



# 2013 Training Hawaii Well Construction & Pump Installation Standards - HWCPIS

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**1st Annual Joint State Water Conference  
January 14-18, 2013**

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# COMMISSION ON WATER RESOURCE MANAGEMENT

Ke Kahuwai Pono

“The trustee who oversees the rightful sharing of water.”





MDWS Kanoa I Production Well (6-5731-002)



Small Private Well - Aquaholic (2-1122-006)



Sea Life Park A -  
Saltwater Well  
(3-1940-002)



Kahaluu DMW (8-3457-004)



# Training Outline

Authority & Purpose

Background & Scope

HWCPIS Considerations

- Regulatory
- Well Construction Details
- Pump Installation Details
- Reporting Responsibilities



# Training Outline

## Authority & Purpose

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# Authority & Purpose

- **HRS 174C-86:** The Commission shall adopt minimum standards for well construction and pump installation... to ensure safe and sanitary maintenance and operation wells, to prevent waste, and to prevent contamination of ground water.
- **HAR 13-168-14:** Requires the Commission to adopt minimum standards for:
  - ✓ *Well construction*
  - ✓ *Pump and pumping equipment installation, repairs, and replacements, and specifications*
  - ✓ *Abandonment and permanent sealing of wells*



# Authority & Purpose

- **HRS** minimum standards for installation, maintenance and to
- **HAR 13-168-14**: Further, as amended in 1997 when standards were first adopted:
  - ✓ *Incorporated into administrative rules by reference*



# Authority & Purpose – Simply Stated



The reasons for well standards are to:

- protect aquifers
- prevent well contamination
- maintain resource sustainability



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# Background

- CWRM adopted first HWCPIS in 1997
- Updated in 2004, & new Commission policy to review and update every 5 years
- CWRM staff behind but working on update
  - ✓ *Increase ease of use and clarity*
  - ✓ *Address comments, concerns, and FAQs from water resource professionals and contractors*
  - ✓ *Refine minimum requirements for well construction to ensure water resources are protected*



# Scope - Training



COMMISSION ON WATER RESOURCE MANAGEMENT

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ABOUT US | NEWS & EVENTS | INFORMATION | PLANNING | SURFACE WATER | GROUND WATER

### Well Construction and Pump Installation Standards



Improperly and inadequately constructed wells can cause pollution, or increase the chances of salt-water intrusion to ground water sources to the point of requiring cessation of use or expensive treatment before use. The Hawaii State Water Code and the Administrative Rules of the Department of Land and Natural Resources require the Commission on Water Resource Management to develop minimum standards for the construction, modification, repair/maintenance and sealing/abandonment of wells in order to protect the quality and quantity of Hawaii's ground-water resources.

The Hawaii Well Construction and Pump Installation Standards were amended to the Hawaii Administrative Rules in January 1997, and have subsequently been revised in February 2004. In accordance with the State Water Code, and as stated in §13-152-14, HAR, the goal of the standards is to "ensure the safe and sanitary maintenance and operation of wells, the prevention of waste, and the prevention of contamination of ground water aquifers."

[Click to view the Hawaii Well Construction and Pump Installation Standards \[225 KB\]](#)

### Free Online Training for Homeowners with Water Wells

The Private Well Class is a free, step-by-step education program to help well owners understand groundwater basics, well care best practices, and how to find assistance. It will also teach well owners how to sample their well, how to interpret sample results, and what they can do to protect their well and source water from contamination. The program combines a 10-part online class with live, interactive webinar events in which the material will be reinforced and questions answered. Steve Wilson, a groundwater hydrologist with the Illinois State Water Survey with over 20 years of experience working with private well owners, will serve as the primary instructor for The Private Well Class. To register, please visit: <http://privatewellclass.org>



- Activities
- Hydrologic Units
- Well Information Request
- Well Standards
- Free Online Training for Homeowners
- Water Management Areas
- Water Use Reporting



# Scope - Training “Construction”



Department of Land and Natural Resources  
COMMISSION ON WATER RESOURCE MANAGEMENT

## HAWAII Well Construction & Pump Installation STANDARDS

Honolulu, Hawaii  
Revised February 2004



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# Training Outline

Authority & Purpose

Background & Scope

## HWCPIS Considerations

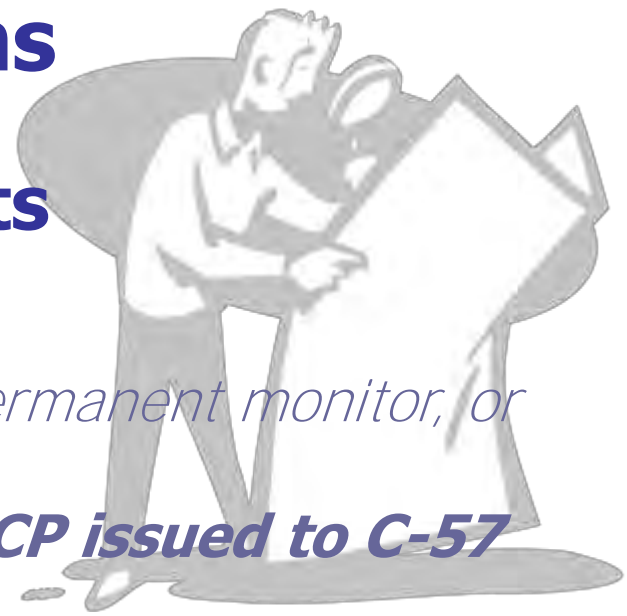
- Regulatory
- Well Construction Details
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- Reporting Responsibilities



