tests be made on representative samples before acceptance. All costs incurred in connection with these tests shall be borne by the Contractor.

B. Bending Diagrams and Order Lists: Two copies of all reinforcing steel order lists and bending diagrams shall be furnished directly to the Engineer and at the site for his use in administering the contract.

Furnishing such lists and diagrams to the Engineer shall not be construed to mean that the lists and diagrams will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and diagrams and for furnishing and placing all bar reinforcing steel in accordance with the details shown on the plans as specified.

C. Bending: Bends for stirrups and ties shall be made around a pin having a diameter not less than two times the minimum dimensions of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum dimension of the bar, except that for bars larger than one inch, the pin shall be not less than eight times the bar thickness. All bars shall be bent cold before placing in forms.

D. Placing: Reinforcement shall be accurately placed, supported, aligned, and secured against movement. Bars shall be tied at all intersections except where the spacing is less than one foot in each direction, in which case alternate intersections shall be tied.

Distance from forms and between layers of reinforcing shall be maintained by means of approved commercial chairs, stays, blocks, ties, hangers, or other approved supports. The use of pebbles, pieces of broken stone or brick, metal pipe, or wooden blocks shall not be permitted.

No concrete shall be placed prior to the inspection and approval of the size and placement of all reinforcement by the Engineer.

E. Splicing: End laps of bars at splices shall be a minimum of 30 bar diameters and shall be staggered unless otherwise shown. Bars shall be installed in as long lengths as practicable and splices reduced to a minimum unless otherwise shown on the plans.

F. Wire Mesh: Wire mesh shall be rolled out flat and firmly held in place to the lines and grade as shown on the plans before placing concrete. Splices shall be made by lapping not less than one mesh and securely tied.

Reinforcing Steel
03210-2
G. Coverage: Unless otherwise specified on the plans, the minimum clear thickness of concrete covering reinforcement shall be 2 inches when concrete is placed against form, 3 inches when concrete is placed against ground, and 1-1/2 inches from tops of slabs or unformed surfaces.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This specification covers the requirements for furnishing, hauling, mixing, placing, and curing of concrete.

1.2 SUBMITTALS

The Contractor shall submit concrete mix design for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland cement shall conform to the requirements of ASTM C150, Type I, for all concrete work.

B. Concrete Aggregates

1. Fine aggregates shall be calcareous or basalt sands, or a combination thereof. They shall meet the grading requirements of ASTM C33 unless the concrete producer can provide past data that show that a proposed non-conforming gradation will produce concrete with the required strength and suitable workability.

If manufactured sands are used in the concrete mix, the Contractor may select and use a water-reducing and/or an air-entraining admixture as specified hereinafter to provide satisfactory workability in the concrete. The cement content of a mix shall be as specified hereinafter, and the use of an admixture shall in no way result in the reduction of the cement factor.

2. Coarse aggregates shall be crushed close-grained, blue lava rock meeting the grading requirements of sizes 57 or 67 (ASTM D448) or both. The maximum size of aggregate shall not be larger than 1/5 of the narrowest dimensions between sides of the forms of the member for which the concrete is to be used not larger than 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.
C. Concrete Reinforcement

1. Reinforcing steel shall be deformed bars conforming to ASTM A615, grade as shown on plans.

2. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 and shall be galvanized.

3. Metal accessories such as spaces, chairs, ties, and other devices necessary for properly placing, supporting and fastening reinforcement in place shall be provided. Chairs shall be galvanized. Annealed steel wire or not less than 16-gauge shall be used to secure reinforcement.

D. Water used in mixing concrete shall be potable.

E. Non-slip grit shall be an abrasive aggregate of silicon carbide or aluminum oxide.

F. Admixture, if used, shall conform to ASTM C494 or ASTM C260 and shall be mixed in proper amount in accordance with directions of manufacturer.

G. Curing compound shall conform to ASTM C309.

PART 3 - EXECUTION

3.1 DESIGN OF CONCRETE MIXES

A. All concrete throughout shall be either job or plant mixture in an approved type of power operated mixer that will insure uniformity and homogeneity of the concrete produced.

B. Mixing at jobsite shall be done in accordance with ACI 614.

C. Ready-mixed and mixed-in-transit concrete shall be mixed to conform to the provisions of ASTM C94.

D. Concrete shall be mixed only in such quantity as is required for immediate use. No retempering will be permitted and concrete that has started to harden shall be discarded and promptly removed from the job.

E. Admixtures conforming to paragraph 2.1 may be used in the concrete as recommended by the supplier and approved by the Engineer.
3.3 PLACING CONCRETE

A. No concrete shall be placed in the absence of the Engineer or his representative who shall be given one day advance notice of starting time of concrete pour.

B. Preparation

1. Concrete shall be placed upon clean, damp surfaces with no free water, or upon properly compacted fills but never upon soft mud or dry, porous earth.

2. Before depositing new concrete on or against concrete which has set, all accumulation or mortar splashed upon reinforcing steel and the surfaces of forms shall be removed and the forms shall be retightened. The surfaces of previously set concrete shall be thoroughly roughened and cleaned of all foreign matter and laitance, saturated with water and slushed with a coat of cement grout. New concrete shall be placed before the grout has attained its initial set.

C. Conveying

1. Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods that will prevent segregation.

2. Concrete shall be deposited as nearly as practicable in its final position. Extensive spading as a means of transportation shall be avoided and in no case shall vibrators be used to transport concrete inside forms.

3. Open troughs and chutes shall have a slope not to exceed 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

4. The concrete shall not be allowed to drop freely more than six feet except where specifically authorized by the Engineer. When placing operations would involve the dropping of concrete from a height of more than six feet it shall be conveyed through pipes or flexible drop chutes.

5. If any appreciable segregation occurs through the conveying methods employed, their use shall be ordered discontinued by the Engineer and some other satisfactory method of placing concrete shall be used.

6. All chutes, troughs, pipes and other means of conveyance shall kept clean and free from coatings of hardened cement or concrete by thoroughly cleaning with water and chipping after each pour. Water used for flushing shall be discharged away from the vicinity of the concrete or forms already in place.
D. Depositing

1. Unless adequate protection is provided, concrete shall not be placed during rain. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish. Fresh concrete that has been deposited but has not attained its initial set shall be protected in the event of rain.

2. Placing of the concrete shall be started at the far end of work so that each batch will be dumped against previously placed concrete, not away from it.

E. Compaction

1. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness. All compaction shall be done by use of high frequency internal vibrators. Where the vibrator cannot be inserted into the concrete, compaction shall be done by spading, rodding, or forking.

2. Frequency of vibrator shall be not less than 7,000 impulses per minute. The Contractor shall provide a sufficient number of vibrators to properly consolidate all concrete immediately after placing. At least one standby vibrator shall be on hand at all times during placement of the concrete.

3.4 REINFORCEMENT

A. Reinforcing steel bars, wire and wire fabric shall be provided in the sizes, length and configurations as indicated on plans and shall be thoroughly cleaned, before placing, of loose mill scale, loose flaky rust, oil, and all coatings that will destroy or reduce bond. If necessary, they shall be cleaned again before placing of concrete. All items shall be fabricated, positioned and secured in place as indicated in the plans and as herein specified. Annealed steel wire of not less than 16-gauge shall be used to secure reinforcement. Unless otherwise noted, cleaning, bending and placing of reinforcement shall be done in accordance with the standard practice of the Concrete Reinforcing Steel Institute.

B. Concrete or metal support and spacers shall be used to secure the proper spacing of reinforcement over formwork. Stirrups shall be accurately and securely wired to the bars at both top and bottom. At slabs, footings and beams in contact with earth, pre-cast concrete blocks (not bricks or hollow tile) shall be used to hold reinforcement at a proper distance above earth.

C. Bars shall be tied at all intersections, and distances from forms shall be maintained by means of pre-cast concrete blocks, ties, hangers or other approved supports.
D. Bars shall be bent cold to the shapes shown on the plans. Bends shall be made around a pin having a diameter not less than 6 times the bar diameter except that for bars of larger than 1-inch diameter the pin diameter shall be 8 times the bar diameter. If required, bars may be bent in the field using a "hickey" bar.

E. All reinforcing steel bars shall be furnished in the lengths indicated on the plans. Splicing of bars, except where shown, will not be permitted without the approval of the Engineer.

3.5 CONCRETE SLABS ON GRADE

A. Concrete slabs on earth shall be placed over a structural fill as specified in another section.

B. All slabs shall be reinforced with 6 x 8 - W1.4 by W1.4 welded wire fabric unless otherwise shown or called for on the plans.

C. Care shall be taken in handling and placing the reinforcement as follows:

1. Reinforcing fabric shall not be rolled over by trucks, buggles or wheelbarrows, nor trampled to the extent that it is bent out of the plans of the fabric. Material which has been so bent that it cannot be laid out flat shall be rejected.

2. Reinforcing fabric shall be positively set, either prior to or during the placement of concrete, to the levels required within the slabs as indicated on the plans or as otherwise called for herein.

D. A bond-break filler shall be provided where edge of slab abuts any vertical surface and where indicated on plans. Width of filler strips shall equal depth of floor slab.

3.6 FINISHING OF SLABS

A. Broom Finish for Slabs: The concrete slabs shall be given a coarse transverse scored texture by drawing a broom across the surface. The operation shall follow immediately after steel trowelling.

B. A brass survey plate/marker shall be embedded in the relatively level well head concrete slab.

3.7 REPAIR OF DEFECTS

A. After forms have been removed, any concrete which is not constructed as shown on the plans or is out of alignment or level beyond required tolerances or which shows a defective surface which in the opinion of the Engineer cannot be properly repaired or patched shall be removed.

Concrete
03300-5
B. Where concrete which is exposed to view requires repairing or patching, the texture of the surface of such repair or patch shall closely match that of the surrounding surface.

3.8 CURING AND PROTECTION

A. All concrete shall be cured for a period of not less than seven (7) days by one of the methods listed below. During this curing period, the concrete shall be maintained with minimal moisture loss at a relatively constant temperature. Fresh concrete shall be protected from heavy rains, flowing water, mechanical injury, and injurious action of the sun. Curing method selected must be compatible with the finish to be applied to the concrete.

Curing shall immediately follow the finishing operation.

B. Water Curing: If cured with water, concrete shall be kept wet by mechanical sprinklers, by ponding, or by any other method which will keep the surfaces continuously wet.

C. Saturated Sand Curing: Surfaces cured with sand shall be covered with a minimum of one inch thickness of sand which shall be kept uniformly distributed and continuously saturated during the entire curing period.

D. Curing Compounds: Curing compounds shall not be used on concrete surfaces that are to receive paint finish, acid stain or resilient flooring, except those that are recommended by the manufacturer to be compatible with the applied finish. The Contractor shall submit to the Engineer a letter certifying that the curing compound is compatible with the applied finish. Application shall be in accordance with the manufacturer’s recommendations. If curing, sealing or other compounds are used which are incompatible with applied finish, such compound shall be thoroughly removed by grinding with a terrazo grinder.

E. Waterproof Paper: Waterproof paper or opaque polyethylene film conforming to ASTM C171 may be used. The paper or film shall be anchored securely and all edges sealed or applied in such a manner as to prevent moisture escaping from the concrete.

3.9 SAMPLING AND TESTING

A. Sampling - ASTM C 172: Collect samples of fresh concrete to perform tests specified. ASTM C 31 for making test specimens.

B. Slump Tests - ASTM C 143: Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at
commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 10 cubic yards (maximum) of concrete.

C. Compressive Strength Tests - ASTM C 39: Make four test cylinders for each set of tests in accordance with ASTM C 31. Test one cylinder at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Provide concrete cylinders for compression tests not less than once a day, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5,000 square feet of surface for slabs or walls. If the average strength of the 28-day test cylinders is less than f_c and a maximum of one single cylinder is less than f_c minus 300 psi, take three ASTM C 42 core samples and test. If the average strength of the 28-day test cylinders is less than f_c and two or more cylinders are less than f_c minus 300 psi, take six core samples and test. Concrete represented by core tests shall be considered structurally adequate if the average of the three cores is equal to at least 85 percent of f_c and if no single core is less than 80 percent of f_c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new, acceptable concrete at no additional cost to the State. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

D. Testing: All sampling and testing shall be performed by an independent testing agency and all test results submitted to the Engineer for approval. All cost of sampling and testing shall be borne by the contractor.

END OF SECTION
PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing metal fabrications which are not part of structural steel or other metal systems.

1.2 RELATED SECTION

A. Section 09900 - Painting: Shop priming, field touch-up and finishing.

1.3 REFERENCES

A. American Institute of Steel Construction (AISC):


B. American National Standards Institute (ANSI):

B18.2.1-81 Square and Hex Bolts and Screws Inch Series Including Hex Cap Screws and Lag Screws.

B18.2.2-72 Square and Hex Nuts.

B18.5-78 Round Headed Bolts.

C. American Society for Testing and Materials (ASTM):

A 36-84a Structural Steel.

A 53-84a Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

A 120-82 Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

A 123-84 Zinc (Hot-Galvanized) Coatings on Products Fabricated
from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.

A 143-74 (84) Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

A 153-82 Zinc Coating (Hot Dip) on Iron and Steel Hardware.


A 325-86a High-Strength Bolts for Structural Steel Joints.

A 500-84 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

A 501-84 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

A 687-84 Steel Bolts and Studs.

A 780-80 Repair of Damaged Hot-Dip Galvanized Coatings.

D. American Welding Society (AWS):

B 3.0-77 Welding Procedure and Performance Qualification.

D 1.1-86 Structural Welding Code, Steel.

E. Federal Specification (FS):

FF-S-85C & AM-1 Screws, Cap, Slotted and Hexagon Head.

F. Occupational Safety and Health Standards, State of Hawaii (OSHS):

Chapter 126 Welding, Cutting and Brazing.

1.4 QUALITY ASSURANCE

A. Qualification of Welding Work: AWS B 3.0, for welding processes and welding operations.
B. Codes and Standards: Comply with codes, specifications and standards, referred to in this specification, except where provisions in this specification or drawings exceed such requirements.

1.5 SUBMITTALS

A. Shop Drawings: Shop drawings for each fabricated items showing fabrication, assembly and erection details, sizes of members, fastening, supports, anchors, clearances, and necessary connections to work of other trades.

B. Product Data: Manufacturer's product data showing references to industry standards for expansion anchor bolts.

1.6 PRODUCT HANDLING

A. Transport and store material with adequate protection against damage. Store items in an enclosed area free from contact with soil and weather.

B. Remove and replace damaged items with new items.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rolled Steel Shapes, Plates and Bars: ASTM A 36, unless otherwise indicated.

B. Structural Tubing: ASTM A 500, Grade B or ASTM A 501, unless otherwise indicated.

C. Steel Pipes: ASTM A 53, Type E or S, Grade B. Minimum standard weight class, or ASTM A 120 Schedule 40 (standard weight), unless otherwise indicated.

D. Fittings for Steel Pipe: Standard malleable iron fittings, unless otherwise indicated.

E. Steel Rods and Anchor Bolts: ASTM A 36 or ASTM A 307 Grade A, unless otherwise indicated.

F. Bolts and Nuts: ASTM A 325, unless otherwise indicated.

G. Welding Electrodes: AWS D1.1, E 70 Series Electrodes, unless otherwise indicated.

H. Galvanizing Repair Material: ASTM A 780, zinc based alloys, zinc rich paint or zinc for spraying.
I. Steel and Iron: AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings"; if not specified otherwise, use standard mill finished structural steel shapes or bar iron.

J. Anchors and Fasteners: Where exposed, shall be of same material, color, and finish as metal to which applied. Provide zinc-coated or stainless steel fasteners for exterior use and where built into exterior walls. Select fasteners for type, grade, and class best suited for purpose.

2. Toggle Bolts: ANSI B18.2.1 and ANSI B18.5.

K. Metal Surface, General: For fabrication of work of this Section which will be exposed to view, use only those materials which are smooth and free from surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.

2.2 FABRICATION

A. Shop Fabrication: Fabricate and assemble items in shop to greatest extent possible by mechanics skilled in trade and in accordance with manufacturer's directions. Form metalwork to shape and size, with sharp lines, angles, and true curves. Fabricate work to allow for expansion and contraction of materials. Provide welding and bracing of adequate strength and durability, with tight, flush joints, dressed smooth and clean.

B. Metal Surfaces: Shall be clean and free from mill scale, flake rust and rust pitting; well formed and finished to shape and size, with sharp lines, angles, and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Use welds and flush rivets and finish flush and smooth on surfaces that will be exposed after installation. Do not use screws or bolts where they can be avoided; when used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

C. Construction: Thickness of metal and details of assembly and supports shall give strength and stiffness for minimum loads specified or indicated. Joints exposed to weather shall be formed to exclude water.

D. Fastening: Provide necessary rabbets, lugs, and brackets so that work can be assembled in a neat and substantial manner. Drill holes for bolts and screws. Form
joints exposed to weather to exclude water. Conceal fastening where possible.

E. Welding: AWS D1.1 for welding of steel. Weld to prevent permanent distortion of connected parts. Weld continuously along entire area of contact (except where tack welding is permitted. Do not tack weld exposed connections). Grind smooth visible welds in finished installation and clean welds immediately by chipping or wire brushing. Comply with OSHS, Chapter 126.

2.3 TREATMENT

A. Ferrous Metal Surfaces:

1. General: Metal fabrications made of ferrous metals shall be galvanized except items embedded in concrete and unless otherwise indicated.

B. Galvanizing:

1. Surface Preparation:
   a. Prepare surfaces as required by initial surface condition.
   b. Pre-clean steelwork utilizing an alkaline cleaner, acid pickle and flux.

2. Coating Application:
   a. ASTM A 123, galvanize steel members, fabrications, and assemblies after fabrication where practicable by the hot dip process.
   b. ASTM A 153, galvanize bolts, nuts and washers and iron and steel hardware components.
   c. ASTM A 143, safeguard products against steel embrittlement.

3. Coating Weight:
   a. ASTM A 123, paragraph 5.1 of ASTM A 123 or ASTM A 153, Table 1 as appropriate.

4. Surface Finish: Continuous, adherent, as smooth and evenly distributed as possible and free from any defect detrimental to stated end use of coated article.

5. Adhesion: Withstand normal handling consistent with nature and thickness of coating and normal use of article.

6. Treatment: Do not treat freshly galvanized or passivated surfaces with oils,
grease, or chemicals which might interfere with adhesion of subsequent paint
primers and coatings.

7. Galvanizing Repair: ASTM A 780, whenever damage exceeds 3/16 inch in
width, repair galvanized items damaged by welding cutting or by excessively
rough handling during shipping or installation. Do not heat surfaces that repair
paint has been applied to.

2.4 ANCHORAGE, FASTENINGS, AND CONNECTIONS

A. Anchorage: Provide anchorage for fastening work securely in place. Set anchors in
concrete as the work progresses and space maximum 2 feet on centers, unless
indicated otherwise. Sizes, kinds, and spacings of anchors not indicated or specified
shall be as necessary for purpose, as approved. Anchorage not otherwise specified or
indicated includes slotted inserts, expansion shields, and powder-driven fasteners,
when approved for concrete; toggle bolts and through bolts for masonry; machine and
carriage bolts for steel; through bolts, lag bolts, and screws for wood. Provide inserts
of suitable and approved types where required for support or anchorage of equipment
and finish construction. Inserts shall be gray or malleable iron castings or galvanized
steel unless indicated or specified otherwise. Slotted inserts shall be of types required
to engage with anchors, except where specified otherwise, anchors and anchor bolts in
exterior walls shall be zinc-coated and all other anchors and anchor bolts shall be as a
minimum heavily coated with bituminous paint.

B. Fastenings: Do not use wood plugs in any material. Use non-ferrous attachments for
non-ferrous metal. Make exposed fastenings of compatible materials, generally
matching in color and finish, and harmonizing with material to which fastenings are
applied. Conceal fastenings where practicable. Drill and punch to produce clean true
lines and surfaces. Countersink metalwork to receive hardware.

C. Threaded Connections: Make threaded connections up tight so that threads are
entirely concealed. Make bolted work up tight and nick threads or bush stem to
prevent loosening. Shoulder and head, dowel and pin abutting bars. Pass small bars
through larger bars and pin. Rivet, bolt, and screw heads shall be flat and
countersunk in exposed work and elsewhere as required. Machine removable
members and fit and secure by screws or bolts of proper size and approved spacing.

D. Anchors and Connecting Members: Provide in concrete or masonry as work
progresses, to avoid unnecessary cutting and drilling. Cut, fit, and drill as necessary
so materials are properly set in place and to permit engaging work to be properly
installed.

E. Design Connections: Where not shown or indicated, connection details shall be in
accordance with AISC M011 and connections shall be provided using common steel
bolts. Provide necessary holes for securing work to building. Use lock washers under

Metal Fabrications
05500-6
nuts.

F. Built-In Work: Metal work built-in with concrete or masonry shall be formed for anchorage, or be provided with suitable anchoring devices as shown or as required. Furnish metal work in ample time for securing in place as work progresses.

G. Grouting: Grout metal fabrications and anchors to assure filling of spaces and intimate contact of grouting materials with surface to be grouted. Place grout rapidly and continuously so as to avoid cold joints and voids.

2.5 TEMPLATES

A. Furnish templates, other devices and instructions necessary for the setting of anchors and anchor bolts where required to accurate locations.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which metal fabrications are to be installed. Should any condition be found unsuitable, no work shall be done until unsuitable conditions have been corrected and are acceptable to Contractor. Proceeding with work will imply acceptance of the conditions by Contractor.

3.2 PREPARATION

A. Field Verification: Verify measurements in field, as required, for work fabricated to fit job conditions. Examine adjoining work on which metal fabrication work is in any way dependent on for workmanship or fit. Provide corrective work as may be necessary.

B. Coordination: Coordinate placement of anchorage in concrete or masonry construction with other trades.

3.3 INSTALLATION

A. General: Install plumb, square, straight, rigid, and true; accurately fit with tight joints and intersections. Brace work adequately, reinforce, and anchor in place.

B. Isolation of Metals: Where dissimilar metals are in contact with one another, or with concrete, separate for prevention of corrosion by approved methods and/or materials.

C. Support and Anchors: Provide supporting members, fastenings, framing, hangers, bracing, brackets, straps, bolts, angles and similar items required to set or connect...
miscellaneous metal items including suitable anchors, expansion shields and similar items for attachment to structure. Install expansion anchor bolts as recommended by manufacturer.

D. False Work: Provide guys, braces and false work for temporary support of parts of the work and remove when work is self-supporting.

3.4 FIELD TOUCH UP

A. Provide field touch up on galvanized metals not embedded in concrete or masonry as specified under item "Galvanizing Repair."

B. Provide field touch up on ungalvanized metals not embedded in concrete or masonry as specified under Section 09900-Painting.

C. After erection, prime bolts, anchors, field welds and abrasions with same primer as used for metal work.

END OF SECTION
SECTION 09900
PAINTING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing of paints for aboveground exposed steel junction boxes.

1.2 RELATED DOCUMENTS

The General Provisions of the Contract, including General and Special Provisions and General Requirements of the Specifications, apply to the work specified in this section.

1.3 SUBMITTALS

A. Schedule of Finishes

1. 4 sets of proposed painting finish schedules shall be submitted to the Engineer for approval.

B. Color Samples

1. 3 sets of each color Finish sample shall be submitted to the Engineer for approval.

2. After the color finish sample has been approved, one set of color finish samples painted onto 8-1/2"x 11" cardboard shall be submitted to the Engineer. The cardboard shall be divided into 4 horizontal strips and painted as follows:

a. Prime 3 strips starting from the bottom.

b. 1st coat bottom 2 strips.

c. 2nd coat bottom strip.

C. Schedule of Operations

1. Before work on the project is commenced, 4 complete sets of a work schedule showing his sequence of operations and dates shall be submitted by the Contractor to the Engineer.

D. Guarantee
1. 3 copies of a written guarantee shall be submitted to the Engineer.

1.2 ANALYZING AND TESTING

All paints shall be subject to laboratory tests whenever the Engineer deems necessary to determine conformation to the requirements of these specifications. Cost of testing will be borne by the State. All rejected materials shall be removed from the job site immediately. Surfaces painted with rejected material shall be redone at no additional cost to the State.

1.4 GUARANTEE

A. The Contractor shall guarantee that the work performed under this section conforms to the contract requirements and is free of any defect of material or workmanship performed by the Contractor. Such guarantee shall continue for a period of 2 years from the date of project acceptance during which period the Contractor shall remedy at his own expense any such failure to conform or any such defect.

B. The State shall notify the Contractor in writing within a reasonable time after discovery of any failure or defect.

C. Should the Contractor fail to remedy any failure or defect described in Paragraph A above within 10 working days after receipt of notice thereof, the State shall have the right to repair or otherwise remedy such failure or damage at the Contractor's expense.

1.5 SPECIAL REQUIREMENTS

A. Codes

1. The Contractor shall comply with the State OSHL (Occupational Safety and Health Law) and all pollution control regulations of the State Department of Health.

2. Any violations of the above regulations or codes shall be dealt with as mentioned in the Special Provisions Section and the Environmental Protection Section of these specifications.

B. Protection

1. Persons

a. The Contractor shall take all necessary precautions to protect public pedestrians including tenants from injury.
b. The Contractor shall provide, erect and maintain safety barricades around scaffolds, hoists and wherever Contractor's operations create hazardous conditions in order to properly protect the public and tenants.

2. Completed Work: The Contractor shall provide all necessary protection for wet paint surfaces.

3. Protective Covering: The Contractor shall provide and install protective covering over furniture, equipment, floor and other areas that are not scheduled for treatment. Protective covering shall be clean sanitary drop cloth or plastic sheets. Paint applied to surfaces not scheduled for treatment shall be completely removed and surfaces shall be returned to original condition.

4. Safeguarding of Property: The Contractor shall take whatever steps may be necessary to safeguard his work and also the property of the State and other individuals in the vicinity of his work area during the execution of this Contract. He shall be responsible for and make good on any and all damages and for losses to work or property caused by his or his employee's negligence. Also see "Protection of Property" in the Special Provision Section.

5. Fire Safety: The Contractor shall direct his employees not to smoke in the vicinity and exercise precautions against fire at all times. Waste rags, plastic (polyester sheets), empty cans, etc. shall be removed from the site at the end of each day.

C. Storage Area for Materials: No paint material, empty cans and paint brushes and rollers may be stored in buildings, but shall be stored in separate storage facilities away from the buildings.

The Contractor may furnish a job site storage facility. Such facility shall comply with requirements of the local Fire Department. The storage area shall be kept clean and facility shall be locked when not in use or when no visual supervision is possible.

D. Right of Rejection: The Engineer shall have the right to reject all work which is not in compliance with the plans and specifications. Rejected work will be redone at no additional cost to the State.

E. Sequence of Operations: The sequence of operations shall divide the surfaces into work areas and present a schedule for:

1. Surface preparation and spot prime.
2. Prime coat.
3. First finish coat.
4. Second finish coat.

F. Inspection and Approvals: The Contractor shall obtain written approval from the Engineer upon completion of each phase of work (phases of work are: surface preparation and spot prime, prime, first finish coat, second finish coat) before proceeding into the next phase work. The Contractor shall give the Engineer one day (24 hours minimum) advance notice of completion of any phase of work for an area only when he deviates from the previously-submitted work schedule. The Contractor shall provide necessary access to areas to be inspected.

Failure to obtain approval of any phase of work for a work area may result in redoing the operation at no cost to the State.

PART 2 - PRODUCTS

2.1 PROHIBITION OF HAZARDOUS MATERIALS

A. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

B. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.

2.2 PAINTS

A. Materials shall be equal in quality to that specified under the Schedule of Finishes and any given finish shall be as labeled by one manufacturer.

B. All materials shall be delivered to the job site in undamaged original containers bearing the manufacturer's label and shall be stored in such a manner as to prevent damage. All rejected materials shall be removed from the job site immediately.

C. Fuller O'Brien paint is indicated for standard of quality and color, only. Comparable high quality top line paints manufactured by Devoe, Benjamin Moore, Sinclair, Spectra-Tone or approved equal.

D. Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's printed specifications. Compound thinnet, mineral oil, kerosene, refined linseed oil, or gasoline shall not be used for thinning.

E. Except for metal primers, all paint shall contain mildewcide equal in strength to 2 oz. of Super Ad-It per gallon of paint pre-mixed by supplier.

Painting
09900-4
F. The supplier shall submit a signed certification that the paint materials contains mildewcide equal in strength to 2 oz. of Super Ad It.

2.3 SCHEDULE OF FINISHES

A. The Schedule of finishes is made for the convenience of the Contractor and indicates the types and quality of finished to be applied to the surfaces.

B. Any surface not specifically noted in the finish schedule shall be finished to match adjoining work.

2.4 SCHEDULE - EXTERIOR SURFACES

A. Steel - Galvanized (Fuller O'Brien Specifications)

1. Pretreatment - 321-60 Vinyl wash primer
2. First Coat - 221-12 Zinc rich primer
3. Second Coat - 312-XX Heavy duty enamel
4. Third Coat - 312-XX Heavy duty enamel

B. Color of paints shall be as approved by the Engineer.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Ferrous Metal and Galvanized Metal:

1. Remove from surface to be painted all foreign matter such as tape, gum, and burrs.
2. Remove all rust to bare metal. Remove all loose, blistered, scaled, crazed, chalky finish to a tight and firm finish.

3.2 AINT APPLICATION

A. General

1. All work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.
2. All materials shall be applied in accordance with the manufacturer's

Painting
09900-5
specifications and the finished surfaces shall be free from runs, sags, drops, ridges, waves, laps, streaks, brush marks and variations in color, texture and finish (glossy or dull). The coverage shall be complete and each coat shall be so applied as to produce a film of uniform thickness. No paint, varnish or enamel shall be applied until the preceding coat is thoroughly dry and approved.

3. No exterior painting of unprotected surfaces shall be done in rainy, damp weather. Coats shall be applied only to surfaces that are thoroughly dry.

B. Application: Shall be by brush or roller only. Airless spraying may be permitted, but only with the approval of the Engineer for otherwise inaccessible areas.

C. Colors: Each coat shall be tinted a different shade from the preceding coat. Colors shall be as selected by the Engineer.

D. All surfaces adjacent to areas being finished shall be protected and left clean of paints, stains, etc. Clean drop cloths shall be used until completion of job.

E. All mixing shall be done outside the building.

3.3 LEAN-UP

A. During the progress of the work, all debris, empty crates, waste, drippings, etc. shall be removed by the Contractor and the grounds about the areas to be painted shall be left clean and orderly at the end of each work day.

B. Upon completion of the work, staging, scaffolding, containers and all other debris shall be removed from the site. All paint, shellac, oil, or stains splashed or spilled upon adjacent surfaces not requiring treatment (hardware, fixture, floor, glass) shall be removed and the entire job left clean and acceptable.

