DEPARTMENT OF WATER SUPPLY
COUNTY OF HAWAII
HILO, HAWAII

JOB NO. 97-690

PROPOSAL AND SPECIFICATIONS

FOR THE

CONSTRUCTION OF THE NEW WAIAHA EXPLORATORY WELL DRILLING

DISTRICT OF NORTH KONA

COUNTY OF HAWAII - STATE OF HAWAII

1999
TABLE OF CONTENTS

INVITATION TO BIDDERS

NOTICE TO BIDDERS

NOTICE CONCERNING ECONOMIC STABILIZATION ACT OF 1970, AS AMENDED

INSTRUCTIONS TO BIDDERS

PROPOSAL

SPECIAL PROVISIONS

PLANS

GENERAL REQUIREMENTS AND COVENANTS (Bound Separately)

WATER SYSTEM STANDARDS, VOLUMES 1 AND 2 (Bound Separately)

CONTRACT AND BOND (Bound Separately)

STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Bound Separately)

STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION (Bound Separately)

HAWAII WELL CONSTRUCTION AND PUMP INSTALLATION STANDARDS (Bound Separately)
NOTICE TO BIDDERS

NOTICE CONCERNING ECONOMIC STABILIZATION ACT
OF 1970, AS AMENDED

The bidder is reminded that mandatory provision of federal measures promulgated under authority of the Economic Stabilization Act of 1970 (P.L. 91-379, 84 Stat. 799) including Executive Orders of the President, amendments thereto, and rules and regulations issued thereunder may be applicable to invitations to bid, bid proposals and contracts.

In addition, all bid proposals submitted shall, to the best of the bidder's knowledge and belief, be in accordance with applicable mandatory provisions of measures promulgated by authority of the Economic Stabilization Act of 1970, and where any provision of the contract specifications is inconsistent, such mandatory provisions shall control.
## INSTRUCTIONS TO BIDDERS

### CONTENTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>WELL CONSTRUCTION STANDARDS, WATER SYSTEM STANDARDS AND GENERAL REQUIREMENTS AND COVENANTS</td>
<td>IB-1</td>
</tr>
<tr>
<td></td>
<td>A. WELL CONSTRUCTION STANDARDS</td>
<td>IB-1</td>
</tr>
<tr>
<td></td>
<td>B. WATER SYSTEM STANDARDS</td>
<td>IB-1</td>
</tr>
<tr>
<td></td>
<td>C. GENERAL REQUIREMENTS AND COVENANTS</td>
<td>IB-1</td>
</tr>
<tr>
<td>2.</td>
<td>PROPOSAL REQUIREMENTS AND CONDITIONS</td>
<td>IB-2</td>
</tr>
<tr>
<td></td>
<td>A. NOTICE OF INTENTION TO BID AND QUESTIONNAIRE</td>
<td>IB-2</td>
</tr>
<tr>
<td></td>
<td>B. PROPOSAL</td>
<td>IB-3</td>
</tr>
<tr>
<td></td>
<td>C. SECURITY TO BE FURNISHED BY EACH BIDDER</td>
<td>IB-3</td>
</tr>
<tr>
<td></td>
<td>D. SEALED BIDS</td>
<td>IB-4</td>
</tr>
<tr>
<td></td>
<td>E. INTERPRETATION OF PROPOSED CONTRACT DOCUMENTS</td>
<td>IB-4</td>
</tr>
<tr>
<td></td>
<td>F. ADDENDA OR BULLETINS</td>
<td>IB-5</td>
</tr>
<tr>
<td></td>
<td>G. DEPOSIT AND REFUND FOR PLANS AND SPECIFICATIONS</td>
<td>IB-5</td>
</tr>
<tr>
<td>3.</td>
<td>AWARD AND EXECUTION OF CONTRACT</td>
<td>IB-5</td>
</tr>
<tr>
<td></td>
<td>A. AWARD OF CONTRACT</td>
<td>IB-5</td>
</tr>
<tr>
<td></td>
<td>B. PERFORMANCE BOND</td>
<td>IB-6</td>
</tr>
<tr>
<td></td>
<td>C. NOTICE TO PROCEED PROCEDURE</td>
<td>IB-6</td>
</tr>
<tr>
<td>4.</td>
<td>SCOPE OF WORK</td>
<td>IB-7</td>
</tr>
<tr>
<td></td>
<td>A. SCOPE OF WORK</td>
<td>IB-7</td>
</tr>
<tr>
<td></td>
<td>B. ITEMS NOT SPECIFIED IN THE BID</td>
<td>IB-7</td>
</tr>
<tr>
<td></td>
<td>C. SITE RESTORATION</td>
<td>IB-7</td>
</tr>
<tr>
<td>5.</td>
<td>CONTROL OF WORK</td>
<td>IB-7</td>
</tr>
<tr>
<td></td>
<td>WORK SCHEDULE</td>
<td>IB-7</td>
</tr>
<tr>
<td>6.</td>
<td>CONTROL OF MATERIALS AND EQUIPMENT</td>
<td>IB-8</td>
</tr>
<tr>
<td></td>
<td>COMPLIANCE WITH SPECIFICATIONS OF MATERIALS</td>
<td>IB-8</td>
</tr>
<tr>
<td>7.</td>
<td>LEGAL RELATION AND RESPONSIBILITIES</td>
<td>IB-8</td>
</tr>
<tr>
<td></td>
<td>A. LICENSED BIDDERS</td>
<td>IB-8</td>
</tr>
<tr>
<td></td>
<td>B. PERMITS AND LICENSES</td>
<td>IB-9</td>
</tr>
<tr>
<td></td>
<td>C. PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE</td>
<td>IB-9</td>
</tr>
<tr>
<td>8.</td>
<td>PROSECUTION AND PROGRESS</td>
<td>IB-10</td>
</tr>
<tr>
<td></td>
<td>A. LOCAL LABOR</td>
<td>IB-10</td>
</tr>
<tr>
<td></td>
<td>B. HOURS AND WAGES</td>
<td>IB-10</td>
</tr>
<tr>
<td></td>
<td>C. GUARANTEE OF WORK</td>
<td>IB-10</td>
</tr>
<tr>
<td>9.</td>
<td>BLASTING</td>
<td>IB-11</td>
</tr>
<tr>
<td>10.</td>
<td>EXISTING UTILITIES</td>
<td>IB-11</td>
</tr>
</tbody>
</table>
II. STANDARDS FOR PUBLIC WORKS CONSTRUCTION

12. AVAILABILITY OF UTILITIES

13. FORUM SELECTION CLAUSE

14. TAX CLEARANCE

15. TERMINATION OF SERVICES

16. MANAGED PROCESS REVIEW

17. TERMINATION FOR CONVENIENCE OF CONSTRUCTION CONTRACTS

18. PROJECT SIGN

19. INFORMATION ON HAWAII STATE TAXES ADMINISTERED BY THE DEPARTMENT OF TAXATION

20. HOUSED WORKING AREA FOR DEPARTMENT'S PERSONNEL

21. ACCESS TO WELL SITE
INSTRUCTIONS TO BIDDERS

1. WELL CONSTRUCTION STANDARDS, WATER SYSTEM STANDARDS AND GENERAL REQUIREMENTS AND COVENANTS:

A. WELL CONSTRUCTION STANDARDS:

The "Hawaii Well Construction and Pump Installation Standards" of the State Commission on Water Resource Management, dated January 1997, is hereby made a part of this contract. A copy of the Standards can be obtained from the office of the Division of Water Resource Management, Room 227, Kalanimoku Building, 1151 Punchbowl Street, Honolulu, Hawaii 96813.

B. WATER SYSTEM STANDARDS:

"Water System Standards," Volumes 1 and 2, covering Standard Specifications for Planning, Materials, and Construction and "Approved Material List and Standard Details," dated 1985, as amended, is hereby made a part of this contract and may be purchased at the Office of the Manager, Room 103, 25 Aupuni Street, Hilo, Hawaii, at a cost of $7.00 per set.

C. GENERAL REQUIREMENTS AND COVENANTS:

"General Requirements and Covenants," dated June 1986, is hereby made a part of this contract and may be purchased at the Office of the Manager, Room 103, 25 Aupuni Street, Hilo, Hawaii, at a cost of $3.00 per copy. The following provisions contained in these Instruction to Bidders reiterates and may supplement the provisions contained in the "General Requirements and Covenants."

The bidder's attention is directed to the Hawaii Revised Statutes and to Chapter 103D - Hawaii Public Procurement Code which was effective July 1, 1994. This new chapter amends and repeals several sections of Chapter 103 - Expenditure of Public Money and Public Contracts.

In the General Requirements and Covenants, and where reference is made to Chapter 103, the following changes are noted:

Section 2.1 Competency of Bidders

Section 103-25 repealed and replaced by Section 103D-310.
Section 2.8 Proposal Guaranty

Sections 103-28, 103-30, and 103-31 repealed and replaced by Sections 103D-323 and 103D-325.

Section 3.3 Award of Contract

Section 103-26 repealed and replaced by Section 103D-302.

Section 3.5 Requirement of Contract Bond

Sections 103-34 to 103-38 repealed and replaced by Sections 103D-324 and 103D-325.

Section 3.6 Execution of the Contract

Section 103-39 repealed and replaced by Section 103D-309.

Section 7.1 (F) Preference for Hawaii Products

Sections 103-41 through 103-48 replaced by Section 103D-1002.

Section 7.1(K) Listing of Joint Contractor and/or Subcontractors

Sections 103-29 and 103-33 repealed and replaced by Sections 103D-302 and 103D-501.

2. PROPOSAL REQUIREMENTS AND CONDITIONS:

A. 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 Manager, Room 103, 25 Aupuni Street, Hilo, Hawaii, at least ten (10) calendar days prior to the date designated for opening of bids as required by Section 103D - Hawaii Revised Statutes.

The Manager may require the prospective bidder to file a "Standard Questionnaire and Financial Statement for bidders," as required by Section 103D-310, Hawaii Revised Statutes, at least seventy-two (72) hours prior to the time advertised for the opening of bids. If the answers and statement are satisfactory, the bidder's proposal will be received.

The "Standard Questionnaire and Financial Statement for Bidders."
shall be on the form provided by the Department of Water Supply, County of Hawaii.

