HONOLULU GROUND WATER CONTROL AREA

WELL DRILLING PERMIT
for
Honolulu Fire Department Exploratory Caprock Well
State Well No. 2056-04
Moanalua, Oahu

TO: Honolulu Fire Department
1455 South Beretania Street, 3rd Flr.
Honolulu, Hawaii 96814

In accordance with Chapter 166 of Title 13, "Rules for the Control of Ground Water Use in the State of Hawaii", your application to drill an exploratory caprock well at TMK: 1-1-02:12 (State Well No. 2056-04) is approved subject to the following conditions:

1. A Driller's Well Completion Report (enclosed) shall be submitted to the Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96809, within 60 days after completion of the well.

2. Pumping test data shall be submitted to the Division of Water and Land Development within 60 days after testing of the well.

3. An "as-built" drawing of the well and a map showing the exact location of the well shall be submitted upon completion of the well.

4. This well drilling permit is for drilling and testing only and the well shall be suitably capped after completion. No pump may be installed and no water used from this well without the necessary well modification and water use permits from the Department of Land and Natural Resources under Administrative Rules, Chapter 166 of Title 13.

5. The issuance of this drilling permit shall in no way prejudice any future consideration by the Board of Land and Natural Resources on the issuance or non-issuance of a permit to withdraw and use water from this well.

6. The applicant comply with all applicable laws, rules, and ordinances.
7. This permit may be revoked if work is not started within six months of date of issuance or if work is suspended or abandoned for six months.

DEC 16 1987
Date of Issuance

Enc. (Driller's Report Form)
cc: USGS
  Department of Health,
  Drinking Water Program
  Ground Water Protection Program
  Honolulu Board of Water Supply

/\WILLIAM W. PATY
Chairperson of the Board
Summary

Feasibility of development of a water source for training purposes at the Valkenburgh site of the Fire Department has been successfully demonstrated with the drilling and testing of two shallow wells. Both wells were tested at 500 gpm and showed drawdowns of less than 2 feet. Although not actually tested at 1,000 gpm, analytical technique indicates that at 1,000 gpm, drawdown would be less than 6 feet for one well pumping. For two wells yielding a total of 2,000 gpm, drawdowns should be less than 8 feet. Although the water is presently mildly brackish with chloride ranging between 420 and 920 ppm, salinity is expected to rise considerably with more use. In order to conserve the water and minimize increase of salinity, water used for training should be recharged into the ground either through use of the wells or through another well drilled to the area of use.

A decision is required on how to best utilize the source as it relates to the purposes of the Honolulu Fire Department (HFD). A meeting to be attended by HFD, Board of Water Supply (BWS), and Building Department should be held to discuss the various alternatives available.

Drilling of Wells

Two wells were completed at the HFD Valkenburgh Firefighting Training Center in January and February 1989. The two wells, State well Nos. 2056-95 and 96, respectively, were drilled at
the ewa portion of the property as shown on Figure 1. Both wells encountered sticky clay derived from volcanic ash to depths of approximately 12 feet, followed by hard, consolidated volcanic ash to 45 feet, and reef deposits to 80 feet (see Table 1).

Both wells are constructed of 12-inch PVC casing and 20 feet of PVC well screen placed into 20-inch holes and backfilled with No. 4 crushed rock. A concrete collar and a protective steel casing protect the wellhead as in Figure 2.

Testing of Wells
The water is derived from reef deposits which yield water freely to pumping. Both wells were tested up to 500 gallons per minute. Drawdowns were less than 2 feet as shown in Figures 3 and 4. Projected to 1,000 gpm, drawdown increases to only 6 feet. With both wells pumping at 1,000 gpm, drawdowns will increase only slightly.