END OF SECTION
<table>
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<tr>
<th>DESCRIPTION</th>
<th>NO. OF PAGES</th>
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<td>Surety Performance Bond</td>
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<tr>
<td>Right of Entry</td>
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</tbody>
</table>
RIGHT-OF-ENTRY

The successful bidder will not be required to execute a right-of-entry form for entry into the proposed well site during construction. The Engineering Division will obtain for the successful bidder the right-of-entry for entry into the proposed well site.
LOCATION MAP

Kahuku Point

Kaena Point

North

SCALE IN THOUSAND FEET

ENGINEERING DIVISION
FOR
COMMISSION ON WATER RESOURCE MANAGEMENT

JOB NO. G55C018B

WAIMALU DEEP MONITOR

AIEA, OAHU, HAWAII
T.M.K.: 9-8-11: 006
ACT 177, SLH 2002, ITEM D-4C

INDEX

DESCRIPTION
TITLE SHEET
SITE PLAN, WELL SECTION & DETAILS
CHAIN LINK FENCE DETAILS

SHEET NO.
1
2
3

APPROVED:

ERNEST Y.W. OAU, DEPUTY
COMMISSION ON WATER RE
DEPARTMENT OF LAND AN
1. FOOTING DETAIL

WALK GATE DETAIL

SIDE DETAIL

SCALE: N.T.S.

3" MAX.
1'-3" MIN.

PIPE POST

3" MAX.
1'-3" MIN.

CONC. FOOTING

6'-0" MAX.
6'-0" MIN.
1'-3" DIA. MIN.

GATE POST

3" MAX.
1'-3" MIN.

CONC. FOOTING

3" MAX.
1'-3" MIN.

FABRIC BAND

1/4" GALV. ROD

GUIDE FOR PADLOCK

2" TOP RAIL

1/4" TOP RAIL

2" LINE POST

1/4" TOP RAIL

2" GALV. ROD

2" GALV. WIRE

TIES 24" O.C.

GALV. STEEL WIRE

2" #8 GAUGE

CHAIN LINK MESH

TRUSSED AND BRACED TO PREVENT SAG. FRAMES MAY BE WELDED. WHERE WELDING IS DONE, TOUCH UP JOINT AREA WITH "GALVICON" OR EQUAL APPLIED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. WALK GATE FRAMES SHALL BE CROSS-TRUSSED WITH 3/8-INCH ADJUSTABLE TRUSS RODS.

GATE HINGES TO PERMIT GATE TO SWING IN TOWARDS ENCLOSURE 180 DEGREES AND SHALL BE OF CYCLONE HEAVY DUTY DOUBLE CLAMPING OFFSET TYPE OR EQUAL. WALK GATE TO BE FURNISHED WITH LOCK KEEPER AND GUIDE FOR PADLOCK AS SHOWN ON THIS DRAWING.

PADLOCK TO BE FURNISHED BY THE CONTRACTOR.

5. SELVAGE WIRE

PROVIDE NO. 8 GAUGE GALVANIZED Coil SPRING STEEL WIRE OF GOOD COMMERCIAL QUALITY WIRE WOVEN ALONG BOTTOM OF FENCE.

6. GALVANIZING

ALL PARTS OF FENCE AND GATES ABOVE AND BELOW GROUND SHALL BE NEW AND HEAVILY GALVANIZED BY HOT-DIP PROCESS.

7. BARBED WIRE

PROVIDE THREE LINES OF 4-POINT PATTERN, EACH COMPOSED OF TWO STRANDS OF 12 1/2 GAUGE GALVANIZED WIRE AT 5" MINIMUM SPACING.

LINE POSTS: 2 1/2-INCH PIPE, 5.79 LBS. PER LINEAL FOOT.
GATE POSTS: 2 1/2-INCH PIPE, 5.79 LBS. PER LINEAL FOOT.
CORNER POSTS: 2 1/2-INCH PIPE, 5.79 LBS. PER LINEAL FOOT.

LINE POSTS SPACED NOT OVER 10 FEET APART, UNLESS OTHERWISE SPECIFIED.
FASTEN FABRIC TO POSTS WITH GALVANIZED STEEL WIRE, SPACED 12-INCHES APART. ALL POSTS SHALL BE FITTED WITH APPROVED TOPS.

SET POSTS TRUE TO LINE AND GRADE AND EMBED IN CONCRETE FOOTINGS AS SHOWN ON THIS DRAWING. TOP OF CONCRETE FOOTINGS SHALL BE TROWELLED SMOOTH AND SLOPED TO SHED WATER. FORM TOP 6-INCHES OF FOOTINGS. CONCRETE SHALL BE 2,500 P.S.I.

FENCE POST FOOTING DEPTH SHALL BE MEASURED FROM EXISTING GROUND.

3. TOP RAILS 7 BRACES

TOP RAILS: 1 1/4-INCH PIPE, 2.27 LBS. PER LINEAL FOOT.
BRACES: 1 1/4-INCH PIPE, 2.27 LBS. PER LINEAL FOOT.
FASTEN FABRIC TO RAIL AND BRACES WITH GALVANIZED STEEL WIRE NO. 12 GAUGE, SPACED 24-INCHES APART, EXCEPT AS SHOWN ON THIS DRAWING. THE TOP RAIL SHALL BE PROVIDED WITH GALVANIZED COUPLINGS APPROXIMATELY EVERY 20 FEET.

4. GATES

PROVIDE GATES AS SHOWN ON DRAWING WITH SUITABLE BACKSTOPS FOR HOLDING THE GATE IN OPEN POSITION.

FRAMES: 1 1/2-INCH PIPE, 2.72 LBS. PER LINEAL FOOT, JOINED BY HEAVY MALLEABLE OR PRESSEL STEEL FITTINGS, RIGIDLY TRUSSED AND BRACED TO PREVENT SAG. FRAMES MAY BE WELDED. WHERE WELDING IS DONE, TOUCH UP JOINT AREA WITH "GALVICON" OR EQUAL APPLIED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. WALK GATE FRAMES SHALL BE CROSS-TRUSSED WITH 3/8-INCH ADJUSTABLE TRUSS RODS.

GATE HINGES TO PERMIT GATE TO SWING IN TOWARDS ENCLOSURE 180 DEGREES AND SHALL BE OF CYCLONE HEAVY DUTY DOUBLE CLAMPING OFFSET TYPE OR EQUAL. WALK GATE TO BE FURNISHED WITH LOCK KEEPER AND GUIDE FOR PADLOCK AS SHOWN ON THIS DRAWING.

PADLOCK TO BE FURNISHED BY THE CONTRACTOR.
Deep Monitoring Well
Site Selection Report
Waimalu Gulch Well, Waimalu,
Oahu, Hawai‘i
Job Number G55CO18B

Prepared for:
State of Hawai‘i, Department of
Land & Natural Resources,
Commission for Water Resources
Development

May 16, 2003
1.0 INTRODUCTION

In order to provide information on the long-term changes of the salt-to-fresh-water transition zone underneath Hawai‘i, State of Hawaii, Department of Land and Natural Resources (DLNR) the Commission on Water Resources Management (CWRM) and have constructed a series of deep monitoring wells. Currently, DLNR has contracted with URS Corporation to site, design and monitor the construction of three of these wells, located at (1) Wailuku (Iao) near Wailuku, Maui, (2) Pearl Harbor (Ewa-Kunia Mauka 2 ) near Kunia, Oahu, and (3) Waimalu Gulch near Waimalu, Oahu. Each well site is the subject of a separate site report, in this case, the Waimalu Gulch deep-monitoring well that will monitor the Waimalu Aquifer System of the Pearl Harbor Sector. Currently, there are four other deep-monitoring wells in the Pearl Harbor Sector.

2.0 SITE SELECTION REPORT

2.1 Location

The well will be constructed in Central Oahu (Figure 1 & 2), at the end of the paved section of Kilinoe Street about 1.3 miles northeast of the mouth (East Loch of Pearl Harbor) of Waimalu Stream. The land is owned by the Mr. Wallace Lean and currently unused. Access to the site is by the dirt road continuation of Kilinoe Street, approximately 0.9 miles west northeast of the intersection of Kilinoe and Kaahele Streets. The City & County of Honolulu Tax Map location is TMK (1) 9-8-11:6. The site is located on US Geological Survey topographic map, Waipahu 1983 7.5-minute quadrangle, 1:24,000 scale.

The site is located on the west side of Waimalu Gulch, an incised channel dissecting the slopes of the Koolau Range, directly northeast of the East Loch of Pearl Harbor. The USGS topographic map indicates an elevation at the site of about 60 ft above mean seal level (MSL). During a February 2003 site visit, a handheld global positioning system (GPS) measurement indicated that the most probable location for the well was:

<table>
<thead>
<tr>
<th>UTM NAD 83</th>
<th>610214m E</th>
<th>2366616m N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Hawaiian</td>
<td>609926m E</td>
<td>2366823m N</td>
</tr>
<tr>
<td>Lat/Long</td>
<td>21.39842°N</td>
<td>157.93672°W</td>
</tr>
</tbody>
</table>

Waimalu Gulch is the main drainage way for surface water in the region and is a perennial stream. The gulch discharges to the East Loch of Pearl Harbor a little more than a mile downstream of the site.

URS
Currently, the land surrounding the well site is developed housing downstream on the north side of the creek and undeveloped at the site and south of the creek. Within the gulch and near the site, a mixed community of ruderal (weedy), or invasive vegetation has established itself.

2.2 Geology

The site is located within the dissected toe of the Koolau Range slopes as it meets the north shore of Pearl Harbor. During the Pleistocene Epoch, interacting sea level rise and subsidence of the island generated an interbedded series of marine sedimentary, coral reef and terrestrial alluvium between the existing Waianae and Koolau Mountains. In late Pleistocene to Holocene times, eruptive activity of the Honolulu Volcanics added tuffaceous and volcanoclastic beds to this sequence, principally in the eastern and southern margins (Walker 1990).

Basalts underlying the region are Koolau Basalt units and younger Honolulu volcanoes are unlikely this far west. The Pliocene Koolau Basalt shield-stage, flow units are typically thin, with flow thickness of about 10 feet and few interbedded soils. Outcrops adjacent to the well site include mostly a’a lavas with some pahoehoe units. The over lying sedimentary sequence, informally called the “Caprock” in local reports, wedges out against the Koolau basalts in the eastern Pearl Harbor/Waimalu area. Tuffaceous layers are locally thick in the eastern section due to its proximity to the Salt Lake eruptive complex. The Caprock section is primarily composed of interbedded carbonate sands and weathered basaltic alluvium. Oki (1998) distinguishes a low permeability, older alluvium unit comprising deposits of the initial erosion of the Koolau shield volcano that fills deep stream valleys. It is possible that this unit may be locally significant below Waimalu Stream.

On top of the basalts are variable thicknesses of local sediments, volcanic ash and weathered basalt. Reddish-brown, clayey silt with scattered boulders are found near the well site. Soils formed in the well site area are, clayey silt and silty clay loam. Zones of saprolite, eroded and chemically weathered basalt with interbedded basaltic boulders are found in nearby areas (Dames & Moore 1983). The well site, however, is located adjacent to Waimalu Stream and significantly deeper soil and alluvium (including the older alluvium) could be present at the site.

2.3 Hydrogeology

The site lies over the Waimalu Aquifer System of the Pearl Harbor Sector as defined by Mink and Lau (1990). The Pearl Harbor Sector extends from near Mililani southeasterly and southwesterly to East Honolulu and Ewa, respectively. The delineation of the Pearl Harbor
Sector is based upon the separation of the high-level or dike-impounded bedrock aquifers, as described by Dale and Takasaki (1976) and Mink and Lau (1990).

The high-level aquifers are maintained at relatively high potentiometric head behind impoundments. The impoundments restrict horizontal flow and result from dikes or other cross cutting, low permeability volcanic units. The Schofield High Level Water Body is presumably separated from the aquifers of the Pearl Harbor Sector by an unknown and approximately located cross cutting feature, termed the Southern Groundwater Dam by Dale and Takasaki (1976). However, recharge to the Pearl Harbor Sector aquifers is thought by Mink (1980) to probably cross this boundary, with additional recharge coming from direct precipitation and leakage across the unconformity with the Koolau series basalts.

The Waimalu aquifer system includes the southeastern most water-bearing units of the Pearl Harbor Sector and includes subsurface sedimentary and volcanic rocks that extend from the crest of the Koolau Mountains to the East Loch of Pearl Harbor. The western boundary of the Waimalu aquifer system, abutting the Waipahu/Waiawa Aquifer System, is not as distinct but follows an arcuate line from the Koolau Mountains to East Loch. The eastern boundary of the aquifer is defined by low-permeability alluvium filling the pre Holocene, Halawa Valley.

Ground water in the Waimalu aquifer system is unconfined and flowing to the southwest (Visher and Mink 1964, Oki 1998). However along the base of the terrace, conditions shift to artesian as ground water is confined by carbonate sedimentary units of the Caprock. A series of springs is found along the northeastern shores of Pearl Harbor, including Waiau and Waimanu Springs near the mouth of Waimalu Gulch, which at one time flowed at between 25 and 12 million gallons/day (Visher and Mink 1964).

Ground water near the well site is found at 4.62 ft deep, or +18.38 ft MSL in elevation according to USGS records (late 1970s). The latest measurement from well 2256-10 near Aiea Bay give an artesian water level of +15 ft MSL, about 5 ft above the surface. Declines in water levels in the Pearl Harbor region are reported by Soroos and Ewart (1979) at about 7 ft between 1958 and 1978. The middle of the transition zone in this area is projected to be about -850 ft MSL at well T-67, east of Waimalu Gulch on the shore of East Loch (Visher & Mink 1964). The Ghyben-Herzberg model (Bear 1979) suggests a transition zone midpoint of about -640 ft MSL at the Waimalu Gulch site Using the modeled elevation, this predicts a total depth for the new well of 1010 feet bgs or -940 ft MSL to fully penetrate the transition zone (60 ft site elevation - (-650 ft transition zone elevation - 300 ft additional depth).
3.0 LAND STATUS

3.1 Land Ownership

The site of the deep monitoring well is owned by Mr. Wallace K. Lean but is surrounded by land owned by the State of Hawai‘i and leased to Mr. Lean.

3.2 Tax Assessment Valuation

According to the City and County of Honolulu (CCH) Department of Planning and Permitting, the taxed valuation of the well site is $16,100.

4.0 CONSULTATIONS

4.1 State Historic Preservation Department (SHPD)

Appendix 2 contains a copy of the letter sent to Ms. Holly McEldowney, Acting Administrator of SHPD, describing the proposed well site and asking for concurrence of no impact to cultural or historic properties. The response from Ms McEldowney is also included, indicating the agreement of the SHPD in this finding.

4.2 Zoning Authority

The site is zoned R-5, residential, and the property is currently unused, although leased property adjacent includes a gamecock farm.

4.3 Floodplain Management Section

The site is located on FEMA Flood Insurance Rate Map 15003C0245 E, effective date 11/20/2000 and falls in Flood Hazard Zone D, indicating areas in which the flood hazard is undetermined.
5.0 PERMITTING NEEDS

5.1 Stream Channel Alteration Permit (SCAP)

According to Mr. David Higa of CWRM, a SCAP would only be needed if the drilling altered the bank or bed of the stream. Waimalu Gulch is located a few yards from the drill site. However, the site is not in the stream and it is not anticipated that there will be a need to alter the bed or banks of the stream. At this time, no SCAP is anticipated.

5.2 Building Permit

According to CCH Department of Planning and Permitting, a building permit will not be needed if the wellhead concrete pad is not over 30 inches above grade, or if the well is not plumbed or equipped with an external, electrical pump (turbine-type). Since the well will not be used for production, there is no need for either a pump or pad and a building permit is not needed. A grading/grubbing permit will not be needed since the expected disturbance will be less than 50 cu. yds. of cut or fill and 3 ft. in vertical height at its deepest point.

5.3 Conservation District Use Permit (CDUP)

According to the most recent GIS maps developed by the State of Hawai‘i, Office of Planning, the proposed well site is not in a Conservation District.

5.4 Environmental Assessment (EA) or Environmental Impact Statement (EIS)

This project is categorically excluded from the need for an EA or EIS under the Comprehensive Exemption List dated 9/19/84 for the Department of Land and Natural Resources, as approved by the Environmental Quality Commission. The specific exemption of this project falls under category 5,

"Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource."

A copy of the exemption memo is included in Appendix 2.
5.5 Special Management Area Permit (SMAP)

According to the most recent GIS maps developed by the State of Hawai‘i, Office of Planning, the proposed well site is not in a Special Management Area.

5.6 Commission for Water Resource Management Well Construction Permit

A well construction permit will be required by CWRM and will need to include all relevant location, drilling and construction data.

The Well Completion Report form accompanying the application for the permit will contain the specific details on the well construction. The well construction specifications put to bid will contain a stipulation requiring that the drilling contractor accurately complete this form for submittal to CWRM upon completion of the well.
Deep Monitoring Well Program

Figure 1 - Waimalu Site

- Approximate Location of Well Site
- TMK Boundaries

Base map from USGS 7.5'

URS
Figure 2 – Well Site Vicinity, Waimalu Gulch Deep-Monitoring Well
6.0 REFERENCES

Bear, J, 1979, Dynamics of fluids in porous media. Elsevier, New York


Dames and Moore, 1983, Soils investigation, proposed Our Savior Lutheran Church and School, Waimalu, Oahu, Hawaii: Geotechnical report for private client, 6 p.


APPENDIX 1
LOCAL WELL LOGS
<table>
<thead>
<tr>
<th>cross section of boring</th>
<th>Elevation of Strata referred to</th>
<th>depth below ground surface</th>
<th>thickness of strata</th>
<th>sample</th>
<th>data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Job: Recasing of Well 194**

for C.S. Alaka

Boring-No.

Location: Aiea

Record: 12

Date drilled: SEPT 11, 1947

Driller

Drilling method

Diameter of hole

Remarks:

This well had been flowing into open pit from which water was pumped for irrigation purposes only. It was deemed to use same for domestic purposes as Bd. of Health required tight cover to above ground level. Well now capped with 6" galv. steel pipe.

By: Ha Whitton

Copy to: U.S.G.S., Bd. of Health
Well 195

Clov. 29.86 ft.

Final ground level after bulldozing

Present ground level

#3 fine rocks

6 ft. Top of cement

3/4" galvanized pipe

8" casing

83.7 ft. End of 8" casing

Sand

91.5" Top of beach sand

92" Top of #3 fine rocks

#3 fine rocks

337 ft.

Top of #3 coarse rocks

#3 coarse rocks

6" galvanized pipe

347" bottom of 6" pipe

355.7 ft. Bottom of well

Perforations in 6" pipe

2-4-58

2.4-58 SW
Well 195 - 1A  
(C & C Waimalu No. 1)  
Description of well cuttings collected by Samson and Smock, Ltd.

<table>
<thead>
<tr>
<th>Description</th>
<th>Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light gray, fine-grained basalt, weathered in part</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Medium to light gray, fine-grained, dense basalt, weathered in part</td>
<td>10 - 32</td>
</tr>
<tr>
<td>Medium gray, dense, fine-grained basalt</td>
<td>32 - 36</td>
</tr>
<tr>
<td>Pale red, weathered, fine-grained, very vesicular basalt; small vesicles. Some medium gray dense, fine-grained basalt</td>
<td>36 - 89</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt</td>
<td>89 - 95</td>
</tr>
<tr>
<td>Drab to pale brown clay; few fragments of fresh, gray, fine-grained basalt</td>
<td>95 - 110</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt; some fragments of yellow to red, weathered basalt</td>
<td>110 - 114</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt and gray, fine-grained very vesicular basalt</td>
<td>114 - 120</td>
</tr>
<tr>
<td>Medium gray, weathered, very vesicular basalt</td>
<td>120 - 140</td>
</tr>
<tr>
<td>Same as 120 - 140 except less weathered and with some gray, fine-grained, dense basalt</td>
<td>140 - 194</td>
</tr>
<tr>
<td>Medium gray, fine-grained, generally dense basalt, few vesicles</td>
<td>194 - 211</td>
</tr>
<tr>
<td>Medium to dark gray, fine-grained, dense basalt</td>
<td>211 - 231</td>
</tr>
<tr>
<td>Dark gray basalt; drilled to silt size particles</td>
<td>231 - 248</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt</td>
<td>248 - 250</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt and brown, fine-grained, very vesicular basalt</td>
<td>250 - 273</td>
</tr>
<tr>
<td>Medium gray to reddish brown, fine-grained basalt; some small vesicles</td>
<td>278 - 310</td>
</tr>
</tbody>
</table>
SAMSON AND SMOCK, LTD.
HONOLULU 6, HAWAII

January 6, 1956

U. S. Geological Survey
Federal Building
Honolulu, Hawaii

Attention: Mr. Howard S. Leak, District Engineer

Gentlemen:

We enclose a copy of the log of the well drilled and completed recently for the Waimalu Development Co., Ltd., at Waimalu, Oahu.

Very truly yours,

SAMSON AND SMOCK, LTD.

Walter H. Samson
Manager

WHS: hs
Encl
LOG OF WELL (No. 195-1) DRILLED
FOR WAIMALU DEVELOPMENT CO., LTD.
AT WAIMALU, OAHU

Well started: October 20, 1954
Well completed: December 20, 1954

Formation:

0' to 1.5' = Rock and soil fill
1.5' to 10' = Boulder
10' to 16' = Boulder and loose decayed rock
16' to 18' = Decayed rock
18' to 24' = Boulder
24' to 25' = Decomposed rock
25' to 30' = Boulder
30' to 32' = Medium hard decayed rock
32' to 35' = Boulder
35' to 36' = Medium hard rock
36' to 38' = Soft decomposed rock
38' to 39' = Medium hard rock
39' to 45' = Medium hard decayed rock
45' to 60' = Soft decayed rock, mixed with little clay
60' to 67' = Medium hard decayed rock
67' to 76' = Soft decayed rock
76' to 86' = Medium hard decayed rock
86' to 89' = Medium hard porous rock
89' to 95' = Hard boulder
95' to 100' = Soft decayed rock
100' to 103' = Medium hard rock
103' to 105' = Soft decayed rock
105' to 114' = Hard rock
114' to 115' = Hard rock, soft on one side
115' to 120' = Hard rock
120' to 126' = Soft red rock
126' to 128' = Soft red rock mixed with gray rock
128' to 140' = Soft rock
140' to 146' = Medium hard rock
146' to 164' = Soft red rock - conglomerate
164' to 172' = Hard rock
172' to 177' = Medium hard rock
177' to 181' = Hard rock
181' to 194' = Soft red rock
194' to 198' = Medium hard rock
198' to 206' = Medium hard porous rock
206' to 211' = Soft red rock
211' to 225' = Medium hard rock
225' to 227' = Hard rock
227' to 231' = Medium hard rock
231' to 248' = Hard rock
248' to 250' = Medium hard rock
250' to 273' = Soft red rock
273' to 278' = Medium hard rock
278' to 279' = Hard rock
279' to 296' = Medium hard rock
296' to 310' = Soft red rock - mix
310' to 316' = Soft rock
316' to 327' = Medium hard rock

Casing: 129 feet of 12" I.D. casing
Well 195-1 A

Location- On south side of Waimalu Gulch, 0.55 mile northeast (mauka) of Kamehameha Highway, and 1.2 miles northwest of Aiea.

Owner- Waimalu Development Company.

Altitude- 102 ft.


Diameter- 12 inches (i.d.)

Depth- 327 ft.

Casing- 129 ft.

Head- Dec. 27, 1954, 20.31 ft.

Chloride- Dec. 27, 1954, 58 p.p.m. (average for 7 samples taken during 2-hr. pumping test).

Use- Municipal supply.

Capacity- Tested by pumping, Dec. 27, 1954, at the rate of 325 g.p.m. with a drawdown of 0.81 ft.

Bench Mark- 8-6.56 46 ppm

Log

0' to 1.5' Rock and soil fill
1.5' to 10 Boulder
10 to 16 Boulder and loose decayed rock
16 to 18 Decayed rock
18 to 24 Boulder
24 to 25 Decomposed rock
25 to 30 Boulder
30 to 32 Medium hard decayed rock
32 to 35 Boulder
35 to 36 Medium hard rock
36 to 38 Soft decomposed rock
38 to 39 Medium hard rock
39 to 45 Medium hard decayed rock
45 to 60 Soft decayed rock, mixed with little clay
60 to 67 Medium hard decayed rock
67 to 76 Soft decayed rock
76 to 86 Medium hard decayed rock
86 to 89 Medium hard porous rock
89 to 95 Hard boulder
95 to 100 Soft decayed rock
100 to 103 Medium hard rock
103 to 105 Soft decayed rock
105 to 114 Hard rock
114 to 115 Hard rock, soft on one side
115 to 120 Hard rock
120 to 126 Soft red rock
126 to 128 Soft red rock mixed with gray rock
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 to 140</td>
<td>Soft rock</td>
</tr>
<tr>
<td>146 to 150</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>150 to 164</td>
<td>Soft red rock - conglomerate</td>
</tr>
<tr>
<td>164 to 172</td>
<td>Hard rock</td>
</tr>
<tr>
<td>172 to 177</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>177 to 181</td>
<td>Hard rock</td>
</tr>
<tr>
<td>181 to 194</td>
<td>Soft red rock</td>
</tr>
<tr>
<td>194 to 198</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>198 to 206</td>
<td>Medium hard porous rock</td>
</tr>
<tr>
<td>206 to 211</td>
<td>Soft red rock</td>
</tr>
<tr>
<td>211 to 225</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>225 to 227</td>
<td>Hard rock</td>
</tr>
<tr>
<td>227 to 231</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>231 to 240</td>
<td>Hard rock</td>
</tr>
<tr>
<td>240 to 250</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>250 to 273</td>
<td>Soft red rock</td>
</tr>
<tr>
<td>273 to 279</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>279 to 296</td>
<td>Hard rock</td>
</tr>
<tr>
<td>296 to 310</td>
<td>Medium hard rock</td>
</tr>
<tr>
<td>310 to 316</td>
<td>Soft red rock - mix</td>
</tr>
<tr>
<td>316 to 327</td>
<td>Soft rock</td>
</tr>
</tbody>
</table>

**Bottom of well (ft) = 225**

**Bottom of casing (ft) = 216.3**
Well 195 - 1B  
(C & C Waimalu Well 2)

Description of well cuttings collected by Samson and Smock, Ltd.

<table>
<thead>
<tr>
<th>Description</th>
<th>Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium to light gray, fine-grained, dense basalt</td>
<td>0 - 13</td>
</tr>
<tr>
<td>Brown clay with fragments of light gray, dense basalt</td>
<td>13 - 32</td>
</tr>
<tr>
<td>Medium gray to brownish gray, fine-grained basalt with numerous vesicles</td>
<td>32 - 46</td>
</tr>
<tr>
<td>Medium gray, fine-grained, very vesicular basalt</td>
<td>46 - 67</td>
</tr>
<tr>
<td>Medium gray, fine-grained basalt with many brown to red partly weathered fragments</td>
<td>67 - 86</td>
</tr>
<tr>
<td>Medium gray, fine-grained, very vesicular, weathered basalt</td>
<td>86 - 97</td>
</tr>
<tr>
<td>Medium gray, fine-grained, generally dense basalt</td>
<td>97 - 120</td>
</tr>
<tr>
<td>Dark gray, fine-grained, generally dense basalt</td>
<td>120 - 132</td>
</tr>
<tr>
<td>Sample drilled to powder, probably same as 120 - 132</td>
<td>132 - 137</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt; with some drab to brown basalt</td>
<td>137 - 163</td>
</tr>
<tr>
<td>Dark gray, fine-grained, dense basalt with fragments of red basalt</td>
<td>163 - 170</td>
</tr>
<tr>
<td>Dark gray, fine-grained, dense basalt</td>
<td>170 - 262</td>
</tr>
<tr>
<td>Medium gray, fine-grained basalt; drilled to powder</td>
<td>268 - 300</td>
</tr>
</tbody>
</table>
U. S. Geological Survey
Federal Building,
Honolulu, Hawaii

Attention: Mr. Howard S. Leak

Gentlemen:

We enclose copies of drill logs for the following wells recently drilled and completed:

1. Well No. 2 for Waimalu Development Co., Ltd., at Waimalu, Oahu

2. Salt-water well for swimming pool use for Allan Renton on his property at 3165 Diamond Head Road.

Very truly yours,

SAMSON AND SMOCK, LTD.

Walter H. Samson
Manager

WHSH: hs
Encl. 2
LOG OF WELL NO. 2 DRILLED FOR WAIMALU DEVELOPMENT CO., LTD. AT WAIMALU, OAHU

June 8 - 27, 1955

Formation:

0' to 2' = Small loose boulders
2' to 13' = Boulders
13' to 32' = Boulders and clay
32' to 46' = Boulders
46' to 50' = Clay
50' to 54' = Boulders
54' to 67' = Clay and boulders
67' to 71' = Medium hard decayed rock
71' to 78' = Soft decayed rock
78' to 82' = Medium hard decayed rock
82' to 86' = Soft decayed rock
86' to 94' = Medium hard puka puka rock
94' to 97' = Soft rock
97' to 101' = Medium hard rock
101' to 107' = Hard rock
107' to 111' = Medium hard rock
111' to 115' = Boulders
115' to 122' = Hard rock
122' to 125' = Soft red rock
125' to 131' = Soft rock
131' to 145' = Hard rock
145' to 163' = Soft rock
163' to 167' = Hard rock
167' to 177' = Medium hard rock
177' to 188' = Soft rock
188' to 195' = Medium hard rock, soft in places
195' to 225' = Medium hard rock
225' to 228' = Hard rock
228' to 233' = Medium hard rock
233' to 241' = Hard rock
241' to 268' = Medium hard rock
268' to 279' = Hard rock
279' to 284' = Medium hard rock
284' to 298' = Hard rock
298' to 300' = Medium hard rock
300' to 304' = Soft rock
304' to 327' = Medium hard rock

Casing: 12" I.D.
Length of Casing: 127 feet
Water Level: 82' 4"

Note: No pump test was run in this well.
Formation:

0' to 2' - Small loose boulders
2' to 15' - Boulders
13' to 32' - Boulders and clay
32' to 46' - Boulders
46' to 50' - Clay
50' to 54' - Boulders
54' to 67' - Clay and boulders
67' to 71' - Medium hard decayed rock
71' to 73' - Soft decayed rock
78' to 82' - Medium hard decayed rock
82' to 86' - Soft decayed rock
86' to 94' - Medium hard pukapuka rock
94' to 97' - Soft rock
97' to 101' - Medium hard rock
101' to 107' - Hard rock
107' to 111' - Medium hard rock
111' to 115' - Boulders
115' to 122' - Hard rock
122' to 125' - Soft red rock
125' to 131' - Soft rock
131' to 145' - Hard rock
145' to 163' - Soft rock
163' to 167' - Hard rock
167' to 177' - Medium hard rock
177' to 188' - Soft rock
188' to 195' - Medium hard rock, soft in places
195' to 225' - Medium hard rock
225' to 228' - Hard rock
228' to 233' - Medium hard rock
233' to 241' - Hard rock
241' to 268' - Medium hard rock
268' to 279' - Hard rock
279' to 284' - Medium hard rock
284' to 299' - Hard rock
299' to 300' - Medium hard rock
300' to 304' - Soft rock
304' to 327' - Medium hard rock

Wells A & B equipped with Smithway deep-well pumps
Test Hole (T-52)  
(Honolulu BWS Waimalu Test Hole)  

Description of well cuttings collected by Samson and Smock, Ltd.