B. PROPOSAL:

1) Bids shall be made upon the form therefore obtained at the Office of the Manager, properly and with all items filled out. Numbers shall be stated both in writing and in figures for Total Sum bid and the signatures of all persons signing shall be in longhand. The completed form shall be without interlineations, omissions or alterations, unless necessitated by an Addendum as specified elsewhere in these instructions and initialed by the Bidder. The completed form shall be without erasures.

2) Bids shall not contain any recapitulation of the work to be done; alternative proposals will not be considered unless called for. No oral, telegraphic or telephonic proposals or modifications will be considered.

3) Before submitting a bid, bidders shall carefully examine the drawings, read the specifications and the form of agreement, shall visit the site of work and shall fully inform themselves as to all existing conditions and limitations pertinent to the execution of this contract and shall include in the bid a sum to cover the cost of all items included in the contract documents. Arrangements to visit the site may be made by contacting the Department of Water Supply at 961-8660.

4) Bids shall be delivered to the Office of the Manager, Room 103, 25 Aupuni Street, Hilo, Hawaii or Hawaii County Services, Room 103, 75-5706 Kuakini Highway, Kailua-Kona, Hawaii.

C. SECURITY TO BE FURNISHED BY EACH BIDDER:

A Proposal Guaranty as required by law made payable to the Department of Water Supply, for five (5%) percent of the amount of the bid and in the form as required by Section 2.8, Proposal Guaranty of the "General Requirements and Covenants," dated June 1986, and Sections 103D-323 and 103D-325, Hawaii Revised Statutes, shall accompany each bid as evidence of good faith and as a guarantee that if awarded the contract, the bidder will execute the contract and furnish a bond as required. The successful bidder's deposit, certified check or bid bond will be retained until he has entered into a satisfactory contract and furnished a one hundred percent (100%) performance bond. The Department of Water Supply of the County of Hawaii reserves the
right to hold the deposits, certified checks or bid bonds of the three lowest bidders, until the successful bidder has entered into a contract and furnished a one hundred percent (100%) performance bond.

Bid bond shall be furnished by a bonding company authorized to do business in the State of Hawaii. Should the successful bidder fail to enter into a contract and furnish a satisfactory performance bond within the time stated in his proposal, the deposit, certified check or bid bond shall be forfeited as liquidated damages.

D. SEALED BIDS:

All bids for this project shall be enclosed in a sealed envelope and marked:

   JOB NO. 97-690

   CONSTRUCTION OF THE NEW WAIAHA EXPLORATORY WELL DRILLING

   District of NORTH KONA
   County of Hawaii - State of Hawaii

The bidder shall use ink to fill all blank spaces provided for in the bid.

The attached form of the Proposal is furnished only for the guidance of the bidders and is not to be used for actual bidding. An official copy of the Proposal on which the bid shall be made will be furnished to the prospective bidder when plans and specifications are obtained.

E. INTERPRETATION OF PROPOSED CONTRACT DOCUMENTS:

If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications or other proposed contract documents, he may submit to the Manager a written request for an interpretation thereof. Any interpretation of the proposed contract documents will be made only by addendum, duly issued and a copy of such addendum will be mailed or delivered to each person receiving a set of such documents. The Department of Water Supply of the County of Hawaii will not be responsible for any other explanations or interpretations of the proposed documents.
F. ADDENDA OR BULLETINS:

Any addendum or bulletin issued during the time of bidding and forming a part of the documents loaned to the bidder for the preparation of his bid, shall be covered in the bid and shall be made a part of the contract.

G. DEPOSIT AND REFUND FOR PLANS AND SPECIFICATIONS:

All plans and specifications may be obtained from the office of the Manager upon a deposit of the amount specified in the Invitation to Bidders. The plans and specifications are the property of the Department on loan to the bidder until bids are due. Bidders, should they decide not to submit bid, are requested to return the plans and specifications. The deposit shall not be construed to be the purchase price of any part of these documents. The deposit shall be refunded upon the return of the complete plans and specifications, provided that they are returned in usable condition and within thirty (30) consecutive calendar days after the date designated for the opening of bids. No refund shall be made after the expiration of this period except as follows:

(a) The Contractor submitting the apparent low bid for the project may retain his plans and specifications unless otherwise notified.

(b) All persons or firms shown on the listing of joint contractors and subcontractors and also on the listing of suppliers contained in the apparent low bidder's proposal may also retain their plans and specifications unless otherwise notified.

3. AWARD AND EXECUTION OF CONTRACT:

A. AWARD OF CONTRACT:

All bids will be compared on the basis of the lowest total sum bid or as specified elsewhere herein. The award, if made, will be made to the lowest responsible bidder within sixty (60) days after the opening of bids. No bidder may withdraw his bid for a period of sixty (60) days after the date set for the opening of bids. It is understood and agreed that should identical low bids be received, the award will be determined by drawing lots.

In accordance with Section 103-53, Hawaii Revised Statutes, as amended, an original tax clearance certificate from both the State Department of Taxation and the Internal Revenue Service (IRS) must be
obtained and submitted to the Department of Water Supply before the contract is entered into.

If the bidder is unable to secure these tax clearance certificates, then in lieu of these certificates, the bidder shall submit the required certification letters from these taxing agencies in conformance with Section 103-53, Hawaii Revised Statutes.

The timeline for the award and execution of the contract to the lowest responsible bidder is important to the Department. Although Section 103-53, Hawaii Revised Statutes does not require submission of the tax clearance certificates at the time of bidding, the Department requests all bidders to submit these tax clearances or certification letters prior to bid opening if practicable, to expedite entering into the contract. Failure to provide tax clearances prior to bid opening will not however disqualify the bidder. Inability to provide tax clearances or certification letters at the time of award will disqualify the bidder.

The Department of Water Supply reserves the right to accept or reject any and all bids and to waive any and all defects in the best interest of the Department of Water Supply.

B. PERFORMANCE BOND:

The successful bidder, should any bid be accepted, must within ten (10) days after official notice is given of such award or within further time as may be allowed by the Water Commission or the Manager, execute a bond to the Department in an amount equal to one hundred percent (100%) of the contract price, including amounts estimated to be required for extra work or of the cost of the work required by law; this bond is to conform to the provisions of Sections 103D-324 and 103D-325, Hawaii Revised Statutes, and any law applicable thereto.

The insurance company or surety company shall have a current rating of at least "B+" as provided by Best's Key Rating Guide. If the surety or insurance company loses its "B+" or better rating before completion and acceptance of the work, Contractor shall provide such new or additional bonding/insurance as may be requested by the Department, with a surety or insurance company holding a then current "B+" or better rating.

C. NOTICE TO PROCEED PROCEDURE:

The successful bidder shall order all materials necessary to complete the work called for in the plans, proposal and specifications
immediately upon execution of the contract documents. Notice to proceed shall then be given accordingly but in no case shall it be given later than forty-five (45) calendar days from the date of execution of the contract documents. It is the intent of the Department to give Notice to Proceed as soon as the award of the contract is made.

4. **SCOPE OF WORK:**

   A. **SCOPE OF WORK:**

   The project consists of paying for all labor, materials, tools and equipment necessary for sealing of the existing exploratory well for the purpose of abandonment and for drilling, casing, and testing of a well at elevation 1542± feet above mean sea level, all in accordance with the plans and specifications.

   B. **ITEMS NOT SPECIFIED IN THE BID:**

   Where items of work called for on the drawings or specified in these specifications and for which payments are not directly provided for in the bid, payment shall be considered incidental to the various bid items.

   C. **SITE RESTORATION:**

   Upon completion of work, the Contractor shall remove all excess materials and scraps from the project site and clean the area to the satisfaction of the Manager. All existing landscape shall be restored to its original condition or better which shall include any necessary replanting of grass and/or plants and the maintenance and care therefore for a period of sixty (60) days after the acceptance of the project.

5. **CONTROL OF WORK:**

   **WORK SCHEDULE:**

   The Contractor shall submit to the Manager, prior to starting any work on the project, a work schedule timetable which shall be closely adhered to throughout the period of the contract. The work schedule shall show the various divisions of work and their proposed sequence of operation and shall also show the estimated monthly payments that will be requested throughout the contract period.
6. CONTROL OF MATERIALS AND EQUIPMENT:

COMPLIANCE WITH SPECIFICATIONS OF MATERIALS:

All workmanship and materials incorporated in the contract are to be of the best available grade of their respective kinds. Whenever in the specifications any material or process is indicated or specified by patent or proprietary name of manufacturers, such specifications shall be deemed to be used for the purpose of facilitating description of the material or process desired and shall be deemed to be followed by the words "or approved equal," and the Contractor may offer for approval any materials or process which shall equal in every respect that so specified. Where the bidder is contemplating submission of a bid based on a brand of manufactured article other than the brand specified, he shall submit for approval of the Department, samples or supporting data for the proposed brand substitution not later than ten (10) days prior to the date of opening of bids. The Department's approval shall be secured in writing prior to the submission of bid.

The Department will not accept any proposed substitution request for approval after the date of opening of bids. The only exception shall be if the specified brand material, equipment or article, or approved brand material, equipment or article is no longer being manufactured and is unavailable for use. It shall be the Contractor's responsibility to provide necessary information to prove the exception.

The burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials shall be upon the bidder and he SHALL furnish at his own expense all information, brochures and drawings (at least 3) necessary or related thereto as required by the Manager.

The Manager shall be the sole judge as to the comparative quality and suitability of alternative equipment or articles or materials and his (her) decision shall be final and binding. Refer to Section 6.3 of the "General Requirements and Covenants."

7. LEGAL RELATION AND RESPONSIBILITIES:

A. LICENSED BIDDERS:

All prospective bidders shall be Contractors licensed in the State of Hawaii for the appropriate work proposed, at the time of bidding and throughout the contract period and the burden of proof shall rest with
the bidder. No bid will be received from any unlicensed bidder.

B. **PERMITS AND LICENSES:**

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental for the due and lawful prosecution of the work.

C. **PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE:**

The Contractor shall take out comprehensive personal injury and property damage liability insurance which protects the Contractor and all of his subcontractors from claims for damages to property and for personal injury which may arise from or be caused by the operations under the contract, whether the operations be by the Contractor or by any subcontractor or by anyone directly or indirectly employed by either the Contractor or subcontractor. All insurance shall cover the Contractor for all work performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside of the work area, and all change orders. The insurance policies shall not contain any clause to the effect that the insurer is not liable on account of any accident out of work performed by subcontractors or their employees.