# Regulatory Considerations

## CWRM Standards and Permits


- Well Construction Permit
  - ✓ *Required statewide (production, permanent monitor, or sealing of these wells)*
  - ✓ *C-57 license required (DCCA) & **WCP issued to C-57***
  - ✓ *New or modification construction*
  - ✓ *Not required for geotechnical holes (structural), test borings, temporary monitoring wells, injection & dry wells - (DOH & County), or geothermal wells (DLNR)*
- Pump Installation Permit
  - ✓ *Required statewide*
  - ✓ *C-57, C-57a, or A license required (DCCA) & **PIP issued to licensed contractor***
  - ✓ *New or increases in existing pump capacity*
  - ✓ *Not required for new pumps with same capacity as existing pump in well or routine maintenance*

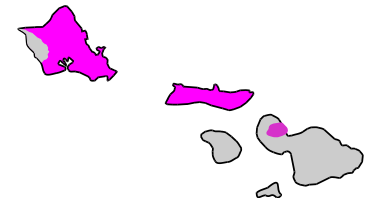


# Regulatory Considerations

## CWRM Standards and Permits

- Ground Water Use Permits

- ✓ *GWUP issued to well owner*
- ✓ *Required in designated Ground Water Management Areas*
  - *All of Oahu except Waianae area*
  - *Entire island of Molokai* 
  - *Iao Aquifer on Maui*
- ✓ *Can drill exploratory well (WCP) without GWUP*
- ✓ *No PIP without GWUP*





# Regulatory Considerations

## CWRM Standards and Permits

- Emergencies

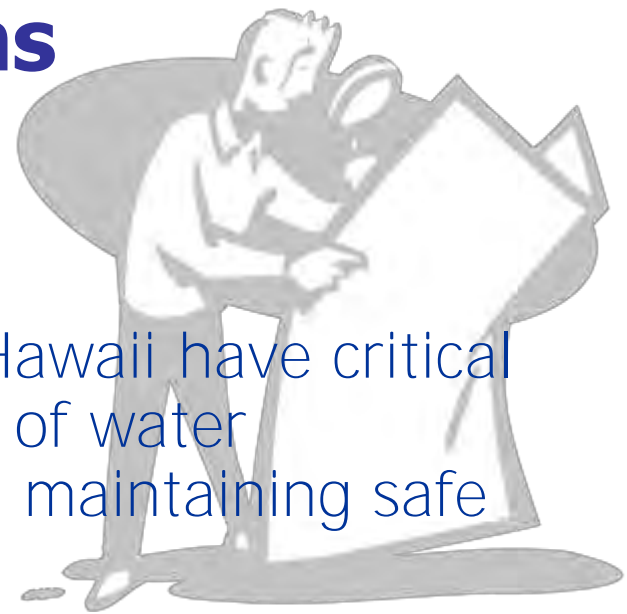
- ✓ *Not addressed in HRS or HAR*
- ✓ *However, by reference in HWCPIS – allowable to do emergency work without permit so long as CWRM immediately notified and within 60 days of completion report submitted*
- ✓ *Emergency - to prevent or minimize loss of life, risk to public health and safety, or damage to property*
- ✓ *If permit required and not an emergency, CWRM may levy fines of up to \$5,000/day.*



# Regulatory Considerations

## Other standards may apply

- Other governmental agencies in Hawaii have critical roles in preventing contamination of water resources, aquifer protection, and maintaining safe drinking water sources
  - ✓ *State Department of Health (DOH)*
  - ✓ *County Hawaii Water System Standards (2002 – as amended)*
- Professional and trade organizations
  - ✓ *AWWA, ASTM, NSF, ANSI*
- More stringent controls than minimum standards may be required to achieve water resource protection goals



# Regulatory Considerations

Other standards may apply

Department of Health – Well Construction



DOH permits and requirements

✓ ***NPDES general permit*** for "treated wastewater effluent" associated with drilling activities

- Authority: § 11-55, App. I, HAR
- Well drilling slurries, lubricating fluids wastewater, well purge wastewater
- Notice of Intent & filing fees to DOH for coverage under general permit
- Well construction permit holder responsible to comply