<table>
<thead>
<tr>
<th>Description</th>
<th>Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray, fine-grained, weathered basalt</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Gray, fine-grained, weathered basalt with fragments of very vesicular gray weathered basalt</td>
<td>10 - 40</td>
</tr>
<tr>
<td>Dark gray to dark reddish brown, fine-grained, partly weathered basalt</td>
<td>40 - 50</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt</td>
<td>50 - 68</td>
</tr>
<tr>
<td>Light to dark gray, fine-grained, dense basalt</td>
<td>68 - 75</td>
</tr>
<tr>
<td>Light to dark gray, fine-grained, dense basalt with reddish brown weathered basalt</td>
<td>75 - 85</td>
</tr>
<tr>
<td>Gray, fine-grained, partly weathered basalt</td>
<td>85 - 95</td>
</tr>
<tr>
<td>Dark gray to reddish brown, very vesicular, weathered basalt; generally small vesicles</td>
<td>95 - 135</td>
</tr>
<tr>
<td>Gray to reddish brown basalt; some red to yellow clayey material; few olivine grains</td>
<td>135 - 145</td>
</tr>
<tr>
<td>Gray, fine-grained, dense, olivine-rich basalt; somewhat weathered</td>
<td>145 - 155</td>
</tr>
<tr>
<td>Gray, fine-grained, olivine-rich basalt and dark gray to reddish brown fine-grained basalt; all somewhat weathered</td>
<td>155 - 161</td>
</tr>
<tr>
<td>Dark reddish brown clay with some fragments of basalt as in 155 - 161</td>
<td>161 - 172</td>
</tr>
<tr>
<td>Description</td>
<td>Depth (feet)</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Medium to light gray, fine-grained, olivine-rich basalt; generally dense;</td>
<td>172 - 178</td>
</tr>
<tr>
<td>somewhat weathered</td>
<td></td>
</tr>
<tr>
<td>Indeterminate sample</td>
<td>178 - 190</td>
</tr>
<tr>
<td>Medium to dark gray, fine-grained basalt, olivine rich in part</td>
<td>190 - 260</td>
</tr>
<tr>
<td>Light brownish red, fine-grained basalt in large fragments; appears to be</td>
<td>260 - 270</td>
</tr>
<tr>
<td>clinker</td>
<td></td>
</tr>
<tr>
<td>Dark gray to medium gray, fine-grained basalt</td>
<td>270 - 285</td>
</tr>
<tr>
<td>Medium to dark gray, fine-grained basalt with some small olivine grains</td>
<td>285 - 296</td>
</tr>
<tr>
<td>Brown, fine-grained vesicular basalt; small vesicles</td>
<td>296 - 298</td>
</tr>
<tr>
<td>Medium gray, very fine-grained, generally dense basalt</td>
<td>298 - 313</td>
</tr>
<tr>
<td>Medium gray, fine-grained, dense basalt and medium gray to reddish brown,</td>
<td>313 - 321</td>
</tr>
<tr>
<td>fine-grained, very vesicular basalt</td>
<td></td>
</tr>
</tbody>
</table>
Oahu T-52
LOG OF OBSERVATION WELL DRILLED
FOR C & C BOARD OF WATER SUPPLY
AT WAIMALU VALLEY, OAHU

Started: September 28, 1955
Completed: November 25, 1955

Formation:
0' to 12' = Clay and boulders
12' to 25' = Porous gray ledge rock
25' to 40' = Ledge rock
40' to 51' = Medium hard ledge rock
51' to 68' = Medium hard rock
68' to 95' = Soft ledge rock
95' to 100' = Hard rock
100' to 133' = Medium hard rock
133' to 144' = Red rock
144' to 173' = Clay and gravel
173' to 182' = Hard cracked rock
182' to 186' = Medium hard red rock
186' to 196' = Hard rock
196' to 231' = Medium hard rock
231' to 255' = Soft rock with hard streaks
255' to 264' = Medium hard rock
264' to 270' = Medium hard red rock
270' to 289' = Medium hard rock
289' to 293' = Hard rock
293' to 296' = Medium hard rock
296' to 298' = Medium hard red rock
298' to 304' = Medium hard rock
304' to 313' = Hard rock
313' to 318' = Medium hard pukapuka rock
318' to 321' = Hard pukapuka rock

Casing: 179' 10" of 16" O.D. casing
**RECORD OF WELL**

<table>
<thead>
<tr>
<th>Well No.:</th>
<th>Oahu T-52 &quot;Upper Waialu Well&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner:</td>
<td>City &amp; County, Board of Water Supply</td>
</tr>
<tr>
<td>Location:</td>
<td>Waialu Valley</td>
</tr>
</tbody>
</table>

| Name of District:   | Ewa District                     |
| Latitude and Longitude: | Lat. 21°24'16", Long. 157°55'43" |
| Date drilled:       | Nov. 1955                        |
| Drilled by:         | Samson & Smock, Ltd.             |
| Aquifer:            | Basalt of Koolau volcanic series, Pliocene (?) age |
| Altitude (ft.):     | Land-surface datum is 168 feet above msl. |
| Depth (ft.):        | 321 feet                         |
| Diameter (inches):  | 16 inches                        |
| Depth of casing (ft.): | 180 feet, perforations 170 to 180 feet. |
| Use of Well:        | USGS Observation well.           |
| Use of Water:       |                                  |
| Recording gage installed (date): | August 1956                      |
| Recording gage installed by: | City & County, Board of Water Supply |
| Description of Measuring Point: | B.M. = top of casing, elev. 162.13 ft. |
| Remarks:            | Water level records furnished by C&G, B.W.S. |

*Corrected Nov. 1964.*
## AHU WELL 197-3 RECORD OF WELL

1. Location: State  
   County  
   Nearest P. O.  
   Direction from P. O.  
   Distance from P. O.  miles;  ¼ sec., T., R.  
   If in city, give street and number  

2. Owner: K. Minami Ltd  
   Address  
   Driller: REV. Sanders  
   Address Pacific Drilling Co. Ltd  

3. Situation: Is well on upland, in valley, or on hillside?  
   IN VALLEY  

4. Elevation of top of well: 129 ft. ABOVE the level of  
   Sea  

5. Type of well: DRILLED  
   Kind of drilling rig used ROTARY  
   (Dug, driven, bored, or drilled)  
   (Sea, depot, lake, or stream)  

6. Depth of well: 206 ft.; year in which well was finished 1958  
   Does well enter bed? YES; if so, at what depth? 70 ft.; kind of rock LAVA  
   Diameter: At top 7½ inches; at bottom 4½ inches.  

7. Principal water bed: SAND  
   Depth to principal water bed 14.3 ft.; thickness of bed 17 ft.  
   If other water supplies were found, give depth to each  

8. Casings: Kind STEEL; size 4; length 140 ft.; between depths of 0 and 140 ft.  
   Kind ; size ; length ft.; between depths of and ft.  
   Kind ; size ; length ft.; between depths of and ft.  
   Packers (if any): Depth at which packers were used ; kind  
   Screen or Strainer: Was well finished with screen? ; kind  
   Screen or Strainer length of screen ft.; diameter inches; size of openings  

9. Head: Does well at present overflow without pumping? NO; did it overflow when new? NO;  
   if flowing, give pressure lb. per sq. inch; or height water will rise in a pipe ft. above surface;  
   original pressure or head ; if not flowing, give water level in well ft. below surface.  

10. Pump: Is the well pumped? ; kind of pump ; kind of power  
   size or capacity of pump ; kind of power  

11. Yield: Natural flow at present (if any) gallons per minute; original flow gallons per minute;  
   well has been pumped at gallons per minute continuously for hours;  
   quantity of water ordinarily obtained from well gallons per day.  

12. Use: For what purpose is the water used?  

13. Quality of the water: FRESH; is there an analysis? NO  
   Hard or soft, fresh or salty, etc.)  
   Temperature of water ° F.  

14. Cost of well, not including pump:  
   Name of person filling blank W. R. Craddock  
   Date 4/24/54  
   Address 2511 Kaimuki Ave. ST.
Well 197-3

Location: On lot B, parcel 14, in Waimalu Gulch, 0.7 mile northeast (mauka) of Oahu Sugar Co.'s pumping station No. 4 (well 197) and 1.5 miles north of Aiea. Tax key: 9-8-11.

Owner: K. Minami.

Altitude: 128 ft.

Drilled: July, 1958 by Pacific Drilling Co.

Diameter: 4 in.

Depth: 206 ft.

Casing: 140 ft.

Head: July 9, 1958, 19.4 ft.

Chloride: July 9, 1958, 35 p.p.m.

Use: Piggery water supply.

Bench mark: Top of concrete pump base, 0.2 ft. above the ground; altitude, 128.43 ft.

Log:
0 - 2 ft. Clay and boulders
24 - 55  Grey lava rock
55 - 70  Brown and red cinder
70 - 79  Grey lava rock
79 - 85  Cinder
85 - 105 Grey lava rock
105 - 110 Decomposed cinder
110 - 113 Grey lava rock
113 - 160 Red and brown cinder
160 - 170 Grey lava rock (decomposed)
170 - 175 Red, brown and black cinder
175 - 187 Blue rock
187 - 190 Cinder
190 - 206 Blue rock

9-10-58
S.W.
### Records of Drilled Wells on Oahu

#### Observations—Well 196 (Continued)

<table>
<thead>
<tr>
<th>Date</th>
<th>Head (ft.)</th>
<th>Chloride (p.p.m.)</th>
<th>Date</th>
<th>Head (ft.)</th>
<th>Chloride (p.p.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>1962</td>
<td>21.6</td>
<td>Dec.</td>
<td>1932</td>
<td>34.1</td>
</tr>
<tr>
<td>Jun.</td>
<td>1962</td>
<td>21.6</td>
<td>Jan.</td>
<td>1933</td>
<td>23.9</td>
</tr>
<tr>
<td>Jul.</td>
<td>1962</td>
<td>23.9</td>
<td>Feb.</td>
<td>1934</td>
<td>23.9</td>
</tr>
<tr>
<td>Aug.</td>
<td>1962</td>
<td>21.6</td>
<td>Mar.</td>
<td>1934</td>
<td>21.8</td>
</tr>
<tr>
<td>Sep.</td>
<td>1962</td>
<td>23.9</td>
<td>Apr.</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Oct.</td>
<td>1962</td>
<td>21.6</td>
<td>May</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Nov.</td>
<td>1962</td>
<td>23.9</td>
<td>June</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Dec.</td>
<td>1962</td>
<td>21.6</td>
<td>July</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Aug.</td>
<td>1962</td>
<td>23.9</td>
<td>Sep.</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Oct.</td>
<td>1962</td>
<td>21.6</td>
<td>Nov.</td>
<td>1934</td>
<td>21.6</td>
</tr>
<tr>
<td>Nov.</td>
<td>1962</td>
<td>23.9</td>
<td>Dec.</td>
<td>1934</td>
<td>21.6</td>
</tr>
</tbody>
</table>


#### Logs

<table>
<thead>
<tr>
<th>Well</th>
<th>Depth (ft.)</th>
<th>Well D</th>
<th>Depth (ft.)</th>
<th>Well E</th>
<th>Depth (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well A 1</td>
<td>0-35</td>
<td>Blue sand (Pa.)</td>
<td>0-45</td>
<td>Blue rock (Tkb.)</td>
<td>0-65</td>
</tr>
<tr>
<td>Brown rock (Pa.)</td>
<td>35-649</td>
<td>Soft blue rock (Pa or Tkb.)</td>
<td>42-110</td>
<td>Blue rock (Tkb.)</td>
<td>65-959</td>
</tr>
<tr>
<td>Clay (Pa or Tkb.)</td>
<td>349-354</td>
<td>Blue rock (Tkb.)</td>
<td>72-120</td>
<td>Blue rock (Tkb.)</td>
<td>95-150</td>
</tr>
<tr>
<td>Blue rock (Tkb.)</td>
<td>249-300</td>
<td>Soft blue rock (Tkb.)</td>
<td>79-150</td>
<td>Blue rock (Tkb.)</td>
<td>110-190</td>
</tr>
<tr>
<td>Clay (Pa or Tkb.)</td>
<td>352-359</td>
<td>Blue rock (Tkb.)</td>
<td>85-150</td>
<td>Blue rock (Tkb.)</td>
<td>115-190</td>
</tr>
<tr>
<td>Blue rock (Tkb.)</td>
<td>249-300</td>
<td>Soft blue rock (Tkb.)</td>
<td>90-150</td>
<td>Blue rock (Tkb.)</td>
<td>120-190</td>
</tr>
<tr>
<td>Blue rock (Tkb.)</td>
<td>249-300</td>
<td>Soft blue rock (Tkb.)</td>
<td>95-150</td>
<td>Blue rock (Tkb.)</td>
<td>125-190</td>
</tr>
<tr>
<td>Soft blue rock (Tkb.)</td>
<td>352-359</td>
<td>Blue rock (Tkb.)</td>
<td>100-150</td>
<td>Blue rock (Tkb.)</td>
<td>130-190</td>
</tr>
<tr>
<td>Blue rock (Tkb.)</td>
<td>249-300</td>
<td>Soft blue rock (Tkb.)</td>
<td>105-150</td>
<td>Blue rock (Tkb.)</td>
<td>135-190</td>
</tr>
<tr>
<td>Blue rock (Tkb.)</td>
<td>249-300</td>
<td>Soft blue rock (Tkb.)</td>
<td>110-150</td>
<td>Blue rock (Tkb.)</td>
<td>140-190</td>
</tr>
</tbody>
</table>

**Logs**
### RECORDS OF DRILLED WELLS ON OAHU

**Logs—Well 197 (Continued)**

<table>
<thead>
<tr>
<th>Well F</th>
<th>Depth (ft.)</th>
<th>Color (Tkb)</th>
<th>Depth (ft.)</th>
<th>Color (Tkb)</th>
<th>Depth (ft.)</th>
<th>Color (Tkb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolders (Pa)</td>
<td>0-45</td>
<td>Blue rock (Tkb)</td>
<td>330-350</td>
<td>Slab (Pa)</td>
<td>0-70</td>
<td>June</td>
</tr>
<tr>
<td>Clay (Pa)</td>
<td>45-70</td>
<td>Blue rock (Tkb)</td>
<td>350-367</td>
<td>Soft blue rock (Pa or Tkb)</td>
<td>70-83</td>
<td>Sept.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>70-150</td>
<td>Blue rock (Tkb)</td>
<td>475-500</td>
<td>Blue rock (Tkb)</td>
<td>83-99</td>
<td>Rev.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>120-135</td>
<td>Blue rock (Tkb)</td>
<td>475-500</td>
<td>Soft rock (Tkb)</td>
<td>99-114</td>
<td>Oct.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>135-145</td>
<td>Blue rock (Tkb)</td>
<td>505-510</td>
<td>Blue rock (Tkb)</td>
<td>114-121</td>
<td>Nov.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>175-185</td>
<td>Blue rock (Tkb)</td>
<td>96-126</td>
<td>Soft blue rock (Tkb)</td>
<td>121-141</td>
<td>Jan.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>185-215</td>
<td>Blue rock (Tkb)</td>
<td>141-151</td>
<td>Blue rock (Tkb)</td>
<td>151-176</td>
<td>Feb.</td>
</tr>
<tr>
<td>Bolders (Pa)</td>
<td>215-235</td>
<td>Blue rock (Tkb)</td>
<td>176-194</td>
<td>Soft rock (Tkb)</td>
<td>176-194</td>
<td>Mar.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>235-250</td>
<td>Blue rock (Tkb)</td>
<td>194-200</td>
<td>Blue rock (Tkb)</td>
<td>200-204</td>
<td>Apr.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>245-255</td>
<td>Blue rock (Tkb)</td>
<td>204-224</td>
<td>Soft blue rock (Tkb)</td>
<td>224-235</td>
<td>May</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>225-235</td>
<td>Blue rock (Tkb)</td>
<td>235-245</td>
<td>Soft blue rock (Tkb)</td>
<td>245-255</td>
<td>June</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>245-255</td>
<td>Blue rock (Tkb)</td>
<td>255-265</td>
<td>Soft blue rock (Tkb)</td>
<td>265-276</td>
<td>July</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>265-275</td>
<td>Blue rock (Tkb)</td>
<td>295-305</td>
<td>Soft blue rock (Tkb)</td>
<td>305-315</td>
<td>Sept.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>275-285</td>
<td>Blue rock (Tkb)</td>
<td>315-325</td>
<td>Soft blue rock (Tkb)</td>
<td>325-335</td>
<td>Oct.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>285-295</td>
<td>Blue rock (Tkb)</td>
<td>335-345</td>
<td>Soft blue rock (Tkb)</td>
<td>345-355</td>
<td>Nov.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>295-305</td>
<td>Blue rock (Tkb)</td>
<td>355-365</td>
<td>Soft blue rock (Tkb)</td>
<td>365-375</td>
<td>Dec.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>305-315</td>
<td>Blue rock (Tkb)</td>
<td>375-385</td>
<td>Soft blue rock (Tkb)</td>
<td>385-395</td>
<td>Jan.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>315-325</td>
<td>Blue rock (Tkb)</td>
<td>395-405</td>
<td>Soft blue rock (Tkb)</td>
<td>405-415</td>
<td>Feb.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>325-335</td>
<td>Blue rock (Tkb)</td>
<td>415-425</td>
<td>Soft blue rock (Tkb)</td>
<td>425-435</td>
<td>Mar.</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>335-345</td>
<td>Blue rock (Tkb)</td>
<td>435-445</td>
<td>Soft blue rock (Tkb)</td>
<td>445-455</td>
<td>Apr.</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>345-355</td>
<td>Blue rock (Tkb)</td>
<td>455-465</td>
<td>Soft blue rock (Tkb)</td>
<td>465-475</td>
<td>May</td>
</tr>
<tr>
<td>Soft blue rock (Tkb)</td>
<td>355-365</td>
<td>Blue rock (Tkb)</td>
<td>475-485</td>
<td>Soft blue rock (Tkb)</td>
<td>485-495</td>
<td>June</td>
</tr>
<tr>
<td>Blue rock (Tkb)</td>
<td>365-375</td>
<td>Blue rock (Tkb)</td>
<td>495-505</td>
<td>Soft blue rock (Tkb)</td>
<td>505-515</td>
<td>July</td>
</tr>
</tbody>
</table>

### Observations

**Bench mark, same as plantation bench mark which is stamped 25 ft. about 50 ft. below ground level, 24-51 ft.**

<table>
<thead>
<tr>
<th>Date</th>
<th>Head (L)</th>
<th>Chloride (p.p.m.)</th>
<th>Date</th>
<th>Head (L)</th>
<th>Chloride (p.p.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar. 30, 1910</td>
<td>159</td>
<td>217</td>
<td>July 15, 1921</td>
<td>152</td>
<td>217</td>
</tr>
<tr>
<td>Dec. 21, 1911</td>
<td>157</td>
<td>16.3</td>
<td>Aug. 15, 1921</td>
<td>161</td>
<td>16.3</td>
</tr>
<tr>
<td>Nov. 15, 1912</td>
<td>197</td>
<td>16.3</td>
<td>Oct. 1, 1921</td>
<td>176</td>
<td>16.3</td>
</tr>
<tr>
<td>Sept. 23, 1913</td>
<td>197</td>
<td>24.2</td>
<td>Oct. 10, 1921</td>
<td>256</td>
<td>24.2</td>
</tr>
<tr>
<td>Aug. 15, 1914</td>
<td>197</td>
<td>28</td>
<td>Nov. 15, 1922</td>
<td>185</td>
<td>28</td>
</tr>
<tr>
<td>Nov. 5, 1914</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
</tr>
<tr>
<td>Sept. 5, 1915</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
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<tr>
<td>Sept. 20, 1915</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
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<tr>
<td>Sept. 16, 1915</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
</tr>
<tr>
<td>Nov. 15, 1916</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
</tr>
<tr>
<td>Apr. 8, 1917</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
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<tr>
<td>May 15, 1919</td>
<td>197</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
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</tr>
<tr>
<td>June 5, 1919</td>
<td>22.4</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
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</tr>
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<td>June 15, 1919</td>
<td>22.4</td>
<td>28</td>
<td>May 9, 1923</td>
<td>232.5</td>
<td>28</td>
</tr>
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<td>Depth Feet</td>
<td>Strata</td>
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Oahu Well 197-I

484 feet deep
40 ft. casing
### Well No. 7

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516 feet deep

130 ft. casing.

W.S. Lowe

Oahu well 197-G and H

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504 feet deep

76 ft. casing.
### Well No. 5

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<td>33</td>
<td>Clay</td>
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<td>Gravel</td>
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405 ft. deep.

503 feet deep.

48 ft. casing.

### Well No. 6

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</table>

503 feet deep.

88 ft. casing.

Oahu Well 197-E and F
WAIALU WELLS, HONOLULU PLANTATION CO.
PUMPING PLANT NO. 4.

For well at pumping plant No. 4 in Waialua Gulch.

Well No. 1. A

Depth Feet.  Strata.

35  Boulders (older alluvium)
213  Clay
1  Brown rock
11  Clay (Koolau Gneiss)
3  Blue rock
1  Clay
13  Blue rock
8  Red rock
7  Blue clay
34  Blue rock
3  Blue clay
8  Blue rock
11  Clay (Pali, Kamehameha Rd.)
13  Blue rock
25  Soft blue rock
15  Blue rock
9  Water rock
17  Blue rock
5  Water rock
30  Blue rock
8  Blue rock
8  Blue rock
3  Red rock
122  Blue rock
3  Red rock
55  Blue rock
15  Brown rock
10  Blue rock
5  Red rock
22  Blue rock
12  Red rock
31  Blue rock
12  Water rock
38  Blue rock
50  Water rock
75  Blue rock
5  Red clay
25  Blue rock

955 feet deep.

200 foot casing.

Oahu Well 197-A and D.
APPENDIX 2
LETTERS OF CONSULTATION AND OTHER SUPPORTING DOCUMENTS
March 4, 2003

Dr. Mark T. Murphy, RG
Project Manager
URS Corporation
615 Piikoi Street, Ninth Floor
Honolulu, Hawaii 96814

Dear Dr. Murphy:

SUBJECT: Chapter 6E-8 Historic Preservation Review – DLNR CWRM Installation of 8-Inch Diameter Monitoring Wells at Ewa-Kunia and Waimalu Gulch O‘ahu
Honouliuli, and Waimalu, ‘Ewa, O‘ahu
TMK: (1) 9-2-004:001, (1) 9-8-011:006

Thank you for the opportunity to comment on the proposed installation of 8-inch diameter monitoring wells at Honouliuli and Waimalu O‘ahu. The borings for well construction will be completed using a truck-mounted reverse circulation rotary drill rig. An approximately 50-foot square area would be disturbed during construction of the wells. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the project areas. We received notification of this undertaking from your office on February 25, 2003, and provide the following comments.

Ewa-Kunia Mauka
The proposed monitoring well is located within an area that was commercially cultivated which altered the land for many years. Because it is unlikely that significant historic sites will be found in the area, we believe that this action will have “no effect” on any significant historic sites.

Waimalu
According to you, the proposed monitoring well is located directly off Kilinoe Street within an existing subdivision in Waimalu gulch. A review of our records shows that there are no known historic sites at this location; therefore, we believe that this action will have “no effect” on any significant historic sites.

Should you have any questions, please feel free to call Sara Collins at [redacted] or Elaine Jourdane at [redacted]

Aloha,

P. Holly McEldowney
P. Holly McEldowney, Acting Administrator
State Historic Preservation Division

EJ:jk
24 February 2003

P. Holly McEldowney, Acting Administrator
State Historic Preservation Division
555 Kakuhihewa Building
601 Kamokila Boulevard
Kapolei, HI 96707

Subject: Pre-Consultation Letter
Installation of Three Deep Wells
TMKs (9) 9-2-004:001, (9) 9-8-011:006, and (2) 3-5-002:003

Dear Ms. McEldowney:

URS Corporation has been contracted by the State of Hawaii Department of Land and Natural Resources Commission on Water Resource Management (CWRM) to design and install three 8-inch diameter monitoring wells. As part of the scope of work, URS is assisting the CWRM in selecting locations for the three proposed deep wells (Exhibits A, B, and C-1). Details of the proposed wells are provided in the table below.

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Island</th>
<th>TMK</th>
<th>Approximate Depth (feet below ground surface)</th>
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<td>800 - 1,000</td>
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<tr>
<td>Waimalu Gulch</td>
<td>Oahu</td>
<td>9-8-011:006</td>
<td>100 - 200</td>
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<tr>
<td>Iao</td>
<td>Maui</td>
<td>3-5-002:003</td>
<td>800 - 1,000</td>
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</table>

According to the City and County of Honolulu Department of Planning and Permitting website, the current State Land Use of the proposed Ewa-Kunia Mauka and Waimalu Gulch parcels are agricultural and urban district, respectively, and the current zoning is restricted agricultural and residential district, respectively (City and County of Honolulu, 2003). The current zone of the proposed Iao well is agricultural (Maui County, 2003). The current State Land Use for the Iao well is mostly agricultural, with a small portion to the northeast for urban (Maui County Zoning Department, 2003).
Borings drilled for well construction would be completed using a truck-mounted reverse-circulation rotary drill rig. The wellhead would consist of a metal pipe centered in a 7-foot square concrete pad, extending about a foot above ground surface, and covered by a locking cap. During construction, a 50-foot square area would be disturbed down to a few inches by vehicle tires and the temporary storage of construction materials. The drilling contractor may construct a small pit (10 ft x 10 ft x 3 ft) to mix and store drilling fluids (mostly clay and water). Photographs of the proposed Ewa-Kunia Mauka and Waimalu Gulch well installation locations are attached with this letter as Photographs 1 and 2. Currently, a photograph of the Iao proposed well location is unavailable. An example of the planned surface well completion is presented as Photograph 3. Each well will take approximately two to three weeks to install.

The Ewa-Kunia Mauka proposed well location is a few feet off of an existing pineapple road. The Waimalu Gulch proposed well location is directly off of Kilinoe Street. The Iao proposed well location is at a Maui Department of Water Supply booster station, and access is expected via a county road. URS expects vegetation will be cleared only at the Waimalu Gulch proposed location.

URS is not aware of any historical features present at the proposed locations for the deep well installations. None of the three proposed well locations appeared on the State Historic Preservation Division online Historic Register, when searched for by TMK (State Historic Preservation Division, 2003). The discovery of native Hawaiian remains is not anticipated during well installation activities. URS seeks the State Historic Preservation Division's concurrence that either historic properties are not present on the above referenced TMKs, or that this undertaking will have no adverse affect on any historical properties present.

Sincerely,

URS Corporation

Dr. Mark T. Murphy, RG
Project Manager

(MM/DRPS)
Attachments:  Exhibit A. Iao Deep Monitor Well Location Map
Exhibit B. Ewa Kunia Mauka Deep Monitor Well
Exhibit C-1. Location Map Waimalu Gulch Deep Monitor Well
Photograph 1. Ewa-Kunia Mauka Deep Monitor Well Proposed Location
Photograph 2. Waimalu Gulch Deep Monitor Well Proposed Location
Photograph 3. Example of Proposed Well Surface Completion
References
Exhibit A. Iao Deep Monitor Well Location Map, Near Wailuku, Maui at the Maui DWS 670' Booster Station, Kulikahi Drive
Exhibit B. Ewa Kunia Mauka Deep Monitor Well TMK 9-2-4:1
Exhibit C-1. Location map Waimalu Gulch Deep Monitor Well TMK 9-8-11:6
Photograph 1. Ewa-Kunia Mauka Deep Monitor Well Proposed Location

Photograph 2. Waimalu Gulch Deep Monitor Well Proposed Location
Photograph 3. Example of Proposed Well Surface Completion
REFERENCES


Maui County, Zoning Department, 2003. Personal Communication with Trisha. 20 February.

COMPREHENSIVE EXEMPTION LIST
for the
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
as approved by the
ENVIRONMENTAL QUALITY COMMISSION

September 19, 1984

Pursuant to EIS Regulation 1:33, the following types of actions, where they fall within the given classes of action, shall generally be exempt from requirements regarding preparation of an environmental assessment, negative declaration, or EIS:

Exemption Class #1: Operations, repairs or maintenance of existing structures, facilities, equipment or topographical features, involving negligible or no expansion or change of use beyond that previously existing.

1. Repairs which are necessary to maintain existing structures and facilities used in the irrigation systems at Waimanalo, Oahu; Waimea-Lalamilo, Hawaii; and Molokai. Cutting of trees which are threatening to damage existing structures, facilities and waterways in the irrigation systems. Performing maintenance trimming of brush, removing and depositing sediment and debris in order to open the waterways for irrigation systems.

2. Repairs and improvements which are necessary to maintain in a useful condition the existing access roads and road structures (such as culverts and bridges) to the minimum width required for the operation of vehicles used in the operation and maintenance of irrigation systems.

3. Repairs which are necessary to maintain existing office buildings, control buildings, warehouses, paint sheds, baseyards, grounds, water treatment plants, and other existing facilities used in the existing water systems.

4. Repair, operate and maintain existing pumps and controls, pipes and channels in the same location in order to maintain service in existing water systems. Repair existing electrical and telemetering systems used to operate water facilities, equipment, and appurtenances in existing water systems. Repair existing diversions and intake structures, including
valves, gates, and intake boxes in order to collect or improve the collection at the location of the existing water source diversion works.

5. Repair and maintenance of existing trails and roads leading to data collection stations.

6. Vegetation Clearing from Streams

Work under this exemption would be performed by the Division of Water and Land Development or its contractor on improved and unimproved drainage ditches, swales and streams under the Department of Land and Natural Resources' jurisdiction. Work would involve cutting and removing brush, grass and debris and occasional small trees or bushes to restore channel capacity. The equipment to be used by the contractor or division work crew would include sickles, cane knives, power saw, or tractor with cutting blade attachment. Vegetation and debris would be hauled by truck to an approved sanitary landfill site, or allowed to remain on site where feasible for use as compost.

The herbicide, RODEO, will be applied directly to foliage growing on the banks of stream channels and to emergent foliage growing in fresh and brackish bodies of water. All herbicides will be used under the following conditions:

a. Label instructions will be strictly adhered to.

b. Herbicides will not be used in Kahana Stream, Punalu Stream, or Kaluanui Stream, Koolauloa, Oahu; Wailoa River, Waiakea Fish Pond, Lokoaka Fish Pond and the Wailuku Watershed, Island of Hawaii; and such additional streams or bodies of water as may be identified through consultation with the respective county government, environmental organizations, and the U.S. Fish and Wildlife Service.

Soil disturbance would be minimal, if any, and all work would be confined within the right-of-way.

Exemption Class #2: Replacement or reconstruction of existing structures and facilities where the new structure will be located generally on the same site
1. Replace or reconstruct existing pumps and controls, pipe and channels in the same location and to a size commensurate with the existing system and source capacities to provide service in existing water systems.

2. Replace or reconstruct existing roads and road structures to the minimum width required for the operation of vehicles used in the operation and maintenance of water systems. Roads shall be single-lane with passing turnoffs approximately one mile apart or at the beginning and end of dangerous sections or streams or gully crossings.

3. Replace or reconstruct existing structures, buildings and facilities to the same size and for the same purpose as their existing use in the irrigation systems at Waimanalo, Oahu; Waimea-Lalamilo, Hawaii; and Molokai. Replace or reconstruct existing electrical and telemetering systems to perform the same operational tasks of operating water facilities, equipment and appurtenances in existing water systems.

4. Reconstruction of existing diversions and intake structures, including valves, gates, and intake boxes in order to collect or improve the collection at the location of the existing water source diversion works.

Exemption Class #5: Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.