The Department of Water Supply, County of Hawaii, shall be named as an additional insured on each insurance policy and the Department of Water Supply shall be provided with the same extent of insurance coverage as that provided for the Contractor. The comprehensive personal injury and property damage liability insurance shall have the following minimum limits of liability.

- **Bodily Injury Liability**
  - $250,000 each person
  - $500,000 each occurrence

- **Property Damage Liability**
  - $100,000 each occurrence

The Contractor shall furnish the Department of Water Supply with one (1) copy of the certificate of said insurance prior to commencement of work.

The insurance company shall have a current rating of at least "B+" as provided by Best's Key Rating Guide. If the surety or insurance company loses its "B+" or better rating before completion and
acceptance of the work. Contractor shall provide such new or additional bonding/insurance as may be requested by the Department, with a surety or insurance company holding a then current "B+" or better rating.

8. PROSECUTION AND PROGRESS:

A. LOCAL LABOR:

The Contractor shall hire local labor whenever practicable.

B. HOURS AND WAGES:

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

2) The attention of all bidders is called to Section 7 of the "General Requirements and Covenants," regarding hours of labor, wages and overtime pay, etc. The current 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.

3) The prevailing wage rates (Sections 104-2, 103-54, 103-55, Hawaii Revised Statutes) applicable to the job will be attached to the executed contract documents. The Contractor is hereafter responsible to procure the current wage rate bulletins throughout the contract period, including any contract time extensions granted by the Commission. In accordance with any applicable provisions of Sections 103-54 and 103-55, Hawaii Revised Statutes, the bidder shall submit the requisite certification relative to conditions of employment and shall comply with said conditions during the period of the contract.

C. GUARANTEE OF WORK:

The Contractor shall be responsible for a period of one (1) year after satisfactory completion of the project, for any necessary repairs of roadway facilities disturbed by the work performed under this contract; or to pay the actual cost of repairs made by the Department of Water Supply or its agent. the Contractor shall provide a one (1)
year warranty as stated in Section 8.15 of the General Requirements and Covenants.

9. **BLASTING:**

No blasting shall be allowed on this project unless authorized by the Manager in writing and pursuant to all terms and conditions contained therein.

10. **EXISTING UTILITIES:**

Location of utility lines and appurtenances shown on the plans are from the best information available and are approximate. The Contractor shall not assume that where no existing utilities are shown that none exists. The Contractor shall make every effort to verify the location of all utilities and appurtenances that may affect the required work.

11. **STANDARDS FOR PUBLIC WORKS CONSTRUCTION:**

The "Standard Specifications for Public Works Construction." dated September 1986 and "Standard Details for Public Works Construction." dated September 1984, shall be made a part of this contract where applicable. The Contractor shall be responsible to obtain a copy from the Department of Public Works, County of Hawaii.

12. **AVAILABILITY OF UTILITIES:**

The Contractor shall make his own arrangements for any temporary electric, telephone, and water services required to perform this work, and all costs shall be included in the various items in the bid.

13. **FORUM SELECTION CLAUSE:**

No action or proceeding involving this contract shall be commenced by either party except in the Circuit or District Courts of the Third Circuit, County of Hawaii, State of Hawaii; nor shall any action commenced in such court be removed or transferred to any other state or federal court.

14. **TAX CLEARANCE:**

In accordance with Section 103-53, Hawaii Revised Statutes, this contract shall not be executed by the County of Hawaii until receipt of tax clearances from the State Director of Taxation and the Internal Revenue Service. In addition, final payment on the contract shall be withheld until the receipt of tax clearances from the State Director of Taxation and the
15. TERMINATION OF SERVICES:

It is understood and agreed that any services to be provided in accordance with the terms of this contract may be terminated immediately, in whole or in part, upon a finding by the County that the services must be provided by public employees pursuant to Civil Service Laws or that such services will be discontinued. It is further understood, that should such a finding be made, the County will not be liable under this contract for any resulting damages, and such a termination will not be considered a breach of this agreement.

16. MANAGED PROCESS REVIEW:

Any contract for goods, services, or construction entered into after July 20, 1998, and prior to July 1, 2001, with an expiration date beyond June 30, 2001, shall, during its term, be subject to a single review by the County, pursuant to the managed process in Part III, Section 6 of Act 230, Session Laws of Hawaii, 1998. Pursuant to the managed process review, the contract may be cancelled, renegotiated, continued, or extended by the County. The contract shall continue to be exempt from civil service laws for the duration of the contract even if a managed process review is not implemented.

17. TERMINATION FOR CONVENIENCE OF CONSTRUCTION CONTRACTS:

The Manager may, when the interests of the Department so require, terminate this contract in whole or in part for the convenience of the Department. The Manager shall give written notice of the termination to the contractor, specifying the part of the contract terminated and when termination becomes effective. Except as may be otherwise provided in this contract, said termination for convenience shall be subject to the contract provisions set forth in H.A.R. Section 3-125-22, "Termination for Convenience of Construction Contracts."

18. PROJECT SIGN:

The Contractor shall furnish and place a project sign as shown on Page IB-16 at a location determined by the Manager. The exact wording and arrangement shall be as directed by the Manager. The project sign shall conform to the requirement of Section 5.6(g) of the "General Requirements and Covenants."
19. INFORMATION ON HAWAII STATE TAXES ADMINISTERED BY THE DEPARTMENT OF TAXATION:

This publication provides a general overview of the most common Hawaii State taxes paid by businesses that are located in Hawaii and by businesses that are not located in Hawaii but which conduct business in Hawaii. See pages IB-14 and IB-15.

20. HOUSED WORKING AREA FOR DEPARTMENT'S PERSONNEL:

The Contractor shall provide a housed working area of at least 80 square feet on the site to be used by the Department. This area will be used by the Engineer to perform test, record data, store records and equipment and provide shelter. Cost for providing the housed working area shall be considered incidental to the various bid items.

21. ACCESS TO WELL SITE:

Any cost for providing access to the site and well location shall be the Contractor's responsibility and shall be included in the appropriate bid item. The Contractor shall therefore visit the site and familiarize himself with all conditions that may govern his cost to mobilize all equipment to the site and prepare to drill the new well and to abandon/seal the existing well.
INVITATION TO BIDDERS

Sealed proposals for JOB NO. 97-690, CONSTRUCTION OF THE NEW WAIAHA EXPLORATORY WELL DRILLING, District of North Kona, County of Hawaii, State of Hawaii, will be received by the Department of Water Supply, County of Hawaii, at:

1) 25 Aupuni Street, Room 103, Hilo, Hawaii or

2) Hawaii County Services, Room 103, 75-5706 Kuakini Highway, Kailua-Kona, Hawaii

until __________, 1999 at 2:00 p.m. when they will be publicly opened and read aloud. Bids received after the time fixed for opening or delivered elsewhere other than specified herein will not be considered.

Plans, specifications and forms shall be obtained at the Office of the Manager, Room 103, 25 Aupuni Street, Hilo, Hawaii, upon deposit of legal tender or check of Twenty-Five Dollars ($25.00) made payable to the Department of Water Supply, County of Hawaii, for each set. The Department of Water Supply will not forward by mail, or any other means, any plans, specifications, and forms to any prospective bidder.

Prospective bidders must file with the Manager their "Intent to Bid" not later than ten (10) days prior to the time advertised for opening of bids.

The bidder's attention is directed to Section 103-53, Hawaii Revised Statutes, as amended, which specifies the requirements for submission of tax clearance certificates from both the State Department of Taxation and from the Internal Revenue Service (IRS).

The bidder's attention is directed to Sections 1030 - 1002, Hawaii Revised Statutes, and the rules governing preference for Hawaii Products, as amended, which provides preference for Hawaii Products. The Hawaii Products List may be examined at the Office of the Manager, County of Hawaii, or at the Comptroller's Office, State Office Building, Honolulu, Hawaii.

Dated at Hilo, Hawaii, this ___ day of _______, 1999.

BY AUTHORITY OF THE DEPARTMENT OF WATER SUPPLY, COUNTY OF HAWAII

Milton D. Pavao, Manager

Hawaii Tribune Herald

West Hawaii Today
PROPOSAL
FOR
DEPARTMENT OF WATER SUPPLY
COUNTY OF HAWAII
HILO, HAWAII

JOB NO. 97-690

CONSTRUCTION OF THE
NEW WAIAHA EXPLORATORY WELL DRILLING

District of North Kona
County of Hawaii - State of Hawaii

Department of Water Supply
County of Hawaii
Hilo, HI 96720

Gentlemen:

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 specifications and other contract documents, hereby proposes to pay for all materials, transportation, machinery, tools, equipment, labor, and other incidental work necessary to construct and install, in place complete, JOB NO. 97-690, CONSTRUCTION OF THE NEW WAIAHA EXPLORATORY WELL DRILLING, District of North Kona, County of Hawaii, State of Hawaii, and all work incidental thereto, required and called for under this Proposal, Plans, Specifications, General Requirements and Covenants and any and all addenda on file in the Office of the Manager of the Department of Water Supply, County of Hawaii, within the time set forth and at the price stated below, for the Total Sum Bid of:

__________________ DOLLARS ($ ____________ )

and to complete same within three hundred fifty (350) calendar days from the date of Notice to Proceed.

Materials for this project shall be ordered immediately after execution of the contract.
The following unit prices and/or lump sum prices (to be filled in by the bidder) will be used in making monthly estimates and for determining the cost of omissions, deductions, and/or additions due to authorized increase or decrease from the quantities herein given or in adapting the bid to the appropriation.

All extensions must be made by considering the quantities and unit prices as factors and all extensions and the summation must be arithmetically correct.

It is understood and agreed, however, that if the product of the UNIT PRICE bid and the number of units does not equal the total amount stated by the undersigned in the Proposal for any item, it will be assumed that whichever figure (UNIT PRICE or TOTAL AMOUNT) that results in the lower total bid for the Proposal represents the bidder's intention and for the purpose of determining the lowest bidder, the Proposal shall be corrected accordingly.

