

Bids to be opened at 3:00 P.M.
on December 19, 2024
at Sunnyslope County Water District
3570 Airline Hwy
Hollister, California 95023

SPECIFICATIONS

**SUNNYSLOPE COUNTY WATER DISTRICT
BEST ROADS MUTUAL WATER COMPANY
WATER SYSTEM CONSOLIDATION PROJECT**

**CALIFORNIA DEPARTMENT OF WATER RESOURCES
GRANT AGREEMENT NO 4600015596**



District Board

Ed Mauro, President

James Parker

Dorothy Brown

Mike Alcorn

Jerry Buzzetta

Drew Lander, PE, General Manager


Robert Hillebrecht, PE, Principal Engineer

Wallace Group
San Luis Obispo, California

November 11, 2024

CERTIFICATION

In accordance with the provisions of Section 6735 of the Business of Professions Code of the State of California, these specifications have been prepared by or under the direction of the following Professional Engineers licensed in the State of California.


Zachary C. Markow
License #92952

November 12, 2024



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SUNNYSLOPE COUNTY WATER DISTRICT
San Benito County, California

BEST ROADS MUTUAL WATER COMPANY
WATER SYSTEM CONSOLIDATION PROJECT

CALIFORNIA DEPARTMENT OF WATER RESOURCES
GRANT AGREEMENT NO 4600015596

The work embraced herein is shown on a set of plans for water system improvements and consolidation for Sunnyslope County Water District, entitled "**BEST ROADS MUTUAL WATER COMPANY WATER SYSTEM CONSOLIDATION PROJECT, CALIFORNIA DEPARTMENT OF WATER RESOURCES GRANT AGREEMENT NO 4600015596**", dated November 2024.

The work, as indicated by the Plans shall be done in accordance with the Special Provisions/Technical Specifications and the Contract annexed hereto, including the General Conditions, and also in accordance with the Standard Specifications 2023 of the State of California, Department of Transportation, referred to herein as the "Standard Specifications", which are hereby incorporated by reference.

Document Precedence: In case of conflict between documents, the following documents take precedence in the following order.

- Department of Water Resources Grant Agreement
- Contract between District and Contractor
- Supplementary General Conditions
- General Conditions, EJCDC 2018
- Technical Specifications, including referenced Caltrans 2023 technical provisions
- Plans

PROJECT SUMMARY

SUNNYSLOPE COUNTY WATER DISTRICT
Best Road Mutual Water Company Water System Consolidation Project
Page 1

DOCUMENT NUMBER 00010

INVITATION TO BID

- 1. Introduction:** Notice is hereby given that Sunnyslope County Water District (Owner) will receive sealed bids for performing the construction of Best Road Mutual Water Company Water System Consolidation Project (project) according to the Drawings and Project Manual including Specifications prepared by Wallace Group and accepted by the Owner:
- 2. Questions:** Questions regarding the type of work required may be addressed in writing to:

Rob Hillebrecht, Principal Engineer, Sunnyslope County Water District
rob@sunnyslopewater.org

The final day to submit written questions will be December 13, 2024. Answers to any questions shall be distributed to all bidders in the form of addenda.

- 3. Pre-Bid & Job Site Walk-through Meeting:** A Non-Mandatory pre-bid meeting and site walk-through will be held on Monday, December 9, 2024, at 10:00 AM PST at Sunnyslope County Water District Office, 3570 Airline Hwy, Hollister, CA, 95023.
- 4. Closing Date, Time, & Location:** Physical, hard copy sealed bids will be received at Sunnyslope County Water District Office, 3570 Airline Hwy, Hollister, CA, 95023 until **Thursday, December 19, 2024 at 3:00 PM PST.**

Any bid submitted after the closing date and time will NOT be accepted and will be returned unopened to the bidder. Bids will be publicly opened and read aloud shortly after the specified closing time. Electronic bids will not be accepted.

- 5. Bid Security:** Bid security made payable to the Owner is required to accompany each bid. Bid security shall be in the form of a cashier's or certified check or a Bid Bond as required by the Bid Security Document following the Bid Form.
- 6. Requirements for California Public Works Contracts.**
 - a. Wage Rates

The State Director of the Department of Industrial Relations has established the general prevailing rates of per diem wages and rates for overtime and legal holidays in the locality in which the work is to be performed. Not less

than said prevailing wages shall be paid for work on this project. No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

b. License Requirements

The Contractor shall possess a valid State of California Class A General Engineering Contractor's License at the time of submitting a bid. The Contractor shall provide its license number classification and expiration date on the Bid Form.

c. Security in Lieu of Retainage

Provisions concerning the Contractors' rights to deposit security in lieu of retainage in accordance with California Public Contract Code Sections 10263 and 22300 are covered in the Agreement.