1. Construction of gaging stations to measure streamflow and flood crest in streams in accordance with the prescribed method and practices of the U.S. Geological Survey. Installation of climatological stations to collect data on climatology, all in accordance with the method and practices of the National Weather Service.

2. Construction of test wells not more than 8 inches in diameter to provide ground truth for water resources investigations, the suggested size will enable the
aquifer to be tested for its physical, chemical, biological qualities, as well as providing a pumping test to determine the specific capacity of the aquifer. Test wells shall not be developed to serve water unless an EIS or negative declaration is prepared.

**Exemption Class #6:** Continuing administrative activities, such as purchases for supplies and personnel-related actions.

Requests for federal assistance under Title III of the U.S. Water Resources Planning Act. Grants thus obtained will be used for developing comprehensive water and related land resources plans.

**Exemption Class #7:** Construction or placement of minor structures accessory to existing facilities.

1. Fencing for water facilities.
2. Minor driveways.
3. Installation of exterior lights in already developed areas for security and safety purposes.
4. Water tanks with less than 10,000 gallon capacity.
5. Roof top water catchments.
6. Lines and water faucets for site use only.

**Exemption Class #9:** Demolition of structures, except those structures located on any historic site as designated in the National Register or Hawaii Register as provided for in the Historic Preservation Act of 1966, Public Law 89-665, or Chapter 6, Hawaii Revised Statutes.

Construction required to seal artesian wells which have been abandoned or are leaking. This is a positive means of preventing the wastage of ground water supplies.
NOTE: As stipulated by EIS Regulation 1:33(b), all exemptions under this list are inapplicable when the cumulative impact of planned successive actions of the same type, in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.
ADDITION TO EXEMPTION LIST

for the

Division of Water and Land Development
Department of Land and Natural Resources
as approved by the Environmental Council
September 19, 1984

Pursuant to EIS Regulation 1:33, the following type of action, where it falls within the given class of action, shall generally be exempted from the preparation of an EIS or Negative Declaration.

Exemption Class #1: operations, repairs or maintenance of existing structures, facilities, equipment or topographical features, involving negligible or no expansion or change of use beyond that previously existing.

Item: Vegetation Clearing from Streams

Work under this exemption would be performed by the Division of Water and Land Development or its contractor on improved and unimproved drainage ditches, swales and streams under the Department of Land and Natural Resources' jurisdiction. Work would involve cutting and removing brush, grass and debris and occasional small trees or bushes to restore channel capacity. The equipment to be used by the contractor or division work crew would include sickles, cane knives, power saw, or tractor with cutting blade attachment. Vegetation and debris would be hauled by truck to an approved sanitary landfill site, or allowed to remain on site where feasible for use as compost.

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additional streams or bodies of water as may be identified through consultation with the respective county government, environmental organizations, and the U.S. Fish and Wildlife Service.

Soil disturbance would be minimal, if any, and all work would be confined within the right-of-way.

As stated in the EIS Regulation 1:33b, all exemptions under this item are inapplicable when the cumulative impact of planned successive actions of the same type, in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.
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* THE HORIZONTAL DISPLACEMENT AT THE DEPTH OF *
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* 1060.0 FEET EQUALS 4.77 FEET AT 328.74 *
* ***************************************************** *

*********************************************************************************************************************************
JOB NUMBER: 
WELL NAME: DLNR
LOCATION: KAPOLEI, HAWAII
SURVEY DATE: APRIL 26, 2005
SURVEY ENGINEER: DEAN MCLURE
MAGNETIC DECLINATION: 09.92E TRUE NORTH

*************************************************
** DEPTH MEASURED IN FEET **
*************************************************

COMMENTS: COMBINATION OF OPEN HOLE SURVEY AND INSIDE DRILLPIPE SURVEY

*************************************************
** THIS DIRECTIONAL SURVEY REPORT IS ****
** CORRECT TO THE BEST OF MY KNOWLEDGE ****
** AND IS SUPPORTED BY ACTUAL FIELD DATA! ****
*************************************************

*************************************************
** COMPANY REPRESENTATIVE **
*************************************************
CLOSURE-VIEW VERTICAL CROSS SECTION

WELLBORE NAVIGATION, INC.
VERTICAL CROSS SECTION
FOR
VALLEY WELL DRILLING
WELL NAME: DLNR
JOB NUMBER:
DATE: APRIL 26, 2005
V. SCALE: 100 FT./INCH
H. SCALE: 1 FT./INCH

\[ \text{L} = 77 \text{ FT.} \]
Final Summary of Drilling and Hydrogeologic Conditions for Waimalu Deep Monitor Well No. 2456-05
Aiea, Oahu, Hawaii

Prepared for:
The Commission on Water Resource Management, Department of Land and Natural Resources, State of Hawaii

Prepared by:
URS Corporation

January 4, 2006
January 4, 2006

Mr. Kevin Gooding, Assistant State Geologist
P.O. Box 621
Honolulu, HI 96809

Subject: Final Summary of Drilling and Hydrogeologic Conditions
Waimalu Deep Monitor Well No. 2456-05
Aiea, Oahu, Hawaii
Job Number G55CO18B

Dear Mr. Gooding:

URS Corporation is pleased to present five copies of this Summary of Drilling and Hydrogeologic Conditions prepared for the Waimalu Deep Monitor Well No. 2456-05.

If you have any questions or comments, please call us at [redacted]

Very truly yours,

URS Corporation

Debra R.P. Stiffel
Project Manager

John Kronen, Ph.D.
Geologist

cc: Dennis Imada, DLNR Engineering Branch (2 copies)
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1.0 SYNOPSIS

1.1 Well Location and Description

The Waimalu Deep Monitor Well No. 2456-05 (Site, Waimalu Well) was constructed for the State of Hawaii, Department of Land and Natural Resources (DLNR), Commission on Water Resource Management (CWRM), Job Number G55CO18B. The land is owned by the State of Hawaii and has a land classification of conservation, but the land use is classified as urban district. Access to the site is via a dirt road at the end of Kilinoe Street.

The Waimalu Well is located just south of the rising Koolau volcanic flanks, and north of the coastal physiographic province including Pearl Harbor (Figure 1). The chosen site for drilling the Waimalu Well is in a flat area at the bottom of Waimalu Valley, situated between Waimalu Ridge to the northwest and Kalauao Ridge to the southeast. Waimalu Stream flows to the southwest within the valley and drains into the East Loch of Pearl Harbor. Heavily forested ridges are prominent around the well location with a dirt road bisecting the area that connects to Kilinoe Street. The site was placed on the north side of the dirt road and is adjacent to Waimalu Stream (Figure 1).

1.2 Importance/Pertinence of Project

In order to provide information on the long-term changes of the salt-to-fresh-water transition zone underneath the Hawaiian basal groundwater system, the DLNR CWRM is constructing a series of deep monitoring wells. These deep monitoring wells penetrate the entire water column from fresh water, through the transition zone, and into salt water. The thickness of the transition zones is in constant flux, mainly in response to pumping and variations in annual rainfall.

1.3 Geology

The Koolau Volcanic Series is made up almost entirely of tholeiitic basalts and olivine basalts and as a result, there is a noticeable absence of tuff throughout the Koolau Range. The few interbedded tuff beds amount to less than five percent of the whole section (Wentworth 1951). Small beds can be found near the crest of the range and singular deposits have been found at the head of Nuuanu Valley, near Honolulu. A vast dike system also makes up part of the Koolau Series, with counts as high as 120 dikes per 1,000 feet and averaging just less than one meter thick. Most dikes are vertical or nearly vertical with some angling as low as 60 degrees (Macdonald et al. 1983).
Koolau lavas are of predominantly two types of extrusive rocks: pahoehoe and a’a. Pahoehoe lava is characterized by vertical polygonal joints, spherical vesicles, horizontal joints, and the presence of lava tubes. Pahoehoe lava flows range from 10 to 100 feet thick. A’a lava is characterized by irregular, stretched and deflated vesicles; massive beds that may have well-developed columnar or platy jointing; the absence of lava tubes; and clinker layers that typically bound a massive core or mid layer (Stearns and Vaksvik 1935). The clinker portions are extremely permeable and, therefore, are subject to more rapid chemical weathering.

The mountains of the Koolau Range were formed by the Koolau Shield. This shield is tholeiitic and lacks an alkalic cap. The windward half of the shield is missing because of collapse and the pali (cliff line) marks the predominantly stream eroded-back collapse scarp (Walker 1990). Potassium-Argon dating gives the Koolau Range an age range of 1.8 to 2.85 million years old (Clague and Dalrymple 1989).

The northeastern side of the Koolau Volcano seems to have been subjected to several, very large mass wasting events, while the western (i.e., Central Oahu) portions of the shield were braced by Waianae volcanics, and erosion on a much smaller and slower scale took place. The western valleys of the Koolau Range are choked with alluvium, as is the Schofield Plateau (Macdonald et al. 1983). Mechanical and chemical erosion of the steep escarpments within valleys produces accumulations of blocky material called colluvium. The reason for the steep, cliff-like walls, similar to those found in Manoa Valley and many other valleys along the Koolau Range, is the presence of nearly horizontal beds of alternately greater and lesser resistance to erosion. More rapid erosion of the less resistant beds, usually of a’a clinker, results in undercutting of the more resistant pahoehoe layers (Macdonald et al. 1983). With time, the valley walls may retreat, but the slopes of the cliff remain steep. The predominant erosion process here is apparently due to repeated rockfall and landslide events overtime, which owe to the accumulations of colluvium at the base of slope within the valleys.

After cessation of the Koolau volcanics, there was a period of volcanic quiet that lasted about two million years. Streams cut deep amphitheater-headed valleys into the shield and the island slowly subsided at least 360 meters. Some valleys, such as Manoa Valley, were eroded below present sea level and accumulated coarse detrital sediments.

The southeastern third of the eroded remnant shield experienced a rejuvenation stage of volcanism that interbedded with alluvial sediments. The Koolau Shield has a number of rejuvenation stage vents, south of the erosional ridges, called the Honolulu Volcanic Series, including the landmarks of Diamond Head, Punchbowl, the Tantalus group (Roundtop, Sugarloaf
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& Mount Tantalus), Hanauma Bay, Kaau Volcano, Koko Crater, and Salt Lake. These eruptions
of the Honolulu Volcanic Series did not occur in rapid succession, but were scattered over the
period of the last 900,000 years (Walker 1990).
Figure 2 shows the locations of some regional wells and borings near the Waimalu Well. The
geologic log of C&C Waimalu No.1, approximately one half mile southwest of the Waimalu
Deep Monitoring Well, reveals volcanic strata that mainly consist of fine-grained basalts with
varying degrees of vesicle concentrations. Most of the strata appear to be fresh basalt with
weathered basalts in the minority. C&C Waimalu No.2, approximately one mile southwest of
the Waimalu Deep Monitoring Well, has similar geology with fine-grained dense basalt
constituting the entire stratum. Larger amounts of vesicles are noted in the upper strata however.
Test hole 2455-01 (T-52) contains a similar geological composition to that of the two C&C
Waimalu wells with a noted difference being in the olivine rich basalts ranging in the lower
levels of the boring. Subsequent logs researched in the area provided only general descriptions
of the geological units present. The log for 2455-02 (Oahu Well 197-3) states that the general
composition was approximately 70 feet of alluvium, consisting of clay, boulders, loose gray lava
rock and cinders, followed by 414 feet of Koolau basalt, mostly a'a flows .
Reddish-brown, clayey silts with scattered boulders are found near the well site. Soils formed in
the well site area are clayey silt and silty clay loam. Zones of saprolite with interbedded basaltic
boulders are found in nearby areas (Dames & Moore 1983). According to the Soil Survey of the
Islands of Kauai, Oahu, Maui, Molokai, and Lanai, there are several different soil types defined
within 0.5 mile of the Site, including KlaB, HLMG, rRK, LaB, LaC3, LaC, MpC, MpB, HnB,
and MoC (Foote et al. 1972). The Waimalu Well is located on the Kawaihapai Series (KlaB)

1.4

Hydrological Conditions

There are six observation wells (three of which are co-located with municipal wells) and one
irrigation well within a one-mile radius of Waimalu WelL The closest municipal water wells are
Kaonohi I-I and Kaonohi 1-2, which are located approximately 0.3 miles to the south (Figure 2).
The Waimalu Well is located in the Pearl Harbor aquifer sector, which is the largest on Oahu and
is essentially unconfined landward from the inner shore of Pearl Harbor (Orr and Lau 1987).
The principal boundaries are the Waianae confining bed on the east flank of the range, the rift
dike complex of the Koolau Range, the geohydrologic barrier that separates the northern part of
the Pearl Harbor subordinate aquifer from the Wahiawa high-level water of the Schofield area,

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and the Halawa Valley fill that separates the southeastern part from the Moanalua subordinate aquifer (Figure 3). The Schofield area in central Oahu lies to the north of the southern Oahu area and it is bounded on the north and south by geohydrologic barriers, or groundwater dams as referred to by Dale and Takasaki (1976). Their exact structural nature remains unknown and various hypotheses have been put forth (Nichols et al. 1996; Oki 1998). It is possible that these dams may have resulted from a combination of geological structures including erosional surfaces from the Waianae Range buried by Koolau basalt, dike-intruded rock, and relatively impermeable massive lava flows.

The Pearl Harbor basal aquifer is designated by the United States (U.S.) Environmental Protection Agency (EPA) as a sole source aquifer and is comprised of three aquifer sectors that include Pearl Harbor, Central Oahu, and part of Honolulu (Figure 3) (U.S. EPA 1987). According to the U.S. EPA, a sole source aquifer is defined as one that supplies 50 percent or more of the drinking water of an area. In 2003, an average of 102 million gallons of water was extracted from the Pearl Harbor aquifer sector daily (Gooding 2005). The southern Oahu aquifer is subject to regulation by the DLNR CWRM, which designated it as a groundwater area in 1986.

Depth to groundwater varies nearly directly with elevation, with water levels being several feet above sea level. Water levels on the coastal plain are at or near sea level. Water levels rise rapidly at the foot of the Schofield Plateau to heights of about 22 feet above mean sea level (msl) at Waipahu and to 28 feet above msl in the Mililani and Kipapa areas (Nichols et al. 1996; Hunt 1996). The direction of groundwater flow in the Pearl Harbor aquifer was determined to be due south (Golder and Associates 1998).

2.0 SUMMARY OF WELL INFORMATION

2.1 Well Location

Various geologic processes have imposed the limits on aquifer geometries and have also produced the geohydrologic boundaries that subdivide the regional aquifer system and major watershed areas. The island of Oahu has been subdivided into six aquifer sectors isolated by geological barriers, 23 aquifer systems, and 90 aquifer codes. The Pearl Harbor aquifer sector is further divided into four aquifer systems, and the Waimalu Well is located within the Waimalu Aquifer System (Figure 3) (Mink and Lau 1990, CWRM 2000).

As defined by Mink and Lau (1990), the Waimalu Well lies over the Oahu Pearl Harbor Waimalu Basal Unconfined Flank Aquifer (Figure 3). The aquifer extends from just outside of
Mililani southwest towards Pearl Harbor and southeast towards Honolulu. The aquifer is classified as "currently used" for drinking water, contains fresh water with a chloride concentration less than 250 milligrams per liter (mg/L), and is considered irreplaceable and highly vulnerable to contamination (Mink and Lau 1990). The boundary between the Waimalu System and the Waiawa System to the northwest is synthetic and was drawn to separate the region irrigated with water from the Waimalu System from the Waiawa System. (George A.L. Yuen and Associates, Inc. 1990).

Although slightly different from the Mink and Lau classification of aquifers, the CWRM has published maps on its website identifying the hydrologic unit of the site as the Waimalu Unit. As reported in 2000, the sustainable yield of the Waimalu Unit was 45 million gallons per day (CWRM 2000).

The Waimalu Well lies above the state designated Underground Injection Control line (Department of Health 2004). The City and County of Honolulu Tax Map Key for the site is (1) 9-8-11:006. The site is located on the U.S. Geological Survey (USGS) Waipahu 7.5-minute quadrangle topographic map (USGS 1998). The approximate location of the well is 21°23'50.6", 157° 56' 5.4" (North American Datum 83).

2.2 Well Elevation

The ground surface elevation at the well is 74.89 feet msl and the top of casing elevation is 78.37 feet msl. The brass plate benchmark elevation at the well completion is 74.95 feet msl. The surveyor for this project was Towill Shigeoka & Associates, Inc., and the control benchmark used in the survey was the U.S. Coast and Geodetic Survey Benchmark “L-13” with an elevation of 13.238 feet.

2.3 Well Water Level

Depth to groundwater at the site was measured by Valley Well Drilling, Inc. (Valley Well) at 20.09 feet msl (54.8 ft below ground surface [bgs]) on March 15, 2005, by DLNR at 20.11 feet msl (54.78 feet bgs) on April 11, 2005, and by DLNR at 18.6 feet msl (56.3 feet bgs) on May 24, 2005. No permanent water level measurement devices are installed in the well; external devices were lowered into the well to collect depth to water measurements.
2.4 Depth and Size of Drilled Hole

The total depth of the Waimalu Well is 1,060 feet bgs (-985.11 feet msl). The well is a 16-inch diameter boring with a 10-inch casing and cemented annular space to a depth of approximately 120 feet bgs. Below 120 feet, the boring is an uncased 7.5-inch diameter hole and extends to a depth of 1,060 feet bgs (-985.11 feet msl). Copies of Valley Well's drilling log and well completion report are included as Appendix A.

2.5 Casing Installed

The casing installed from the ground surface to a depth of 120 feet bgs (-45.11 feet msl) was constructed of carbon steel compliant with American Society of Testing and Materials A242 or A606. The carbon steel casing has a 10-inch outer diameter, 5/16-inch wall thickness, and 9 11/16-inch inner diameter.

2.6 Drilling Contractor

The Waimalu Well was constructed by Valley Well. The supervisor of Valley Well is Mike Sober and the driller for the well was Dean McClure. Assistants to the driller included Byron Meachum and Brian Ramos.

2.7 Construction Schedule

Mobilization for the construction of the Waimalu Well began on January 22, 2005. Drilling began on February 24, 2005 and the final depth of 1,060 feet bgs was reached on March 30, 2005 (Figure 1, Photograph C-1). Well construction was completed on April 29, 2005, and demobilization was completed on April 29, 2005.

3.0 LOCATION MAP

A map of the Waimalu Well location is included as Figure 1.

4.0 AS-BUILT CROSS-SECTION OF WELL

As-built cross-sections diagrams of the Waimalu Well are included in Appendix A with Valley Well's logs and in Appendix B with URS Corporation's (URS') geological log.
5.0 GEOLOGICAL LOG

Valley Well personnel collected a sample of the cuttings for the geological log every 10 feet. Photographs of cuttings are included in Appendix C. A URS geologist visited the Site on March 25 and 31, 2005 to log the cuttings collected by Valley Well. Munsell Soil Color Charts were used during logging in order to standardize the colors observed in the cuttings. The blue-gray color of some of the basalt cuttings could only be accurately matched with the GLEY pages of the Munsell charts. “GLEY” is a term used to describe soils exposed to reducing conditions and the GLEY colors (blue and green) were developed originally to describe these soils. The GLEY colors were the closest match to the blue-grey basalt cuttings from the borehole in this study. As a result, both the standard Munsell colors and the GLEY sheets were used to identify the colors of the cuttings. The noted colors in Appendix B are indicative of color only, not of soil or rock type or environmental conditions.

Generally, vesicular to slightly vesicular basalt with some weathering and alteration was observed with layers of weathered basalt/saprolite down to a depth of approximately 350 feet bgs (Photograph C-2). Massive basalt appeared in the cuttings at approximately 250 feet bgs and contained trace olivine crystals (Photograph C-3). The cuttings from approximately 320 feet bgs to 420 feet bgs contained a brittle and breakable white ash (Photograph C-4). Olivine phenocrysts were observed in vesicular basalt from approximately 400 feet bgs to 430 feet bgs, and feldspar phenocrysts were observed in vesicular basalt from approximately 450 feet bgs to 580 feet bgs (Photograph C-5). Vesicular to slightly vesicular basalt was present with massive basalt from approximately 590 feet bgs to 690 feet bgs (Photograph C-6). Highly vesicular to vesicular basalt was observed in cuttings from approximately 700 feet bgs to 880 feet bgs. Saprolite appeared with the vesicular basalt from approximately 880 feet bgs to 940 feet bgs (Photograph C-7). Below approximately 940 feet bgs, vesicular basalt was present with the occasional appearance of saprolite, trace olivine, and massive basalt to a depth of 1,060 feet bgs.

No soil samples were collected for laboratory analysis. A copy of URS’ geological log is included as Appendix B.

6.0 DRILLER’S LOG

Copies of Valley Well’s drilling log and well completion report are included as Appendix A.
7.0 PLUMBNESS DATA

The alignment of the borehole was checked on April 26, 2005 by Wellbore Navigation, Inc. through a magnetic directional survey by minimum curvature. The horizontal displacement of the borehole at a depth of approximately 1,060 feet bgs was 4.77 feet at 328.74 degrees. Copies of the directional survey results are included as Appendix D.

8.0 DRILLING HISTORY

Project delays encountered during the well installation resulted from locating property boundary lines, obtaining base course for the dirt road, and rainy weather.

9.0 WATER CHEMICAL ANALYSIS

DLNR CWRM personnel collected a grab sample of water from the drill pipe when the well depth was approximately 1,060 feet bgs. The water sample was given to URS, who submitted the sample to Oceanic Analytical Laboratory for analysis of chloride under proper chain of custody procedures. The concentration of chloride was 15,700 milligrams per liter, which is a high concentration approaching the salinity of seawater. The entire analytical report is included as Appendix E.

10.0 CONDUCTIVITY AND TEMPERATURE PROFILE

An Ocean Sensors OS200 conductivity, temperature, and depth (CTD) measurement device was lowered into the completed well on April 11, 2005 by representatives of the DLNR CWRM and Valley Well (Photograph C-8). The CTD data collected on that date may not be valid due to the recent completion of the well and the potentially disturbed groundwater. A second lowering of a CTD device into the well was conducted on May 24, 2005. The CTD collected conductivity and temperature data, which are plotted in Figure 4. According to the data collected, the top of the transition zone from fresh to salt water is located at approximately 666 feet bgs (-591 feet msl), the fresh water layer is approximately 609 feet thick, and the midpoint of the transition zone is located at approximately 733 feet bgs (-658 feet msl).

The well was video logged by Valley Well on June 29, 2005 to a depth of approximately 1,006.2 feet bgs. The carbon steel casing was visible and appeared to be in good condition. Groundwater was encountered at approximately 56.7 feet bgs. Particulate matter of varying size was visible throughout the length of the water column surveyed. Transitions between the
geological layers were visible in the uncased portion of the well. Overall, the well appeared to be in good condition with no major obstructions.

11.0 ROCK CHEMICAL ANALYSIS

No chemical analyses were requested or included in the contract for the Waimalu Well.

12.0 SUMMARY

The Waimalu Deep Monitor Well is one of a series of DLNR CWRM deep monitoring wells that will provide information on the long-term changes of the salt-to-fresh-water transition zone underneath the Hawaiian basal groundwater system. These deep monitoring wells penetrate the entire water column from fresh water, through the transition zone, and into salt water. The thickness of the transition zones is in constant flux, mainly in response to pumping and variations in annual rainfall.

As defined by Mink and Lau (1990), the Waimalu Well lies over the Oahu Pearl Harbor Waimalu Basal Unconfined Flank Aquifer. The aquifer is classified as "currently used" for drinking water, contains fresh water with a chloride concentration less than 250 mg/L, and is considered irreplaceable and highly vulnerable to contamination (Mink and Lau 1990). According to CTD data collected in the Waimalu Well, the top of the transition zone from fresh to salt water is located at approximately 666 feet bgs (-591 feet msl), the fresh water layer is approximately 609 feet thick, and the midpoint of the transition zone is located at approximately 733 feet bgs (-658 feet msl).

The DLNR CWRM will continue to monitor the depths to the transition zones in the Waimalu Well and the other deep monitoring wells in support of the program to monitor long-term changes to the aquifer system.
13.0 REFERENCES


FIGURES
Figure 1
Waimalu Deep Monitor Well Site Location

Figure 3
OAHU AQUIFER DESIGNATION

Legend
- Waialua Deep Monitoring Well
- Major Roads
- Aquifer below Waialua Deep Monitor Well
- Aquifer Designations

Source:
John F. Mink and L. Stephen Lau (Water Resources Research Center) for the Department of Health's Groundwater Protection Program. Digitized by DOH - Environmental Planning Office from the original mylars, based on USGS 1:24,000 scale maps. Digitized in 1992 by DOH. Hillshade JPEG created from USGS 10 meter DEMs, 2003.
Figure 4. Conductivity and Temperature Data with Depth
Waimalu Deep Monitor Well (2456-05)
May 24, 2005

Conductivity (microS/cm)

Water level estimate = 56.3 feet bgs
(18.6 feet above msl)

Top of fresh to salt water transition zone (1,000 microS/cm) = ~666 feet bgs (-591 msl)

Midpoint transition zone (25,000 microS/cm) = ~733 feet bgs (-658 feet msl), temp 22.302 deg C

Temperature (deg C)
APPENDIX A

VALLEY WELL DRILLING, INC.
WAIMALU DEEP MONITOR WELL DRILLING LOG
AND WELL COMPLETION REPORT
**State of Hawaii**  
**COMMISSION ON WATER RESOURCE MANAGEMENT**  
**Department of Land and Natural Resources**  
**DRILLER'S LOG**

**Well Number:** 2456-05

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<th>Dates</th>
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**Remarks:**  
Page 1 of 3
State of Hawaii  
COMMISSION ON WATER RESOURCE MANAGEMENT  
Department of Land and Natural Resources  
DRILLER’S LOG

Well Number: 2456-05

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page 2 of 3
State of Hawaii  
COMMISSION ON WATER RESOURCE MANAGEMENT  
Department of Land and Natural Resources  
DRILLER'S LOG

Well Number: 2458.05

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page 3 of 3
## WELL COMPLETION REPORT - PART I

### Well Construction

**State of Hawaii**

**COMMISSION ON WATER RESOURCE MANAGEMENT**

**Department of Land and Natural Resources**

Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. The Commission may not accept incomplete reports. This form shall be submitted within 90 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at 941-3793. For updates to this form or additional information, please visit our website at [http://www.state.hi.us/dlnr/cwrm/](http://www.state.hi.us/dlnr/cwrm/)

### Form Details

1. **State Well No.**: 2456-05  
2. **Well Name**: Waimalu Deep Monitor  
3. **Address**: Kailua Street  
4. **Drilling Company**: Valley Well Drilling  
5. **Date Well Construction (drilled, cased, grouted) completed**: 4/29/05

*In addition to the driller’s log, if a geologic log was prepared, please submit with this form.*

### Drilling Information

6. **Was the subject well cored?** Yes No  
7. **Initial water-level encountered** 54.8 ft. below ground  
8. **Step-Drawdown Test completed?** Yes No  
9. **Constant Rate Aquifer Test completed?** Yes No  
10. **Water-level** ft. above msl  
11. **Chloride** ppm  
12. **Temperature** °F

### Additional Information

13. **Chloride**: __________ ppm  
14. **Temperature**: __________ °F  
15. **Remarks**: Lookable cover

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### Attached Documents

- [Step-Drawdown Test form](12/17/97 SDPTD Form)
- [Constant Rate Aquifer Test form](12/17/97 CRPTD Form)

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### Licensed Driller

**Valley Well Drilling**

C-57 Lic. No. 21358

*Signature* ____________________________  *Date* ____________________________

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WCR1 Form 10/19/04 Page 1 of 5
13. AS-BUILT WELL SECTION (Please attach as-built if different from diagram provided below)

Elevation at top of casing: 78.54 ft., msl*
(Hole Diameter: 16 in.)

Minimum of 2 Radius & 4" Thick Concrete Pad

Ground Elevation: 74.89 ft., msl

Cement Grout: 120 ft. (min. 70% of distance from ground elevation to top of water surface or 500 ft., whichever is less.)

Annular space between hole and casing (1.5' for positive displacement, 3" for other methods):

3 in.

Rock or Gravel Packing:

NA ft.
-

Material:

□ Crushed Basalt
□ Rounded Gravel

Water Level Elevation: 20.06 ft., msl*

Solid Casing Material:
Carbon Steel: compliant with (check one or more):
□ ANSI/WWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A129

And compliant with (check one or more):
□ ASTM A242 or A606 □ Type E □ Type S □ Grade B □ Other

Stainless Steel: (check one):
□ ASTM A409 (production wells) □ ASTM A312 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80

PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one): □ Schedule 40 □ Schedule 80 □ Schedule 120

Thermoplastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:
Carbon Steel: compliant with (check one or more):
□ ANSI/WWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A129

And compliant with (check one or more):
□ ASTM A242 or A606 □ Type E □ Type S □ Grade B □ Other

Stainless Steel: (check one):
□ ASTM A409 (production wells) □ ASTM A312 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80

PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one): □ Schedule 40 □ Schedule 80 □ Schedule 120

Thermoplastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Centrifugally Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

Solid Casing:
(≥ 90% x (Ground Elev. - Water Level Elev.))