✓ *Regulation of construction noise*



Table 2. Well Permits and Reports Required

Well Type	Proposed Activity	Permit Requirements			Applicable Well Standards
		Permit	Report	Enforcing Agency	
Water Well (fresh, brackish, & salt water)	Drill new well. Modify existing well. Redrill existing well. Deepen existing well.	Well Construction	Well completion report.	Commission	These Standards
	Abandon/seal existing well.		Well abandonment/sealing report.		
	Install new pump. Modify existing pump to a larger capacity. Replace existing pump with a larger pump.	Pump Installation	Well completion report.	Commission	These Standards
Monitor Well	Drill new well or modify an existing well. Abandon/seal existing well.	Well Construction	Well completion report.	Commission	These Standards
Injection Well	Construct; Operate; Modify; Abandon/Seal.	Underground Injection Control (UIC)	Refer to Chap. 11-23, HAR.	State Department of Health	Chapter 11-23, HAR.
Geothermal Well	Drill; Modify; Modify use; Abandon/seal.	Geothermal	Refer to Chap. 13-183, HAR.	State Department of Land & Natural Resources	Chapter 13-183, HAR.
Test Boring	Excavate/drill. Abandon/seal.	None	None	None	None
Drainage wells	Construct; Operate; Modify; Abandon/Seal.	Underground Injection Control (UIC)	Refer to Chap. 11-23, HAR.	State Department of Health	Chapter 11-23, HAR.

**Note:** (1) New water wells to be used to supply a public water system must meet the requirements of Chapter 11-20, entitled, "Rules Relating to Potable Water Systems" of the State Department of Health.  
 (2) Test borings related to UIC and/or environmental monitoring or remediation are subject to the State Department of Health.  
 HAR = Hawaii Administrative Rule.





# Training Outline

Authority & Purpose

Background & Scope

## HWCPIS Considerations

- Regulatory
- Well Construction Details
- Pump Installation Details
- Reporting Responsibilities



# Well Construction Details

- Location
- Depth limitations
- Pump Tests
- Casing
- Grouting Annulus
- Well Pad
- Benchmarks
- Capping
- Water Level Measurement Access
- Sealing/Abandonment



# Well Construction Details

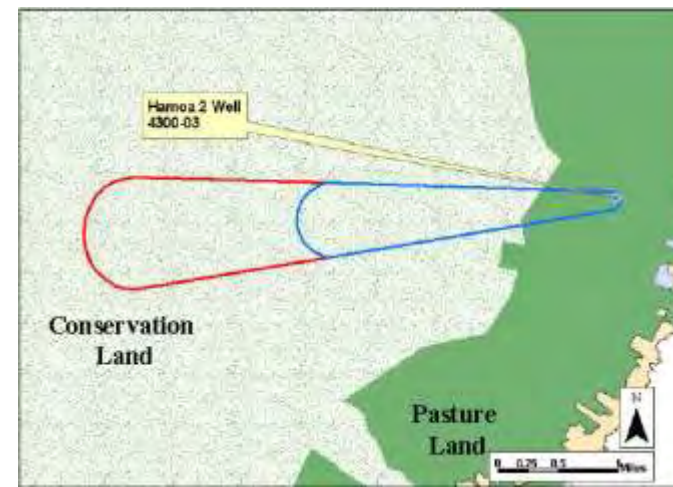
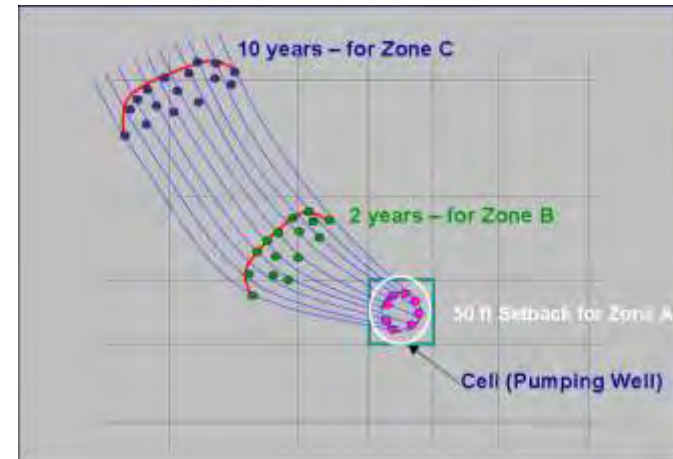
## ▪ Location

*Shall be sited away or upgradient from pollution sources*

- ✓ *Public wells (15 connections or 25 individuals – DOH definition)*
  - *1000 ft. from pollution source*
  - *SWAP considerations*
- ✓ *Private wells – at their own risk*