7. **Withdraw of Bid:** Any bidder may withdraw their bid by written request any time PRIOR to the scheduled closing date and time. Thereafter, no bidder may withdraw its Bid for a period of forty-five (45) days after the time fixed for the opening of the bids, within which time an award will be made.

The Owner reserves the right to reject any and all bids or to waive any irregularities or informalities in any bid or in the bidding. Any bid found to be illegible or incomplete may be rejected.

8. **Bidder Package:** A Bidder Package, including plans and specifications, special provisions, sample contract, and proposal form, may be obtained electronically at no charge to the Bidder. Contact Rob Hillebrecht, Sunnyslope County Water District, at rob@sunnyslopewater.org to request a copy of the Bidder Package.

9. **Time Constraints:**

- a. Requests for information received less than 5 business days prior to Bid opening may not be answered. (00100 paragraph 5.1)
- b. Addenda will be issued no later than 5 business days prior to Bid opening.

- c. Bids shall remain in effect and subject to acceptance for 45 days after the date of Bid opening. If a contract is awarded, it will be awarded within the period that Bids are subject to acceptance. (00100 paragraphs 15 and 16.6)
- d. The successful Bidder shall sign the required number of counterparts of the Agreement and deliver them together with the required bonds to the Owner within 15 days after the date of the Notice of Award.
- e. The Owner will sign the Agreement and deliver a fully-signed counterpart to the Contractor within 10 days after receipt of the required signed counterparts of the Agreement and Satisfactory Bonds from the Contractor. Refer to Article 19, Document 00100 – Instructions to Bidders.
- f. The Owner may issue the Notice to Proceed at any time between the time the Agreement is fully signed by all parties and 90 days thereafter.
- g. The Contract time shall begin to run on the date stated in the Notice to Proceed and the Contractor shall begin construction at the site within 10 days thereafter but not before submitting required insurance certificates.
- h. The Work shall be fully completed within the Contract Time which is One Hundred Twenty (120) Calendar days as stated in the Agreement.
- i. Progress payments shall be made monthly and shall cover work performed up to the Application for Payment Date which shall be the last day of each month. The Contractor shall submit its Application for Payment at least 5 days prior to the Application for Payment Date. The Owner shall make payment within 30 days after the Engineer issues a Recommendation for Payment.

END OF INVITATION TO BID

DOCUMENT NUMBER 00100
INSTRUCTIONS TO BIDDERS

Article 1. General

Bidding Documents containing the Bidding Requirements are provided to prospective bidders to enable them to prepare a bid. Documents that must be submitted with the Bid are listed at the end of the Instructions to Bidders.

Article 2. Defined Terms

2.1 Terms used in these Instructions to Bidders which are defined in the GENERAL CONDITIONS of the Construction Contract have the meanings assigned to them in the General Conditions.

2.2 The term "Addenda" (Addendum) means the written or graphic instruments issued prior to execution of the Agreement which modifies or interprets the Bidding Documents and Contract Documents.

2.3 The term "Bidder" means any person, firm or corporation submitting a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder.

2.4 The term "Successful Bidder" means the lowest, qualified, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2.5 The term "Bid" means the offer or proposal of the Bidder submitted on the prescribed forms setting forth the prices for the work to be performed and furnishing other required information.

2.6 The term "Base Bid" means the amount bid on all of the work required to complete a single Contract as described in the Contract Documents. The Base Bid submitted by the successful bidder combined with any additive or deductive amounts bid on alternates accepted by the Owner and any other modifications becomes the Contract Price.

2.7 The term "Bidding Documents" includes the Invitation to Bid, Instructions to Bidders, Information Available to Bidders, the Bid Form with related documents, the Contract Conditions, Specifications and Drawings (and includes all Addenda issued prior to receipt of Bids.)

2.8 The terms "Contract" and "Project" are defined in the General Conditions paragraph 1.1.

2.9 The term "Notice of Award" is a written notice by the Owner to the Bidder that it is the successful Bidder and upon the Bidders compliance with the Owner's requirements the Owner will execute the Agreement.

Article 3. Copies of Bidding Documents

3.1 Complete sets of Bidding Documents (the Drawings and Project Manual including Specifications) may be obtained electronically via the email designated in the Invitation to Bid for the non-refundable purchase price stated therein.