Length: — ft.
Nominal Diameter: — in.
Wall Thickness: — in.
Bottom Elevation: — ft., msl

Open Casing:
□ Perforated □ Screen

Length: — ft.
Nominal Diameter: — in.
Wall Thickness: — in.
Bottom Elevation: — ft., msl

Open Hole:
□ Diameter: — ft.
□ Bottom Elevation: — ft., msl

*msl = mean sea level
APPENDIX B

URS WAIMALU DEEP MONITOR WELL GEOLOGICAL LOG
Log of Boring WAIMALU DEEP MONITOR WELL

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy, texture, foliation or bedding; weathering; odor and staining</th>
<th>Graphic</th>
<th>Date, time, structures, fractures, drilling problems, general information</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>40% slightly vesicular basalt, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), slightly weathered vesicles, hard; 40% slightly vesicular basalt, 5Y 6/1 gray (dry and wet) weathered with secondary staining, hard; 20% fine grained soil 10YR 5/3 brown; organics present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>As above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Weathered basalt/saprolite, 50% 10YR 5/3 pale brown (dry), 10YR 5/4 yellowish brown (wet), 50% 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), extremely weathered, staining from alteration on surfaces and in vesicles, soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>As above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt
**Log of Boring WAIMALU DEEP MONITOR WELL**

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Weathered basalt/saprolite, 50% 10YR 6/3 pale brown (dry), 10YR 5/4 yellowish brown (wet), 50% 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), extremely weathered, staining from alteration on surfaces and in vesicles, soft</td>
<td></td>
<td></td>
<td>Cuttings: 0.2 - 1.2 cm, subangular - angular</td>
<td>GW at 54.8' bgs on 3/15/05 (VWD) and 54.78' bgs on 4/11/05 (DLNR)</td>
</tr>
<tr>
<td>70</td>
<td>50% slightly vesicular basalt, 5Y 5/1 gray (dry) 5Y 3/1 very dark gray (wet), slightly weathered with staining on surfaces and vesicles hard, 50% weathered basalt/saprolite, 10YR 6/3 pale brown (dry), 10YR 5/4 yellowish brown (wet), extremely weathered, staining on surfaces and vesicles, soft</td>
<td></td>
<td></td>
<td>Cuttings: 0.2 - 1.3 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>As above with 60% slightly vesicular basalt, 40% weathered basalt/saprolite</td>
<td></td>
<td></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Weathered highly vesicular basalt/saprolite, 10YR 6/4 light yellowish brown (dry), 10YR 3/4 dark yellowish brown (wet), extremely weathered, staining on surfaces and vesicles, 2% slightly vesicular basalt, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), slightly weathered with staining present</td>
<td></td>
<td></td>
<td>Cuttings: 0.2 - 2.5 cm, subangular - subrounded</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:**

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

(05HON-16Of.xls: 26536607.33000)
## Log of Boring WAIMALU DEEP MONITOR WELL

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>STRUCTURE/DRILLING</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>Weathered highly vesicular basalt/saprolite, 10YR 6/4 light yellowish brown (dry), 10YR 3/4 dark yellowish brown (wet), extremely weathered, staining on surfaces and vesicles, 2% slightly vesicular basalt, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), slightly weathered with staining present, organics present</td>
<td>Cuttings: 0.5 - 4.0 cm, subrounded - subangular</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>50% slightly vesicular basalt, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), slightly weathered with staining on surfaces and vesicles hard; 50% weathered basalt/saprolite, 10YR 6/3 pale brown (dry), 10YR 5/4 yellowish brown (wet), extremely weathered, staining on surfaces and vesicles, soft, organics present</td>
<td>Cuttings: 0.2 - 1.5 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>As above with 95% weathered vesicular basalt/saprolite and 5% slightly vesicular basalt</td>
<td>Cuttings: 0.2 - 1.0 cm, subangular</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>Slightly vesicular weathered basalt/saprolite, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), soft, vesicles ≤ 1 mm, weathered, reddish brown and white staining in vesicles</td>
<td>Cuttings: 0.2 - 0.8 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>70% as above; 30% saprolite, 5YR 5/4 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), soft, vesicles &lt; 1 mm</td>
<td>Cuttings: 0.2 - 0.6 cm, subangular - subrounded</td>
<td></td>
</tr>
</tbody>
</table>

### REMARKS:

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

URS Corporation

Data Total Reached: 3/30/2005

Date Drilling Started: 2/24/2005
**Log of Boring WAIMALU DEEP MONITOR WELL**

**Project:** DLNR Deep Monitor Well  
**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11-006  
**Coordinates:** 21°23'50.0", 157°56'5.4" (NAD 83)

**Location Type:** Monitoring Well (MW)  
**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling

**Drilling Foreman:** Dean McClure  
**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL

**Sampling Device:** logging f/cuttings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')  
**Total Depth (Feet):** 1,060

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

---

**Depth (feet)**

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>GRAPHIC</th>
<th>STRUCTURE/DRILLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>Slightly vesicular weathered basalt/saprolite, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), soft, vesicles ≤ 1 mm, weathered, reddish brown and white staining in vesicles with 2% saprolite, 5YR 5/4 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), soft, vesicles ≤ 1 mm</td>
<td><img src="#" alt="graphic" /></td>
<td><img src="#" alt="graphic" /></td>
</tr>
<tr>
<td>170</td>
<td>Saprolite, 5YR 4/2 dark reddish gray (dry), 5YR 3/2 dark reddish brown (wet), weathered, some vesicles ≤ 1 mm visible, soft</td>
<td><img src="#" alt="graphic" /></td>
<td><img src="#" alt="graphic" /></td>
</tr>
<tr>
<td>180</td>
<td>As above with white secondary minerals infilling the vesicles</td>
<td><img src="#" alt="graphic" /></td>
<td>As above</td>
</tr>
<tr>
<td>190</td>
<td>As above</td>
<td><img src="#" alt="graphic" /></td>
<td>As above</td>
</tr>
<tr>
<td>200</td>
<td>As above</td>
<td><img src="#" alt="graphic" /></td>
<td>As above</td>
</tr>
</tbody>
</table>

**REMARKS:**

Legend:  
- Clay  
- Vesicular basalt  
- Saprolite  
- Basalt with phenocrysts  
- Cement  
- Massive basalt

URS  
(05HON-160f.xls: 26536607.33000)
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithologic Description</th>
<th>Graphic</th>
<th>Structure/Drilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>Weathered vesicular basalt/saprolite, 70% 5Y 6/1 gray (dry), 5Y 3/1 very dark gray (wet), reddish-brown staining in vesicles, soft; 30% 5YR 5/2 reddish gray (dry), 5YR 3/2 dark reddish brown (wet), soft</td>
<td><img src="image1" alt="Graphic" /></td>
<td>Cuttings: 0.2 - 0.8 cm, subangular - subrounded</td>
</tr>
<tr>
<td>220</td>
<td>As above with 80% gray, 15% reddish gray, 5% vesicular basalt, 5Y 2.5/1 black (wet), hard, vesicles &lt; 1 mm - 2 mm, vesicles slightly weathered</td>
<td><img src="image2" alt="Graphic" /></td>
<td>Cuttings: 0.2 - 3 cm, subangular - angular</td>
</tr>
<tr>
<td>230</td>
<td>As above</td>
<td><img src="image3" alt="Graphic" /></td>
<td>As above</td>
</tr>
<tr>
<td>240</td>
<td>As above</td>
<td><img src="image4" alt="Graphic" /></td>
<td>As above</td>
</tr>
<tr>
<td>250</td>
<td>As above</td>
<td><img src="image5" alt="Graphic" /></td>
<td>As above</td>
</tr>
</tbody>
</table>

**Remarks:**

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithologic Description</th>
<th>Graphic</th>
<th>Structure/Drilling</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>260</td>
<td>Massive basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet) hard, slightly weathered with some brown staining</td>
<td><img src="image1" alt="Diagram" /></td>
<td>Cuttings: 0.2 - 1 cm, subangular to angular cuttings all fairly flat in shape (flake-like)</td>
<td></td>
</tr>
<tr>
<td>270</td>
<td>50% slightly vesicular weathered basalt/saprolite, 5Y 5/1 gray (dry), 5Y 3/1 very dark gray (wet), slightly weathered with staining on surfaces and vesicles, breakable; 50% weathered vesicular basalt/saprolite, 5YR 4/4 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), weathered with staining in vesicles, soft</td>
<td><img src="image2" alt="Diagram" /></td>
<td>Cuttings: 0.2 - 0.8 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>280</td>
<td>As above with 70% reddish brown and 30% gray</td>
<td><img src="image3" alt="Diagram" /></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>290</td>
<td>Massive basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet) hard, slightly weathered with some brown staining, trace olivine crystals and phenocrysts</td>
<td><img src="image4" alt="Diagram" /></td>
<td>Cuttings: 0.2 - 1 cm, subangular to angular cuttings all fairly flat in shape (flake-like)</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>As above</td>
<td><img src="image5" alt="Diagram" /></td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>
### Log of Boring WAIMALU DEEP MONITOR WELL

**Project:** DLNR Deep Monitor Well  
**Site ID:** Waimalu  
**Location Type:** Monitoring Well (MW)  
**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006  
**Coordinates:** 21°23.00.0", 157°56.54.0" (NAD 83)

**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling  
**Drilling Foreman:** Dean McClure  
**Ground Surface Elevation:** 74.69 ft msl  
**Datum:** MSL  
**Sampling Device:** logging fcuitings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')  
**Total Depth (Feet):** 1,060

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>WELL CONSTRUCTION DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>310</td>
<td>Weathered vesicular basalt/saprolite, 5YR 4/3 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), weathered, some pieces breakable, white secondary minerals infilling vesicles</td>
<td>![Image]</td>
<td>Cuttings: 0.2 - 1.0 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>320</td>
<td>Vescicular basalt, 5Y 5/1 gray (dry), 5Y 2.5/1 black (wet), hard, slightly weathered</td>
<td>![Image]</td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>330</td>
<td>50% weathered vesicular basalt/saprolite, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), soft and breakable, weathered with brown staining in vesicles; 50% ash, 5Y 8/1 white (dry), 5Y 6/1 gray (wet), brittle and breakable</td>
<td>![Image]</td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>340</td>
<td>As above with 50% dark gray weathered vesicular basalt/saprolite, 25% white ash, 25% weathered vesicular basalt/saprolite, 5YR 4/3 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), weathered, soft and breakable</td>
<td>![Image]</td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>350</td>
<td>As above with 50% reddish brown weathered vesicular basalt/saprolite, 25% dark gray weathered vesicular basalt/saprolite, and 25% white ash. Some infilling of vesicles with white secondary mineral.</td>
<td>![Image]</td>
<td></td>
<td>As above</td>
</tr>
</tbody>
</table>

**REMARKS:**

*Legend:*  
- Clay  
- Vesicular basalt  
- Basalt with phenocrysts  
- Saprolite  
- Cement  
- Massive basalt

**URS**

(05HON-160f.xls: 26538607.33000)
### Lithologic Description

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>360</td>
<td>As above with 15% white ash, 5% reddish brown weathered vesicular basalt/saprolite, 80% vesicular basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), hard, vesicles slightly staining brown, slightly weathered</td>
<td></td>
<td>Cuttings: 0.1 - 0.7 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>370</td>
<td>As above with trace olivine crystals and phenocrysts</td>
<td></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>380</td>
<td>As above with 90% dark gray vesicular basalt, 5% reddish brown weathered vesicular basalt/saprolite, 5% white ash, and no olivine</td>
<td></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>390</td>
<td>As above with 95% dark gray vesicular basalt, 5% white ash, trace reddish brown weathered vesicular basalt/saprolite</td>
<td></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>Saprolite, 5YR 3/1 very dark gray (dry), 5YR 2.5/1 black (wet), soft and breakable; 5% white ash as above</td>
<td></td>
<td>Cuttings: 0.1 - 1.2 cm, subangular - subrounded</td>
<td></td>
</tr>
</tbody>
</table>

### Remarks:

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

---

**Project:** DLNR Deep Monitor Well  
**Location ID:** Waimalu  
**Location Type:** Monitoring Well (MW)

**Drilling Foreman:** Dean McClure  
**Geologist:** D. Stiffel  
**Consultant:** URS Corporation  
**Drilling Company:** Valley Well Drilling

**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:06  
**Coordinates:** 21°23'50.6", 157°56'5.4" (NAD 83)

**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL  
**Sampling Device:** logging cuttings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005  
**Total Depth (Feet):** 1,060
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>GRAPHIC</th>
<th>STRUCTURE/DRILLING</th>
<th>WELL CONSTRUCTION DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Olivine vesicular basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), hard, weathered, vesicles up to 5 mm, 15% olivine crystals up to 3 mm, olivine phenocrysts</td>
<td><img src="image1" alt="graphic" /></td>
<td>Cuttings: 0.1 - 1.8 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>420</td>
<td>As above with 5% olivine crystals, 5% ash, 5Y 8/1 white (dry), 5Y 6/1 gray (wet), brittle and breakable</td>
<td><img src="image2" alt="graphic" /></td>
<td>Cuttings: 0.1 - 1.4 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>430</td>
<td>Vesicular basalt, GLEY 1 4/N dark gray (dry), GLEY 1 2.5/10 Y greenish black (wet), unweathered, hard, no staining</td>
<td><img src="image3" alt="graphic" /></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>440</td>
<td>Weathered vesicular basalt/saprolite, 5YR 3/2 dark reddish brown (dry), 5YR 2.5/2 dark reddish brown (wet), some pieces breakable, white secondary minerals, trace pieces of dark gray vesicular basalt from 430'</td>
<td><img src="image4" alt="graphic" /></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>450</td>
<td>REMARKS:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Masses basalt

**URS**

*(05HON-16of.xls: 26536607.33000)*
Log of Boring WAIMALU DEEP MONITOR WELL

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>460</td>
<td>Vesicular basalt, GLEY 1 4/N dark gray (dry), GLEY 1 2.5/10 Y greenish black (wet), feldspar phenocrysts, unweathered, hard, no staining</td>
<td>![Graphic]</td>
<td>Cuttings 0.1 - 1.4 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>470</td>
<td>As above with some weathering and brown staining in vesicles</td>
<td>![Graphic]</td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>480</td>
<td>As above at 450', some vesicles bluish/black</td>
<td>![Graphic]</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>As above</td>
<td>![Graphic]</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>As above</td>
<td>![Graphic]</td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:
Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

Date Drilling Started: 2/24/2005
Date Total Depth Reached: 3/30/2005
Log of Boring WAIMALU DEEP MONITOR WELL

Project: DLNR Deep Monitor Well  Site ID: Waimalu
Location Description: Dirt road end of Killinoe Street, TMK (1) 9-8-11:006  Location Type: Monitoring Well (MW)
Consultant: URS Corporation  Geologist: D. Stiffel
Drilling Foreman: Dean McClure  Ground Surface Elevation: 74.89 ft msl
Sampling Device: logging f/cuttings  Datum: MSL
Drilling Company: Valley Well Drilling
Well Site 10 Waimalu
Precision: 05HON-160.xls: 26536607.33000

Location: 21°23'50.6", 157°56'5.4" (NAD 83)

Sampling Device: logging f/cuttings
Borehole Diameter (inches): 16 (0-120'), 7.5 (120-1,060')
Total Depth (Feet): 1,060

Date Drilling Started: 2/24/2005  Date Drilling Reached: 3/30/2005

LITHOLOGIC DESCRIPTION

Rock Type: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Rock Type</th>
<th>Structure/Drilling</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>Vesicular basalt, 80% 5YR 4/3 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), 20% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/10 Y greenish black (wet), hard, feldspar phenocrysts, unweathered</td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>520</td>
<td>As above with 45% reddish brown vesicular basalt, 45% dark gray vesicular basalt, 10% saprolite, 10YR 7/6 yellow (dry), 10YR 6/6 brownish yellow (wet), soft</td>
<td>Cuttings: 0.1 - 1.2 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>530</td>
<td>Vesicular basalt, GLEY 1 4/N dark gray (dry), GLEY 1 2.5/10 Y greenish black (wet), feldspar phenocrysts, unweathered, hard, no staining</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>540</td>
<td>As above</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>550</td>
<td>Highly vesicular basalt 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), vesicles ≤ 2 mm, weathered, some breakable pieces</td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - angular</td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:

Legend:
- Clay
- Vesicular basalt
- Saprolite
- Basalt with phenocrysts
- Cement
- Massive basalt

(05HON-160.xls: 26536607.33000)
# Log of Boring WAIMALU DEEP MONITOR WELL

<table>
<thead>
<tr>
<th>Project: DLNR Deep Monitor Well</th>
<th>Site ID: Waimalu</th>
<th>Location Type: Monitoring Well (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Description: Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006</td>
<td>Coordinates: 21°23′32.8″, 157°55′54″ (NAD 83)</td>
<td></td>
</tr>
<tr>
<td>Consultant: URS Corporation</td>
<td>Geologist: D. Stiffel</td>
<td>Drilling Company: Valley Well Drilling</td>
</tr>
<tr>
<td>Drilling Foreman: Dean McClure</td>
<td>Ground Surface Elevation: 74.89 ft msl</td>
<td>Datum: MSL</td>
</tr>
<tr>
<td>Sampling Device: logging f/cuttings</td>
<td>Borehole Diameter (inches): 16 (0-120'), 7.5 (120-1,060')</td>
<td></td>
</tr>
<tr>
<td>Date Drilling Started: 2/24/2005</td>
<td>Date Total Depth Reached: 3/30/2005</td>
<td></td>
</tr>
</tbody>
</table>

## Lithologic Description

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>560</td>
<td>Highly vesicular basalt 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), vesicles ≤ 2 mm, weathered, some breakable pieces</td>
<td><img src="image" alt="Diagram" /></td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>570</td>
<td>Vesicular basalt, GLEY 1 4/N dark gray (dry), GLEY 1 2.5/10 Y greenish black (wet), feldspar phenocrysts, unweathered, hard, no staining</td>
<td><img src="image" alt="Diagram" /></td>
<td>Cuttings: 0.1 - 1.2 cm, subangular - angular</td>
<td></td>
</tr>
<tr>
<td>580</td>
<td>As above</td>
<td><img src="image" alt="Diagram" /></td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>590</td>
<td>Slightly vesicular basalt, GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, 5% saprolite, 2.5YR 3/6 dark red (dry), 2.5YR 3/6 dark red (wet), soft and breakable</td>
<td><img src="image" alt="Diagram" /></td>
<td>Cuttings: 0.1 - 0.5 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>Vesicular basalt, 5YR 4/3 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), hard, unweathered, no staining</td>
<td><img src="image" alt="Diagram" /></td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - angular</td>
<td></td>
</tr>
</tbody>
</table>

## Remarks

**Legend:**
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

(05HON-160f.xls: 26536807.33000)
### Log of Boring WAIMALU DEEP MONITOR WELL

**Project:** DLNR Deep Monitor Well  
**Site ID:** Waimalu  
**Location Type:** Monitoring Well (MW)

<table>
<thead>
<tr>
<th>Location Description</th>
<th>Coordinates</th>
<th>Consultant</th>
<th>Geologist</th>
<th>Drilling Foreman</th>
<th>Drilling Company</th>
<th>Sampling Device</th>
<th>Borehole Diameter (inches)</th>
<th>Total Depth (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006</td>
<td>21°23'50.6&quot;, 157°56'5.4&quot; (NAD 83)</td>
<td>URS Corporation</td>
<td>D. Stiffel</td>
<td>Dean McClure</td>
<td>Valley Well Drilling</td>
<td>logging &amp; cuttings</td>
<td>16 (0-120'), 7.5 (120-1,060')</td>
<td>1,060</td>
</tr>
</tbody>
</table>

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

#### Lithologic Description

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithology</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>610</td>
<td>Slightly vesicular - massive basalt</td>
<td>GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, slightly weathered, some white and brown staining, cuttings flat and flake-like</td>
</tr>
<tr>
<td>620</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>630</td>
<td>As above</td>
<td></td>
</tr>
<tr>
<td>640</td>
<td>Slightly vesicular - massive basalt</td>
<td>GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, slightly weathered, some white and brown staining, cuttings flat and flake-like</td>
</tr>
<tr>
<td>650</td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- Legend:
  - Clay
  - Vesicular basalt
  - Basalt with phenocrysts
  - Saprolite
  - Cement
  - Massive basalt

**URE**

(05HON-160f.xls: 26536607.33000)
# DLNR Deep Monitor Well

**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006

**Consultant:** URS Corporation

**Drilling Foreman:** Dean McClure

**Geologist:** D. Stiffel

**Drilling Company:** Valley Well Drilling

**Sampling Device:** logging for cuttings

**Well Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')

**Total Depth (Feet):** 1,060

**Date Drilling Started:** 2/24/2005

**Date Total Depth Reached:** 3/30/2005

## Lithologic Description

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Comment</th>
</tr>
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<tbody>
<tr>
<td>660</td>
<td>Weathered vesicular basalt/saprolite, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), some pieces breakable, reddish brown and yellow staining, vesicles up to 3 mm</td>
</tr>
<tr>
<td>670</td>
<td>Highly vesicular basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), hard, vesicles &lt; 2 mm, bluish staining on some vesicle walls</td>
</tr>
<tr>
<td>680</td>
<td>Slightly vesicular basalt, pieces are both red and gray, GLEY 1 4/N dark gray and 10R 5/1 reddish gray (dry), 5R 2.5/1 reddish black and 5YR 3/3 dark reddish brown (wet), hard, unweathered</td>
</tr>
<tr>
<td>690</td>
<td>As above</td>
</tr>
<tr>
<td>700</td>
<td>As above</td>
</tr>
</tbody>
</table>

**Remarks:**

<table>
<thead>
<tr>
<th>Legend:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay</td>
</tr>
<tr>
<td>Vesicular basalt</td>
</tr>
<tr>
<td>Saprolite</td>
</tr>
<tr>
<td>Basalt with phenocrysts</td>
</tr>
<tr>
<td>Cement</td>
</tr>
<tr>
<td>Massive basalt</td>
</tr>
</tbody>
</table>
Log of Boring WAIMALU DEEP MONITOR WELL

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithologic Description</th>
<th>Structure/Drilling</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>710</td>
<td>Highly vesicular basalt, 50% 5YR 4/2 dark reddish gray (dry), 5YR 2.5/2 dark reddish brown (wet), 50% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 2 mm</td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>720</td>
<td>Slightly vesicular basalt, 5Y 4/1 dark gray (dry), 5Y 2.5/1 black (wet), hard, vesicles &lt; 2 mm, white secondary mineral on vesicle walls</td>
<td>Cuttings: 0.1 - 1.2 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>730</td>
<td>Highly vesicular basalt, GLEY 1 4/N dark gray (dry), 5YR 2.5/2 dark reddish brown (wet), weathered and altered, orangish-brown and deep yellow staining, reddish-blue staining in vesicles, vesicles &lt; 1 mm</td>
<td>Cuttings: 0.1 - 1.4 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>740</td>
<td>Slightly vesicular basalt, 90% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), 10% 2.5YR 3/2 dusty red (dry and wet), hard, slightly weathered, some white and brown staining, cuttings flat and flake-like</td>
<td>Cuttings 0.2 - 1.2 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>REMARKS:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Clay
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt
- Vesicular basalt
### Log of Boring WAIMALU DEEP MONITOR WELL

#### Project: DLNR Deep Monitor Well  
**Site ID:** Waimalu  
**Location Type:** Monitoring Well (MW)

**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:06  
**Coordinates:** 21°23'50.6".157°56'5.4" (NAD 83)

**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling

**Drilling Foreman:** Dean McClure  
**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL

**Sampling Device:** logging flcuttings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')

**Total Depth (Feet):** 1,060  
**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

#### LITHOLOGIC DESCRIPTION

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining</th>
<th>Graphic</th>
<th>STRUCTURE/DRLING: Cuttings: 0.1 - 1.2 cm, subangular - subrounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>760</td>
<td>Highly vesicular basalt, 10R 3/4 dusky red (wet), orangish-brown and deep yellow staining, vesicles &lt; 1 mm, some pieces have glassy texture, hard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>770</td>
<td>As above except no glassy texture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>780</td>
<td>Vesicular basalt, pieces are both red and gray, GLEY 1 4/N dark gray and 10R 5/1 reddish gray (dry), 5R 2.5/1 reddish black and 5YR 3/3 dark reddish brown (wet), hard, unweathered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>790</td>
<td>Highly vesicular basalt, 10R 3/4 dusky red (wet), orangish-brown and deep yellow staining, vesicles &lt; 1 mm, some pieces have glassy texture, hard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>Vesicular basalt, GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 3 mm, no staining</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### REMARKS:

Samples are wet

---

URS

(05SHON-1507.xls: 26536567.33000)
# Log of Boring WAIMALU DEEP MONITOR WELL

## Project Information
- **Project**: DLNR Deep Monitor Well
- **Site ID**: Waimalu
- **Location Type**: Monitoring Well (MW)
- **Location Description**: Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006
- **Coordinates**: 21°23'50.8", 157°56'5.4" (NAD 83)

## General Information
- **Consultant**: URS Corporation
- **Geologist**: D. Stifel
- **Drilling Company**: Valley Well Drilling
- **Drilling Foreman**: Dean McClure
- **Ground Surface Elevation**: 74.89 ft msl
- **Datum**: MSL
- **Sampling Device**: logging / cuttings
- **Borehole Diameter (inches)**: 16 (0-120'), 7.5 (120-1,060')
- **Total Depth (Feet)**: 1,060

## Date Information
- **Date Drilling Started**: 2/24/2005
- **Date Total Depth Reached**: 3/30/2005

## LITHOLOGIC DESCRIPTION

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithologic Description</th>
<th>Structure/Drilling</th>
<th>Well Construction Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>810</td>
<td>Highly vesicular basalt, 50% 5YR 4/2 dark reddish gray (dry), 5YR 2.5/2 dark reddish brown (wet), 50% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 2 mm</td>
<td>Cuttings: 0.2 - 1.2 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>820</td>
<td>Highly vesicular basalt, GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 1 mm</td>
<td>Cuttings: 0.3 - 0.8 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>830</td>
<td>As above</td>
<td>Cuttings: 0.2 - 1.0 cm, subangular - subrounded</td>
<td></td>
</tr>
<tr>
<td>840</td>
<td>As above except slightly vesicular basalt, 90% dark gray and 10% dark reddish gray</td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>

## REMARKS:
- Samples are wet

## Legend:
- **Clay**
- **Vesicular basalt**
- **Saprolite**
- **Basalt with phenocrysts**
- **Cement**
- **Massive basalt**
# Log of Boring WAIMALU DEEP MONITOR WELL

## Project Details
- **Project:** DLNR Deep Monitor Well
- **Location:** Waimalu
- **Location Type:** Monitoring Well (MW)
- **Coordinates:** 21°23'50.6", 157°56'5.4" (NAD 83)
- **Drilling Company:** Valley Well Drilling
- **Consultant:** URS Corporation

## Well Details
- **Well ID:**
- **Ground Surface Elevation:** 74.89 ft
- **Datum:** MSL
- **Sampling Device:** logging cuttings
- **Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')
- **Total Depth (Feet):** 1,060
- **Drilling Foreman:** Dean McClure
- **Date Drilling Started:** 2/24/2005
- **Date Total Depth Reached:** 3/30/2005

## Lithologic Description

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Lithologic Type</th>
<th>Description</th>
<th>Cuttings</th>
<th>Construction Detail</th>
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<tbody>
<tr>
<td>860</td>
<td>Highly vesicular basalt, 50% 5YR 4/2 dark reddish gray (dry), 5YR 2.5/2 dark reddish brown (wet), 50% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 2 mm</td>
<td></td>
<td></td>
<td>Subangular - subrounded</td>
</tr>
<tr>
<td>870</td>
<td>Vesicular basalt, GLEY 1 2.5/N black (wet), unweathered, hard, vesicles up to 6 mm</td>
<td></td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>880</td>
<td>Highly vesicular basalt, 50% 5YR 4/2 dark reddish gray (dry), 5YR 2.5/2 dark reddish brown (wet), 50% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 2 mm</td>
<td></td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>890</td>
<td>Vesicular basalt, 5Y 2.5/1 black (wet), unweathered, hard, vesicles &lt; 2 mm, 5% saprolite, 2.5YR 4/8 dark red (wet), weathered, soft, breakable</td>
<td></td>
<td></td>
<td>As above</td>
</tr>
<tr>
<td>900</td>
<td>Remarks: Samples are wet</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Remarks
- Legend:
  - Clay
  - Basalt with phenocrysts
  - Saprolite
  - Cement
  - Massive basalt

---

(05HON-180f.xls: 26536607.33000)
<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining</th>
<th>Graphic</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>910</td>
<td>Saprolite, 5YR 3/4 dark reddish brown (wet), soft, 15% vesicular basalt, GLEY 1 2.5/N black (wet), hard, unweathered, vesicles &lt; 1 mm</td>
<td>![Diagram]</td>
<td>Cuttings: 0.2 - 1.4 cm, subrounded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>920</td>
<td>Vesicular basalt, 5Y 2.5/1 black (wet), unweathered, hard, vesicles &lt; 2 mm, 5% saprolite, 2.5YR 4/8 dark red (wet), weathered, soft, breakable</td>
<td>![Diagram]</td>
<td>Cuttings: 0.1 - 1.4 cm, subangular - subrounded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>930</td>
<td>As above except basalt pieces flake-like</td>
<td>![Diagram]</td>
<td>As above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>940</td>
<td>Vesicular basalt, pieces are both red and gray, GLEY 1 2.5/N black and 10R 4/3 weak red (wet), vesicles up to 1 cm, hard; 5% saprolite, 2.5YR 4/8 dark red (wet), weathered, soft, breakable</td>
<td>![Diagram]</td>
<td>Cuttings: 0.1 - 1.2 cm, subangular - angular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>950</td>
<td>As above</td>
<td>![Diagram]</td>
<td>As above</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:
Samples are wet

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt
## Log of Boring WAIMALU DEEP MONITOR WELL

**Project:** DLNR Deep Monitor Well  
**Site ID:** Waimalu  
**Location Type:** Monitoring Well (MW)  
**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006  
**Coordinates:** 21°23'50.6".157°56'5.4" (NAD 83)  
**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling  
**Drilling Foreman:** Dean McClure  
**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL  
**Sampling Device:** logging & cuttings  
**Well Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')  
**Total Depth (Feet):** 1,060  
**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

### Lithologic Description

**Depth (feet):**  
- **960:** Highly vesicular basalt, 50% 5YR 4/2 dark reddish gray (dry), 5YR 2.5/2 dark reddish brown (wet), 50% GLEY 1 4/N dark gray (dry), GLEY 1 2.5/N black (wet), hard, unweathered, vesicles < 2 mm, some pieces look like pumice  
- **970:** Vesicular basalt, GLEY 1 2.5/N black (wet), vesicles < 1 mm, hard, unweathered  
- **980:** Slightly vesicular basalt, 5Y 2.5/1 black (wet), vesicles < 1 mm, hard, unweathered  
- **990:** Vesicular basalt, 10R 3/2 dusky red (wet), vesicles < 1 mm, hard, unweathered  
- **1000:**  

**Remarks:**  
Samples are wet

**Legend:**  
- Clay  
- Basalt with phenocrysts  
- Saproilite  
- Massive basalt  
- Vesicular basalt

(05HON-1601.xls: 26536607.33000)
**Log of Boring WAIMALU DEEP MONITOR WELL**

**Project:** DLNR Deep Monitor Well  
**Site ID:** Waimalu  
**Location:** Monitoring Well (MW)

**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:006  
**Coordinates:** 21°22'50.8", 157°56'5.4" (NAD 83)

**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling

**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL

**Sampling Device:** logging cuttings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')

**Total Depth (Feet):** 1,060

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>LITHOLOGIC DESCRIPTION</th>
<th>GRAPHIC</th>
<th>STRUCTURE/DRILLING</th>
<th>Well Construction Detail</th>
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<tr>
<td>1010</td>
<td>Vesicular basalt, GLEY 2.5/N black (wet), vesicles &lt; 2 mm, hard, unweathered, 5% saprolite, 2.5YR 4/8 dark red (wet), weathered, soft, breakable</td>
<td><img src="image" alt="Vesicular basalt" /></td>
<td>Cuttings: 0.1 - 0.8 cm, subangular - subrounded</td>
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<tr>
<td>1020</td>
<td>Vesicular basalt, 10R 3/2 dusky red (wet), vesicles &lt; 1 mm, hard, unweathered, trace olivine</td>
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<tr>
<td>1030</td>
<td>Vesicular basalt, 2.5YR 2.5/1 reddish black (wet), vesicles &lt; 1 mm, hard, unweathered</td>
<td><img src="image" alt="Vesicular basalt" /></td>
<td>Cuttings: 0.3 - 1.2 cm, subangular - subrounded</td>
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<tr>
<td>1040</td>
<td>As above with 15% massive basalt, 2.5YR 4/6 dark red (dry), 2.5YR 2.5/4 very dusky red (wet), hard, no weathering</td>
<td><img src="image" alt="Vesicular basalt" /></td>
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**Remarks:**

- Clay
- Basalt with phenocrysts
- Saprolite
- Cement
- Massive basalt

**U.S. Geological Survey**
### Log of Boring WAIMALU DEEP MONITOR WELL

**Project:** DLNR Deep Monitor Well  
**Location Description:** Dirt road end of Kilinoe Street, TMK (1) 9-8-11:06  
**Location Type:** Monitoring Well (MW)

**Consultant:** URS Corporation  
**Geologist:** D. Stiffel  
**Drilling Company:** Valley Well Drilling

**Ground Surface Elevation:** 74.89 ft msl  
**Datum:** MSL

**Sampling Device:** logging f/cuttings  
**Borehole Diameter (inches):** 16 (0-120'), 7.5 (120-1,060')  
**Total Depth (Feet):** 1,060

**Date Drilling Started:** 2/24/2005  
**Date Total Depth Reached:** 3/30/2005

### Lithologic Description

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<th>ROCK TYPE: dry Munsell color, wet Munsell color, USCS grain size, mineralogy; texture; foliation or bedding; weathering; odor and staining</th>
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<th>STRUCTURE/DRILLING</th>
<th>WELL CONSTRUCTION DETAIL</th>
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<td>50% vesicular basalt, 5Y 3/1 very dark gray (dry), 5Y 2.5/1 black (wet), vesicles &lt; 1 mm, unweathered, hard, 50% saprolite, 5YR 4/4 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), soft, weathered</td>
<td><img src="image" alt="Cuttings" /> 0.2 - 1.4 cm, subrounded</td>
<td><img src="image" alt="Cuttings" /> 0.1 - 1.0 cm, subangular - subrounded</td>
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<td>1070</td>
<td>Slightly vesicular basalt, GLEY 1 3/N very dark gray (dry), GLEY 1 2.5/N black (wet), vesicles &lt; 1 mm, slightly weathered with white staining, 2% saprolite, 5YR 4/4 reddish brown (dry), 5YR 3/4 dark reddish brown (wet), soft, weathered</td>
<td><img src="image" alt="Cuttings" /> 0.2 - 1.4 cm, subrounded</td>
<td><img src="image" alt="Cuttings" /> 0.1 - 1.0 cm, subangular - subrounded</td>
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<td>1080</td>
<td></td>
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<td><img src="image" alt="Cuttings" /> 0.1 - 1.0 cm, subangular - subrounded</td>
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<tr>
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<td>1100</td>
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<td></td>
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</table>

**REMARKS:**

Legend:
- Clay
- Vesicular basalt
- Basalt with phenocrysts
- Saprolite
- Massive basalt
- Cement
APPENDIX C

SITE PHOTOGRAPHS
Photograph C-2. 10YR 3/4 dark yellowish brown weathered highly vesicular basalt/saprolite and 5Y 5/1 gray slightly vesicular basalt, cuttings from 90 feet bgs. March 25, 2005.
Photograph C-3. 5Y 4/1 dark gray massive basalt, slightly weathered with some staining, trace olivine present, cuttings from 280 feet bgs. March 25, 2005.