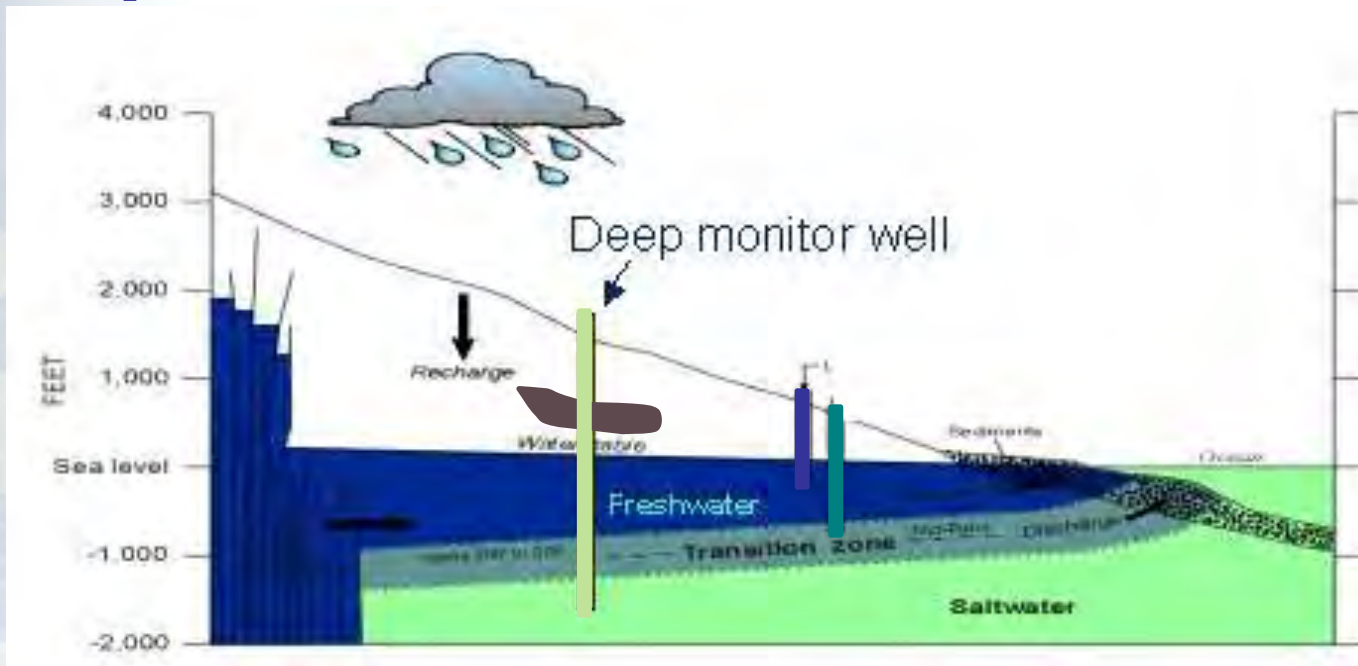
*DOH review considered*

- ✓ *Environmental Management Division*
  - *CWB, SDWB, WWB , also HEERO*
- ✓ *SWAP – Source Water Assessment Program - long list of risk levels and capture zone delineations*



# Well Construction Details

- **Depth limitations**



*Only one aquifer can be tapped at a time:*

- ✓ *Prevents cross-contamination between aquifers*

*Basal aquifers ¼ depth limitation*

- ✓ *Optimization & prevention of upconing contamination*

*Saltwater wells must go to  $\geq 17,000$  ppm cl-*



# Well Construction Details

## ■ Pump Tests

*To assess behavior of the source*

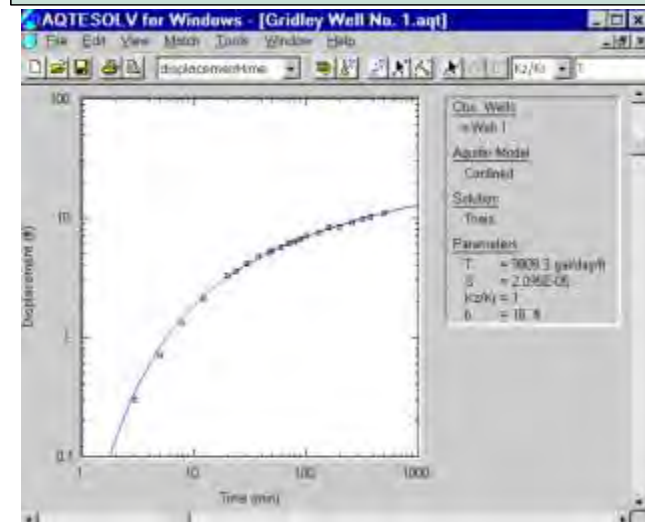
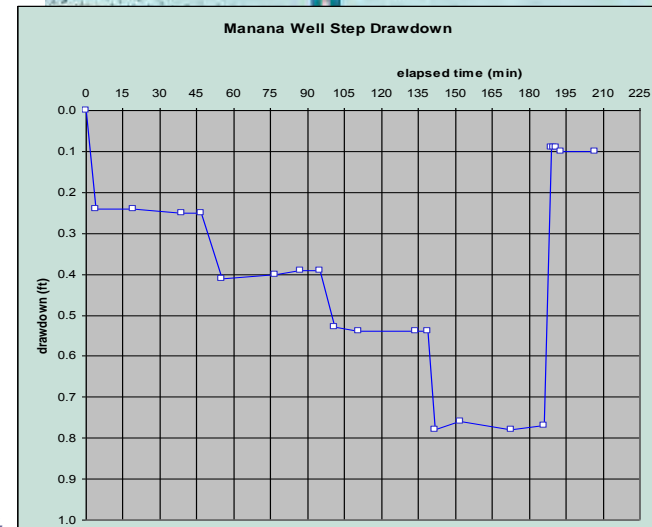
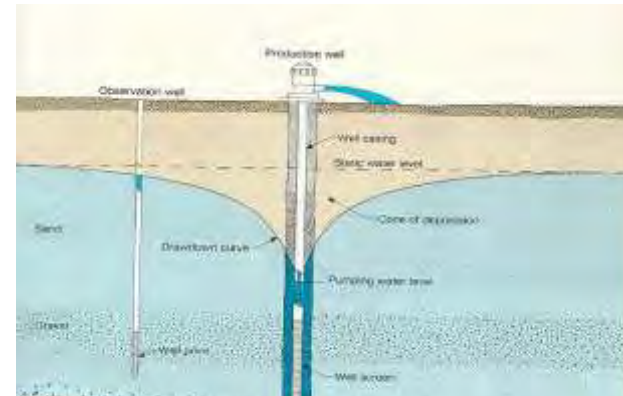
- ✓ *Local well & aquifer sustainability*