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.
Furnish labor, equipment, transportation and incidentals to complete the following work, complete in place, according to the intent of the project's construction plans and specifications.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Estimated Quantity</th>
<th>Description</th>
<th>Unit Price</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lump Sum</td>
<td>Mobilization (not to exceed $30,000.00).</td>
<td>Lump Sum</td>
<td>$</td>
</tr>
<tr>
<td>2.</td>
<td>Lump Sum</td>
<td>Demobilization</td>
<td>Lump Sum</td>
<td>$</td>
</tr>
<tr>
<td>3.</td>
<td>1425 L.F.</td>
<td>Cement grouting the annular space.</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>4.</td>
<td>100 L.F.</td>
<td>Rock Stabilization of the annular space (if needed as determined by the Manager).</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>5.</td>
<td>80 L.F.</td>
<td>Neat cement grouting of the space inside the well casing.</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>6.</td>
<td>10 L.F.</td>
<td>Sand-cement mixture grouting of the space inside the well casing.</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>7.</td>
<td>1512 L.F.</td>
<td>Rock stabilization of the space inside the well casing.</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>8.</td>
<td>1602 L.F.</td>
<td>Drilling cased well from the ground surface to the bottom of the cased well.</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>9.</td>
<td>25 L.F.</td>
<td>Drilling 19-inch diameter open hole after installation of casing.</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>
# Proposal

**FOR**

DEPARTMENT OF WATER SUPPLY  
COUNTY OF HAWAI'I  
Hilo, Hawaii

JOB NO. 97-690

CONSTRUCTION OF THE  
NEW WAI'AIHA EXPLORATORY WELL DRILLING

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>10.</td>
<td>1542 L.F.</td>
<td>Furnishing and installing 20-inch minimum I.D., 0.375-inch thick, solid well casing conforming to ASTM A-242.</td>
</tr>
<tr>
<td>11.</td>
<td>60 L.F.</td>
<td>Furnishing and installing 20-inch minimum I.D., 0.312-inch thick, perforated well casing conforming to ASTM 709. 94.5 sq. in. minimum area of opening per feet. Type 304 Stainless Steel.</td>
</tr>
<tr>
<td>12.</td>
<td>Lump Sum</td>
<td>Furnishing, installing, and subsequent removal of pumping test equipment for initial well test.</td>
</tr>
<tr>
<td>13.</td>
<td>1 Each</td>
<td>Furnishing, installing, and subsequent removal of pumping test equipment after initial well test, if required.</td>
</tr>
<tr>
<td>14.</td>
<td>132 Hrs.</td>
<td>Pumping test</td>
</tr>
<tr>
<td>15.</td>
<td>1427 L.F.</td>
<td>Cement-grouting the annular space.</td>
</tr>
<tr>
<td>16.</td>
<td>100 L.F.</td>
<td>Rock-stabilization of the annular space (if needed as determined by the Manager).</td>
</tr>
<tr>
<td>17.</td>
<td>75 L.F.</td>
<td>Filter-packing the annular space.</td>
</tr>
<tr>
<td>18.</td>
<td>Lump Sum</td>
<td>9 ft. Seal</td>
</tr>
<tr>
<td>19.</td>
<td>Lump Sum</td>
<td>Chlorination of the well.</td>
</tr>
</tbody>
</table>

TOTAL SUM BID: $
The undersigned understands and agrees that the Department reserves the right to award the bid by reducing or increasing the scope of the project depending on the funds available for this project in the best interest of the Department of Water Supply.

The undersigned further understands and agrees that the quantities given herewith are approximate only and are subject to increase or decrease and hereby proposes to perform all quantities of work, as either increased or decreased, in accordance with the provisions of the specifications.

The undersigned also understands and agrees that there shall be no claims for anticipated profit or loss of profit because of a difference between the quantities of the work done or the materials and equipment actually installed and the said estimated quantities. On UNIT PRICE bids, payment will be made only for the actual number of units incorporated in to the finished project at the contract UNIT PRICE.

The undersigned also understands that the Department of Water Supply reserves the right to award the contract to the lowest responsible bidder after an engineering analysis is made of all bids received and not necessarily to the bidder submitting the lowest bid.

Upon the acceptance of the Proposal and the award of the contract by the Department, the undersigned hereby agrees to accept the award and will later enter into and execute the contract in accordance with the provisions of Chapter 103D, Hawaii Revised Statutes, as amended, and any other laws applicable thereto.

The undersigned also agrees that he has carefully read and understands the proposal and the specifications for this contract and that the Department reserves the right to reject any and all bids submitted or to waive any irregularities.

It is understood and agreed that the liquidated damages as shown in Section 8.11 - Failure to Complete the Work on Time of the "General Requirements and Covenants," for each and every calendar day the contractor shall delay the completion of the project.

The bidder agrees that this bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the bid opening date.

Enclosed herewith find legal tender, certificate of deposit, certified check or
surety bond made payable at sight to the Department of Water Supply, County of Hawaii, for the sum of (five \(5\%\) percent of the amount of the total sum bid):

\[
\text{DOLLARS (}$\text{ )}
\]
as required by Sections 103D-323 and 103D-325, Hawaii Revised Statutes.

Respectfully submitted,

________________________

By _______________________

Address ____________________

________________________

Phone No. ____________________

Fax No. ______________________

Contractor's License No. _______
HAWAII PRODUCTS PREFERENCE

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 1030-1002, Hawaii Revised Statutes, as amended, which provides preference for Hawaii products, the bidder proposing to use such Hawaii products and obtain preference provided, need not fill in the schedule below. However, where there are a number of qualifying classes of Hawaii products, 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.

It is also understood that if the bidder proposes to use a non-Hawaii product, the bidder must so designate in said schedule by entering the cost of such non-Hawaii product in the appropriate space provided. Failure on the part of the bidder to designate the use of a non-Hawaii product will automatically commit such bidder to use the acceptable Hawaii product.
SCHEDULE OF ACCEPTABLE HAWAII PRODUCTS & DESIGNATION OF NON-HAWAII PRODUCTS TO BE USED IN LIEU THEREOF

(Under Lump Sum Bid)

<table>
<thead>
<tr>
<th>ACCEPTABLE HAWAII PRODUCTS</th>
<th>NON-HAWAII PRODUCTS TO BE USED</th>
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<tbody>
<tr>
<td>Description</td>
<td>Cost FOB Jobsite.</td>
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<td>Unloaded Including</td>
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<td>Applicable General</td>
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<td>Excise &amp; Use Taxes</td>
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<td>Class</td>
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<tr>
<td>Manufacturer</td>
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</table>

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

It is further understood by the bidder that if upon being granted preference for any Hawaii product and being awarded the contract bidder fails to use such product, the bidder shall be subject to penalties provided in Section 103D-1002, Hawaii Revised Statutes, as amended.

For bid comparison purposes only, the total bid price for the entire contract for each bidder shall be determined in the following manner: An amount equal to the sum of each non-Hawaii product bid by a bidder multiplied by the preference percentage applicable to the particular bid item shall be added to the total bid price of each bidder proposing to furnish the non-Hawaii product to which Hawaii products preference is applicable. In event all bidders propose to furnish non-Hawaii products for a bid item, preference is not applicable.
LISTING OF SUBCONTRACTORS

In compliance with the provisions of Section 103D-302, Hawaii Revised Statutes, the bidder shall include in his bid the names of each person or firm to be engaged by the bidder as a joint contractor or subcontractor in the performance of the public work construction contract. The bid shall also indicate the nature and scope of the work to be performed by such joint contractor or subcontractor.

<table>
<thead>
<tr>
<th>Name of Joint Contractor or Subcontractor</th>
<th>Nature and Scope of Work</th>
<th>Contractor License No.</th>
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</table>
SUPPLIERS

The suppliers of major equipment and categories of equipment shall be indicated below. The bidder shall indicate the equipment used as a basis of his bid for writing the manufacturer's name in the appropriate space. Such supplier designation shall be limited to one supplier only.

Major equipment/instrumentation and categories of equipment include:

<table>
<thead>
<tr>
<th>SUPPLIER</th>
<th>EQUIPMENT</th>
<th>INSTRUMENTATION</th>
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<tbody>
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</table>