Well No. 2056-06, the first well, shows greater salinity during pumping as shown in Table 2. Chloride concentration began at 420 parts per million (ppm) and rose to 920 ppm at the end of 5 hours. The deeper pump setting for this test apparently contributed to this behavior. The second well (2056-08), which is 2 feet shallower, had a somewhat shallower pump setting at 24 feet and exhibited beginning and
ending chlorides of 380 ppm and 560 ppm, respectively. These initial differences will probably diminish as the wells are pumped. Water quality at present is satisfactory for irrigation of non-sensitive plants such as the present grasses and trees on the premises. Water is expected to degrade to higher levels of salinity as the wells are pumped over time, especially at rates over 100 gpm. Degradation rate and final quality of water is not determinable at this time except for the above generalizations. Only operational data from these wells will give this information.

Source Development

Because the water table stands 1.8 feet above mean sea level and 22.6 feet below ground surface, ordinary suction type pumps are unable to lift the water from this depth. Line shaft turbine pumps or submersible pump types would be required unless pits are constructed. Owing to the corrosive nature of brackish and saline water, corrosion-resistant pumps are required. A local pump supplier estimates the cost of a 1,000 gpm pump of this type would be approximately $15,000 using a simple starter and switch system.

Whether a small or large reservoir is required depends on the method needed for training purposes. If truck pumps are part of the training, then the length of the training period determines the minimum size of the reservoir.
For example, a 1,000 gpm well output matches five fire hoses delivering 200 gpm. A 10,000 gallon tank would provide storage for 50 minutes for a single hose and permit six hoses to be operated with such a system. This system relies on the well pump to meet demand. Standpipes on blowoffs and storage in the reservoir could be used to handle surges when hoses are turned off. Lower costs and simplicity are the outstanding advantages of such a system. If two 1,000 gpm pumps are installed, the second could be used for standby or increasing the number of hoses to 11 connections.

The above comments are only suggestions on one way to develop the source. Since there are many other methods that may suit training needs better, a meeting attended by HFD, Building Department, and BWS should be held on the subject.
<table>
<thead>
<tr>
<th>Depth Interval (ft.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-35</td>
<td>Gray-green crystal lithic palagonite tuff (from Makalapa crater?)</td>
</tr>
<tr>
<td>35-45</td>
<td>Mixture of tuff and coral</td>
</tr>
<tr>
<td>45-50</td>
<td>Coral with minor amount of tuff present</td>
</tr>
<tr>
<td>50-55</td>
<td>Coral</td>
</tr>
<tr>
<td>55-70</td>
<td>Mixture of coral and rounded sand particles</td>
</tr>
<tr>
<td>70-75</td>
<td>Coral &gt;&gt; sand</td>
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<tr>
<td>75-80</td>
<td>Coral - sample contains a small basaltic stream pebble</td>
</tr>
<tr>
<td>Depth Interval (ft.)</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
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</tr>
<tr>
<td>0-35</td>
<td>Greenish-brown palagonite tuff</td>
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<tr>
<td>35-45</td>
<td>Mixture of palagonite tuff and coral</td>
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<tr>
<td>45-50</td>
<td>Same as above; coral &gt;&gt; tuff</td>
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<tr>
<td>50-70</td>
<td>Mixture of white coral and tan to yellow sand with rounded basaltic pebbles</td>
</tr>
<tr>
<td>70-75</td>
<td>Same as above, except basaltic pebbles are very small and more the size of coarse sand</td>
</tr>
<tr>
<td>75-78</td>
<td>Same as above, basaltic pebbles present</td>
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<td>Sample No.</td>
<td>Time</td>
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<td>--------</td>
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<td>13:15</td>
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<td>Time</td>
<td>Q (gpm)</td>
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<tr>
<td>1420</td>
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</tr>
</tbody>
</table>
DESCRIPTION


A. OWNER & NAME:   C&C, OF HONOLULU  Well #2

B. LOCATION:   Fire Training Center, 890 Valkenburgh St.

C. DRILLING COMPANY:  Roscoe Moss Company

D. TYPE OF RIG:  60L  DRILLING COMPLETED:  03-89

E. ELEVATION, ms:  Top of drilling platform:  74.4

Height of drilling platform above ground surface:  25 + ft.