*Step-Drawdown for wells  $\geq 70$  gpm*

- ✓ *Determine well specific capacity & hydraulic conductivity*
- ✓ *Chloride sensitivity to pumping*

*Constant Rate for wells  $\geq 50$  gpm*

- ✓ *Determine aquifer storage coefficient & boundaries (streams)*
- ✓ *Chloride sensitivity to pumping*



**Table 8. Minimum Test Period for Constant-Rate Tests**

Proposed Use of Well	Proposed Capacity (gpm)	Minimum Test Period (hours)
Non-Public Water Supply	0 - 50	0
	51 - 100	8
	101 - 300	24
	301 - 700	48
	701 - 1000	72
	1001 +	96
Public Water Supply		96

# Well Construction Details

## ■ Casing

### *Materials allowed*

- ✓ *Carbon Steel*
- ✓ *Stainless Steel*
- ✓ *ABS*
- ✓ *PVC*
- ✓ *Thermoset*

### *No Minimum Casing Diameters for Water Supply Wells.*

- ✓ *The driller or consultant can determine the proper diameter for the casing*

### *Length/Depth of Solid Casing*

- ✓ *≥ 90% depth to water (unconfined)*
- ✓ *Enough to prevent leakage (confined)*
- ✓ *Saltwater Wells : all the way to saltwater (≥ 17,000 ppm cl-)*

*Top of casing  
≥2 ft. above  
100-yr flood elev  
when capped*



# Well Construction Details

## ■ Grouting Annulus

### *Materials allowed*

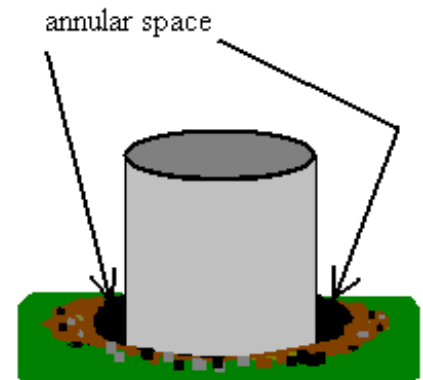
- ✓ Neat cement
- ✓ Concrete
- ✓ Cement-bentonite
- ✓ Sand-cement slurry
- ✓ Bentonite
- ✓ Cement must conform to ASTM C150 Type I

### *Minimum Annulus Width*

- ✓ Positive Displacement (1.5-inch annulus)
- ✓ Non-positive Displacement (2-inch annulus)
- ✓ Public System Non-positive Displacement (3-inch annulus)

### *Minimum Depth of Grout*

- ✓ 70% depth to water or 500 ft., whichever is less.
- ✓ Enough to prevent leakage (confined/perched aquifers)
- ✓ Saltwater Wells: all the way to saltwater ( $\geq 17,000$  ppm cl-)



# Well Construction Details

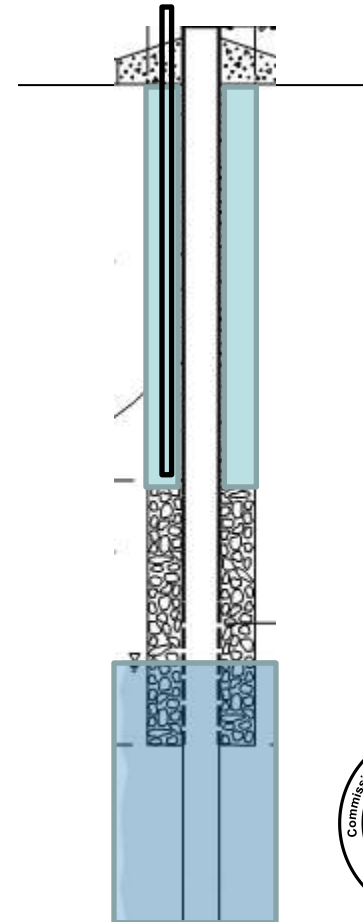
## ■ Grouting Annulus

### *Rock/Gravel Pack*

- ✓ *Locally produced*
- ✓ *Basaltic*
- ✓ *Larger than slotted casing openings*
- ✓ *Disinfected before placement*  
*(drenched with 100 mg/l chlorine solution)*