P-10
# SPECIAL PROVISIONS

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Item</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPECIAL PROVISIONS</td>
<td>SP-1</td>
</tr>
<tr>
<td>5</td>
<td>WELL DRILLING</td>
<td>SP-2</td>
</tr>
<tr>
<td>5.1</td>
<td>GENERAL</td>
<td>SP-2</td>
</tr>
<tr>
<td>5.2</td>
<td>MOBILIZATION AND DEMOBILIZATION</td>
<td>SP-2</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Description</td>
<td>SP-2</td>
</tr>
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<td>5.2.2</td>
<td>Measurement</td>
<td>SP-3</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Payment</td>
<td>SP-3</td>
</tr>
<tr>
<td>5.3</td>
<td>WELL ABANDONMENT/SEALING</td>
<td>SP-3</td>
</tr>
<tr>
<td>5.3.1</td>
<td>General</td>
<td>SP-3</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Grouting Materials for Permanent Sealing</td>
<td>SP-4</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Preliminary Work</td>
<td>SP-4</td>
</tr>
<tr>
<td>5.3.4</td>
<td>Sealing the Perforated Casing Section of the Well</td>
<td>SP-5</td>
</tr>
<tr>
<td>5.3.5</td>
<td>Sealing the Solid Casing Section of the Well</td>
<td>SP-5</td>
</tr>
<tr>
<td>5.3.6</td>
<td>Filling the Annular Space</td>
<td>SP-6</td>
</tr>
<tr>
<td>5.3.7</td>
<td>Measurement and Payment</td>
<td>SP-6</td>
</tr>
<tr>
<td>5.4</td>
<td>DRILLING THE WELL</td>
<td>SP-7</td>
</tr>
<tr>
<td>5.4.1</td>
<td>General</td>
<td>SP-7</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Measurement, Driller's Logs and Samples</td>
<td>SP-8</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Drilling Method and Circulating Medium</td>
<td>SP-10</td>
</tr>
<tr>
<td>5.4.4</td>
<td>Protection</td>
<td>SP-10</td>
</tr>
<tr>
<td>5.4.5</td>
<td>Abandoned Well</td>
<td>SP-10</td>
</tr>
<tr>
<td>5.4.6</td>
<td>Plumbness and Alignment</td>
<td>SP-11</td>
</tr>
<tr>
<td>5.4.7</td>
<td>Measurement</td>
<td>SP-12</td>
</tr>
<tr>
<td>5.4.8</td>
<td>Payment</td>
<td>SP-12</td>
</tr>
<tr>
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<td>Item</td>
<td>Page</td>
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<tr>
<td>5.5</td>
<td>FURNISHING AND INSTALLING THE WELL CASING</td>
<td>SP-12</td>
</tr>
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<td>5.5.1</td>
<td>General</td>
<td>SP-12</td>
</tr>
<tr>
<td>5.5.2</td>
<td>Casing</td>
<td>SP-13</td>
</tr>
<tr>
<td>5.5.3</td>
<td>Casing Markings</td>
<td>SP-13</td>
</tr>
<tr>
<td>5.5.4</td>
<td>Casing Certification</td>
<td>SP-14</td>
</tr>
<tr>
<td>5.5.5</td>
<td>Installation</td>
<td>SP-14</td>
</tr>
<tr>
<td>5.5.6</td>
<td>Installation of Casing Guides</td>
<td>SP-15</td>
</tr>
<tr>
<td>5.5.7</td>
<td>Video Logging</td>
<td>SP-15</td>
</tr>
<tr>
<td>5.5.8</td>
<td>Measurement</td>
<td>SP-15</td>
</tr>
<tr>
<td>5.5.9</td>
<td>Payment</td>
<td>SP-15</td>
</tr>
<tr>
<td>5.6</td>
<td>DEVELOPMENT AND PUMP TESTING THE WELL</td>
<td>SP-16</td>
</tr>
<tr>
<td>5.6.1</td>
<td>Description</td>
<td>SP-16</td>
</tr>
<tr>
<td>5.6.2</td>
<td>Pump Test Equipment and Materials</td>
<td>SP-16</td>
</tr>
<tr>
<td>5.6.3</td>
<td>Installation of the Test Pump and Well Development</td>
<td>SP-17</td>
</tr>
<tr>
<td>5.6.4</td>
<td>Pumping Test</td>
<td>SP-18</td>
</tr>
<tr>
<td>5.6.5</td>
<td>Measurement</td>
<td>SP-19</td>
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<td>5.6.6</td>
<td>Payment</td>
<td>SP-19</td>
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<td>5.7</td>
<td>FILLING THE ANNULAR SPACE</td>
<td>SP-20</td>
</tr>
<tr>
<td>5.7.1</td>
<td>Description</td>
<td>SP-20</td>
</tr>
<tr>
<td>5.7.2</td>
<td>Filter Pack</td>
<td>SP-20</td>
</tr>
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<td>5.7.3</td>
<td>Seal</td>
<td>SP-21</td>
</tr>
<tr>
<td>5.7.4</td>
<td>Cement-Grouting the Annular Space</td>
<td>SP-21</td>
</tr>
<tr>
<td>5.7.5</td>
<td>Rock Stabilization</td>
<td>SP-22</td>
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<tr>
<td>5.7.6</td>
<td>Measurement and Payment</td>
<td>SP-22</td>
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<td>5.8</td>
<td>CHLORINATION</td>
<td>SP-23</td>
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<td>5.8.1</td>
<td>General</td>
<td>SP-23</td>
</tr>
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<td>5.8.2</td>
<td>Procedures</td>
<td>SP-23</td>
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<td>5.8.3</td>
<td>Measurement and Payment</td>
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<td></td>
<td>GENERAL REQUIREMENTS AND COVENANTS</td>
<td>SP-24</td>
</tr>
<tr>
<td>8.14</td>
<td>Final Settlement of Contract</td>
<td>SP-24</td>
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</tbody>
</table>
SPECIAL PROVISIONS

These Special Provisions modify and supplement the "Water System Standards" Volumes 1 and 2, dated 1985, as amended, and "General Requirements and Covenants" of the Department of Water Supply, County of Hawaii, to render them applicable to this specific project. There are no deletions to the Standard Specifications except for those subsections which are specifically deleted by these Special Provisions or those which obviously cannot apply to this project. Where there is a discrepancy between the Special Provisions and the Standard Specifications, the provisions set forth in these Special Provisions shall govern.
SECTION 5 - WELL DRILLING

Delete this section from the Water System Standards, Volume 1, Part III, in its entirety and replace with the following.

SECTION 5.1 - GENERAL

The work shall cover the drilling, casing, development, and pump testing of the new well and abandoning and sealing of the existing well. The work shall include the furnishing of all labor, materials, and incidentals necessary to complete all of the items of work as shown on the plans and as specified herein.

SECTION 5.2 - MOBILIZATION AND DEMOBILIZATION

5.2.1. - DESCRIPTION:

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

The Contractor will clear and grade the site as necessary or as indicated on the plans prior to moving and setting up the drilling rig at the site.

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

If the Contractor utilizes private lands other than the Department’s Waiaha Reservoir site for mobilization purposes, the provisions of this section shall still apply, and the 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 Manager. Payment for clean-up work will not be paid for separately but shall be included in the lump sum amount for Demobilization subject, however, to all provisions specified herein.
5.2.2 - 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 Item No. 1, Mobilization, will be paid when the existing well has been acceptably abandoned/sealed, when 50 feet of the new well has been acceptably drilled and in the Manager's opinion the Contractor has fully mobilized.

2. The contract lump sum price for Item No. 2, Demobilization, will be paid after the new well has been completed and accepted by the Department and the project site cleaned to the satisfaction of the Manager.

Should the Commission terminate the contract before the existing well has been acceptably abandoned/sealed and 50 feet of the new well has been acceptably drilled for reasons other than those specified in the Standards and in the Manager's opinion the Contractor has fully mobilized at the well site, the full amount of bid Item No. 1 shall become due and payable, subject, however, to all the provisions specified hereinabove. The full amount of bid Item No. 2 shall also become due and payable after the above-mentioned termination of the contract, subject, however, to all the provisions specified hereinabove.

5.2.3 - PAYMENT:

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

Item No. 1, "Mobilization"

Item No. 2, "Demobilization"

as in the case may be, which prices shall be full compensation for all the work specified in Section 5.2.1 above.

SECTION 5.3 - WELL ABANDONMENT/SEALING

5.3.1 - GENERAL:

The existing well shall be properly abandoned and permanently sealed to protect the groundwater resources from contamination and waste and to protect public health and safety.

The objective of permanently sealing the well before abandonment is to restore the geological and hydrological conditions that existed before the well was

SP-3
constructed. All well abandonment and sealing shall be performed by a licensed well driller (with a C-57 license) or general contractor (with a C license). A detailed record of the abandonment and sealing of the existing well shall be maintained by the well driller or general contractor for future reference and demonstration that the well was properly sealed. The well driller/contractor shall furnish a copy of the well abandonment/sealing record to the Manager, Department of Water Supply (DWS) when the work is completed. Upon receipt, the DWS shall file the well abandonment/sealing report with the State of Hawaii Department of Land and Natural Resources Commission on Water Resource Management (Commission) within 60 days after completion of the work.

The contractor shall inform the Commission and the DWS before work on abandonment and sealing begins.

The order of work shall be as indicated below:
1. Grout and stabilize the annular space as directed by the Manager.

2. Grout and rock aggregate fill inside the casing as directed by the Manager.

5.3.2 - GROUTING MATERIALS FOR PERMANENT SEALING:

Grouting material acceptable for use to permanently seal the well is either neat cement or sand-cement.

Sand used for sand-cement grout shall conform to "Masonry Sand," ASTM-C-144 or 100% passing No. 4 sieve and 0 to 10% passing No. 200 sieve. Cement used for neat cement and sand-cement grout shall conform to the requirements of ASTM C150 for Portland Cement, Type I.

1. Sand-Cement Grout. Sand-cement for grouting shall be mixed at a ratio of not more than one part sand to one part cement, by weight, and not more than six gallons of water per sack of cement.

2. Neat Cement Grout. Neat cement shall be mixed at a ratio of one 94-pound sack of Portland cement to not more than six gallons of potable water.

5.3.3 - PRELIMINARY WORK:

The contractor shall be aware of and shall verify the physical conditions and as-built dimensions of the existing well that is to be abandoned/sealed. Prior to commencing the well sealing work, the contractor shall clear the well of undesirable debris or cavein material, oil from an oil-lubricated pump, or other pollutants which could interfere with a satisfactory well seal.
The contractor shall inform the DWS as soon as possible if pollutants or contaminants are known, discovered, or suspected to present in the well.

The contractor shall cut off and remove at least two feet of the well casing below the ground surface.

The remaining hole shall be filled with grout as called in section 5.3.5 "Sealing the Solid Casing Section of the well".

Payment for this work shall not be paid for separately but shall be considered incidental to the appropriate bid items for cement-grouting inside the well casing.

5.3.4 SEALING THE PERFORATED CASING SECTION OF THE WELL:

The perforated casing section of the well shall be sealed with neat cement placed from bottom to top with a tremie pipe in a manner conforming to the grouting of the open hole section. However, if the perforated casing section occurs in highly fractured or cavernous formations which causes an excessive loss of neat cement slurry, a mixture of sand and cement conforming to the standards for permanent sealing may be used to fill such intervals of loss before continuing the sealing of the perforated casing section with neat cement.

The neat cement shall be placed by pumping or gravity-flowing it through a 11/4-inch minimum diameter grout pipe. The bottom of the grout pipe shall be placed at the bottom of the well and flushed with potable water immediately before the introduction of the neat cement slurry so as to minimize bridging or clogging of the pipe. The bottom of the grout pipe shall be withdrawn in stages as the casing becomes filled, but shall extend into the slurry column while the grout is being placed so as to prevent inclusion of cavein or foreign material, bridging, dilution or separation of the grout materials. The sealing of the well may be probed for effectiveness with the grout pipe or, if more practical, with a suitable probe attached to a light-weight cable.

5.3.5 - SEALING THE SOLID CASING SECTION OF THE WELL:

The solid casing section of the well shall be sealed with neat cement, sand-cement grout and rock aggregate in one continuous operation from bottom to the ground surface. The grout shall be placed with a 11/4-inch minimum diameter grout pipe in a manner conforming to these Standards. The rock aggregate shall be clean, fine aggregate, 3/8-inch minus, well-graded and conforming to ASTM C-33.