F. HOLE SIZE:  8 in. dia. to 80 ft. below drilling platform.

G. CASING INSTALLED:  12 in. I.D. x PVC in. wall solid section to 60 ft. below drilling platform.

H. ANNULUS:  Grouted 0 ft. to 3 ft. below drilling platform.

I. PERMANENT PUMP INSTALLATION:

- Pump type, make, serial no:
- Motor type, H.P., Voltage, r.p.m:
- Depth of pump intake setting:
- Depth of bottom of airline:

HYDROLOGY

J. INITIAL WATER LEVEL:  ft. below drilling platform.  Date of measurement:

K. INITIAL CHLORIDE:

L. PUMPING TESTS:

M. DRILLER'S LOG:

N. REMARKS:

FOR OFFICIAL USE

Latitude 21° 20' 96.76"

Longitude 151° 50' 91.36"

Well No. 2056-05

FOR DRILLER'S USE

INSTRUCTIONS:  Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96809.

STATE OF HAWAII
DEPARTMENT OF LAND & NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT

DRILLER'S REPORT

DESCRIPTION

Date of report: March 17, 1989
Person filing report: Chester Lao
WELL NAME: Valkenburg No. 1
ISLAND: Oahu

A. OWNER: HFD
B. GENERAL LOCATION: Valkenburg
C. DRILLING COMPANY: Rosco Moss
D. TYPE OF RIG: Cable tool

E. ELEVATION, msl: Top of drilling platform
Height of drilling platform above ground surface
f. BENCH MARK AND METHOD TO DETERMINE

F. HOLE SIZE:

G. CASING INSTALLED:

H. ANNULUS:

I. PERMANENT PUMP INSTALLATION:

- Pump type, make, serial no.: None
- Capacity: g.p.m.
- Motor type, H.P., voltage, r.p.m.
- Depth of pump intake setting
- Which elevation is ft.
- Depth of bottom of airplane
- Which elevation is ft.

HYDROLOGY

J. INITIAL WATER LEVEL:
K. INITIAL CHLORIDE:
L. PUMPING TESTS:

M. DRILLER'S LOG:

N. REMARKS:

FOR DRILLER'S USE

Job Name
Job No.

INSTRUCTIONS:

Send three (3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P.O. Box 373, Honolulu, Hawaii 96809.


FOR OFFICIAL USE

Latitude 21° 20' 37"
Longitude 157° 56' 12"
Well No. 2056-04
CI- CI- Temp.

Job Name .......... 

N. REMARKS: 

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Job No. 

FOR OFFICIAL USE

State of Hawaii
DEPARTMENT OF LAND & NATURAL RESOURCES
DIVISION OF WATER & LAND DEVELOPMENT
DRILLER'S REPORT

RECEIVED

Date of report March 16, 1989. Person filing report L.H. RUNNELL.

A. OWNER & C. OF HONOLULU NAME Well #1 33 MAR 17 A 0:47

B. GENERAL LOCATION Fire Training Center Valkenburgh St.

C. DRILLING COMPANY Roscoe Moss Company

D. TYPE OF RIG 6D.L. DRILLING COMPLETED Feb. 1989. DRILLER'S REPORT

E. ELEVATION, msl: Top of drilling platform 76.5 ft. Bench mark and method used to determine Height of drilling platform above ground surface 0 ft. elevation: 25.4 or 26.5 ft.

F. HOLE SIZE: 
   - 24 in. dia. to 80 ft. below drilling platform.
   - 20 in. dia. to 90 ft. below drilling platform.
   - 18 in. dia. to 100 ft. below drilling platform.

G. CASING INSTALLED: 
   - 12 in. I.D. x PVC in. wall solid section to 60 ft. below drilling platform.
   - 12 in. I.D. x PVC in. wall perforated section to 80 ft. below drilling platform.