### *Placement of Grout*

- ✓ *Soon as possible after casing installed*
- ✓ *Positive Displacement*
- ✓ *Non-positive Displacement*
  - *(tremie pipe freefall [gravity])*
  - *(freefall ok for  $\leq 20$  ft. below ground surface)*
- ✓ *200 ft. lift limit for PVC casing*





# Well Construction Details

## ■ Well Pad

*To Protect Well Head*

*Concrete Base*

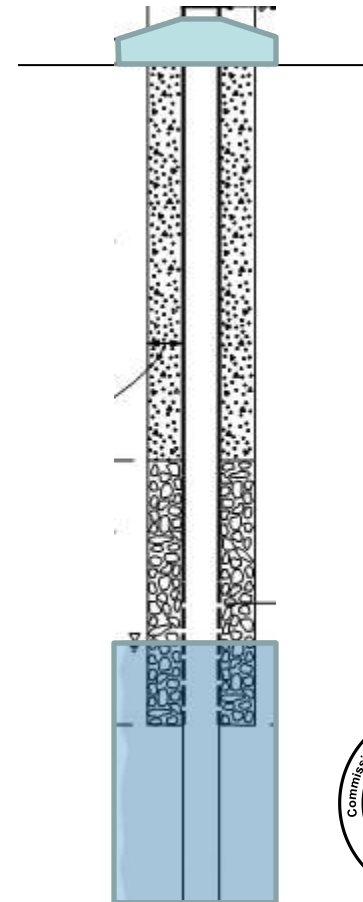
- ✓ *Water tight contact with annular seal & casing*
- ✓ *≥ 4 inches thick*
- ✓ *Slope away from casing*

*Pits or Vaults*

- ✓ *Should be avoided*

*Protection from Vehicles*

- ✓ *Shall install steel posts or equivalent where there is significant traffic*



# Well Construction Details

## ▪ Benchmarks

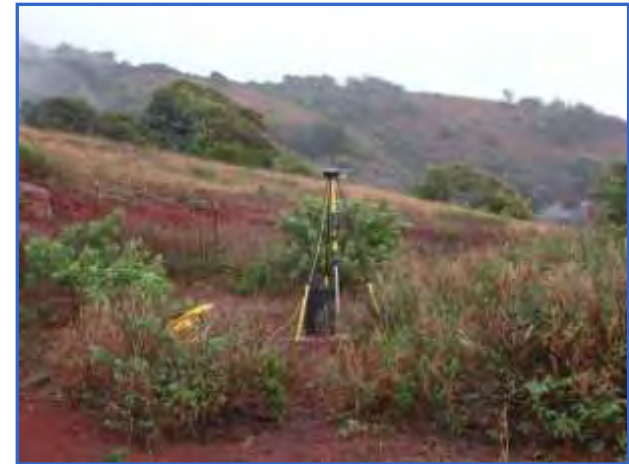
*To provide for accurate*

- ✓ *Elevations*
- ✓ *Well Dimensions*
- ✓ *Aquifer information*
- ✓ *Well number ID*

*Marks required on all wells*

*Elevation Survey*

- ✓ *Public water supply wells*
- ✓ *Private*
  - *$\geq 70$  gpm pump capacity*
  - *Deferred for  $\leq 70$  gpm pump capacity*
- ✓ *Not required for saltwater wells*
- ✓ *Licensed surveyor (DCCA)*



# Well Construction Details

## ■ Capping

*To prevent unauthorized entry into non-pumping wells*

*Required*

- ✓ Lockable Cover
- ✓ Or
- ✓ Casing Cap
  - 1 ½ - inch diameter

*Sanitary cap (optional)*

*If Vented*

- ✓  $\geq 1$  ft. above ground
- ✓ turned down
- ✓ screened



# Well Construction Details

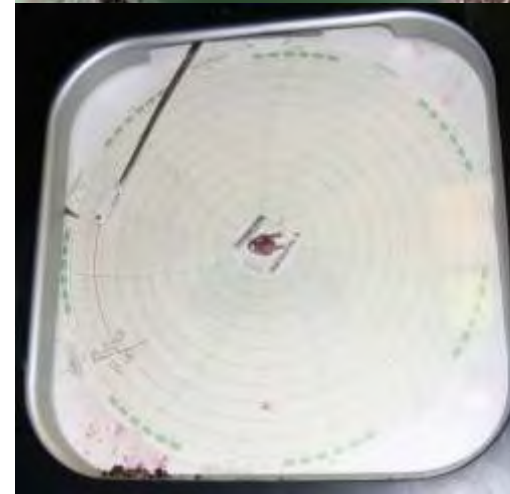
## ▪ Water Level Measurement Access

### *Required for*

- ✓ *Public water supply wells*
- ✓ *Wells with  $\geq 70$  gpm capacity*
- ✓ *Wells with casing diameter  $\geq 6$  in. I.D.*