The contractor shall place the rock aggregate by careful hand shoveling and probing with a rigid rod or pipe for effectiveness.

Grout and rock aggregate shall be placed in the intervals given by the following elevations:
Grout Fill - Two separate intervals:
1) Fill with neat cement - start at elevation 15 feet; end at elevation 20 Feet.
2) Fill with sand-cement mixture - start at elevation 1532 feet; end at elevation 1542 feet (ground elevation).

Rock Aggregate Fill:
Start at elevation 20 feet; end at elevation 1532 feet

5.3.6 - FILLING THE ANNULAR SPACE:

The annular space between the outside of the casing and wall of the drilled hole shall be cement-grouted to the depths as directed by the Manager. The work shall conform to section 5.7.4 “Cement Grouting The Annular Space” of the special provisions contained in the project contract.

5.3.7 - MEASUREMENT AND PAYMENT:

Acceptable abandoning/sealing of the casing and of the annular space by cement-grouting and rock stabilization will be measured and paid for at the bid price per lineal foot for:

Item No. 3, “Cement-grouting the annular space.”

and at the bid price per linear feet for:

Item No. 4, “Rock stabilization of the annular space.”

And at the bid price per linear feet for:

Item No. 5, “Neat cement, grouting inside the casing.”

And at the bid price per linear feet for:

Item No. 6, “Sand-cement mixture grouting inside the casing”

And at the bid price per linear feet for:

Item No. 7, “Rock stabilization inside the casing.”

Which prices shall include full compensation for the appropriate furnishing, mixing, placing and curing the cement grout in the annular space, in the casing and for furnishing all labor, materials, tools, equipment, and incidentals
necessary to furnish and install the above items of work in place complete as specified herein and as shown on the drawings.

SECTION 5.4 - DRILLING THE WELL

5.4.1 - GENERAL:

The well shall be drilled at the location shown on the plan and to a maximum depth of 1700 feet. The exact location of the well shall be designated by the Manager.

The well shall be drilled plumb and straight as specified herein and shall be large enough to install the well casing specified in Section 5.5 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 pipe, tools, and pump to be put into the well or open hole shall be first carefully washed and disinfected by chlorination to the satisfaction of the Manager.

Immediately after encountering water in the drill hole, the contractor shall notify the Manager and shall take provisions to obtain water samples and determine water level readings in the presence of the Manager.

The exact depth of the hole to be drilled and cased shall depend on the nature of the material penetrated by drilling and on hydrologic conditions and shall be determined by the Manager during the course of the drilling. Upon completion of drilling, to determine the exact dimensions of the well, the Contractor, in the presence of the Manager, shall lower the proper size bit to the bottom of the hole and take careful measurement to determine the depth of the hole. Casing shall not be installed until ordered by the Manager. At his option, the Manager may order the drilling of an open hole below the installed casing. This open hole shall have a diameter equal to one inch less than the inside diameter of the installed casing. The depth of the open hole shall be as ordered by the Manager. 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 Department.

The Contractor shall not conduct drilling operations in excess of eight hours a day except with the written consent of the Manager. Not less than 72 hours prior to the commencement of any such overtime work, the Contractor shall submit to the Manager a written notice of his intentions and schedule. The order of work shall be as indicated below. Deviations from this sequence of work must have the prior approval of the Manager.
1. Drill well, obtain water samples, and water level readings upon encountering water, then continue drilling to well casing depth.

2. Geophysical logging of well by the Manager.

3. Alignment and plumbness test of drilled hole.

4. Install solid and perforated casing which shall be temporarily secured with the bottom 5 ft. above final casing depth.

5. Bail well clean and if bentonite is found in the well, add deterrent, mix and bail again as specified in Section 5.5.5 “Installation.”

6. Set casing to final depth and verify static water level of the well in the presence of the Manager.

7. Grout, stabilize and filter pack the annular space as directed by the Manager.

8. Plumbness and alignment test of the cased well in the presence of the Manager.

9. Install test pump, chlorinate the well, develop well by surging and conduct variable rate step-up pump test for yield and drawdown data as directed by the Manager.

10. Conduct a constant rate pump test as directed by the Manager.

11. Drill open hole if ordered by the Manager.

12. If open hole is drilled, repeat Step 5 then repeat Step 9 then repeat Step 10.

13. Run video log.

14. Complete the well and demobilization.

5.4.2 - MEASUREMENT, DRILLER'S LOGS AND SAMPLES:

The Department wishes to gather as much geological and hydrological data as possible and every opportunity shall be accorded the Department to obtain additional samples, make observations, and to study the apparent conditions.

The Contractor shall keep a continuous log of the well; recording the general character, thickness, type and drilling characteristics of materials
encountered including the depth and drilling time, the color and hardness of
the formations, and all other data which may be helpful in the interpretation
of the geology, hydrology, and drilling condition in the area. 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-in shall also be noted in the log. All work done including
but not limited to reaming, backfilling and concreting shall be accurately
recorded. An accurate and carefully recorded log shall be kept current and
available at the well site for inspection by the Manager at any time during the
work. The first carbon copy of the daily drilling log shall be submitted to
the Manager at intervals that he directs.

Samples of drill cuttings shall be taken at successive intervals of 10 feet of
depth and at every change of formation. Samples of drill cuttings shall be
obtained by bailing the hole, by screening the circulating "drilling muds", or
by any other method acceptable to the Manager. Samples of drill cuttings shall
be washed free of any "drilling muds" used in the drilling of the well. These
samples shall be collected in sample bags furnished by the Contractor and shall
be properly labeled and delivered to the Manager at the end of each working
day.

The Contractor shall assist the Manager in determining the elevation of the
water level in the drilled hole with reference to the datum which will be
established by the Manager at the well site. Water level measurements shall be
taken immediately when water is encountered in the well during the drilling
work. Another measurement shall be taken after the casing has been installed
and the well bailed clean. An electrical sounding reel furnished by the
Contractor and approved by the Manager shall be used to make all water level
measurements. The water level data shall include the date and time at which
the measurements are taken and the depth of the well at the time of
measurement. The Department shall be entitled to make additional water level
measurements with its own equipment. When ordered and in the manner directed
by the Manager, the Contractor shall obtain water samples.

The Contractor shall allow the Manager one full working day for running
gеophysical and/or other logs of the well. The Contractor shall give a minimum
of three working days advance notification to the Manager. The full working
days shall fall within the normal Monday to Friday work week excluding any
State or National holiday.

The Contractor shall comply with the provisions and requirements of Chapter
178, HRS as amended (Wells Generally) and the provisions of the Well
Construction permit issued by the Commission on Water Resource Management.
5.4.3 - DRILLING METHOD AND CIRCULATING MEDIUM:

Bentonite or other commercial drilling fluid additives may be used in the drilling or circulating medium in drilling the wells above elevation thirty (30) feet, mean sea level. Below elevation thirty (30) feet cable tool, rotary or reverse rotary circulation with only clear water or air will be permitted in the drilling or circulating medium. Bentonite or other commercial drilling fluid additives shall not be used below elevation thirty (30) feet.

5.4.4 - PROTECTION:

During the progress of the work, the Contractor shall provide an adequate cover over the top of the hole to prevent debris or other objects from entering the well when the crew is not at the well site. The Contractor shall preserve the well in good condition until the Manager has completed all the sampling, testing and measurement; has examined the records; and has accepted the work.

5.4.5 - ABANDONED WELL:

A well will be considered abandoned if the Contractor does not complete the well to the depth ordered by the Manager or if the Contractor should abandon the well due to loss of tools or for any other cause or if the Department does not accept the well due to faulty plumbness and alignment. Such an abandoned well shall be sealed by the Contractor, at no cost to the Department, by filling the hole with approved material as directed by the Manager and in compliance with the Well Construction and Pump Installation Standards of the State Commission on Water Resource Management, Part 3, Well Abandonment and Sealing. The Contractor shall be responsible for all permits and conditions required for such abandonment and sealing. 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 Department and the Contractor shall drill another well in the vicinity of the abandoned well as directed by the Manager.

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 Department.

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.
5.4.6 - PLUMBNESS AND ALIGNMENT:

The cased section of the well shall be constructed and the casing set round, plumb and true to line as specified herein. To demonstrate the compliance of the work with these requirements, the Contractor shall furnish all labor, tools and equipment and in the presence of the Manager, shall make the tests described herein in the manner prescribed by and to the satisfaction of the Manager. The test for plumbness and alignment shall be made both after the hole is drilled, the casing is installed, and the grout in the annulus has had time to set.

Additional tests, however, may be made by the Contractor during the performance of the work. No specific payments shall be made by the Department for making these additional tests and the Contractor shall include the costs of such tests in the applicable bid items.

The requirements for plumbness and alignment shall be made in accordance with the requirements of the AWWA Specification A100-66, Standard Specifications for "Deep Wells," and as otherwise specified herein.

Plumbness and alignment of the cased well shall be tested in the presence of the Manager by lowering into the well, to a depth specified by the Manager, a section of rigid pipe 40 feet long or a dummy of the same length hung plumb to the top of the casing from a minimum height of 30 feet. The outer diameter of the pipe or dummy rings shall not be more than one inch smaller than the diameter of that part of the casing being tested. If a dummy is used, it shall consist of a rigid 6-inch minimum diameter spindle with three rings, each ring being 12 inches wide. The rings shall be truly cylindrical and shall be spaced one each end of the dummy and one right in the center thereof.

Plumbness and alignment test of the drilled hole shall be done in the same manner except the drill bit shall be used instead of the 40 feet dummy.

The test for plumbness shall include a log of the horizontal deviation at 20-foot intervals of depth accurately recorded and submitted to the Manager.

Should the dummy fail to move freely throughout the length of the casing or should the well vary from the vertical in excess of one-half the smallest inside diameter of that part of the well being tested per any 100-foot interval of depth, the plumbness and alignment of the well shall be corrected by the Contractor at his own expense. Should he fail to correct such faulty alignment, plumbness, or sufficient well diameter, the Department may refuse to accept the well and consider it to be abandoned and subject to the requirements of Section 5.4.5.
5.4.7 - MEASUREMENT:

The depth of well to be paid for shall be the actual depth in lineal feet measured vertically from the surface of the prepared ground to the bottom of the cased well as ordered by the Manager. If the well is drilled with a pilot borehole and subsequently reamed to the full borehole diameter, progress payments for the pilot borehole will be paid at 25 percent of the unit price in the Proposal for drilling the full diameter borehole.