   Type of perforation slots - Well Screen 120 openings

H. ANNULUS: Grouted 0 ft. to 3 ft. below drilling platform.
   Gravel packed 3 ft. to 80 ft. below drilling platform.

I. PERMANENT PUMP INSTALLATION:
   - Pump type, make, serial no. Capacity g.p.m.
   - Motor type, H.P., voltage, r.p.m.
   - Depth of pump intake setting ft. below which elevation is rate.
   - Depth of bottom of airline ft. below which elevation is rate.

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HYDROLOGY

J. INITIAL WATER LEVEL ft. below drilling platform. Date of measurement.

K. INITIAL CHLORIDE ppm, total depth of well ft. below drilling platform.

L. PUMPING TESTS:
   - Reference point (R.P.) used: which elevation is ft.
   - Date Feb. 09, 1989
   - Start water level 25 ft. below R. P. Start water level ft. below R. P.
   - End water level 25 ft. below R. P. End water level ft. below R. P.
   - Depth of well 80 ft. below R. P. Depth of well ft. below R. P.

   Elapsed Rate Draw- Temp.
   Time (hours) (gpm) down (ft.) °F
   to 1:00. to 2:00. 4:00. 1:35.
   9:00 to 10:00. 70. 1.12. 1.14.
   10:00 to 11:00. 165. 1.35. to
   11:00 to 12:00. 300. 1.92. to
   12:00 to 1:00. 500. 1.70. to

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SUBSURFACE FORMATION

M. DRILLER'S LOG:
   - 0. to 35. Mud Rock - hard to
   - 35. to 64. Coral to
   - 64. to 80. Hard coral to
   - to to
   - to to
   - to to
   - to to

   N. REMARKS:

---

INSTRUCTIONS: Send three(3) copies to: Manager-Chief Engineer, Division of Water and Land Development, P. O. Box 572, Honolulu, Hawaii 96820.

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES

APPLICATION FOR (check one)

☐ WELL DRILLING PERMIT ☐ WELL Dewatering PERMIT

Instructions: Send completed application and attachments to Department of Land and Natural Resources, P.O. Box 373, Honolulu, Hawaii 96809.
Reference: Regulation 9, Dept. of Land & Natural Resources.

Is the well located in a Designated Ground Water Control Area? ☑ Yes ☐ No
If "yes", application must be accompanied by a Water Use and/or Water Supply Permit and a non-refundable filing fee of $100 payable to the Department of Land & Natural Resources. However, if application is for minor modification of well, filing fee may be waived. If "no", no filing fee is required. Filing fee is waived for federal, state, and county government agencies.

1. WELL LOCATION: Island Oahu Tax Map Key Attach a plot plan showing well location referenced to established property boundaries.

2. WATER USER Honolulu Fire Department Telephone 943-3301
   Address 1455 South Beretania St., 3rd Flr., Honolulu, HI Zip Code 96814

3. PROPOSED DRILLING COMPANY: Board of Water Supply

4. PROPOSED WORK: ☑ Drill new well ☑ Deepen ☑ Redrill ☑ Alter ☑ Seal
   ☑ Abandon ☑ Install new pump ☑ Replace pump ☑ Modify pump
   Fill in the diagram and briefly describe the proposed work (use back of form if necessary):

   Drill and case shallow caprock well for the Fire Department's Training Center. To provide water for the purpose of extinguishing training fires.

5. PROPOSED SECTION OF WELL

   Elevation at top of casing 24 ft. mas.
   Ground Elev. 22± ft. mas.
   Solid casing Material PVC
   Length 58 ft.
   Diameter 1 1/2 in.
   Wall thickness 1/2 in.
   Casing: Perforated & Screen Material PVC
   Length 20 ft.
   Diameter 1 1/2 in.
   Wall thickness 1/4 in.
   Openings in line L.F.

   Hole Dia. 24 in.
   Total Depth 78 ft.
   Rock Packing 75 ft.

   *Approximate elev. at casing. Final elev. (mas) by a surveyor licensed by the State must be submitted at start of construction.