### *Methods*

- ✓ *Airline*
- ✓ *Sounding /chase tube ( $\geq \frac{3}{4}$  in. I.D.)*
- ✓ *Permanent transducer*
- ✓ *Others must be approved by Chairperson*



# Well Construction Details

## ■ Sealing/Abandonment

*Materials allowed:*

- ✓ Neat cement
- ✓ Concrete
- ✓ Cement-bentonite
- ✓ Sand-cement slurry
- ✓ Bentonite – not allowed for brackish or salt wells
- ✓ Cement must conform to ASTM C150 Type I
- ✓ In extreme cases gravel allowed with approved variance

*Material used depends on section of well*

*Casing must be perforated if no record of grouted annulus*

*Entire length of hole must be filled*

*Special attention to artesian well situations*

- ✓ Video logs, Packers, discussion with staff



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# Pump Installation Details

- Pump Types
- Mercury seals not allowed
- Cross Connections
- Flow Meters



# Pump Installation Details

## ▪ Pump Types

*Must conform to ANSI/AWWA E101-88*

- ✓ *Vertical turbine pump-line shaft*
- ✓ *Submersible*
- ✓ *Centrifugal*

### *Lubrication*

- ✓ *Water preferred*
- ✓ *Oil – conforms to USDA or FDA food contact grade*

### *Mounting*

- ✓ *Reinforced pad may be required*
- ✓ *Effective seal between pad and all pumping equipment*





# Pump Installation Details

- **Mercury Seals not are allowed**



# Pump Installation Details

## ▪ Cross Connections

*Must eliminate potable and non-potable cross connections*

- ✓ *Backflow preventors*
- ✓ *Air Gaps*

*Chemigation*

- ✓ *Backflow prevention acceptable to DOH in accordance with 149A-31(6) HRS*



# Pump Installation Details

## ▪ Flow Meters

*All non-saltwater pumping wells require a totalizer installed at manufacturer's specifications*

- ✓ *To track stresses placed on the public trust resource*
- ✓ *To meet well owner pumping report required by rule, under HAR 13-168-7 – Report of Water Use*
- ✓ *If owner refuses to allow contractor to install we allow contractor to finish but well owner must install and report installation before using well.*



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# Reporting Responsibilities

- Well Construction Report
- Pump Installation Report
- Meter Installation Report
- Certificates of Completion



# Reporting Responsibilities

## Well Completion Report

*Must submit to Commission within 60-days of completion*

*Use online forms*

12. AS-BUILT WELL SECTION (Please attach as-built if different from diagram provided below)

STATE WELL NO. \_\_\_\_\_

Elevation at top of casing (to nearest 0.01 ft.) \_\_\_\_\_ ft. msl

Hole Diameter \_\_\_\_\_ in

Minimum of 2' Radius & 4" Thick Concrete Pad

Ground Elevation \_\_\_\_\_ ft. msl  Surveyed  Estimated

Bench mark elevation \_\_\_\_\_ ft. msl  
 (Surveyed to nearest 0.01 ft.)  
 (Estimated)

Cement Grout \_\_\_\_\_ 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 \_\_\_\_\_ in.  
**Note:** minimum for positive displacement methods is 1" for other grouting methods, minimum shall be 2" (non-pneum. water systems) or 3" (pneum. water systems)

Rock or Gravel Packing  
Material \_\_\_\_\_ ft.  
 Crushed Basalt  
 Rounded Gravel

Water Level Elevation \_\_\_\_\_ ft. msl  
(Item 11 from page 1)

Total Depth \_\_\_\_\_ ft.

\*msl = mean sea level

Please refer to the **HAWAII WELL CONSTRUCTION AND PUMP INSTALLATION STANDARDS** to ensure that your as-built is in compliance with applicable standards.

Solid Casing ( $\geq 90\% \times (\text{Ground Elev.} - \text{Water Level Elev.})$ )  
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  
Length: \_\_\_\_\_ ft.  
Diameter: \_\_\_\_\_ in.  
Bottom Elevation: \_\_\_\_\_ ft. msl