3.2 Complete sets of Bidding Documents must be used in preparing Bids; neither the Owner nor the Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.3 The Owner and the Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer or grant a license for any other use.

Article 4. Examination of Contract Documents and Site

4.1 It is the responsibility of each Bidder before submitting a Bid to

- a) examine the Bidding Documents thoroughly;
- b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work;
- c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;
- d) study and carefully correlate Bidder's observations with the Contract Documents;
- e) notify the Engineer of all conflicts, errors or discrepancies in the Contract Documents.

4.2 Additional information available to Bidders, if any, is described in Document Number 00200, Information Available to Bidders.

4.3 Differing Conditions:

1. General Conditions Article 5 limits the extent to which the Contractor may rely on information provided by the Owner or the Design Engineer with regard to:
 - a) subsurface soil conditions;
 - b) existing concealed or underground utilities and underground facilities;
 - c) existing structures and facilities;
2. General Conditions Article 5 identify the Contractor's responsibility:
 - a) for using care in making excavations and in doing demolition;
 - b) for damage to existing utilities and underground facilities and for loss of use thereof;
 - c) for the protection of workers and others from known and unknown or concealed hazards.
3. General Conditions Article 5 identifies conditions under which the Contractor may be entitled to a change in Contract Time or Price due to differing or unknown conditions.

4.4 The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent facilities or utilities or easements for permanent changes in existing facilities or utilities have been obtained or will be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

4.5 Bidder's Representations. By submitting a bid each bidder represents and warrants:

1. It has visited the site and has reviewed the Bidding Documents and the Information Available to Bidders; it has made any other investigations, explorations or tests and has obtained any other data it considers necessary for preparation of its Bid; and it has read and understands provisions in the General Conditions relevant to differing and unknown conditions.
2. It has read, studied and understands the entire set of Bidding Documents including the Construction Drawings, Specifications and General Conditions and finds them fit and sufficient for the purpose of preparing its Bid and constructing the Work required.
3. Its Bid is based on providing all of the material, labor, equipment and services necessary to complete the Work in full compliance with the Contract Documents without exception.

Article 5. Interpretations and Addenda (Before Contract Award)

5.1 All questions about the meaning or intent of the Contract Documents are to be directed to the Engineer. Interpretations or responses considered necessary by the Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the Engineer as having received the Bidding Documents. Questions received less than Five Business days prior to the date for opening of bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or responses will be without legal effect and are not to be relied upon by the Bidders unless they are integrated into the written Contract Documents.

5.2 Addenda may also be issued to modify the Bidding Documents as deemed advisable by the Engineer.

Article 6. Bid Security

Each Bid must be accompanied by Bid Security conforming to the requirements of Document Number 00410, Bid Security.

Article 7. Contract Time

The numbers of days (Contract Time) within which the Work is to be Substantially Completed and Finally Completed and ready for acceptance and final payment are set forth in the Bid Form and the Agreement.

Article 8. Liquidated Damages

Provisions for liquidated damages, if any, are set forth in the Agreement.

Article 9. Substitute or Proposed Equivalent ("Or Equal") Items

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or Proposed Equivalent ("Or Equal") items. Whenever it is indicated in the Drawings or specified in the Specifications that a Proposed Equivalent ("Or Equal") item of material or equipment may be furnished or used by the Contractor if acceptable to the Engineer, such acceptance will not be considered by the Engineer until after the Effective Date of the Agreement. The procedure for submission of any such Proposed Equivalent ("Or Equal") item by the Contractor for the Engineer's review and consideration is set forth in Article 7 of the GENERAL CONDITIONS under Specified Items/Proposed Equivalents and may be supplemented in Division One.

Article 10. Listing of Subcontractors

Pursuant to State law, the Bidders must designate the name, location of place of business, and contractor's license number for each subcontractor who will perform work or render services to the Bidder in an amount that exceeds one half of one percent (1/2%) of the Bidder's Total Bid Price, or \$10,000, whichever is higher, if work involves streets or highways. Bidder must also include the portion of work each such subcontractor will perform conforming to the requirements and format of Document Number 00430. Bidder must self-perform a minimum of 50% of the work on the Project.

Article 11. Bid Form

11.1 The Bid Form is included with the Bidding Documents; additional copies may be reproduced by the Bidder.

11.2 All blanks on the Bid Form must be completed legibly in ink or by type. Bid amounts must be stated in written words and in figures. If there is discrepancy between the written words and figures, the word value shall supersede.

11.3 Bids by corporations must be executed in the corporate name by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

11.4 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5 All names must be legibly printed in ink or typed below the signature.