6. PROPOSED USE: ☑ Municipal ☑ Military ☑ Agriculture ☑ Industrial
   ☑ Domestic ☑ Disposal ☑ Other (specify) for HFD Training Cen

7. PROPOSED AMOUNT OF WITHDRAWAL: Check most appropriate box and fill in amount.
   ☑ Daily gallons ☑ Monthly 30,000 gallons ☑ Yearly gallons

7. PROPOSED PUMP OR FLOW CAPACITY: unknown gallons per minute

Signature: Water User
CONSENT OF LANDOWNER IS GRANTED

Signature: Landowner of Well Site
Date: 11/19/87

Date: 8-26-87

For Official Use:
State Well No. 2056-05
DLNR Permit No. ______
DLNR Application No. ______
<table>
<thead>
<tr>
<th>TELEPHONED</th>
<th>PLEASE CALL</th>
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</thead>
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<tr>
<td>CALLED TO SEE YOU</td>
<td>WILL CALL AGAIN</td>
</tr>
<tr>
<td>WANTS TO SEE YOU</td>
<td>URGENT</td>
</tr>
</tbody>
</table>

**Message:**

Is there a well permit for the Vacherberg Fire Facility faculty issued to Co. Bleg or fire dept. (out in Capitola area)?

Sherri

Operator

Drilling to start soon - Chester

LAD - 1/12/10
<table>
<thead>
<tr>
<th>TO:</th>
<th>INITIAL:</th>
<th>PLEASE:</th>
<th>REMARKS:</th>
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<tbody>
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<td></td>
<td>See Me</td>
<td>Just to reminder</td>
</tr>
<tr>
<td>G. Matsumoto</td>
<td></td>
<td>Take Action By</td>
<td></td>
</tr>
<tr>
<td>L. Chang</td>
<td></td>
<td>Route to Your Branch</td>
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</tr>
<tr>
<td>G. Akita</td>
<td></td>
<td>Review &amp; Comment</td>
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</tr>
<tr>
<td>D. Lum</td>
<td></td>
<td>Draft Reply By</td>
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<td>S. Miyamoto</td>
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<td>N. Kaneshiro</td>
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<td>For Information</td>
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<tr>
<td>R. Suzuki</td>
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</tr>
</tbody>
</table>

**DATE:** 1/1/88

**FILE IN:** Honolulu GWCA 2056-04

**REMARKS:**

- Draft Reply
- Acknowledge Receipt
- Xerox copies
- Return
- Mail
- For Information

**Annotations:**
- Signed: [signature]
- Handwritten notes: [notes]
Mr. William Paty, Chairperson  
Board of Land and Natural Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Well Drilling Permit Application for the Honolulu Fire Department Training Center's Shallow Caprock Well

We submit a Well Drilling Permit Application for a shallow exploratory caprock well, which we propose to drill at the Honolulu Fire Department's Training Center, located on Valkenburgh Street. If the yield is adequate, water from the well will be used for their firefighting training. We are assisting the Fire Department in the development of the well.

If you have any questions, please contact Chester Lao at 527-5276.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer

Attachment

Pure Water . . . man's greatest need – use it wisely
APPLICATION FOR (check one)

☐ WELL DRILLING PERMIT    ☐ WELL MODIFICATION PERMIT

Instructions: Send completed application and attachments to Department of Land and Natural Resources, P.O. Box 373, Honolulu, Hawaii 96809.

Reference: Regulation 9, Dept. of Land & Natural Resources.

Is the well located in a Designated Ground Water Control Area?  ☑ Yes  ☐ No

If "Yes", application must be accompanied by a Water Use and/or Water Supply Permit and a non-refundable filing fee of $100 payable to the Department of Land & Natural Resources. However, if application is for minor modification of well, filing fee may be waived. If "No", no filing fee is required. Filing fee is waived for federal, state, and county government agencies.

1. WELL LOCATION: Island:  ☐ Oahu Tax Map Key:  Attach a plot plan showing well location referenced to established property boundaries.