Photograph C-4. 5Y 4/1 dark gray weathered vesicular basalt and 5Y 8/1 white ash, cuttings from 320 feet bgs. March 25, 2005.
Photograph C-5. GLEY 1 4/N dark gray vesicular basalt with feldspar phenocrysts, cuttings from 470 feet bgs. March 25, 2005.

Photograph C-6. GLEY 1 4/N dark gray massive basalt with 5R 4/1 dark reddish gray vesicular basalt, cuttings from 610 feet bgs. March 31, 2005.
Photograph C-7. 5YR 3/4 dark reddish brown saprolite with GLEY 1 2.5/N vesicular basalt, cuttings from 900 feet bgs. March 31, 2005.
APPENDIX D

WELLBORE NAVIGATION, INC.
WAIMALU DEEP MONITOR WELL DIRECTIONAL SURVEY
WELLBORE NAVIGATION, INC.
TUSTIN, CALIFORNIA

MAGNETIC DIRECTIONAL SURVEY
BY MINIMUM CURVATURE
FOR

**************************************************
* VALLEY WELL DRILLING *
**************************************************

JOB NUMBER:
WELL NAME: DLNR
LOCATION: KAPOLEI, HAWAII
SURVEY DATE: APRIL 26, 2005
SURVEY ENGINEER: DEAN MCLURE
MAGNETIC DECLINATION: 09.92E TRUE NORTH

**************************************************
***** DEPTH MEASURED IN FEET ********
**************************************************

COMMENTS: COMBINATION OF
OPEN HOLE SURVEY AND
INSIDE DRILLPIPE SURVEY

******************************************************************************
******************************************************************************
******************************************************************************
*** THIS DIRECTIONAL SURVEY REPORT IS ****
** CORRECT TO THE BEST OF MY KNOWLEDGE ***
* AND IS SUPPORTED BY ACTUAL FIELD DATA! *
**
**
**
** COMPANY REPRESENTATIVE
******************************************************************************
******************************************************************************
******************************************************************************
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<th>VERT. SECT.</th>
<th>L/R CLOS.</th>
<th>INCL</th>
<th>BEARING AZIMUTH</th>
<th>COORDINATES LATITUDE DEPARTURE /100</th>
<th>D-LEG D-LEG STATION DISPLACEMENT</th>
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<td>0.00</td>
<td>0.00</td>
<td>0.000</td>
<td>00.00</td>
<td>000.00</td>
<td>0.00 N 0.00 E 0.00</td>
<td>0.00 AT 000.00</td>
<td>0.00</td>
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<td>20.0</td>
<td>20.00</td>
<td>0.00</td>
<td>0.000</td>
<td>00.00</td>
<td>000.00</td>
<td>0.00 N 0.00 E 0.00</td>
<td>0.00 AT 000.00</td>
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<td>0.29 AT 290.64</td>
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<td>200.00</td>
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<td>00.50</td>
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<td>4.07 N 2.47 W 1.00</td>
<td>0.60 AT 328.74</td>
<td>4.77 AT 328.74</td>
</tr>
</tbody>
</table>

***********************************************
* ***
* THE HORIZONTAL DISPLACEMENT AT THE DEPTH OF *
* ***
* 1060.0 FEET EQUALS 4.77 FEET AT 328.74 *
* ***********************************************
WELLBORE NAVIGATION INC.
HORIZONTAL PROJECTION
FOR
VALLEY WELL DRILLING
WELL NAME: DLNR
JOB NUMBER:
DATE: APRIL 26, 2005
SCALE: .5 FT./INCH

HORZ. DISP.
4.77 AT 328.74
CLOSURE-VIEW VERTICAL CROSS SECTION

WELLBORE NAVIGATION, INC.
VERTICAL CROSS SECTION
FOR
VALLEY WELL DRILLING
WELL NAME: DLNR
JOB NUMBER:
DATE: APRIL 25, 2005
V. SCALE: 100 FT./INCH
H. SCALE: 1 FT./INCH

0 2 4 6 8
CYD DISPLACEMENT

6,77 FT.
APPENDIX E

OCEANIC ANALYTICAL LABORATORY REPORT
April 15, 2005

Debra Stiffel          Work Order No.: 0504023
URS Corporation
615 Piikoi Street, Suite 900
Honolulu, HI 96814
TEL: (808) .UNKNOWN_ FAX: (808) .UNKNOWN_

RE: DLNR Waimalu Deep Well, 26536607

Dear Debra Stiffel:

Oceanic Analytical Laboratory, Inc. received/relogged 1 sample on 4/4/2005 01:30 PM for the analyses presented in the following report.

The total number of pages in the report including this Coverletter, Sample Summary, Case Narrative, Result Summary, QC Summary, Chain of Custody form(s), Relog Request Form and/or any attachment(s) is 8.

All data presented in the following report are relevant only to the samples as received and to the items tested by the laboratory. All data are calculated based on wet weight except where noted in the reporting unit. The report meets all applicable NELAC standards and shall not be reproduced except in full, without the written approval of the laboratory.

There were no problems with the analyses and all data for associated QC met laboratory specifications except where noted in the Case Narrative.

Applicable samples will be stored at no extra charge for a period of 30 days following the final report. Samples will be properly disposed of after 30 days, unless notified otherwise in writing.

If you have any questions regarding these tests results, please feel free to call.

Very truly yours,

OCEANIC ANALYTICAL LABORATORY, INC.

Aidan Scott
Laboratory Manager
Oceanic Analytical Laboratory, Inc.  

Work Order Sample Summary  

<table>
<thead>
<tr>
<th>Client:</th>
<th>URS Corporation</th>
</tr>
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<tbody>
<tr>
<td>Project:</td>
<td>DLNR Waimalu Deep Well, 26536607</td>
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<tr>
<td>Work Order:</td>
<td>0504023</td>
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<td>Date Received</td>
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Analytical Report for Samples  

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<th>Client Sample ID</th>
<th>Collection Date</th>
<th>Sample On Hold</th>
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<tbody>
<tr>
<td>0504023-01A</td>
<td>WAIMALU DEEP WELL - 1060</td>
<td>03/31/2005 12:00</td>
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Case Narrative

Client: URS Corporation
Project: DLNR Waimalu Deep Well, 26536607
Work Order: 0504023

Samples were analyzed using the methods outlined in the following references:

Methods for Chemical Analysis of Water and Wastes.

All method blanks, laboratory spikes, and/or matrix spikes met quality assurance objectives.
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<th>Analyses</th>
<th>Reporting Result</th>
<th>Limit</th>
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<th>Prepared Date</th>
<th>Analyze Date</th>
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**Qualifiers**

- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- * - Value exceeds Maximum Contaminant Level
- S - Spike Recovery outside accepted recovery limits
- R - RPD outside accepted recovery limits
- E - Value above quantitation range
### QC Summary

**Method Blank**

**Client:** URS Corporation  
**Work Order:** 050423  
**Project:** DLNR Waimalu Deep Well, 26536607

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<th>%REC</th>
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<td>Chloride</td>
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**Qualifiers:**  
- ND - Not Detected at the Reporting Limit  
- J - Analyte detected below quantitation limits  
- B - Analyte detected in the associated Method Blank  
- %REC - % Recovery  
- S - Spike Recovery outside established recovery limit  
- R - RPD outside established recovery limits  
- DF - Dilution Factor  
- RPD - Relative Percent Difference
Oceanic Analytical Laboratory, Inc.

Date: Apr 15, 2005

QC Summary
Sample Matrix Spike

Client: URS Corporation
Work Order: 0504023
Project: DLNR Waimalu Deep Well, 26536607

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<td>960.3</td>
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<td>75 125</td>
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<th>DF</th>
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<th>Spike Ref Val</th>
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<td>25</td>
<td>1250</td>
<td>960.3</td>
<td>100</td>
<td>75 125</td>
<td>2220 0.308 20</td>
</tr>
</tbody>
</table>

Qualifiers:
- ND - Not Detected at the Reporting Limit
- J - Analyte detected below quantitation limits
- B - Analyte detected in the associated Method Blank
- %REC - % Recovery
- S - Spike Recovery outside established recovery limit
- R - RPD outside established recovery limits
- DF - Dilution Factor
- RPD - Relative Percent Difference
Oceanic Analytical Laboratory, Inc.  

QC Summary  
Laboratory Control Spike

Client: URS Corporation  
Work Order: 0504023  
Project: DLNR Waimalu Deep Well, 26536607

Sample ID: LCS040805  
Batch ID: R29481  
Test Code: E325.2  
Prep Date: 4/8/2005  
Run ID: LAC1_050408A  
Analysis Date: 4/8/2005  
Units: mg/L

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>POL</th>
<th>DF</th>
<th>Spike Value</th>
<th>Ref Val</th>
<th>%REC</th>
<th>Limits</th>
<th>RPD</th>
<th>RPD Limit</th>
<th>Qual</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride</td>
<td>50.21</td>
<td>1.0</td>
<td>1</td>
<td>50</td>
<td>0</td>
<td>100</td>
<td>80</td>
<td>120</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Qualifiers  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
%REC - % Recovery  
S - Spike Recovery outside established recovery limit  
R - RPD outside established recovery limits  
DF - Dilution Factor  
RPD - Relative Percent Difference

Notes:

3
# Chain of Custody / Analysis Request Form

- **Report To:** Debra Stiffel
- **Company Name:** US Corporation
- **Address:** 615 Piikoi St 9th Floor
- **City:** Honolulu
- **State:** HI
- **Zip:** 96814
- **Phone:** 593.1116
- **Fax:** 593.1198
- **Sample No.:** RG, DE
- **Job Name:** DLNR Waimalu Deep Well
- **Job Number:** 26536667

## Client Sample I.D.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>COMP</th>
<th>GRAB</th>
<th>Matrix</th>
<th>Preservation Method</th>
<th>Sampling</th>
<th>Date</th>
<th>Time</th>
<th>Number of Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Waimalu Deep Well - 1060</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>4-4-05</td>
<td>1200</td>
<td>X</td>
</tr>
</tbody>
</table>

## Laboratory No.

- **Lab No.:** 0504023-01

## Delivery Method

- **Date / Time Released:** 4/4/2005 13:30
- **Method:** Hand

## Received by

- **Date / Time Received:** 4/4/2005 10:30
- **Company / Agency Affiliation:** AAL

## Condition Noted

- **Condition:** 23°C, ~

## Comments:

- White – Oceanic Analytical
- Yellow – Oceanic Analytical
- Pink – Client

Please Check Box
- Dispose by Lab
- Return to Client
- Archive
13. AS-BUILT WELL SECTION (Please attach as-built if different from diagram provided below)

Elevation at top of casing: 78.37 ft, msl
(to nearest 0.01 ft.)

Hole Diameter: 16 in.

Minimum of 2' Radius & 4" Thick Concrete Pad
Ground Elevation: 74.89 ft, msl

Bench mark elevation:
74.95 ft, msl*(Survey to nearest 0.01 ft.)

Cement Grout: 120 a
(min. 70% of distance from
ground elevation to top
top of water surface or 500 ft., whichever is less.)

Annular space between
hole and casing (1.5" for
positive displacement, 3" for other methods):
3 in.

Rock or Gravel Packing:
NA
Material:
□ Crushed Basalt
□ Rounded Gravel

Water Level Elevation:
20.06 ft, msl*

Solid Casing Material:
Carbon Steel: compliant with (check one or more): □ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A129
And compliant with (check one or more): □ ASTM A242 or A606 □ Type E □ Type S □ Grade B □ Other
Stainless Steel: (check one): □ ASTM A409 (production wells) □ ASTM A312 (monitor wells)
ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one): □ Schedule 40 □ Schedule 80 □ Schedule 120
Thermostatic Plastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Cantilevered Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:
Carbon Steel: compliant with (check one or more): □ ANSI/AWWA C200 □ API Spec. 5L □ ASTM A53 □ ASTM A129
And compliant with (check one or more): □ ASTM A242 or A606 □ Type E □ Type S □ Grade B □ Other
Stainless Steel: (check one): □ ASTM A409 (production wells) □ ASTM A312 (monitor wells)
ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one) □ Schedule 40 □ Schedule 80
PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one): □ Schedule 40 □ Schedule 80 □ Schedule 120
Thermostatic Plastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2996
□ Cantilevered Cast Resin Pipe conforming to ASTM D2997
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

*msl = mean sea level

WCR1 Form 10/18/04 Page 2 of 5
June 15, 2011

Ms. Angela Kaaihue
98-941 Moanalua Road Suite # 202
Aiea, Hawaii 96701

Dear Ms. Kaaihue:

Subject: Waimalu Aquifer, Kalauao, Ewa, Oahu, TMK:(1) 9-8-011:006.

This is to acknowledge your letter dated May 27, 2011 along with the enclosed documents pertaining to information on groundwater and contamination.

We forwarded or will forward your letter and enclosed documents to the Commission on Water Resource Management and the Department of Health for their information and if appropriate, action.

Thank you.

Sincerely,

Russell Y. Tsuji
Administrator

cc: Mr. Roy Hardy (CWRM)
Department of Health
JUNE 29, 2006
1000 hrs.

3-24-06-05  Winona Deep Monitor

MEMO:

SOME ONE BACKED INTO SWINGING GATE
AND BENT THE VERTICAL GATE POLE.
UNABLE TO LIFT POLE. WILL TRY TO 
REPAIR ON NEXT LOGGING VISIT. WELL IS SECURE.

Mitchell
May 1, 2006

Memo for the record

Kevin Gooding

Subject: Waimalu Deep Monitor Well

When we were logging the well on April 26 Mrs. Minami complained about the condition of the road. We told her we would pass on the message to Land Division.

I gave Land Division the message on May 1, 2006.
August 11, 2005

Mr. Eric Hirano
Department of Land and Natural Resources
Engineering Division
1151 Punchbowl St., Room 221
Honolulu, HI 96813

Dear Mr. Hirano:

Certificate of Well Construction Completion for Well No. 2456-05

We are pleased to inform you that the Well Construction work permitted for the Waimalu Deep Monitor Well (Well No. 2456-05) is complete and acceptable.

To protect Hawaii's natural groundwater resources for the benefit of all, the following requirements apply to the use of your well:

1. If the well is not in use it must be properly capped.

2. If the well is to be abandoned then the landowner must cause a licensed contractor to apply for a well abandonment permit in accordance with §13-168-12(f) prior to any well sealing or plugging work.

3. In the event that the well operator and/or landowner changes, the Commission shall be notified of the change prior to the change, and all forms shall be transferred to the new owner.

4. In the event the benchmark in the concrete base of the well is altered in any way, an updated elevation survey (page 5 of the Well Completion Report Part I) shall be submitted to the Commission. The Well Completion Report Part I can be obtained by contacting staff or at www.hawaii.gov/dlnr/cwrmlforms.htm.

Because groundwater in Hawaii is a public trust, and adverse effects at one well may affect other water resources, any violation of the above conditions, or any other provision of the Hawaii Administrative Rules, may be subject to fines of up to $5,000/day. The Commission realizes it needs your help, and for you to do your part in utilizing this shared resource, and as such prefers to work with you in meeting the goal of protecting the resource.

If you have any questions, please contact Lenore Y. Nakama of the Commission staff at [contact information] or toll-free at (Hawaii), (Kauai), (Maui), (Lanai & Molokai).

Sincerely,

DEAN A. NAKANO
 Acting Deputy Director

LYN:sd

c: Honolulu Board of Water Supply
August 11, 2005

Mr. Mike Sober
Valley Well Drilling
91-235A Oihana St.
Kapolei, HI 96707

Dear Mr. Sober:

Well Completion Report Part I for Well No. 2456-05

We received your Well Completion Report Part I for the Waimalu Deep Monitor Well (Well No. 2456-05) on July 7, 2005 and acknowledge that it is complete.

This completes your obligation under the well construction permit. A certificate of well construction completion will be issued to the well operator/landowner and you will receive a copy. This certificate transfers responsibility of all aspects of well usage and maintenance from you to the well operator/landowner.

If you have any questions, please contact Lenore Y. Nakama of the Commission staff at [redacted] or toll-free at [redacted] (Hawaii), [redacted] (Kauai), [redacted] (Maui), or [redacted] (Lanai & Molokai).

Sincerely,

DEAN A. NAKANO
Acting Deputy Director

LYN:sd
c: Eric Hirano, DLNR
### Well Check Program
4/1/04 - Revised for update to Well Standards (February 2004)

#### Data Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Well Number</td>
<td>2456-05</td>
</tr>
<tr>
<td>Well Name</td>
<td>waimalu deep</td>
</tr>
<tr>
<td>Ground Elevation</td>
<td>74.89</td>
</tr>
<tr>
<td>Cement Grout</td>
<td>120</td>
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<tr>
<td>Grouting Method</td>
<td>positive displacement</td>
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<tr>
<td>Hole Diameter</td>
<td>16</td>
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<td>Total Depth</td>
<td>1050</td>
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<tr>
<td>Estimated Head</td>
<td>20.06</td>
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<tr>
<td>Public Water Supply Well?</td>
<td>no</td>
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<tr>
<td>Solid Casing Material</td>
<td>steel</td>
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<td>Solid Casing Specification</td>
<td>ASTM A606</td>
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<td>Solid Casing Length</td>
<td>120</td>
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<td>Solid Casing Diameter</td>
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<td>Solid Casing Wall Thickness</td>
<td>0.3125</td>
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<tr>
<td>Open Casing Length</td>
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#### Results

**Well Depth**

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<tr>
<td>Theoretical Thickness of Aquifer</td>
<td>822.46</td>
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<tr>
<td>1/4 Aquifer Thickness</td>
<td>205.615</td>
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<tr>
<td>Depth of Well below Sea Level</td>
<td>976.11</td>
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**Well Casing**

<table>
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<tr>
<td>Minimum Wall Thickness Material</td>
<td>steel</td>
</tr>
<tr>
<td>Minimum Thickness per standards</td>
<td>0.25</td>
</tr>
<tr>
<td>Wall Thickness Provided</td>
<td>0.3125</td>
</tr>
<tr>
<td>Minimum Length of Solid Casing</td>
<td>49.347</td>
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<tr>
<td>90% of ground to top of aquifer</td>
<td></td>
</tr>
<tr>
<td>Length of solid casing Provided</td>
<td>120</td>
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<tr>
<td>Casing Material</td>
<td>ASTM A606</td>
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<td>(For use only - check for 200' limit)</td>
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**Annular Space**

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<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
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<td>38.381</td>
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<tr>
<td>Depth of Grouting provided</td>
<td>120</td>
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<tr>
<td>Minimum Annular Space required</td>
<td>1.5</td>
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<td>Thickness of Annular Space</td>
<td>3</td>
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Section 2.2: too deep
Section 2.4(b): okay
Section 2.4(c): okay
Section 2.4(d): in compliance
Section 2.6(c): okay
Section 2.6(d): okay
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<tr>
<th>TO:</th>
<th>INIT</th>
<th>TO:</th>
<th>INIT</th>
<th>FOR:</th>
<th>PLEASE:</th>
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<tr>
<td>ANAKALEA, P.</td>
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<td>KUNIMURA, I.</td>
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<td>Approval</td>
<td>See Me</td>
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<tr>
<td>BAUER, G.</td>
<td></td>
<td>NAKAMA, L.</td>
<td></td>
<td>Signature</td>
<td>Review &amp; Comment</td>
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<td>CHING, F.</td>
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<td>NAKANO, D.</td>
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<td>Information</td>
<td>Take Action</td>
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<td>DANBARA, S.</td>
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<td>OHYE, M.</td>
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<tr>
<td>FUJII, N.</td>
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<td>SAKODA, E.</td>
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<td>Type Final</td>
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<td>GOODING, K.</td>
<td></td>
<td>SUBIA, S.</td>
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<td>File</td>
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<td>HARDY, R.</td>
<td></td>
<td>SWANSON, S.</td>
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<td>Xerox ___ copies</td>
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<tr>
<td>HIGA, D.</td>
<td></td>
<td>UYENO, D.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ICE, C.</td>
<td></td>
<td>YODA, K.</td>
<td></td>
<td></td>
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<tr>
<td>IMATA, R.</td>
<td></td>
<td>YOSHINAGA, M.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mr. Timothy Steinberger, Vice President  
URS Corporation  
615 Piikoi Street, Suite 900  
Honolulu, Hawaii 96814-3141

Dear Mr. Steinberger:

Job No. G55CO18B, Waimalu Deep Monitor Well, Oahu

We request that the geologic report for the subject projects be prepared following the enclosed outline. The enclosed outline lists topics that need to be covered by the geologic report to provide an accurate description of each well site’s geology. Outline topics come from previously published United States Geologic Survey Open-File reports (i.e. Construction, Geology, and Aquifer Testing of the Maalo Road, Aahoaka Hill, and Upper Eleele Tank Monitor Wells, Kauai).

For your information, the geologic report prepared by your firm for the Pearl Harbor (Ewa-Kunia Mauka 2) Deep Monitor Well will not require revisions to follow the enclosed outline.

Should you have any questions, please contact Mr. Dennis Imada of the Planning Branch at