11.6 The Bid shall contain an acknowledgement of receipt of all ADDENDA (the numbers of which must be filled in on the Bid Form). ADDENDA are designated as Document Number 00900.

11.7 The address and telephone number for communications regarding the Bid must be shown.

11.8 When the Bidding Documents include more than one Contract, Bidders may submit a Bid for any of the individual portions of the project defined in Bidding Documents as a separate Contract or any combination of Contracts provided for in the Bid Form.

11.9 Bids must include a single lump sum price for the Base Bid and a separate price or state "no change in price" for each Alternate described in the Specifications and listed on the Bid Form. The Bid for each Alternate will be the amount to be added to or deducted from the Base Bid if the Owner selects the Alternate. Bids that do not include a price for every Alternate may be rejected.

Article 12. Submission of Bids

Bids shall be submitted at the time and place indicated in the Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title and, when the Project includes more than one Contract, with the designated Contract or portion of the project for which the Bid is submitted. The envelope shall bear the name and address of the Bidder and the Bid shall be accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

Article 13. Modification and Withdrawal of Bids

13.1 Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

13.2 If, within five days after Bids are opened, any Bidder files a duly signed, written notice with the Owner and promptly thereafter demonstrates in detail to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, how the mistake occurred, that the mistake was not due to an error in judgment or to carelessness in inspecting the site or reading the plans or specifications, that Bidder may withdraw its Bid and the Bid Security will be returned. A Bidder who withdraws its Bid will be disqualified from further bidding on the Work to be provided under the Contract Documents.

Article 14. Opening of Bids

Bids will be opened and (unless obviously non-responsive) read aloud publicly. An abstract of the amounts of the Base Bids and major Alternates (if any) will be made available to Bidders after the opening of Bids.

Article 15. Bids to Remain Subject to Acceptance

All Bids will remain subject to acceptance for forty-five (45) days after the day of the Bid opening, but the Owner may, in its sole discretion, release any Bid and return the Bid Security prior to that date. Bids on Alternates shall remain valid for 60 days after execution of the Agreement.

Article 16. Award of Contract

16.1 The Owner reserves the right to reject any and all Bids and to waive any and all irregularities in Bids not involving price, time or changes in the Work. The Owner reserves the right to reject any nonconforming, nonresponsive, incomplete, unbalanced or conditional Bids. The Owner also reserves the right to reject the Bid of any Bidder that in the Owner's judgment would not be financially or otherwise responsible or that does not meet pertinent minimum experience criteria established by the Owner and stated in the Instructions to Bidders.

16.2 In evaluating Bids, the Owner will consider whether or not the Bids comply with the prescribed requirements, and include such Alternates, unit prices and other data, as may be required in the Bid Form and supplements thereto.

16.3 Discrepancies in the multiplication of units of Work and unit prices, if any, will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between bid amounts stated in words and in figures will be resolved in favor of the amount stated in words.

16.4 The Owner may accept any Alternate without regard to the order in which they are listed and will determine the lowest Bidder on the basis of the Base Bid and the Alternates accepted.

16.5 If the Contract is to be awarded, it will be awarded to the lowest qualified, responsible and responsive Bidder that in the Owner's judgment will be in the best interests of the Project.

16.6 If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within the number of days that Bids are subject to acceptance as stated in Article 15.

Article 17. Contract Security

17.1 The Owner's requirements for performance and payment bonds are set forth in Article 2 of the General Conditions.

17.2 The Successful Bidder shall engage a surety who through binding agreement will assume liability for all debts and responsibility for the acceptable performance of the Work under this Contract if the Contractor defaults.

17.3 When the Successful Bidder delivers the executed Agreement to the Owner, it must be accompanied by the required bonds in the forms contained in the section of the Project Manual titled Contract Forms.

Article 18. Insurance

18.1 The Owner's requirements for insurance are set forth in the Agreement.

18.2 The Successful Bidder shall purchase insurance from an insurance company or companies who meet the requirements of Agreement, will provide the required insurance provisions, and will furnish insurance certificates and documentation in acceptable form to Owner.

18.3 The Successful Bidder shall deliver the required insurance certificates to the Owner and Engineer prior to beginning work. In no case will the Notice to Proceed be considered as allowing the Work to begin until the insurance certificates are received by the Owner, even though the Contract Time as stated in the Notice to Proceed will commence to run.

18.4 If Acts of God insurance is required, it will be quoted as a separate bid item.

18.5 Contractor shall complete the Certificate of Insurance Compliance with the bid stating they shall meet all insurance requirements.