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

The Contractor shall not receive specific compensation for making the plumbness and alignment tests and the cost of all testing and corrections for plumbness, alignment, and well diameter shall be included in the contract bid prices for Proposal Items 8 and 9.

5.4.8 - PAYMENT:

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

Item No. 8. "Drilling cased well from the ground surface to the bottom of the cased well." and for:

Item No. 9. "Drilling 19-inch diameter open hole after installation of casing."

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 water; geophysical logging by the Department; protecting and maintaining the well; measuring the depth of well as required; making all tests including the plumbness and alignment tests and necessary corrections of defects; all fishing operations and necessary corrections of defects; 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.

SECTION 5.5 - FURNISHING AND INSTALLING THE WELL CASING

5.5.1 - GENERAL:

Both the solid and perforated steel casing to be installed in the well under this contract shall be furnished at the well site by the Contractor.
The casing shall be installed in the well only when ordered in writing by the Manager and as specified herein. The Manager will specify the total length of the solid and perforated casing to be installed. Installation shall be made only during normal daylight working hours.

5.5.2 - CASING:

The solid casing to be furnished and installed in the well shall be of corrosion resistant steel having four to six times the atmospheric corrosion resistance of structural carbon steel, and conforming to ASTM Designation A-242 (USS Cor-ten, Kaiser Steel Kaisaloy or approved equal). The solid casing shall have a minimum inside diameter and a minimum wall thickness as called for in the Proposal and shall be clean, straight and free from kinks. The individual lengths of solid casing shall be provided with beveled ends suitable for butt welding. The bottom of the casing, solid or perforated, shall be supplied with a steel shoe.

The perforated casing to be furnished and installed in the well shall be Stainless Steel, Type 304 (18-8). The perforated “Ful Flo” pattern casing shall have a minimum inside diameter and a minimum thickness as called for in the Proposal. The openings in the casing shall be machine made perpendicular to the axis of the casing and of a louver form with the aperture facing downward. The minimum area of opening per foot of casing shall be as called for in the Proposal. The width of the openings shall be sized such to retain the filter material in the annular space. Physical properties of perforated casing: Yield strength $\geq 35,000$ psi, tensile strength $\geq 75,000$ psi, Rockwell “B” hardness max. = 88. Chemical properties: Carbon 0.08% max., Mangonese 2.0% max., Phosphorus 0.45% max., Sulphur 0.030% max., Silicon 1.0% max., Chromium 17.00-20.00%, Nickel 8.00-12.00%.

For field assembly of perforated casing, the ends of sections to be joined shall be welded in accordance with the manufacturer’s recommendations. The connection of perforated casing to the solid casing shall be made as detailed by the attached sketch for the “mechanical connection mild steel to stainless steel” detail.

The top of the installed solid casing shall be capped with a 1/4-inch steel plate and 3-inch diameter threaded coupling with a plug as shown on the Construction Plans.

5.5.3 - CASING MARKINGS:

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

SP-13
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.

5.5.4 - 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 Manager. 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.) In addition, the Contractor shall clearly state thereon the width of the openings and the square inches of opening per foot of perforated casing.

5.5.5 - INSTALLATION:

The casing shall be installed in the presence of and as directed by the Manager. The casing shall be properly aligned and welded by qualified welders and shall be continuous for its entire length. Every precaution shall be taken to prevent the casing from dropping into the hole. No driving of the casing will be permitted.

The Contractor shall carefully lower the casing in the drilled hole. 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 be lowered and temporarily secured five (5) feet above the final casing depth and then the entire aquifer section of the drilled hole shall be initially developed and cleaned by bailing the well clear of drill cuttings, cave-in materials, etc., which may enter the well through and below the perforated casing to the satisfaction of the Manager. If traces of bentonite are found, the Contractor shall mix within the aquifer section of the drilled hole, with the bailer, a commercially available bio-degradable detergent. After at least two hours of mixing with bailer, the Contractor shall second time bail clean the aquifer section of the hole. The amount of detergent shall be according to the manufacturer's instructions subject to the approval by the Manager. The casing shall then be lowered to its final position with the bottom of the casing resting on the bottom of the drilled hole with only partial weight of the total
length of the casing such that the perforated section of the casing will not be damaged, distorted or misaligned and shall then be held temporarily until cement grouting is placed and cured as called for in Section 5.7 - Filling the Annular Space.

5.5.6 - INSTALLATION OF CASING GUIDES:

During the installation of the well casing, the Contractor shall furnish and install casing guides at 30' o.c., 3 units per section, 120° apart, and vertically aligned in the ungrouted annular space. The casing guides may be commercially made or fabricated.

5.5.7 - VIDEO LOGGING:

The Contractor shall make a video log of the well at two times during the well's construction: when the borehole has been drilled and bailed clean and prior to casing installation; and after the well has been completed and pump tested. The video logging shall be recorded with VHS cassette system in the presence of the Manager. The Contractor shall give a minimum of three working days advance notice to the Manager of the date of video logging. It shall be the responsibility of the Contractor to ensure that the well water is clean and that the equipment is in proper working for the video logging to ensure adequate clarity of the video log.

The original and one copy of the video cassette tape recording shall be delivered to the Manager and shall become the property of the Department of Water Supply.

5.5.8 - MEASUREMENT:

The length of casing to be paid shall be the number of lineal feet of casing measured to the nearest foot acceptable installed in the well. The Contractor shall not receive compensation for making the video log, but it shall be considered incidental to the furnishing and installation of the solid casing.

5.5.9 - PAYMENT:

The total footage, measured as provided above of casing furnished and installed by the Contractor will be paid for at the bid price per lineal foot for:

Item No. 10. "Furnishing and installing 20-inch minimum I.D., 0.375-inch thick solid well casing conforming to ASTM A-242," and for:

Item No. 11. "Furnishing and installing 20-inch minimum I.D.,

SP-15
as the case may be, which price shall be full compensation for furnishing and hauling the casing to the well site; for bailing, for perforating the casing, for cleaning and surging the well; for furnishing and installing the casing guides; for unloading, handling, cutting, aligning, welding, and setting the casing; for capping the top of the casing; for video logging; and for all labor, equipment, tools, materials, and incidentals necessary to complete the work.

The Contractor may furnish and install casing with a larger inside diameter and/or thickness than specified in the above specifications; however, he shall not be entitled to additional compensation over and above the contract unit price bid for the items listed above.

SECTION 5.6 - DEVELOPMENT AND PUMP TESTING THE WELL

5.6.1 - DESCRIPTION:

Development and pump testing of the well shall consist of use of the pump test equipment to develop the well and to determine yield, drawdown, recovery, and quality of water at various rates of pumping. The equipment and methods shall be as specified below and as directed by the Manager. The test pumping unit may be electrically or fossil fuel powered, and shall be designed and thoroughly sound-proofed such that at least 5 days of around-the-clock pump testing can be conducted without any stoppage due to noise complaints by affected residents.

5.6.2 - PUMP TEST EQUIPMENT AND MATERIALS:

The Contractor shall furnish and install a test pump assembly capable of discharging at various sustained rates between 200 to 1500 gallons of water per minute to the ground surface. The test pump assembly shall be capable of pumping at any constant rate in the above-specified range for a period of at least 120 continuous hours. The Contractor shall also furnish and install all other equipment and material, except as specified herein, and shall supply the power required to perform the pump test of the well as directed by the Manager.

All Contractor furnished equipment and appurtenances shall be in good operating condition. Before proceeding with the delivery to the project site of the test pump and driver required by this section, the Contractor must submit in writing to the Manager the description, pump characteristics, curves and specifications of the test pump and driver, including the size and total length of the pump
and the size of the discharge column. With this data, the Manager will determine the top of pump bowl and airline setting.

The rate of discharge from the well shall be measured with an approved water meter to be furnished and appropriately installed with a straight run of pipe before and after by the Contractor and controlled by an approved valve installed by the Contractor at least six (6) feet beyond the meter. The Contractor shall furnish any and all other equipment and materials that may be required to measure the rate of discharge and it shall be the Contractor’s responsibility to determine and provide the necessary and proper fittings to connect the water meter. The Contractor shall also provide the necessary facilities and make arrangements for the proper disposal of the well water. The Contractor shall provide adequate lighting for safe night operation of all the test equipment in and outside of the housed working area.

Water level measurements during the pumping test shall be determined by the airline method. The Department shall furnish a mercury manometer for measuring the air pressure of the Contractor furnished airline assembly. The Contractor shall furnish an airline assembly consisting entirely of 1/4-inch nominal inside diameter ANSI Schedule 40, galvanized pipe complete with a needle type control valve and all fittings and appurtenances necessary to connect the mercury manometer furnished by the Department, including air tank and pressure regulator, to measure water levels in a manner acceptable to the Manager. The airline shall be securely fastened to the discharge column.

The airline assembly shall be tested for leakage in the presence of the Manager by subjecting it to a pressure equal to the submergence of the airline below static water level. At the required test pressure, the airline pressure shall not drop more than 1.0 foot of water during a period of five minutes.

5.6.3 - INSTALLATION OF THE TEST PUMP AND WELL DEVELOPMENT:

When a pumping test is directed by the Manager, the Contractor shall clean the well by bailing to the satisfaction of the Manager prior to the installation of the test pump. The Contractor shall satisfy himself that the well is adequately prepared for the proper installation and operation of the test pump assembly. After the test pump has been installed and ready for use, the Contractor shall develop the well by pumping and surging as specified below.

If the well has been drilled with bentonite, the Contractor shall introduce into the aquifer a commercially available biodegradable detergent. Thereupon, the Contractor shall mix the detergent in the well by intermittently pump surging without any discharge of water at the surface and let the detergent remain in the well for 24 hours prior to development of the well by pump surging. Thereupon, if the Manager deems unsatisfactory the result of such
initial detergent application and pumping and surging on improving the drawdown
of the well, the Contractor shall repeat a second time the above procedure of
detergent application, 24-hour retention period, and pumping and surging. The
amount of detergent shall be according to the manufacturer's instructions,
subject to the approval of the Manager.

Thereupon, the well shall be intermittently pumped at 30 minute intervals at a
rate of 1500 gpm or until the well is free of bentonite, drill cuttings, sand
and other materials and the pumped water shows no turbidity and less than
1 c.c. of solids per liter.