Sincerely,

For ERIC T. HIRANO  
Chief Engineer

DI:ck  
Enclosure  
c: CWRM (Glenn Bauer w/out attachment)
<table>
<thead>
<tr>
<th>Depth Interval (ft)</th>
<th>Elevation (ft MSL)</th>
<th>Description</th>
<th>rock type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 20</td>
<td>74 to 54</td>
<td>light grey, white, brown and greenish, mostly highly weathered, porphyritic with olivine phenocrysts, olivine weathered to red, white chalky clay, irregular shaped vesicles, conglomerate cemented with clay</td>
<td>stream alluvium with a'a boulders, Basalt</td>
</tr>
<tr>
<td>20 to 40</td>
<td>54 to 34</td>
<td>same except for rounded as well as irregular vesicles</td>
<td>stream alluvium with a'a boulders, Basalt</td>
</tr>
<tr>
<td>40 to 60</td>
<td>34 to 14</td>
<td>same but with more moderately weathered fragments with one mm rounded vesicles</td>
<td>same with less weathered pahoehoe fragments</td>
</tr>
<tr>
<td>60 to 80</td>
<td>14 to -6</td>
<td>light grey, brown, reddish and greenish, highly to moderately weathered, rounded and irregular vesicles, some vesicles filled with dark colored clay</td>
<td>Weathered a'a and pahoehoe basalt</td>
</tr>
<tr>
<td>80 to 100</td>
<td>-6 to -26</td>
<td>brown, grey and reddish, moderately weathered with rounded vesicles, some vesicles filled with dark brown clay, some balls of soil</td>
<td>weathered pahoehoe basalt</td>
</tr>
<tr>
<td>100 to 120</td>
<td>-26 to -46</td>
<td>light brown with rounded vesicles, highly weathered, also dark grey with irregular vesicles</td>
<td>weathered pahoehoe and a'a basalt</td>
</tr>
<tr>
<td>120 to 140</td>
<td>-46 to -66</td>
<td>light grey, reddish, round vesicles less than 1mm, moderately to highly weathered</td>
<td>weathered pahoehoe basalt</td>
</tr>
<tr>
<td>140 to 150</td>
<td>-66 to -76</td>
<td>light to dark grey, slightly to moderately weathered, angular vesicles, less than 1mm,</td>
<td>a'a basalt</td>
</tr>
<tr>
<td>140 to 160</td>
<td>-66 to -86</td>
<td>reddish brown, completely weathered</td>
<td>soil or weathered ash</td>
</tr>
<tr>
<td>160 to 170</td>
<td>-86 to -96</td>
<td>same</td>
<td>soil or weathered ash</td>
</tr>
<tr>
<td>170 to 180</td>
<td>-96 to -106</td>
<td>light grey, greenish and reddish, moderately to highly weathered, olivine weathered orange, angular vesicles</td>
<td>weathered a'a</td>
</tr>
<tr>
<td>180 to 200</td>
<td>-106 to -126</td>
<td>light grey, with reddish coating, moderately weathered, olivine weathered orange, angular vesicles</td>
<td>weathered a'a</td>
</tr>
<tr>
<td>200 to 220</td>
<td>-126 to -146</td>
<td>dark grey, red, some light grey greenish, moderately weathered, olivine weathered orange, angular vesicles,</td>
<td>weathered a'a</td>
</tr>
<tr>
<td>220 to 240</td>
<td>-146 to -166</td>
<td>dark grey, purple coating, some reddish fragments, slightly weathered, angular and spherical vesicles</td>
<td>slightly weathered a'a and pahoehoe</td>
</tr>
<tr>
<td>Depth Range</td>
<td>Grain Type</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>240 to 250</td>
<td>-166 to -176</td>
<td>same</td>
<td></td>
</tr>
<tr>
<td>250 to 260</td>
<td>-176 to -186</td>
<td>grey and red, moderate to highly weathered, porphyritic with weathered olivine phenocrysts, red fragments weathered to clay, angular vesicles</td>
<td></td>
</tr>
<tr>
<td>260 to 270</td>
<td>-186 to -196</td>
<td>same with white chalky fragments with rounded vesicles</td>
<td></td>
</tr>
<tr>
<td>270 to 280</td>
<td>-196 to -206</td>
<td>light to dark grey, moderately slightly to moderately weathered, medium grained aphanitic, angular vesicles</td>
<td></td>
</tr>
<tr>
<td>280 to 290</td>
<td>-206 to -216</td>
<td>same</td>
<td></td>
</tr>
<tr>
<td>290 to 300</td>
<td>-216 to -226</td>
<td>red, highly weathered, angular vesicles, amygdule filled with white mineral - clay or calcite</td>
<td></td>
</tr>
<tr>
<td>300 to 320</td>
<td>-226 to -246</td>
<td>dark grey and white, slightly to moderately weathered, aphanitic, spheroidal vesicles, white minerals (clay or calcite) are very soft</td>
<td></td>
</tr>
<tr>
<td>320 to 340</td>
<td>-246 to -266</td>
<td>same except some vesicles are filled with the white mineral</td>
<td></td>
</tr>
<tr>
<td>340 to 360</td>
<td>-266 to -286</td>
<td>same</td>
<td></td>
</tr>
<tr>
<td>360 to 380</td>
<td>-286 to -306</td>
<td>dark grey with some white minerals, slightly to moderately weathered, round and angular vesicles, some vesicles have orange lining, aphanitic texture</td>
<td></td>
</tr>
<tr>
<td>380 to 390</td>
<td>-306 to -316</td>
<td>dark grey, brown, highly weathered, angular vesicles, some fragments have look like soil balls</td>
<td></td>
</tr>
<tr>
<td>390 to 400</td>
<td>-316 to -326</td>
<td>dark grey, moderately weathered, porphyritic, 2 mm olivine phenocrysts, white infilling of some vesicles, vesicles generally spheroidal</td>
<td></td>
</tr>
<tr>
<td>400 to 420</td>
<td>-326 to -346</td>
<td>light and dark grey, slightly weathered, porphyritic with 2 mm olivine and feldspar phenocrysts, angular and spheroidal vesicles</td>
<td></td>
</tr>
<tr>
<td>420 to 430</td>
<td>-346 to -356</td>
<td>dark grey greenish, slightly to moderately weathered, angular and spheroidal vesicles, reddish coating in some places</td>
<td></td>
</tr>
<tr>
<td>430 to 440</td>
<td>-356 to -366</td>
<td>red, brown and grey, slightly weathered, scoriaceous, angular and spheroidal vesicles, amygdule with white mineral</td>
<td></td>
</tr>
<tr>
<td>440 to 450</td>
<td>-366 to -376</td>
<td>dark grey, slightly weathered to unweathered, irregular angular vesicles, feldspar phenocrysts, some fragments scoriacious,</td>
<td></td>
</tr>
<tr>
<td>450 to 460</td>
<td>-376 to -386</td>
<td>dark grey with reddish and white fragments, slightly to moderately weathered, with amygdule, rounded vesicles</td>
<td></td>
</tr>
<tr>
<td>460 to 480</td>
<td>-386 to -406</td>
<td>same except some vesicles have a bluish coating</td>
<td></td>
</tr>
<tr>
<td>480 to 490</td>
<td>-406 to -416</td>
<td>dark grey, slightly weathered to unweathered, spheroidal vesicles, scoriaceous, some vesicles filled or lined with white mineral</td>
<td></td>
</tr>
<tr>
<td>Layer</td>
<td>Range</td>
<td>Description</td>
<td>Text</td>
</tr>
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<td>------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>490</td>
<td>500</td>
<td>-416 to -426 dark red to brown, slightly weathered, spheroidal vesicles,</td>
<td>pahoehoe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>slightly weathered, euhedral feldspar phenocrysts,</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>510</td>
<td>-426 to -436 same</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>510</td>
<td>520</td>
<td>-436 to -446 dark grey, unweathered, spheroidal vesicles, some scoriaceous</td>
<td>pahoehoe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fragments, subhedral feldspar phenocrysts</td>
<td></td>
</tr>
<tr>
<td>520</td>
<td>530</td>
<td>-446 to -456 same except for vesicles up to 2 mm in some fragments</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>530</td>
<td>540</td>
<td>-456 to -466 dark grey and dark red, moderately weathered, aphanitic,</td>
<td>cinders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spheroidal vesicles, scoriaceous</td>
<td></td>
</tr>
<tr>
<td>540</td>
<td>550</td>
<td>-466 to -476 same</td>
<td>cinders</td>
</tr>
<tr>
<td>550</td>
<td>560</td>
<td>-476 to -486 dark grey, slightly weathered to unweathered, aphanitic,</td>
<td>pahoehoe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spheroidal vesicles, pahoehoe</td>
<td></td>
</tr>
<tr>
<td>560</td>
<td>570</td>
<td>-486 to -496 dark grey, moderately weathered, rounded by irregular shaped</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vesicles, aphanitic</td>
<td></td>
</tr>
<tr>
<td>570</td>
<td>580</td>
<td>-496 to -506 light to dark grey with reddish fragments, slightly weathered</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to unweathered, dense, very few rounded vesicles, aphanitic</td>
<td></td>
</tr>
<tr>
<td>580</td>
<td>590</td>
<td>-506 to -516 dark grey and dark red, moderately weathered, few irregular</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>shaped vesicles, some vesicles filled in</td>
<td></td>
</tr>
<tr>
<td>590</td>
<td>600</td>
<td>-516 to -526 light grey, unweathered, spheroidal and irregular shaped</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vesicles, porphyritic texture, euhedral olivine phenocrysts, black coating in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>some vesicles</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>620</td>
<td>-526 to -546 dark grey to reddish, unweathered, spheroidal vesicles, up to</td>
<td>pahoehoe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 mm in diameter, aphanitic texture</td>
<td></td>
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<tr>
<td>620</td>
<td>630</td>
<td>-546 to -556 dark grey to reddish, unweathered, irregular vesicles, up to</td>
<td>a'a</td>
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<tr>
<td></td>
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<td>1 mm in diameter, aphanitic</td>
<td></td>
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<tr>
<td>630</td>
<td>640</td>
<td>-556 to -566 light grey, slightly weathered, no vesicles, aphanitic,</td>
<td>a'a</td>
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<tr>
<td>640</td>
<td>650</td>
<td>-566 to -576 greenish light grey, vesicles coated with brownish red,</td>
<td>pahoehoe</td>
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<tr>
<td></td>
<td></td>
<td>moderately weathered, spheroidal vesicles up to .5 mm diameter, aphanitic</td>
<td></td>
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<tr>
<td>650</td>
<td>660</td>
<td>-576 to -586 greenish light grey, moderately weathered, vesicles coated with</td>
<td>pahoehoe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>blackish and reddish material, spheroidal vesicles about 1 mm, scoriaceous,</td>
<td></td>
</tr>
<tr>
<td>660</td>
<td>670</td>
<td>-586 to -596 dark grey and reddish, slightly weathered, irregular vesicles</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.25 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>670</td>
<td>680</td>
<td>-596 to -606 dark grey, unweathered, few irregular shaped vesicles, &lt;.25 mm</td>
<td>a'a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>680</td>
<td>690</td>
<td>-606 to -616 same</td>
<td>a'a</td>
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<tr>
<td>Time Interval</td>
<td>Interval</td>
<td>Description</td>
<td>Type</td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
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<tr>
<td>690 to 700</td>
<td>-616 to -626</td>
<td>dark grey and reddish, unweathered, spheroidal vesicles up to 1 mm diameter, aphanitic texture</td>
<td>pahoehoe</td>
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<tr>
<td>700 to 710</td>
<td>-626 to -636</td>
<td>dark grey, unweathered, spheroidal vesicles up to .5 mm, aphanitic</td>
<td>pahoehoe</td>
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<tr>
<td>710 to 720</td>
<td>-636 to -646</td>
<td>dark grey, unweathered, very few spheroidal vesicles up .75 mm, aphanitic</td>
<td>pahoehoe</td>
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<tr>
<td>720 to 730</td>
<td>-646 to -656</td>
<td>dark grey with reddish parts, unweathered, small spheroidal vesicles .5 mm diameter with reddish infilling in some, aphanitic</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>730 to 740</td>
<td>-656 to -666</td>
<td>light grey to dark grey with whitish parts, unweathered, irregular shaped vesicles, aphanitic</td>
<td>?</td>
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<tr>
<td>740 to 750</td>
<td>-666 to -676</td>
<td>blackish, dark grey, reddish and brownish, unweathered, some glassy texture, scoriaceous, spheroidal vesicles .5 mm diameter, aphanitic with some faces with glassy texture</td>
<td>shelly pahoehoe</td>
</tr>
<tr>
<td>750 to 760</td>
<td>-676 to -686</td>
<td>same except no glassy parts</td>
<td>shelly pahoehoe</td>
</tr>
<tr>
<td>760 to 770</td>
<td>-686 to -696</td>
<td>same</td>
<td>shelly pahoehoe</td>
</tr>
<tr>
<td>770 to 780</td>
<td>-696 to -706</td>
<td>reddish brown and yellow with grey, unweathered, scoriaceous with .5 mm spheroidal diameter vesicles, glassy parts, some fragments altered to yellow clay, aphanitic</td>
<td>shelly pahoehoe</td>
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<tr>
<td>780 to 790</td>
<td>-706 to -716</td>
<td>dark grey with whitish parts, unweathered, spheroidal vesicles up to 2 mm diameter, aphanitic</td>
<td>pahoehoe</td>
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<tr>
<td>790 to 800</td>
<td>-716 to -726</td>
<td>reddish brown and yellow with grey, unweathered, scoriaceous with .5 mm spheroidal diameter vesicles, glassy parts, some fragments altered to yellow clay, aphanitic</td>
<td>shelly pahoehoe</td>
</tr>
<tr>
<td>800 to 810</td>
<td>-726 to -736</td>
<td>dark grey, unweathered, round vesicles up to .5 mm diameter, red coating in some vesicles, aphanitic</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>810 to 820</td>
<td>-736 to -746</td>
<td>same</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>820 to 830</td>
<td>-746 to -756</td>
<td>same</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>830 to 840</td>
<td>-756 to -766</td>
<td>dark grey with reddish parts, unweathered, small irregular shaped vesicles .1 mm diameter, aphanitic</td>
<td>a'a</td>
</tr>
<tr>
<td>840 to 850</td>
<td>-766 to -776</td>
<td>same</td>
<td>a'a</td>
</tr>
<tr>
<td>850 to 860</td>
<td>-776 to -786</td>
<td>dark grey and red, unweathered, spheroidal vesicles .5 mm diameter, aphanitic texture, pahoehoe</td>
<td></td>
</tr>
<tr>
<td>860 to 870</td>
<td>-786 to -796</td>
<td>dark grey, unweathered, large spheroidal vesicles 4 mm diameter, white coating in some vesicles, aphanitic texture</td>
<td>pahoehoe</td>
</tr>
<tr>
<td>Luminescence</td>
<td>Range</td>
<td>Description</td>
<td>Aphanitic</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>870 to 880</td>
<td>-796 to -806</td>
<td>Dark grey and red, unweathered, spheroidal vesicles up to 1 mm diameter, white coating in some vesicles, aphanitic</td>
<td></td>
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<tr>
<td>880 to 890</td>
<td>-806 to -816</td>
<td>Dark grey, unweathered, spheroidal vesicles .5 mm diameter, aphanitic</td>
<td></td>
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<tr>
<td>890 to 900</td>
<td>-816 to -826</td>
<td>Dark red, moderately to completely weathered, some fragments red clay, darker minerals in the groundmass.</td>
<td></td>
</tr>
<tr>
<td>900 to 920</td>
<td>-826 to -846</td>
<td>Dark grey with greenish tint, slightly to moderately weathered, both spheroidal and irregular vesicles up to .2 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>920 to 930</td>
<td>-846 to -866</td>
<td>Dark grey with some red, unweathered, spheroidal vesicles up to 5 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>930 to 940</td>
<td>-866 to -866</td>
<td>Light grey with whitish parts, unweathered very small spheroidal pinhole sized vesicles, aphanitic</td>
<td></td>
</tr>
<tr>
<td>940 to 950</td>
<td>-866 to -876</td>
<td>Dark grey with some red, unweathered, spheroidal vesicles up to 5 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>950 to 970</td>
<td>-876 to -896</td>
<td>Dark grey with reddish coating in vesicles, unweathered, small vesicles .5 mm diameter spheroidal and irregular shape, aphanitic</td>
<td>pahoehoe扇</td>
</tr>
<tr>
<td>970 to 980</td>
<td>-896 to -906</td>
<td>Light grey with whitish parts, slightly to moderately weathered, irregular shaped vesicles up to 1 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>980 to 990</td>
<td>-906 to -916</td>
<td>Dark red with some gray, unweathered, irregular and spheroidal vesicles 2 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>990 to 1000</td>
<td>-916 to -926</td>
<td>Light grey with whitish parts, slightly weathered, few vesicles irregular shaped up to 1.5 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>1000 to 1010</td>
<td>-926 to -936</td>
<td>Grey, with reddish coating in the vesicles, moderately to slightly weathered, spheroidal vesicles up to 1 mm diameter, aphanitic</td>
<td></td>
</tr>
<tr>
<td>1010 to 1030</td>
<td>-936 to -956</td>
<td>Same</td>
<td></td>
</tr>
<tr>
<td>1030 to 1040</td>
<td>-956 to -966</td>
<td>Grey with some dark and light red fragments, slightly weathered to unweathered, spheroidal and angular vesicles up to 1 mm diameter, aphanitic</td>
<td></td>
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<tr>
<td>1040 to 1050</td>
<td>-966 to -976</td>
<td>Grey and orange, completely weathered to moderately weathered, 50% fragments have spheroidal vesicles up to 2 mm diameter, other fragments are clay with no vesicles, rock fragments are aphanitic</td>
<td></td>
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<tr>
<td>1050 to 1060</td>
<td>-976 to -986</td>
<td>Grey with whitish coating, moderately weathered, spheroidal vesicles 1 mm diameter, aphanitic</td>
<td></td>
</tr>
</tbody>
</table>
Date: 8/11/2015

Problem Sheet

1. Find the volume of a sphere with radius 5 cm.

Volume of Sphere = \( \frac{4}{3} \pi r^3 \)

Radius = 5 cm

Volume = \( \frac{4}{3} \pi (5)^3 \)

Volume = \( \frac{4}{3} \pi (125) \)

Volume = \( \frac{500}{3} \pi \) cm³

2. Find the area of a circle with diameter 10 cm.

Area of Circle = \( \pi r^2 \)

Diameter = 10 cm, so Radius = 5 cm

Area = \( \pi (5)^2 \)

Area = 25\( \pi \) cm²

3. Find the circumference of a circle with diameter 8 cm.

Circumference = \( \pi d \)

Diameter = 8 cm

Circumference = \( 8 \pi \) cm

4. Find the area of a triangle with base 12 cm and height 9 cm.

Area of Triangle = \( \frac{1}{2} bh \)

Base = 12 cm, Height = 9 cm

Area = \( \frac{1}{2} (12)(9) \)

Area = 54 cm²

5. Find the perimeter of a rectangle with length 15 cm and width 10 cm.

Perimeter of Rectangle = 2(l + w)

Length = 15 cm, Width = 10 cm

Perimeter = 2(15 + 10)

Perimeter = 2(25)

Perimeter = 50 cm

6. Find the surface area of a cube with side length 6 cm.

Surface Area of Cube = 6s²

Side Length = 6 cm

Surface Area = 6(6²)

Surface Area = 6(36)

Surface Area = 216 cm²

7. Find the volume of a rectangular prism with length 10 cm, width 5 cm, and height 4 cm.

Volume of Rectangular Prism = lwh

Length = 10 cm, Width = 5 cm, Height = 4 cm

Volume = (10)(5)(4)

Volume = 200 cm³

---

Total:

Volume of Sphere = \( \frac{500}{3} \pi \) cm³

Area of Circle = 25\( \pi \) cm²

Circumference of Circle = 8\( \pi \) cm

Area of Triangle = 54 cm²

Perimeter of Rectangle = 50 cm

Surface Area of Cube = 216 cm²

Volume of Rectangular Prism = 200 cm³

Remainder: 836
# State of Hawaii
## COMMISSION ON WATER RESOURCE MANAGEMENT
### Department of Land and Natural Resources

## WELL COMPLETION REPORT - PART I
### Well Construction

*Instructions: Please print in ink or type and send completed report (with attachments, if applicable) to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. The Commission may not accept incomplete reports. This form shall be submitted within 60 days of the completion of work. For assistance, please consult the Hawaii Well Construction and Pump Installation Standards or call the Regulation Branch at \[phone number\]. For updates to this form or additional information, please visit our website at \[website URL\].*

1. **State Well No.:** 2456-05  
   **Well Name:** Waimalu Deep Monitor  
   **Island:** Oahu
2. **Address:** Kilinoe Street  
   **Tax Map Key:** 9-8-11:006
3. **Drilling Company:** Valley Well Drilling
4. **Drilling method used during construction:**  
   - [ ] Rotary  
   - [ ] Percussion  
   - [X] Other (describe) Reverse Circ.
5. **Date Well Construction (drilled,cased,grouted) completed:** 4/29/05  
   Fill out attached Driller's Log
   
   *In addition to the driller's log, if a geologic log was prepared, please submit with this form.*
6. **Was the subject well cored?**  
   - [ ] Yes  
   - [X] No
7. **Initial water-level encountered:** 54.8 ft. below ground  
   **Date and time of measurement:** 3/15/05 0700
8. **Step-Drawdown Test completed?**  
   - [X] No  
   - [ ] Yes  
   Attach Step-Drawdown Test form (12/1/97 SDPTD Form)
9. **Constant Rate Aquifer Test completed?**  
   - [X] No  
   - [ ] Yes  
   Attach Constant Rate Aquifer Test form (12/1/97 CRPTD Form)
10. **Parameters prior to pump test:**
    - **Water-level:**__ ft. above msl  
      **Date and time of measurement:**__
    - **Chloride:**__ ppm  
      **Date and time of sampling:**__
    - **Temperature:**__ °F  
      **Date and time of measurement:**__
11. **Fill in the as-built section on the other side of this sheet.**
12. **Attach photograph of well and concrete pad showing benchmark on concrete pad.**
13. **Fill in attached surveyor's report.**
14. **If a pump is not planned to be installed, please describe (below in the remarks section) how well is secured to prevent unauthorized access (example: lockable cover, threaded coupling, etc.)**
15. **Remarks:**  
   - Lockable cover
   - ____________________________
   - ____________________________
   - ____________________________

---

**Licensed Driller (print)**  
Valley Well Drilling  
C-57 Lic. No. 21358

**Signature**  

**Date** 6/20/05
13. AS-BUILT WELL SECTION (Please attach as-built if different from diagram provided below)

Elevation at top of casing: 78.54 ft., msl*

Bench mark elevation:
74.96 ft., msl*
(Survey to nearest 0.01 ft.)

Cement Grout: 120 ft. (min. 70% of distance from ground elevation to top of water surface or 500 ft., whichever is less.)

Annular space between hole and casing (1.5" for positive displacement, 3" for other methods):
3 in.

Rock or Gravel Packing:
NA ft.

Total Depth: 1050 ft.

Water Level Elevation:
20.06 ft., msl*

Solid Casing: (≥ 90% x (Ground Elev.-Water Level Elev))
Length: 120 ft.
Nominal Diameter: 10 in.
Wall Thickness: 5/16 in.
Bottom Elevation: -45.11 ft., msl

Open Casing:
□ Perforated  □ Screen
Length: NA ft.
Nominal Diameter: (check one or more):
□ ASTM A408 (production wells)  □ ASTM A312 (monitor wells)
Wall Thickness: (check one or more):
□ ASTM A408 (production wells)  □ ASTM A312 (monitor wells)
Bottom Elevation: (check one or more):
□ ASTM A408 (production wells)  □ ASTM A312 (monitor wells)

Open Hole:
Length: 930 ft.
Diameter: 7.5 in.
Bottom Elevation: -975.11 ft., msl

Solid Casing Material:
2.2456.05 WAIMANALI DEEP MONITOR

Carbon Steel: compliant with (check one or more):
□ ANSI/AWWA C200  □ API Spec. 5L  □ ASTM A53  □ ASTM A139
□ Other

Stainless Steel: (check one):
□ ASTM A242 or A806  □ Type E  □ Type S  □ Grade B  □ Other
□ ASTM A408 (production wells)  □ ASTM A312 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one)
□ Schedule 40  □ Schedule 80

PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one):
□ Schedule 40  □ Schedule 80  □ Schedule 120

Thermoset Plastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2966
□ Centrifugally Cast Resin Pipe conforming to ASTM D2967
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:

Carbon Steel: compliant with (check one or more):
□ ANSI/AWWA C200  □ API Spec. 5L  □ ASTM A53  □ ASTM A139
□ Other

Stainless Steel: (check one):
□ ASTM A242 or A806  □ Type E  □ Type S  □ Grade B  □ Other
□ ASTM A408 (production wells)  □ ASTM A312 (monitor wells)

ABS Plastic conforming to ASTM F480 and ASTM D1527: (check one)
□ Schedule 40  □ Schedule 80

PVC Plastic conforming to ASTM F480 and (ASTM D1785 or ASTM D2241): (check one):
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Thermoset Plastic: (check one)
□ Filament Wound Resin Pipe conforming to ASTM D2966
□ Centrifugally Cast Resin Pipe conforming to ASTM D2967
□ Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
□ Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
□ PTFE Fluorocarbon Tubing conforming to ASTM D3296
□ FEP Fluorocarbon Tubing conforming to ASTM D3296
**State of Hawaii**  
**COMMISSION ON WATER RESOURCE MANAGEMENT**  
Department of Land and Natural Resources  
**DRILLER'S LOG**

**Well Number:** 2456-05

<table>
<thead>
<tr>
<th>Depths (ft.)</th>
<th>Rock description, Water level, etc.</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 8</td>
<td>large basalt boulders w/dark brown silty sand</td>
<td>2/24/05</td>
</tr>
<tr>
<td>8 to 40</td>
<td>large basalt boulders w/dark brown silty sand</td>
<td>2/25/05</td>
</tr>
<tr>
<td>40 to 50</td>
<td>blue gray basalt mixed w/clay</td>
<td>2/28/05</td>
</tr>
<tr>
<td>50 to 75</td>
<td>soft brown clay mixed w/weathered basalt</td>
<td>2/28/05</td>
</tr>
<tr>
<td>75 to 95</td>
<td>saphrolite reddish brown</td>
<td>2/28/05</td>
</tr>
<tr>
<td>95 to 100</td>
<td>blue gray basalt, med hard</td>
<td>2/28/05</td>
</tr>
<tr>
<td>95 to 105</td>
<td>blue gray basalt med hard</td>
<td>3/1/05</td>
</tr>
<tr>
<td>105 to 125</td>
<td>weathered basalt med</td>
<td>3/1/05</td>
</tr>
<tr>
<td>120 to 130</td>
<td>light brown weathered rock</td>
<td>3/14/05</td>
</tr>
<tr>
<td>130 to 140</td>
<td>dark brown vesicular basalt</td>
<td>3/14/05</td>
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<tr>
<td>140 to 150</td>
<td>greenish gray basalt, very hard</td>
<td>3/15/05</td>
</tr>
<tr>
<td>150 to 170</td>
<td>light brown, vesicular, med</td>
<td>3/15/05</td>
</tr>
<tr>
<td>170 to 180</td>
<td>light gray, weathered soft</td>
<td>3/15/05</td>
</tr>
<tr>
<td>180 to 240</td>
<td>dark gray basalt, very hard</td>
<td>3/15/05</td>
</tr>
<tr>
<td>240 to 250</td>
<td>basalt olive gray, very hard</td>
<td>3/16/05</td>
</tr>
<tr>
<td>250 to 260</td>
<td>weathered, light brown, med</td>
<td>3/16/05</td>
</tr>
<tr>
<td>260 to 280</td>
<td>greenish gray, dense, very hard</td>
<td>3/16/05</td>
</tr>
<tr>
<td>280 to 295</td>
<td>light gray basalt, very hard</td>
<td>3/17/05</td>
</tr>
<tr>
<td>295 to 305</td>
<td>light brown, vesicular, medium</td>
<td>3/17/05</td>
</tr>
<tr>
<td>305 to 310</td>
<td>dark brown, vesicular, med</td>
<td>3/17/05</td>
</tr>
<tr>
<td>310 to 315</td>
<td>dark gray basalt very hard</td>
<td>3/17/05</td>
</tr>
<tr>
<td>315 to 320</td>
<td>greenish gray, med hard</td>
<td>3/17/05</td>
</tr>
<tr>
<td>320 to 330</td>
<td>light brown, vesicular med</td>
<td>3/18/05</td>
</tr>
<tr>
<td>330 to 340</td>
<td>light brown, vesicular med</td>
<td>3/18/05</td>
</tr>
<tr>
<td>340 to 360</td>
<td>dark brown vesicular med</td>
<td>3/18/05</td>
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<tr>
<td>360 to 390</td>
<td>dark brown vesicular med</td>
<td>3/18/05</td>
</tr>
<tr>
<td>390 to 395</td>
<td>dark gray, weathered, mix w/dark gray clay, soft</td>
<td>3/18/05</td>
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<tr>
<td>395 to 400</td>
<td>olive gray, vesicular, med</td>
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<td>400 to 410</td>
<td>olive gray, vesicular, med</td>
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<tr>
<td>410 to 420</td>
<td>olive gray w/olivine, hard</td>
<td>3/18/05</td>
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<tr>
<td>420 to 430</td>
<td>olive gray basalt, hard</td>
<td>3/21/05</td>
</tr>
<tr>
<td>430 to 438</td>
<td>cinders, varying colors</td>
<td>3/21/05</td>
</tr>
<tr>
<td>438 to 450</td>
<td>light brown vesicular basalt, med hard</td>
<td>3/21/05</td>
</tr>
<tr>
<td>450 to 455</td>
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<td>3/21/05</td>
</tr>
<tr>
<td>460 to 470</td>
<td>dark gray, dense, very hard</td>
<td>3/21/05</td>
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**Remarks:**

page 1 of 3
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<th>Rock description, Water level, etc.</th>
<th>Dates</th>
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<td>470 to 480</td>
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<tr>
<td>480 to 490</td>
<td>olive gray basalt, weathered, med</td>
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<tr>
<td>490 to 510</td>
<td>olive gray basalt, weathered, med</td>
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</tr>
<tr>
<td>510 to 520</td>
<td>olive gray, dense, very hard</td>
<td></td>
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<tr>
<td>520 to 530</td>
<td>dark gray basalt, hard</td>
<td></td>
</tr>
<tr>
<td>530 to 540</td>
<td>dark gray, weathered, med</td>
<td></td>
</tr>
<tr>
<td>540 to 557</td>
<td>dark brown vesicular</td>
<td></td>
</tr>
<tr>
<td>557 to 560</td>
<td>dark gray, dense, hard</td>
<td></td>
</tr>
<tr>
<td>560 to 580</td>
<td>dark gray, med hard</td>
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<td>580 to 590</td>
<td>light brown, weathered</td>
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<td>590 to 600</td>
<td>olive gray, very hard</td>
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<td>610 to 615</td>
<td>dark gray hard, basalt</td>
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</tr>
<tr>
<td>615 to 630</td>
<td>dark gray, weathered, med</td>
<td></td>
</tr>
<tr>
<td>630 to 640</td>
<td>dark gray, very hard</td>
<td></td>
</tr>
<tr>
<td>640 to 650</td>
<td>dark brown vesicular, med</td>
<td></td>
</tr>
<tr>
<td>650 to 660</td>
<td>olive gray vesicular, med</td>
<td></td>
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<tr>
<td>660 to 670</td>
<td>dark brown vesicular</td>
<td></td>
</tr>
<tr>
<td>670 to 680</td>
<td>dark gray, very hard</td>
<td></td>
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**Remarks:**
page 2 of 3
## State of Hawaii
**Commission on Water Resource Management**
Department of Land and Natural Resources
**Driller's Log**

**Well Number:** 2456.05

<table>
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<th>Depths (ft.)</th>
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<td>895 to 900</td>
<td>light brown clay med</td>
<td>3/28/05</td>
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<td>900 to 910</td>
<td>dark gray weathered basalt</td>
<td>3/29/05</td>
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<td>910 to 920</td>
<td>dark gray, hard</td>
<td>3/29/05</td>
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<tr>
<td>920 to 930</td>
<td>dark brown mix w/dark gray, hard</td>
<td>3/29/05</td>
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<tr>
<td>930 to 940</td>
<td>olive gray med hard</td>
<td>3/29/05</td>
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<tr>
<td>940 to 957</td>
<td>cinders dark brown, med</td>
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<td>957 to 970</td>
<td>dark gray vesicular</td>
<td>3/29/05</td>
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<tr>
<td>970 to 990</td>
<td>olive gray, dense, hard</td>
<td>3/29/05</td>
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<tr>
<td>990 to 1000</td>
<td>dark gray, hard</td>
<td>3/29/05</td>
</tr>
<tr>
<td>1000 to 1010</td>
<td>dark gray mix w/dark brown</td>
<td>3/29/05</td>
</tr>
<tr>
<td>1010 to 1020</td>
<td>dark brown vesicular</td>
<td>3/30/05</td>
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<td>1020 to 1030</td>
<td>dark gray vesicular</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1030 to 1040</td>
<td>dark brown weathered</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1040 to 1050</td>
<td>dark gray basalt mix w/light brown clay</td>
<td>3/30/05</td>
</tr>
<tr>
<td>1050 to 1060</td>
<td>dark gray, very hard</td>
<td>3/30/05</td>
</tr>
</tbody>
</table>

**Remarks:**
page 3 of 3
Valley Well Drilling
91-235A Oihana Street
Kapolei, Hawaii 96707

Gentlemen:

SUBJECT: WELL ELEVATION
WAIMALU DEEP MONITORING WELL
At Waimalu, Ewa, Honolulu, Hawaii
TMK: (1) 9-8-11: 006

The undersigned hereby certifies that the following are the results from our survey of the well site on May 23, 2005:

Well Elevation:

<table>
<thead>
<tr>
<th>Component</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top benchmark (brass disk)</td>
<td>74.95 ft.</td>
</tr>
<tr>
<td>Top well cap</td>
<td>78.53 ft.</td>
</tr>
<tr>
<td>Top well casing</td>
<td>77.06 ft.</td>
</tr>
</tbody>
</table>

Well Location:

21° 23' 51" N (NAD 83)
157° 56' 05" W

TOWILL, SHIGEOKA & ASSOCIATES, INC.

Robert K.Y. Lee
Licensed Professional Land Surveyor
Certificate Number 5075
Well Elevation

Benchmark Elevation 74.95

Attach photos of completed well and concrete pad showing benchmark location.

I certify that the elevation shown above:

1) Was done in accordance with acceptable surveying practices
2) Is accurate to the nearest 0.01 ft.
3) Is referenced to mean sea level

Robert K. Y. Lee
 Lic. No. 5075
 June 30, 2005

Surveyor License No. Date
TRANSMITTAL/REVIEW/APPROVAL

Submit Original and 5 copies to ENGINEERING DIVISION

DATE: 6/21/05

JOB NO: G55C018B
TITLE: Waimalu Deep Monitor Well,

SUBMITTAL NO: 2

FROM (CONTRACTOR)(ADDRESS)
VALLEY WELL DRILLING
91-235A OIHANA STREET
KAPOLEI, HAWAII 96707

TO: STATE OF HAWAII DEPT OF LAND & NATURAL RESOURCE ENGINEERING DIVISION
ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

ENCL. MIN. NO. OF COPIES (6) FOR RECORD ONLY (4)

DESCRIPTION SPEC. PARA. NO./LOCATION ON DW

Well Completion Report Compaction Test Report Plumbness Survey Video Log Surety Release Tax Clearance

TRANSMITTED for:
☑ APPROVAL ☐ CLARIFICATION ☐ SELECTION ☐ CONTRACT DEVIATION

It is hereby certified that the material submitted herein conforms to contract requirements and will fit in the allocated spaces.

CONTRACTOR, SIGNATURE: train st

FROM: DLNR, ENGINEERING DIVISION
SIGNATURE: DATE:

TO: (CONSULTANT) RETURN BY (DATE)
For review/comments. (____) copies of enclosures forwarded. MUST RETURN WITHIN 10 CALENDAR DAYS unless submittal is for record/info purpose only and there are no adverse comments.

RECOMMENDED:
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☐ APPROVAL, As noted, subject to contract requirements
☐ RETURN, For correction and submission
☐ DISAPPROVAL

REMARKS:

(____) copies of encls. retained

FROM: DLNR, ENGINEERING DIVISION
TO: CONTRACTOR VALLEY WELL DRILLING
DATE:

SIGNATURE: Consultant

Enclosure(s) is(are):

RECOMMENDED:
☐ APPROVED, Subject to contract requirements
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☐ DISAPPROVED
☐ CONFORM TO REMARKS BY CONSULTANT (ABOVE)

REMARKS:

Distribution: Contractor
File
Inspector (Ranceford Yoshida)
Parks

SIGNATURE:
**TRANSMITTAL/REVIEW/APPROVAL**

**JOB NO:** G55C018B  **TITLE:** Waimalu Deep Monitor Well  **SUBMITTAL NO:** 2  **DATE:** 6/21/03

**FROM (CONTRACTOR)(ADDRESS):**
VALLEY WELL DRILLING  
91-235A OIHANA STREET  
KAPOLEI, HAWAII 96707

**TO:** STATE OF HAWAII DEPT OF LAND & NATURAL RESOURCES  
ENGINEERING DIVISION  
ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

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<tr>
<td>Compaction Test Report</td>
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<tr>
<td>Plumbness Survey</td>
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<tr>
<td>Video Log</td>
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<tr>
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CONSULTANT

**DATE:**

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File  
Inspector (Ranceford Yoshida)  
Parks

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- VALLEY WELL DRILLING
- 91-235A OIHANA STREET
- KAPOLEI, HAWAII 96707

**TO:** STATE OF HAWAII DEPT OF LAND & NATURAL RESOURCES ENGINEERING DIVISION

ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

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- Contractor
- File
- Inspector (Ranceford Yoshida)
- Parks

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DATE: 6/21/05

JOB NO: G55C018B

TITLE: Waimalu Deep Monitor Well

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KAPOLEI, HAWAII 96707

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ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

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DESCRIPTION SPEC. PARA. NO./LOCATION ON DW

Well Completion Report
Compaction Test Report
Plumbness Survey
Video Log
Surety Release
Tax Clearance

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Inspector (Ranceford Yoshida)
Parks
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**CONSULTANT**

**FROM:** DLNR, ENGINEERING DIVISION
**TO:** CONTRACTOR VALLEY WELL DRILLING

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JOB NO: G55C018B

TITLE: Waimalu Deep Monitor Well

SUBMITTAL NO: 2

FROM (CONTRACTOR)(ADDRESS) VALLEY WELL DRILLING
91-235A OIHANA STREET
KAPOLEI, HAWAII 96707

TO: STATE OF HAWAII DEPT OF LAND & NATURAL RESOURCES
ENGINEERING DIVISION
ROOM 221, 1151 PUNCHBOWL STREET, HONOLULU, HI 96813

ENCL. MIN. NO. OF COPIES (6)
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Compaction Test Report
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Video Log
Surety Release
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REMARKS:

__________________________

SIGNATURE: ________________________________

Distribution: Contractor
File
Inspector (Ranceford Yoshida)
Parks

SIGNATURE: ________________________________
STATE OF HAWAII — DEPARTMENT OF TAXATION
TAX CLEARANCE APPLICATION
PLEASE TYPE OR PRINT CLEARLY

1. APPLICANT INFORMATION:
(PLEASE PRINT CLEARLY)

Applicant’s Name: Valley Well Drilling
Address: 31-235A Olahana St.
City/State/Zip Code: Kapolei, HI 96707
DBA/Trade Name:

2. TAX IDENTIFICATION NUMBERS: (Complete applicable ID numbers)
Hawaii General Excise ID # 10632086
Federal Employer ID # 931118761
Social Security # (SSN)

3. APPLICANT IS ANN.: (CHECK ONLY ONE BOX)
☐ CORPORATION
☐ 6 CORPORATION
☐ TAX EXEMPT ORGANIZATION
☐ INDIVIDUAL
☐ PARTNERSHIP
☐ ESTATE
☐ TRUST
☐ LIMITED LIABILITY COMPANY
☐ LIMITED LIABILITY PARTNERSHIP
☐ Single member LLC disregarded as separate from owner; enter owner’s FEIN/SSN

4. THE TAX CLEARANCE IS REQUIRED FOR:
☐ CITY, COUNTY, OR STATE GOVERNMENT CONTRACT IN HAWAII
☐ REAL ESTATE LICENSE
☐ FINANCIAL CLOSING
☐ CONTRACTOR LICENSE
☐ HAWAII STATE RESIDENCY
☐ PROGRESS PAYMENT
☐ FEDERAL CONTRACT
☐ BULK SALES
☐ OTHER
☐ PERSONAL
☐ LOAN

* IRS APPROVAL STAMP IS ONLY FOR PURPOSES INDICATED BY ASTERISK.