Article 19. Signing of Agreement

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen (15) days thereafter the Contractor shall sign and deliver the required number of counterparts of the Agreement together with the required Bonds to the Owner. Within ten (10) days thereafter the Owner will deliver one fully signed counterpart to the Contractor. Each counterpart is to be accompanied by a complete set of the Drawings with appropriate identification which shall be signed by the parties to the Agreement.

Article 20. Limitation of Liability

The Agreement contains a clause limiting the liability of the Owner and the Design Engineer to the Contractor for defects in the Contract Documents.

Article 21. Retainage

The percentage of retainage that will be withheld from each Progress Payment is set forth in the Agreement.

Provisions concerning the Contractor's rights to deposit securities in lieu of retainage in accordance with California Public Contract Code Sections 10263 and 22300 are set forth in the Agreement.

Article 22: Sales and Use Taxes

Owner is not exempt from California State Sales and Use Taxes on materials and equipment. All applicable taxes shall be included in the Work.

Article 23. Pre-bid Conference

A NON-MANDATORY pre-bid conference will be held at:

10:00 AM PST on Monday, December 9, 2024 at Sunnyslope County Water District Office, 3570 Airline Hwy, Hollister, CA, 95023

Representatives of the Owner and the Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. The Engineer will transmit to all prospective Bidders of record such Addenda as the Engineer considers necessary in response to questions arising at the conference.

Article 24. Pre-Bid Site Visit; Access to Site

A NON-MANDATORY pre-bid site visit will be held at:

10:00 AM PST on Monday, December 9, 2024 at Sunnyslope County Water District Office, 3570 Airline Hwy, Hollister, CA, 95023

Representatives of the Owner and the Engineer will be present to show Bidders the general location of the Work. Bidders are encouraged to visit the site at the time prescribed.

The Contractor may arrange with the Owner for access to the site at the Owner's convenience for the purpose of digging test pits or drilling test holes to evaluate subsurface soil conditions.

The Contractor shall fill all holes and leave site in "as found condition."

Article 25. Contracts to be Assigned by the Owner

No other Contracts for portions of the work directly negotiated by the Owner with a third party (such as SCADA controls) are assigned to the Contractor.

Article 26. Base Bidding of Equipment and Systems

Base Bids shall include providing equipment or complete systems by makers selected by the Bidder from those named by the Owner in the Specifications. Changes in price quoted by Bidders for acceptance of alternate equipment proposed by Bidders will not be considered in determining the lowest Base Bid.

Alternate equipment or systems proposed by the Bidder will only be considered after award of the Contract and at the option of the Owner. If alternate equipment or systems

are accepted, the Contract Price will be adjusted by Change Order in an amount equal to the difference in price quoted by the Bidder on the Base Bid Equipment and Systems List.

Article 27. Licensing and Minimum Experience Requirement

Pursuant to section 7028.15 of the Business and Professions Code and section 3300 of the Public Contract Code, all bidders must possess licenses issued by the State of California Contractors License Board for performance of this Contract. Pursuant to section 7028.15 of the Business and Professions Code, any bid submitted by a contractor not currently licensed in accordance with state law and pursuant to the requirements found in the Contract Documents shall be nonresponsive.

Bidder shall submit Document Number 00420 - Bidder's Qualifications, with its Bid to verify it has the minimum experience qualifications required for bidding.

In the Owner's judgment, the minimum experience requirement for Bidders to Bid on this Contract is the successful completion of at least two projects similar in size complexity and construction cost to the project being bid at this time.

Article 28. Public Works Contractor Registration

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. No bid will be accepted nor any contract entered into without proof of the contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work. If awarded a Contract, the Bidder and its subcontractors, of any tier, shall maintain active registration with the Department of Industrial Relations for the duration of the Project. To this end, Bidder shall sign and submit with its Bid the Public Works Contractor Registration Certification on Article 9 of the Bid Form, attesting to the facts contained therein. Failure to submit this form may render the Bid non-responsive. In addition, each Bidder shall provide the registration number for each listed subcontractor in the space provided in the Designation of Subcontractors Form.