2. WATER USER:  Honolulu Fire Department  Telephone: 943-3301

Address: 1455 South Beretania St., 3rd Flr., Honolulu, HI Zip Code: 96814

3. PROPOSED DRILLING COMPANY: Board of Water Supply

4. PROPOSED WORK:  ☑ Drill new well  ☐ Deepen  ☐ Redrill  ☐ Alter  ☐ Seal  ☐ Abandon  ☐ Install new pump  ☐ Replace pump  ☐ Modify pump

Fill in the diagram and briefly describe the proposed work (use back of form if necessary):

Drill and case shallow caprock well for the Fire Department's Training Center. To provide water for the purpose of extinguishing training fires.

PROPOSED SECTION OF WELL

<table>
<thead>
<tr>
<th>Elevation at top of casing</th>
<th>Ground Elev. 20± ft., msl.</th>
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<tbody>
<tr>
<td>Cement</td>
<td>Solid casing:</td>
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<tr>
<td>Grout 2 ft.</td>
<td>Material: Steel</td>
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<tr>
<td>Hole Dia. 24 in.</td>
<td>Length 15 ft.</td>
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<tr>
<td>Total Depth 35 ft.</td>
<td>Diameter 14 OD in.</td>
</tr>
<tr>
<td>Rock Packing 33 ft.</td>
<td>Wall thickness 3/16 in.</td>
</tr>
<tr>
<td><em>Approximate elev. at filling. Final elev. (msl) by a surveyor licensed by the State must be submitted at start of construction.</em></td>
<td></td>
</tr>
</tbody>
</table>

5. PROPOSED USE:  ☑ Municipal  ☐ Military  ☐ Agriculture  ☐ Industrial  ☐ Domestic  ☐ Disposal  ☐ Other (specify) for HFD Training Center

6. PROPOSED AMOUNT OF WITHDRAWAL: Check most appropriate box and fill in amount.

☐ Daily ________ gallons  ☑ Monthly 30,000 gallons  ☐ Yearly ________ gallons

7. PROPOSED PUMP OR FLOW CAPACITY: unknown ________ gallons per minute

Signature: [ ]  Date: 8-26-87

Water User

CONSENT OF LANDOWNER IS GRANTED

For Official Use:

State Well No.  __________

DLNR Permit No.  __________

DLNR Application No.  __________

Signature: [ ]  Date: 11/12/87

Landowner of Well Site
APPROVED:

CHIEF, PLANNING AND ENGINEERING DIVISION

DATE

JOB
HONOLULU FIRE DEPARTMENT
VALKENBURGH STREET
WATER DEVELOPMENT
LOCATION MAP

SHEET 1 OF 4 SHEETS
EXISTING GROUND

CONCRETE

GRAVEL PACKED ANNULUS (BY BWS)

SOLID CASING (BY BWS)

WELL SCREEN (BY BWS)

GRAVEL PACKED ANNULUS (BY BWS)

WELL SECTION
Scale: 3/4" = 1'-0"

HONOLULU FIRE DEPARTMENT
VALKENBURGH STREET
WATER DEVELOPMENT
WELL SECTION

SHEET 3 OF 4 SHEETS
PADLOCK (NIC) FURNISHED BY BWS

1/4" x 1-1/2" STEEL BAR w/ 5/16" x 1-9/16" SLOT

3/8" Ø HOLE

PADLOCK

6" BAR PLUG

5/16" STEEL PLATE

1/4" x 1-1/2" STEEL BAR w/ 5/16" x 1-9/16" SLOT

1/2"

PLAN

SECTION A

BAR CAP LOCK DETAILS

SCALE: 1-1/2" = 1'-0"

SLOT TO MATE WITH STEEL BAR

6" BAR PLUG

5/16" STEEL PLATE

1/3/16"

1/4"

COVER DETAIL

SCALE: 1-1/2" = 1'-0"

APPROVED:

CHIEF PLANNING & ENGINEERING DIV., BWS

DATE

JOB

HFD VALKENBURGH CAPROCK WELL
EXPLORATORY WELL:
DRILLING, CASING AND TESTING ONE WELL
HONOLULU, OAHU, HAWAII

SHEET 4 OF 4 SHEETS