**Solid Casing Material:**

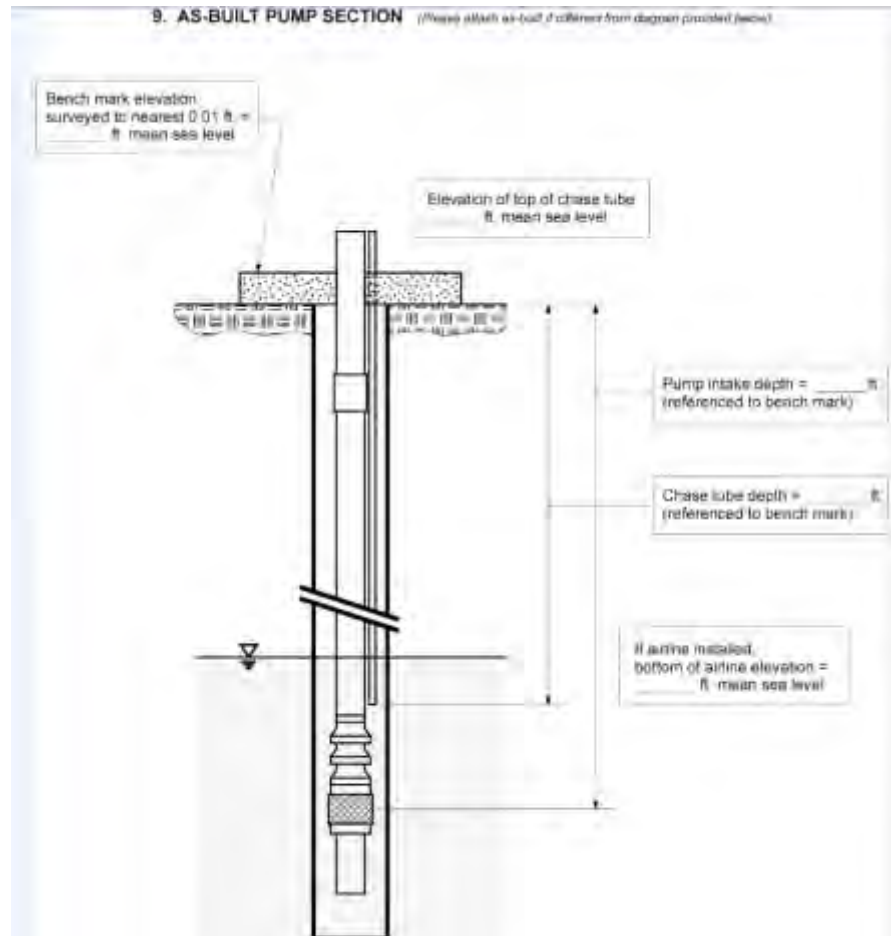
Carbon Steel, compliant with applicable codes: — ANSI/AISC 360 — API Spec. 5L — ASTM A53 — ASTM A132

# Reporting Responsibilities

## ▪ Pump Installation Report

*Must submit to Commission within 60-days of completion*

*Use online forms*



# Reporting Responsibilities

## ▪ Certificates of Completion

### *Certificate of Well Construction Completion*

- ✓ *Acceptable WCR - to contractor*
- ✓ *CWCC – to landowner of well*
  - ✓ *Landowner becomes responsible for sealing*

### *Certificate of Pump Installation Completion*

- ✓ *Acceptable PIR – to contractor*
- ✓ *CPIC – to well owner operator*
  - ✓ *Well owner responsible for pumpage reports*
- ✓ *Not issued if meter not installed where required*
  - *Well cannot be pumped*
  - *CPIC when well owner submits acceptable meter installation report*





# MAHALO

see <http://hawaii.gov/dlnr/cwrn/>

COMMISSION ON WATER RESOURCE MANAGEMENT

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ABOUT US NEWS & EVENTS INFORMATION PLANNING SURFACE WATER GROUND WATER

## Water News

### NOMINATIONS FOR COMMISSION MEMBERS

The Nominating Committee for the State Commission on Water Resource Management is soliciting nominations for two positions on the Commission starting July 1, 2013. The Nominating Committee will send the names of three individuals for each position to the Governor who selects one person for each position and submits the names to the Senate for confirmation.

[Learn more about the Commission...](#)

[How to Apply...](#)

### FREE ONLINE TRAINING FOR PRIVATE WELL OWNERS

The Private Well Class is a free, step-by-step education program to help well owners understand groundwater basics, well care best practices, and how to find assistance. It will also teach well owners how to sample their well, how to interpret sample results, and what they can do to protect their well and source water from contamination. The program contains a 10-part online class with live, interactive webinar events in which the material will be reinforced and questions answered.

[Learn more...](#)

### NA WA I EHA APPURTENANT RIGHTS

The Commission received claims for Appurtenant rights in the Na Wa I Eha Surface Water Management Area. Relevant documentation submitted by the applicants is available for viewing. Written objections to Appurtenant rights claims received by the Commission have been posted.

[Learn more...](#)

### COMMISSION EMPLOYMENT OPPORTUNITIES:

The Commission on Water Resource Management is currently seeking to fill two (2) civil service positions: Geologist I (1) and Information Technology Specialist II (1) for the term beginning

## QUICK LINKS

SEARCH

- ▶ Applications & Forms
- ▶ State Water Code
- ▶ Commission Meetings
- ▶ Hawaii Water Plan
- ▶ Water Resource Bulletin
- ▶ Upcoming Events

WEATHER FORECAST