Article 29. Documents that Must be Submitted with Bids

Bidders must submit the following signed Documents with their Bids:

Title

Bid Form

Bid Security

Security for Compensation Certificate

Certification of Insurance Compliance

Bidder's Qualifications

Subcontractor List

Non-Collusion Affidavit

Iran Contracting Act Certification

Economic Sanctions Against Russia Certification

END OF INSTRUCTIONS TO BIDDERS

INFORMATION AVAILABLE TO BIDDERS

Article 1

For the convenience of Bidders, the Owner is providing the items and information listed below which the Owner has in its possession, and which may relate to the Work, the Project, or the site. The Owner has not made any independent investigation to determine the accuracy or completeness of any such items and information; and all such items and information are provided or made available to Bidders without any representation or warranty by the Owner whatsoever as to their accuracy, completeness, or relevancy. Bidders are solely responsible for independently evaluating any such items and information; and such items and information shall not be relied upon by the Bidders without careful independent verification.

- 1.1 Access to the Work Site: All access to sites shall be coordinated with the owning districts as needed.

END OF INFORMATION AVAILABLE TO BIDDERS

BID FORM

Project Identification: Best Road Mutual Water Company Water System
Consolidation Project

This Bid is Submitted To:

Sunnyslope County Water District
3570 Airline Highway
Hollister, CA 95023

The Engineer is:

Zach Markow, PE C92952
Wallace Group
(805) 544 – 4011
zachm@wallacegroup.us

Article 1

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

Article 2

Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for forty-five (45) days after the day of Bid opening. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of the Owner's Notice of Award.

Article 3

In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

- (a) Bidder has examined copies of all the Bidding Documents.
- (b) Bidder has examined copies of the following Addenda (receipt of which is hereby acknowledged):

Date	Addenda Number
_____	_____
_____	_____
_____	_____

(c) Bidder has familiarized itself with the nature and extent of the Contract Documents, Work, site locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

(d) Bidder has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in Document Number 00200, Information Available to Bidders.

(e) Bidder has read and accepts the provisions in General Conditions Article 5 identifying the Contractor's responsibility:

- a) for using care in making excavations and in doing demolition,
- b) for damage to existing utilities and underground facilities and for loss of use
- c) for the protection of workers and others from known and unknown or concealed hazards.

(f) Bidder has read and accepts the provisions in General Conditions Article 5 which identifies the limited conditions under which the Contractor may be entitled to a change in Contract Time or Price due to differing or unknown conditions.

(g) Bidder has visited the site and has reviewed the Bidding Documents and the Information Available to Bidders and it has made any other investigations, explorations or tests and has obtained any other data it considers necessary for preparation of its Bid.

Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the Contract Documents and Bidder has read and understands provisions in the General Conditions relevant to differing and unknown conditions.

(h) Bidder has given Engineer written notice of conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder.

(i) Bidder has read, studied and understands the entire set of Bidding Documents including the Construction Drawings, Specifications and General Conditions and finds them fit and sufficient for the purpose of preparing its Bid and constructing the Work required.

(j) Bidder represents that its Bid is based on providing all of the material, labor, equipment and services necessary to complete the Work as specified and shown in the Contract Documents.

Article 4

Requirements for California Public Works Contracts.

(a) **DECLARATION OF LICENSE STATUS.** The Bidder declares that it possesses a valid State of California Class A - General Engineering Contractor's license at the time of

submitting this Bid. Bidder shall state its license number, classification and expiration date on its Bid Form Article 9.

(b) **PREVAILING WAGE RATES.** The undersigned agrees that, if awarded the Contract, the undersigned and all of its subcontractors shall pay all laborers, workers, and mechanics employed in the performance of such Contract, or any subcontract thereunder, not less than the general prevailing rate of per diem wages and rates for overtime and legal holidays in the locality in which the work is to be performed, as ascertained and determined, by the statutes and regulations applicable thereto.

(c) **NONCOLLUSION AFFIDAVIT.** In accordance with Public Contract Code Section 7106, Bidders are required to execute and submit with their Bid Document Number 00480 "Non-collusion Affidavit."

(d) **USE OF BID DEPOSITORIES.** The Bidder declares that it has not used subcontractors' bids from a bid depository that in any way attempts to restrict, control, influence or regulate free open price competition among subcontractors in the submission of their bids to prime Bidders.

(e) **SECURITY FOR COMPENSATION CERTIFICATE.** Bidders are required to execute and submit with their Bid Document Number 00414 "Security for Compensation Certificate."