The development of the well by pump surging shall be considered complete and
satisfactory if the well and pumped water remains free of bentonite, if any,
drill cuttings, sand, cave-in and other materials after three (3) consecutive
30 minute intervals of pump surging at the specified rate.

The cost of all development operations shall be incidental to the project and
shall be included in bid item for pumping test.

5.6.4 - PUMPING TEST:

The pumping test equipment shall be acceptably installed and tested for proper
operations in the presence of the Manager. The pumping test shall be scheduled
to begin only on Monday during daylight hours at the time designated by the
Manager. The Contractor shall notify the Manager of his readiness to begin the
pumping test at least Wednesday prior to the scheduled test. The Manager will
provide the necessary personnel for directing the pumping test. The Contractor
shall not begin the pumping test until the Manager is present at the site and
the Manager orders the test to begin.

The pumping test procedure shall be prescribed by the Manager during the course
of the testing. The pumping shall be started, regulated and stopped as
directed by the Manager. The testing shall include measuring the rate of
discharge and drawdown at the various pumping rates and the rate of recovery.
If deemed necessary, the Manager may order a long-term continuous pumping test
under his direction. Testing will be conducted during the night, and possibly
on Saturdays, Sundays, and National and State holidays as required by the
Manager. Records will be kept throughout all tests showing the pumping rates,
corresponding water levels in the well, and the temperature of water being
discharged. In addition, the Contractor shall collect samples of the pumped
water at the intervals directed by the Manager.

During the entire testing period, the Contractor shall have at least one man
available at the well site to operate and maintain the test pump and
appurtenant equipment and to assist the Manager in performing other incidental
work required for the pumping test. The Contractor shall be responsible for efficient continuous operation and maintenance of the pumping unit and measuring devices during the tests. The Department will not pay for any damages to the pumping test equipment for any cause.

Any failure, inability to meet specification requirements, or inefficient operation of the pumping equipment, instruments, or measuring devices provided by the Contractor for the pumping test may necessitate repetition of part of the test or of the entire test as determined by the Manager.

The Manager will collect the water samples to be tested for drilling water certification and will be responsible for the delivery of these samples to the appropriate laboratory for analysis.

5.6.5 - MEASUREMENT:

Payment for well development by pump-surging shall be considered incidental to the pump test.

The installation and removal of pumping test equipment and material to be paid for shall be considered complete when the well has been satisfactorily tested and accepted by the Manager and when the removal has been completed to the satisfaction of the Manager.

The pumping test time to be paid for will be the actual number of hours that the pump is operated under the direction and to the satisfaction of the Manager measured to the nearest half-hour. The measurement of time will begin after the Manager orders the pumping test begun and shall end when the Manager orders the pumping test to be terminated. Time lost due to any failure, inability to meet specification requirements, or inefficient operation of the pumping equipment or measuring devices will not be measured for payment.

5.6.6 - PAYMENT:

Installing and removing equipment for testing the well will be paid for at the bid price for:

Item No. 12, “Furnishing, installing and subsequent removal of pumping test equipment for initial well test.”

and at the bid price each per setup for:

Item No. 13, “Furnishing, installing and subsequent removal of pumping test equipment after initial well test, if required.”
which price shall be full compensation for cleaning the well by bailing: furnishing, hauling and installing test pump, power unit, power supply, discharge column, airline assembly using 1/4-inch nominal inside diameter ANSI Schedule 40 galvanized pipe, measuring devices, pipeline and materials necessary for the proper disposal of the water, and all other equipment necessary to conduct the test; for all delays necessitated by the nature of the work or as specified above; for the subsequent removal and hauling of the units listed above; and for all labor, equipment, tools, materials, and incidentals necessary to test the well.

The hours measured as provided above, for the pumping test, will be paid for at the bid price per hour for:

Item No. 14, "Pumping Test."

which price shall be full compensation for labor required for developing, chlorinating and testing the well; for furnishing the fuel and power; for keeping the records; for taking samples, for maintaining and operating all pumping equipment and measuring devices required for the test; and for providing all labor, tools, equipment, materials and incidentals necessary to complete the testing of the well as directed by the Manager.

SECTION 5.7 - FILLING THE ANNULAR SPACE

5.7.1 - DESCRIPTION:

This section covers the cement-grouting, rock stabilization and filter packing of the annular space between the wall of the drilled hole and the casing. All work required in this section shall be done during normal daylight working hours and in the presence of the Manager. The Contractor shall notify the Manager not less than 48 hours prior to performing any work under this section.

5.7.2 - FILTER PACK:

The first procedure for filling the annular space consists of furnishing and installing the filter pack gravel.

The filter pack gravel shall consist of commercially available sound, durable water worn stream gravel as furnished by Monterey Sand Company of P.O. Box 3055, Monterey, California 94942, (408) 395-6541, or approved equal. The material shall be washed and shall contain no silt, clay, organic matter or other deleterious material and shall not contain more than 2 percent by weight of thin, flat or elongated pieces in which the largest dimension exceeds three times the smallest dimension.
The material shall be uniform in size. Size of the material shall be determined by the Contractor taking into account the width of opening of the perforated casing and the graduation of the aquifer material. A five (5) lb. sample of the material shall be submitted for approval prior to placement.

The material shall be delivered to the site in bulk or bagged and shall be protected from the weather and contamination until used. Material in contact with bare ground shall not be used.

The Contractor shall be responsible for insuring that the filter material is disinfected during installation.

The filter material shall be poured in place from the surface into the annular space between the borehole wall and the casing and shall extend from the bottom of the cased well to fifteen (15) feet above Mean Sea Level. Placement of the material shall be done at a measured and uniform rate and it shall be probed with a rigid rod for effectiveness and to insure no bridging occurs. The Contractor shall keep a continuous record of the amount of material placed in the annular space.

5.7.3 - SEAL:

An effective seal over the filter pack shall consist of two-foot layers of No. 67 course aggregate (1 inch minus), fine aggregate (3/4 inch minus), and sand. Each layer shall be carefully hand shoveled and probed with a rigid rod or pipe for effectiveness. The aggregates shall be topped with a three-foot layer of concrete mix with 3/4-inch maximum aggregate and allowed 24 hours to set. The Contractor shall satisfy himself as to the integrity of the seal for subsequent grouting and rock stabilization subject to the approval by the Manager.

5.7.4 - CEMENT GROUTING THE ANNULAR SPACE:

The annular space between the outside of the casing and wall of the drilled hole shall be cement-grouted to depths as directed by the Manager and at all intervals of low permeability, for example, dense aa basalt as determined by the driller, drilling conditions, and geophysical logs, subject to approval by the Manager.

Cement grout shall consist of a mixture of one part Portland cement, one part rock sand and sufficient water per sack of cement to form a consistency such that the grout may be placed by a tremie pipe of appropriate diameter. The amount of water to be added shall be subject to the Manager's approval.

The grout shall be placed in the annular space by pumping it through a one and one-quarter inch minimum inside diameter grout pipe as directed by the Manager.
After a minimum of 24 hours after placing the seal, cement grouting will be accomplished by placing grout in the annular space in a manner that the hydrostatic pressure of the grout will not distort or collapse the casing.

It is essential that the entire annular space be completely filled with grout. Grout shall be placed by tremie pipe in a manner that will avoid segregation of materials, inclusion of foreign material and bridging of grout materials.

5.7.5 - ROCK STABILIZATION:

At intervals of excessive grout loss as determined by the Manager, the Contractor may rock stabilize the annular space with clean fine aggregate by tremie pipe or by careful hand shoveling and probing with a rigid rod or pipe for effectiveness.

The clean fine aggregate shall be 3/8 inch minus, well graded, and conforming to ASTM C-33.

5.7.6 - MEASUREMENT AND PAYMENT:

Acceptable filling of the annular space by cement-grouting, rock stabilization, filter packing and sealing will be measured and paid for at the bid price per lineal foot for:

Item No. 15. “Cement-grouting the annular space.”

and at the bid price per linear feet for:

Item No. 16. “Rock stabilization of the annular space.”

and at the bid price per linear feet for:

Item No. 17. “Filter Packing the annular space” and at the bid lump sum price for:

Item No. 18. “9 ft. Seal”

which prices shall include full compensation for the appropriate furnishing, mixing, placing and curing the cement grout in the annular space and for furnishing all labor, materials, tools, equipment, and incidentals necessary to furnish and install the above items of work in place complete as specified herein and as shown on the drawings.
SECTION 5.8 - CHLORINATION

5.8.1 - GENERAL:

The well shall be disinfected to remove bacteriological contamination that may have been introduced during the drilling process. Disinfection shall be done by a chlorine solution of water and available chlorine compounds.

5.8.2 - PROCEDURES:

A. Disinfection of Filter Pack

After installation of the filter pack material and prior to installing the 9-ft. seal, the Contractor shall pour a chlorine solution uniformly in the annular space. The chlorine solution strength shall be such that a concentration of at least 50-mg/L of available chlorine will be obtained. The volume of the chlorine solution poured in the annular space shall be twice the volume occupied by the filter pack.

B. Disinfection of the Well

After installation of the test pump and prior to well development, the Contractor shall pour a chlorine solution into the well. The chlorine strength and volume shall be such that a concentration of at least 50-mg/L will be obtained for the entire water depth of the well. The well shall not be disturbed or agitated for a period of 24 hours after the application of the chlorine solution.

B. Test

To assure that the well has been satisfactorily disinfected, the Contractor shall select a qualified water testing laboratory and have a bacteriological test made prior to removal of the test pump. It shall be the Contractor's responsibility to see that the well is so tested and, if contaminated, follow disinfection procedures approved by the Manager until the contamination is no longer present.

5.8.3 - MEASUREMENT AND PAYMENT:

Chlorination of the well will be measured and paid for at the bid lump sum price for:

Item No. 19. "Chlorination of the well"
which price shall include all necessary labor, lab fees, materials, tools, equipment and incidentals necessary to complete the work as specified herein.

GENERAL REQUIREMENTS AND COVENANTS

SECTION 8 - PROSECUTION AND PROGRESS

SECTION 8.14 - FINAL SETTLEMENT OF CONTRACT:

The requirements of Item (a) - 3 shall be DELETED.