5. NO. OF CERTIFIED COPIES REQUESTED: 10

6. SIGNATURE:

Kike Sober Operations Manager
PRINT NAME
PRINT TITLE: Corporate Officer, General Partner, or Member, Individual (Sole Proprietor), Trustee, Executor

SIGNATURE
DATE 1/12/05
TELEPHONE (808) 582-1767
FAX (808) 682-1769

POWER OF ATTORNEY: If submitted by someone other than a Corporate Officer, General Partner or Member, Individual (Sole Proprietor), Trustee, or Executor, a power of attorney (State of Hawaii, Department of Taxation, Form N-496) must be submitted with this application. If a Tax Clearance is required from the Internal Revenue Service, IRS Form 8283, or IRS Form 5849, it is also required. Applications submitted without proper authorization will be sent to the address of record with the taxing authority. UNSIGNED APPLICATIONS WILL NOT BE PROCESSED.

PLEASE TYPE OR PRINT CLEARLY — THE FRONT PAGE OF THIS APPLICATION BECOMES THE CERTIFICATE UPON APPROVAL.

SEE PAGE 2 ON REVERSE FOR SEPARATE INSTRUCTIONS. FAILURE TO PROVIDE REQUIRED INFORMATION ON PAGE 2 OF THIS APPLICATION OR AS REQUIRED IN THE SEPARATE INSTRUCTIONS TO THIS APPLICATION WILL RESULT IN A DENIAL OF THE TAX CLEARANCE REQUEST.

Page 05
REPORT OF CONCRETE CYLINDER TEST
CONSTRUCTION ENGINEERING LABS, INC.

Report Date: 6/15/05

Project Number: 05194
Project: DLNR Deep Monitoring Well - Waimalu
Client: Valley Well Drilling
Address: 91-235A Oihana Street
Kapolei, HI. 96707

FIELD TEST CONDITIONS AND RESULTS (ASTM C 39)

Date Placed: 4/18/2005
Time Sampled:
Location of Sample:
Supplier:
Ticket Number:
Truck Number:
Mix Number:
Design Strength: 3500
Time Batched:
Batch Size:
Slump: (AASHTO T 119)
Concrete Temp:
Water Added:

LABORATORY TEST RESULTS (ASTM C 31)

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<th>Test Date</th>
<th>Age</th>
<th>Load</th>
<th>Diameter</th>
<th>Area</th>
<th>Strength</th>
<th>Percent of Design</th>
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<td>7</td>
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<td>12.57</td>
<td>4095</td>
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Remarks:

Copies to:

TYPES OF FRACTURES

A  Cone
B  Cone & Split
C  Cone & Shear
D  Shear
E  Columnar

Reported by:
Ronald A Pickering II
Vice President Operations
CONSENT OF SURETY
TO FINAL PAYMENT
AIA DOCUMENT G707 - ELECTRONIC FORMAT

TO OWNER: State of Hawaii
(Name and address)

PROJECT: Waimalu Deep Monitor Well
(#G5500188)
(Name and address)

ARCHITECT'S PROJECT NO.: #G5500188

CONTRACT FOR: Waimalu Deep Monitor Well
(#G5500188)

CONTRACT DATED: June 17, 2005

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Surety)

Travelers Casualty & Surety Company of America
2000 S Colorado Blvd, Ste 2-480
Denver CO 80222-7910

on bond of
(Contractor)

Valley Well Drilling
91-235A Ohana St, Kapolei HI 96707

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of
(Owner)

Hawaii Department of Land & Natural Resources
PO Box 373, Honolulu HI 96809

any of its obligations to

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:

(Insert in writing the month followed by the numeric date and year.)

June 10, 2005

Attest: Candy Wilkes

(Signature of authorized representative)

Darren W Hart / Attorney In Fact

(Printed name and title)

© 1994 THE AMERICAN INSTITUTE OF ARCHITECTS, 1735 NEW YORK AVENUE, N.W., WASHINGTON, D.C. 20006-5291. AIA DOCUMENT G707 - CONSENT OF SURETY TO FINAL PAYMENT - 1994 EDITION - AIA® - WARNING: Unlicensed photocopying violates U.S. copyright laws and will subject the violator to legal prosecution. This document was electronically produced with permission of the AIA and can be reproduced in accordance with your license without violation until the date of expiration as noted below. User Document: g707specification.aia -- 11/15/2001. AIA License Number 1102688, which expires on 9/15/2002.
Ms. Yvonne Y. Izu  
Deputy Director  
Commission of Water Resource Management  
Department of Land and Natural Resources  
1151 Punchbowl Street Room 227  
Honolulu, Hawaii 96817

Dear Ms. Izu:

Subject: Set Aside to the Department of Land and Natural Resources, Commission of Water Resource Management, For Monitor Well and Access and the Issuance of a Construction Right-of-Entry, Waimalu, Ewa, Oahu, Tax Map Key:9-8-011:6 (Portion)

We are pleased to inform you that the Board of Land and Natural Resources at its meeting held on September 24, 2004 under agenda Item D-13, approved the set aside to the Department of Land and Natural Resources, Commission of Water Resource Management for monitor well and access purposes and authorized the issuance of a construction right-of-entry, Waimalu, Ewa, Oahu, TMK:9-8-011:6 (portion, subject to the following terms and conditions:

1. The right of entry shall commence immediately and will continue until the set aside document is issued.

2. Commission of Water Resource Management, its contractors, consultants, and/or persons acting for or on its behalf shall use due care for public safety and shall take every precaution to avoid damaging the premises and causing any erosion to the surrounding areas during the dredging.

3. Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf shall indemnify and hold harmless the State of Hawaii, Department of Land and Natural Resources.
Resources, its officers, employees and agents against any loss, liability, claim or demand for property damage, personal injury, and death arising out of any act or omission of the Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf.

4. Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf shall comply with all applicable rules, regulations, ordinances and statutes of the Federal, State and County governments relative to the use of the subject area, including those relating to public health and safety.

5. In the event any unanticipated sites or remains of historic or prehistoric interest are encountered during construction, the Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf shall stop work immediately and contact the State Historic Preservation Division in Honolulu at (808) 692-8015.

6. Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf shall be responsible for cleaning and restoring the area to its original condition or a condition satisfactory to the Department of Land and Natural Resources, Land Division, upon termination of the project.

7. The State of Hawaii will not be responsible for any loss, liability, claim or demand for property damage, property loss, or personal injury, including but not limited to death arising out of any injury or damage caused by or resulting from any act or omission of the Commission of Water Resource Management, its contractors, consultants and/or persons acting for or on its behalf in connection with the Commission of Water Resource Management's entry onto and occupancy of the premises described herein.

8. All equipment, tools, construction materials, dirt rocks, debris and any other items related to this project will be removed.

9. The Department of Land and Natural Resources reserves the right to impose additional terms and conditions as may be prescribed by the Chairperson that will best serve the interest of the State of Hawaii.
Should you concur with the above terms and conditions, please acknowledge and return a signed copy of this letter to the Oahu District Office. If you have any questions regarding this matter, please contact Steve Lau of our Land Division at [Contact Information]

Very truly yours,

Charlene Unoki
Assistant Administrator

[Signature]

Commission of Water Resource Management

DATE: 10/11/04

cc: Land Board Member
TO: Ms. Yvonne Izu, Deputy Director  
Commission on Water Resource Management

FROM: Eric T. Hirano, Chief Engineer

SUBJECT: Job No. G55CO18B, Waimalu Deep Monitor Well, Oahu, Hawaii

Attached for your files is your copy of the fully executed original Well Construction Permit for the subject project.

Should you have any questions, please contact Mr. Andrew Monden of the Planning Branch at extension [redacted].

DI:ssk
Attachment
WELL CONSTRUCTION PERMIT
Waialua Deep Monitor Well, Well No. 2456-05

Note: This permit shall be prominently displayed at the site until the work is completed.

In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-188, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of Waialua Deep Monitor Well (Well No. 2456-05) at Kilinoe Street, Cahu, TMK 9-8-11:006, subject to the Hawaii Well Construction & Pump Installation Standards (February 2004) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 821, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences and staff shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The well construction permit shall be for construction and testing of the well only. A minimum 1 1/4-inch diameter monitor tube shall be permanently installed in a manner acceptable to the Chairperson and conduct a pumping test in accordance with the Standards (a pump testing worksheet is attached). The permittee, well operator, and/or well owner shall submit to the Chairperson the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson.

3. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson.

4. The permittee, well operator, and/or well owner shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment, to schedule work to avoid periods of high rainfall, and to revegetate any cleared areas as soon as possible.

5. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee, well operator, and/or well owner shall stop work and contact the Department's Historic Preservation immediately.

6. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to construct the well shall not constitute a determination of correlative water rights.

7. The following shall be submitted to the Chairperson within sixty (60) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test results, including time, pumping rate, drawdown, chloride content, and other data.

8. The permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances; non-compliance may be grounds for revocation of this permit.

9. The well construction permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (February 13, 2004; HWPCS). If the HWPCS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result.

10. The permit may be revoked by the Commission if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend this permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee, well operator, and/or well owner notice of the proposed action and an opportunity to be heard.

11. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee, well operator, and/or well owner must apply for a well abandonment permit in accordance with §13-168-12(0) prior to any well sealing or plugging work.

12. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit relating to or connected with the granting of this permit.

13. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 1, 2004
Expiration Date: September 1, 2006

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed and understand that I shall not commence work until I and the driller have signed, dated, and returned the permit to the Commission. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $5000 per day starting from the permit date of approval.

Permittee's Signature: Eric T. Hirano
Printed Name: ERIC T. HIRANO
Firm or Title: CHIEF ENGINEER, DEP. ENGR., DIV.
Driller's Signature: M.K. Solar
C-57 License #: 21359
Date: 9/16/94
Printed Name: Valley Well Drilling
Firm or Title: VALLEY WELL DRILLING

Please sign both copies of this permit, return one to the Chairperson, and retain the other for your records.

PETER T. YOUNG, Chairperson
Commission on Water Resource Management

USGS
Department of Health's Safe Drinking Water, Wastewater, and Clean Water Branches
Honolulu Board of Water Supply
Land Division
This project has not gone through the historic preservation review process. Please submit documentation if necessary.

This project has already gone through the historic preservation review process.
   a. mitigation has been completed
   b. other

We have not been consulted on this undertaking, however we believe there are no historic properties present, because:
   a) intensive cultivation has altered the land
   b) residential development/urbanization has altered the land
   c) previous grubbing/grading has altered the land
   d) an acceptable archaeological assessment or inventory survey found no historic properties
   e) The project is located on a flood plain near the valley stream. There are no known historic sites at this location nor is it likely that historic sites would be found at this location.

Thus, we believe that "no historic properties will be affected" by this undertaking.

Sincerely,

P. Holly McEldowney, Administrator
State Historic Preservation Division
Ref: 2456-05.wcp

September 3, 2004

Mr. Eric Hirano
Engineering Division
Department of Land and Natural Resources
1151 Punchbowl Street, Room 221
Honolulu, HI 96813

Dear Mr. Hirano:

Well Construction Permit
Waimalu Deep Monitor Well (Well No. 2456-05)

Enclosed are two (2) copies of your approved Well Construction Permit for the captioned well(s) that authorize well construction activities but excludes installation work for your permanent pump. As part of the Chairperson's approval, the following special conditions were added and are part of your permit under Permit Condition 13:

**Special Conditions**

1. Standard Condition 2 is modified to exempt the permittee from the requirement for pumping tests.

2. Standard Condition 7.e. is waived.

Please sign and have the contractor sign both permit originals and return one for our files.

**IMPORTANT** - Drilling work shall not commence until a fully signed permit is returned to the Commission. Please provide all the information in this packet to your well drilling contractor. The permittee, well operator, and/or well owner are responsible for all conditions of the permit. This includes ensuring that the well construction contractor, or other party who constructs the well(s), submits a completed Part I of the Well Completion Report form (enclosed) within sixty (60) days after the well construction work is completed. Be advised that you may be subject to fines of up to $5000 per day for any violations of your permit conditions starting from the permit approval date.

If you have any questions, please call Lenore Y. Nakama of the Commission staff at [phone number]

Sincerely,

Peter T. Young
Chairperson

Enclosures

c: Land Division
In accordance with Department of Land and Natural Resources, Commission on Water Resource Management's Administrative Rules, Section 13-168, entitled "Water Use, Wells, and Stream Diversion Works", this document permits the construction and testing of Waimalu Deep Monitor Well (Well No. 2456-05) at Kilinoe Street, Oahu, TMK 9-8-11:006, subject to the Hawaii Well Construction & Pump Installation Standards (February 2004) which include but are not limited to the following conditions:

1. The Chairperson of the Commission on Water Resource Management (Commission), P.O. Box 621, Honolulu, HI 96809, shall be notified, in writing, at least two (2) weeks before any work authorized by this permit commences and shall be allowed to inspect installation activities in accordance with §13-168-15, Hawaii Administrative Rules.

2. The well construction permit shall be for construction and testing of the well only. A minimum 1¼-inch diameter monitor tube shall be permanently installed, in a manner acceptable to the Chairperson, to accurately record water levels. The permittee, well operator, and/or well owner shall coordinate with the Chairperson and conduct a pumping test in accordance with the Standards (a pump testing worksheet is attached). The permittee, well operator, and/or well owner shall submit to the Chairperson the test results as a basis for supporting an application to install a permanent pump and withdraw water for use. No permanent pump may be installed until a pump installation permit is approved and issued by the Chairperson.

3. In basal ground water, the depth of the well may not exceed one-fourth (1/4) of the theoretical thickness (41 times initial head) of the basal ground water unless otherwise authorized by the Chairperson.

4. The permittee, well operator, and/or well owner shall incorporate mitigation measures to prevent construction debris from entering the aquatic environment. Schedule work to avoid periods of high rainfall, and revegetate any cleared areas as soon as possible.

5. In the event that subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal are encountered during construction, the permittee, well operator, and/or well owner shall stop work and contact the Department’s Historic Preservation immediately.

6. The proposed well construction shall not adversely affect existing or future legal uses of water in the area, including any surface water or established instream flow standards. This permit or the authorization to conduct the well shall not constitute a determination of correlative water rights.

7. The following shall be submitted to the Chairperson within sixty (60) days after completion of work:
   b. Elevation (referenced to mean sea level, msl) survey by a Hawaii-licensed surveyor.
   c. As-built sectional drawing of the well.
   d. Plot plan and map showing the exact location of the well.
   e. Complete pumping test records, including time, pumping rate, drawdown, chloride content, and other data.

8. The permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances; non-compliance may be grounds for revocation of this permit.

9. The well construction permit application is incorporated into this permit by reference and is subject to the Hawaii Well Construction & Pump Installation Standards (February 18, 2004; HWCPIS). If the HWCPIS are not followed and as a consequence water is wasted or contaminated, a lien on the property may result.

10. The permit may be revoked by the Commission if work is not started within six (6) months after the date of approval or if work is suspended or abandoned for six (6) months, unless otherwise specified. The work proposed in the well construction permit application shall be completed within two (2) years from the date of permit approval, unless otherwise specified. The permit may be extended by the Chairperson upon a showing of good cause and good-faith performance. A request to extend the permit shall be submitted to the Chairperson no later than three (3) months prior to the date the permit expires. If the commencement date is not met, the Commission may revoke the permit after giving the permittee, well operator, and/or well owner notice of the proposed action and an opportunity to be heard.

11. If the well is not to be used it must be properly capped. If the well is to be abandoned then the permittee, well operator, and/or well owner shall comply with all applicable laws, rules, and ordinances; non-compliance may be grounds for revocation of this permit.

12. The permittee, its successors, and assigns shall indemnify, defend, and hold the State of Hawaii harmless from and against any loss, liability, claim, or demand for property damage, personal injury, or death arising out of any act or omission of the applicant, assigns, officers, employees, contractors, and agents under this permit or relating to or connected with the granting of this permit.

13. Special conditions in the attached cover transmittal letter are incorporated herein by reference.

Date of Approval: September 1, 2004
Expiration Date: September 1, 2006

PETER T. YOUNG, Chairperson
Commission on Water Resource Management

I have read the conditions and terms of this permit and understand them. I accept and agree to meet these conditions as a prerequisite and underlying condition of my ability to proceed and understand that I shall not commence work until I and the driller have signed, dated, and returned the permit to the Commission. I also understand that non-compliance with any permit condition may be grounds for revocation and fines of up to $5000 per day starting from the permit date of approval.

Permittee’s Signature: __________________________ Date: __________________________

Printed Name: __________________________ Firm or Title: __________________________

Driller’s Signature: __________________________ C-57 License #: __________________________ Date: __________________________

Printed Name: __________________________ Firm or Title: __________________________

Please sign both copies of this permit, return one to the Chairperson, and retain the other for your records.

Attachment

C: USGS
Department of Health's Safe Drinking Water, Wastewater, and Clean Water Branches
Honolulu Board of Water Supply
Land Division
## Well Check Program
4/1/04 - Revised for update to Well Standards (February 2004)

### Data Input

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<tr>
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<td>Cement Grout</td>
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<td>Open Casing Length</td>
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### Results

#### Well Depth
- Theoretical Thickness of Aquifer: 738
- 1/4 Aquifer Thickness: 184.5
- Depth of Well below Sea Level: -940 (too deep)  
  Section 2.2

#### Well Casing
- Minimum Wall Thickness
  - Material: steel
  - Minimum Thickness per standards: 0.25
  - Wall Thickness Provided: 0.3125 (okay)  
    Section 2.4(b)
- Minimum Length of Solid Casing: 37.8
- 90% of ground to top of aquifer: 80 (okay)  
  Section 2.4(c)
- Length of solid casing Provided: 80 (okay)  
  Section 2.4(c)
- Casing Material: ASTM A139  
  in compliance  
  Section 2.4(d)
- (for pvc only - check for 200' limit) okay  
  Section 2.4(d)

#### Annular Space
- Depth of Grouting
  - Calculated Depth of Grouting: 29.4
  - Depth of Grouting provided: 80 (okay)  
    Section 2.6(c)
- Minimum Annular Space required: 2
- Thickness of Annular Space
  - 3 (okay)  
  Section 2.6(d)
MEMORANDUM FOR THE RECORD

SUBJECT: Well Construction Permit Application for Well No. 2456-05
FROM: Lenore Nakama

7/28/04 Muffet at Historic Preservation called. They are reviewing the proposed well site. They have records from the 1970's that there is a cave site just about where the well site will be. The records are not very good. Muffet will try to meet our deadline of 8/23/04 to return comments, but she needs to discuss with Holly McEldowney, Acting Administrator.

9/1/04 Called Muffet. Ok to issue permit, cave is not near well site. She will send review comments that "no impact".
TO: Dede Mamiya, Administrator  
Land Division

FROM: Yvonne Y. Izu, Deputy Director  
Commission on Water Resource Management

SUBJECT: Well Construction Permit Application  
Waimalu Deep Monitor Well (Well No. 2456-05)

Transmitted for your review and comment is a copy of the captioned Well Construction permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by August 23, 2004. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Lenore Y. Nakama of the Commission staff at [_______]

LYN:ss  
Attachment(s)

RESPONSE:

[  ] A water lease/permit is required of this applicant and an application for such will be requested by our division.

[  ] A water lease/permit is not required of this applicant.

[  ] A water lease/permit has been obtained by the applicant through lease no. [_______]

[  ] This well project [ ] requires [ ] does not require a CDUP. If a CDUP is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.

[  ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[  ] No objections

[  ] Other comments:

Contact Person: Gary Martin  
Phone: [_______]

Signed: [_______]  
Date: AUG 26 2004
July 21, 2004

TO: Mr. Eric Hirano, Chief Engineer  
Engineering Division

FROM: Yvonne Y. Izu, Deputy Director  
Commission on Water Resource Management

SUBJECT: Well Construction Permit Application  
Waimalu Deep Monitor Well (Well No. 2456-05)

We acknowledge receipt, on July 1, 2004, of your completed Well Construction permit application for the Waimalu Deep Monitor Well (Well No. 2456-05). You can expect your application to be processed within ninety (90) days from this date.

If you have any questions about your permit application, please contact Lenore Y. Nakama of the Commission staff at

LN:ss
July 21, 2004

TO: Dede Mamiya, Administrator  
    Land Division

FROM: Yvonne Y. Izu, Deputy Director  
    Commission on Water Resource Management

SUBJECT: Well Construction Permit Application  
    Waimalu Deep Monitor Well (Well No. 2456-05)

Transmitted for your review and comment is a copy of the captioned Well Construction permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by August 23, 2004. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

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LYN:ss  
Attachment(s)

RESPONSE:

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[ ] A water lease/permit has been obtained by the applicant through lease no. __________________________.

[ ] This well project [ ] requires [ ] does not require a CDUP. If a CDUP is required it [ ] has [ ] has not been approved and [ ] is [ ] is not currently active.

[ ] Other relevant Land Division rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ___________________________ Phone: ___________________________

Signed: ___________________________ Date: ___________________________
July 21, 2004

TO: Holly McEldowney, Acting Administrator
   Historic Preservation

FROM: Yvonne Y. Izu, Deputy Director
      Commission on Water Resource Management

SUBJECT: Well Construction Permit Application
         Waimalu Deep Monitor Well (Well No. 2456-05)

Transmitted for your review and comment is a copy of the captioned Well Construction permit application.

We would appreciate your comments on the captioned application with regard to the programs, plans, and objectives specific to your division. Please respond by returning this cover memo form by August 23, 2004. If we do not receive comments or a request for additional review time by this date, we will assume you have no comments.

Please find the attached maps to locate the proposed well. If you have any questions about this permit application, request additional information, or request additional review time, please contact Lenore Y. Nakama of the Commission staff at [Blank].

LYN:ss
Attachment(s)

RESPONSE:

[ ] There may be areas in the vicinity of the well site that contain subsurface cultural remains such as artifacts, burials or concentrations of shells or charcoal.

[ ] Other relevant Historic Preservation rules/regulations, information, or recommendations are attached.

[ ] No objections

[ ] Other comments:

Contact Person: ___________________________ Phone: ________________

Signed: ___________________________ Date: ________________
### PUBLIC RECORD DATA

**TMK # 1-9-8-11-6**  
**98-378 MOANALUA RD**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owner:</strong></td>
<td>STATE OF HAWAI'I /ETAL</td>
</tr>
<tr>
<td><strong>Tax Payer:</strong></td>
<td>LEAN,WALLACE K /ETAL</td>
</tr>
<tr>
<td><strong>Tax Bill:</strong></td>
<td>94-1031 AHAHUI ST, MILILANI TOWN, HI 96789 USA</td>
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<tr>
<td><strong>Annual Tax:</strong></td>
<td>$113.43</td>
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<tr>
<td><strong>Land:</strong></td>
<td>$16,100</td>
</tr>
<tr>
<td><strong>Exemption:</strong></td>
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<tr>
<td><strong>Size:</strong></td>
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<td><strong>Total Buildings:</strong></td>
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<td><strong>Exemption:</strong></td>
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<td><strong>Total:</strong></td>
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<td><strong>Exemption:</strong></td>
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<td><strong>Size:</strong></td>
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</table>

**DEPARTMENT OF PLANNING AND PERMITTING**

This data from the Department of Planning and Permitting is unofficial and is subject to change without notice. It is the user's responsibility to verify the accuracy of information from official documents which are available for inspection at the City department responsible for the data.

**CENSUS TRACT** 78.06  
**CIVIL FINES** NONE  
**DEVELOPMENT PLAN AREA** PRIMARY URBAN CENTER  
**DEVELOPMENT PLAN DESIGN** PRESERVATION  
**FLOOD ZONE** FIRM ZONE D  
**HEIGHT LIMIT** 25 FEET  
**HISTORIC SITE REGISTER** NONE  
**LOT RESTRICTIONS** NONE  
**SMA/SHORELINE** NOT IN SMA  
**SPECIAL DISTRICT** NOT IN SPECIAL DISTRICT  
**STATE LAND USE** URBAN DISTRICT  
**STREET SETBACK** NONE  
**ZONING (CZC)** R-6 RESIDENTIAL DISTRICT  
**ZONING (LUO)** R-5 RESIDENTIAL DISTRICT

This information has been supplied by third parties and has not been independently verified by Hawaii Information Service and is, therefore, not guaranteed.

TO: Yvonne Izu, Deputy Director  
Commission on Water Resource Management

FROM: Eric T. Hirano, Chief Engineer

SUBJECT: Job No. G55C018B, Waimalu Deep Monitor Well, Aiea, Oahu

We submit to you for processing, the Well Construction Permit application for the subject project.

Should you have any questions, please call Mr. Andrew Munden of the Planning Branch at extension 70229.

DI: Attachment
**WELL INFORMATION:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Application</td>
<td>[print legibly]</td>
</tr>
<tr>
<td>Signature of Applicant</td>
<td>[print legibly]</td>
</tr>
<tr>
<td>License</td>
<td>_____________________</td>
</tr>
<tr>
<td>Well Owner</td>
<td>State DLNR</td>
</tr>
<tr>
<td>Contractor</td>
<td>_____________________</td>
</tr>
<tr>
<td>Permit Fee Payable To</td>
<td>Dept. of Land and Natural Resources</td>
</tr>
<tr>
<td>Accounting Code</td>
<td>WCPPIA 9717/03</td>
</tr>
<tr>
<td>For Official Use Only</td>
<td>RECEIVED JUL 1 8:19</td>
</tr>
</tbody>
</table>

**LEGAL REQUIREMENTS:**

- If required, these permits must be obtained before the Commission can legally issue a permit.
- Conservation District Use Permit (CDUP)
- Environmental Impact Statement (EIS) or Environmental Assessment (EA)
- Special Management Area Permit (SMAP)
- Archeological Requirements
- Remarks, Explanations

**OTHER IMPORTANT INFORMATION:**

- If the proposed work is not to be completed within two (2) years of the approval date, the contractor shall submit to the Commission a well completion/abandonment report within 60 days after the completion date of the permitted work.
- Monthly water use data shall be submitted to the Commission.
- Such approval shall not constitute a determination of correlative water rights and shall not guarantee the pump capacity or future use up to the permitted pump capacity.
- In the event that the application is not correctly filled out, any permit may be suspended until the item is brought in to compliance, and any work done while the permit is in suspension may result in fines of up to $1000 per day.

**Signature:**

- Well Owner:
- Contractor:
- DLNR Land Division:

**Mailing Address:**

- 1151 Punchbowl Street, Rm 221, Honolulu, Hawaii 96813
- 1151 Punchbowl Street, Rm 220, Honolulu, Hawaii 96813
- 1151 Punchbowl Street, Rm 221, Honolulu, Hawaii 96813

**Contact Person:**

- Eric Hirano
- Dierdre Mamiya
- _____________________

**Phone:**

- _____________________
- _____________________
- _____________________

**Fax:**

- _____________________
- _____________________
- _____________________

**Tax Map Key:**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sec</th>
<th>Plat</th>
<th>Parcel</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>8</td>
<td>11</td>
<td>006</td>
</tr>
</tbody>
</table>

**Is this well part of a battery of wells?**

- Yes
- No

**Does this well serve 25 or more people at least 60 days per year or have 15 or more service connections?**

- Yes
- No

**Type of Well:**

- Domestic (individual, noncommercial water system)
- Municipal (including hotels, stores, etc.)
- Industrial
- Irrigation (crop)
- Military
- Other (explain):

**Amount of Flow:**

- Open-pipe
- Flowmeter
- Monitor
- Well
- Office
- Other (explain):

**Method of Flow Measurement:**

- Gallons per day
Solid Casing Material:
- Carbon Steel: compliant with (check one or more):
  - ANSI/AWWA C200
  - API Spec. 5L
  - ASTM A53
  - ASTM A139
- Stainless Steel: (check one):
  - ASTM A409 (production wells)
  - ASTM A512 (monitor wells)
- ABS Plastic conforming to ASTM F480 and ASTM D1785 or ASTM D2241: (check one):
  - Schedule 40
  - Schedule 80
  - Schedule 120
- Thermoset Plastic: (check one):
  - Filament Wound Resin Pipe conforming to ASTM D2995
  - Centrifugally Cast Resin Pipe conforming to ASTM D2997
  - Reinforced Plastic Mortar Pressure Pipe conforming to ASTM D3517
  - Glass Fiber Reinforced Resin Pressure Pipe conforming to AWWA C950
  - PTFE Fluorocarbon Tubing conforming to ASTM D3296
  - FEP Fluorocarbon Tubing conforming to ASTM D3296

Open Casing Material:
- Carbon Steel: compliant with (check one or more):
  - ANSI/AWWA C200
  - API Spec. 5L
  - ASTM A53
  - ASTM A139
- Stainless Steel: (check one):
  - ASTM A409 (production wells)
  - ASTM A512 (monitor wells)
- ABS Plastic conforming to ASTM F480 and ASTM D1785 or ASTM D2241: (check one):
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  - Schedule 80
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  - Filament Wound Resin Pipe conforming to ASTM D2995
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  - PTFE Fluorocarbon Tubing conforming to ASTM D3296
  - FEP Fluorocarbon Tubing conforming to ASTM D3296

* The approximate elevation must be referenced to mean sea level (msl) at the time of application filing. Final elevations of well components shall be submitted in the Well Completion/Well Abandonment reports and referenced to a benchmark which has been established by a surveyor licensed by the State.

For non-salt water Basalt Wells - bottom elevation of well should not be deeper than 1/4 of aquifer thickness or,

Bottom Elevation of Well Limit = \([\text{Water Elevation} - \frac{41x(0.25)}{4}]\) = -18.5 ft.
Deep Monitoring Well Program

Figure 1 - Waimalu Site

- Approximate Location of Well Site

Base map from USGS 7.5'

URS