Article 5

Bidder will complete the Work for the lump sum price(s) included on the following sheet:

ITEM	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL COST
GENERAL CONSTRUCTION					
1	Mobilization and Demobilization	1	LS		
2	Construction Survey	1	LS		
3	Erosion, Sedimentation, and Water Pollution Control	1	LS		
4	Traffic Control	1	LS		
5	Sheeting, Shoring, and Bracing	1	LS		
UTILITIES					
6	Connect to Existing SSCWD and BRWMC Water Mains	1	LS		
7	Furnish & Install 8" PVC C-900 Water Main	4,280	LF		
8	Furnish & Install 8" Gate Valves	5	EA		
9	Furnish & Install 1" Air Valve Assembly	3	EA		
10	Furnish & Install Fire Hydrant Assembly	6	EA		
11	Furnish & Install Shallow Trench Water Main Installation	80	LF		
12	Abandon Existing BRMWC Wells	1	LS		
13	Storm Drain Undercrossing	20	LF		
14	Sanitary Sewer Force Main Undercrossing	20	LF		
EARTHWORK					
15	Class 2 Aggregate Base	650	CY		
16	Hot Mix Asphalt	630	TON		
17	Furnish & Install Pavement Marking and Striping	1	LS		
TOTAL BASE BID:					

Bid Total \$ _____ **DOLLARS & _____ CENTS**
(Written Amount)

Signature of Bidder: _____ **Date:** _____

Article 6

(a) Bidder agrees that the Work will be finally complete and ready for acceptance and final payment on or before the dates or within the number of calendar days indicated in the Agreement.

(b) Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

(c) Bidder accepts the Limitation of Liability Clause contained in the Agreement.

Article 7

The following documents are attached to and made a condition of this Bid:

- (a) Required Bid Security in the form of a bid bond
- (b) Designation of Equipment or Material Manufacturers
- (d) Security for Compensation Certificate
- (e) Certificate of Insurance Compliance
- (f) Bidder's References
- (g) Bidder's Qualifications
- (h) Subcontractor List
- (i) Non-collusion Affidavit
- (j) Iran Contracting Act Certification
- (k) Economic Sanctions against Russia Certification

Article 8

Communications concerning this Bid shall be addressed to:

Rob Hillebrecht, Principal Engineer, Sunnyslope County Water District
rob@sunnyslopewater.org

Article 9

The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

Bidder declares that it does possess a contractor's license of the required classification, valid in the appropriate jurisdiction at the time of submitting this bid.

Contractor's license number: _____

License classification: _____

License expiration date: _____

If Bidder is:
An Individual

By: (SEAL)

Individual's Name: _____

Signature: _____

Date: _____

Doing business as: _____

Business Address: _____

Telephone Number: _____

If Bidder is:
A Partnership

By: (SEAL)

Firm Name: _____

Business Address: _____

Telephone No: _____

General Partner Name: _____

Signature: _____

Title: _____

Date: _____

If Bidder is:
A Corporation

By: (SEAL)

Corporation's Name: _____

State of Incorporation: _____

Business Address: _____

Telephone No: _____

By:

Name of Person Authorized to Sign: _____

Signature: _____

Title: _____

Date: _____

Attest:

Secretary Name: _____

Secretary Signature: _____

Date: _____

BID SECURITY

1. Bid Security, made payable to the Owner, shall accompany each Bid. Bid Security shall be in the form of a cashier's check or certified check in the amount of not less than ten percent (10%) of the Bidder's maximum price, or in the form of a Bid Bond in said amount (in the form attached). Bid Bond shall be executed by such sureties as are named in the current list of "Certified Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds or Certified Reinsurer Companies Holding Certificates Of Authority As Acceptable Reinsuring Companies" published in Circular 570 (most recent amendment) by the Audit Staff Bureau of Accounts, U.S. Treasury Department (www.fms.treas.gov/c570/index.html) and is admitted to issue bonds in the states in which the Project is located and all Work is performed. All bonds signed by an agent shall be accompanied by a certified copy of the authority to act.
2. Bid Security shall remain subject to acceptance for forty-five (45) days after the day of the Bid opening, but the Owner may, at its sole discretion, release any Bid and return the Bid Security prior to that date.
3. The Bid Security of the successful Bidder will be retained until such Bidder has within fifteen (15) days of issuance of written notice of contract award;
 - a. Executed the contract agreement,
 - b. Furnished a performance bond and a payment bond fully executed as described in the Contract Forms section.
 - c. Furnished certificates of insurance as described in the General Conditions, and If the successful Bidder fails to deliver the executed documents described above within fifteen days after Notice of Award, the Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited.
4. The Bid Security of other Bidders whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earlier of the seventh day after the effective date of the Agreement or the forty-sixth day after the Bid opening, whereupon Bid Security furnished by such Bidders will be returned.
5. Bid Security with Bids which are not competitive will be returned within seven days after the Bid.

END OF BID SECURITY

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned,

_____ as Principal, and _____ as Surety, are hereby held and firmly bound unto _____ as Owner in the penal sum of _____ dollars for the payment of which sum, well and truly to be made, we hereby bind ourselves, our successors and assigns jointly and severally firmly by these presents.

Signed and sealed, this _____ day of _____, _____.

The Condition of the above obligation is such that where the Principal has submitted a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing, for construction of _____ Project.

NOW, THEREFORE;

- (a) If said Bid shall be rejected, or
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of the Agreement attachment hereto (properly completed in accordance with said Bid) and shall furnish Bonds for Faithful Performance of said contract, and for the Payment of all persons performing labor and furnishing material in connection therewith, and provide certificates and policies of insurance as specified in the Bid documents and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first set forth above.

_____ (Seal)
(Principal)

By: _____

END OF BID BOND

SECURITY FOR COMPENSATION CERTIFICATE

(To be submitted with Bid)

(Required by Section 1861, California Labor Code)

TO: _____
(Owner)

I am aware of the provisions of Section 3700 of the Labor Code of the State of California which require every employer to be insured against liability for workers' compensation claims or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

(Signature of Bidder)

(Type or Print Name)

(Title)

(Company)

(Business Address)

(Place of Residence)

END OF SECURITY FOR COMPENSATION CERTIFICATE

SECURITY FOR COMPENSATION CERTIFICATE

SUNNYSLOPE COUNTY WATER DISTRICT

Best Road Mutual Water Company Water System Consolidation Project

CERTIFICATION OF INSURANCE COMPLIANCE

(To be submitted with Bid)

TO: _____
(Owner)

I acknowledge that I am aware of and accept the provisions of the Agreement with regard to the insurance requirements and hereby certify that I can and shall obtain insurance that fully complies with all insurance requirements.

(Signature of Bidder)

(Type or Print Name)

(Title)

(Company)

(Business Address)

(Place of Residence)

END OF CERTIFICATION OF INSURANCE COMPLIANCE

BIDDER'S QUALIFICATIONS

(To be submitted with Bid)

The Bidder has been engaged in the contracting business, under the present business name for _____ years. Experience in work of a nature similar to that covered in the proposal extends over a period of _____ years.

The Bidder, as a contractor, has never failed to satisfactorily complete a contract awarded to him, except as follows:

The following contracts have been satisfactorily completed in the last three years for the persons, firm or authority indicated, and to whom reference is made:

Year	Type of Work	Contract Amount	For Whom
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Signed _____

(Same signature as on bid form)

END OF BIDDER'S QUALIFICATIONS

SUBCONTRACTOR LIST

(To be submitted with Bid)

Each Bidder shall set forth below with its bid:

(a) The name and the location of the place of business of each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the work or improvement, or a subcontractor licensed by the State of California who, under subcontract to the Contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one half of 1 percent (0.5%) of the Contractor's total bid or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of 1 (0.5) percent of the Contractor's total bid or ten thousand dollars (\$10,000), whichever is greater.

(b) The portion of the work which will be done by each such Subcontractor. The Contractor shall list only one Subcontractor for each portion of the work.

[(c) Submit a separate Subcontractor's list for each individual Contract for which a Base Bid is submitted.]

[(d) Submit a separate second page of Subcontractor's list to identify changes in Subcontractors that will be required if the owner selects a particular alternate.]

If the Bidder fails to specify a Subcontractor for any portion of the work as above-stated, or if the Bidder lists more than one Subcontractor for the same portion of the work, he agrees to perform that work himself. The following is submitted concerning Subcontractors:

Subcontractor Name	Address Shop or Office	Class of Work	Portion of Work to be Done	Subcontractor's License Number and Class
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

NON-COLLUSION AFFIDAVIT

(To be submitted with Bid)

In accordance with Section 7106 of the State of California Public Contract Code, Bidders are required to execute the following Non-collusion Affidavit.

NON-COLLUSION DECLARATION TO BE SUBMITTED WITH BID

I, _____, declare that I am _____
(Name) (Title)

of _____, the party making the foregoing bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder or fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Executed on _____, in _____.
(Date) (Location)

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

(Signature of Declarant)

END OF NON-COLLUSION AFFIDAVIT

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Section 2200 *et seq.*)

As required by California Public Contract Code Section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 *et seq.*) is true and correct:

1. The Contractor is not:
 - (i) identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or
 - (ii) a financial institution that extends, for 45 days or more, credit in the amount of \$20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.
2. Agency has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, Agency will be unable to obtain the goods and/or services to be provided pursuant to the Contract.
3. The amount of the Contract payable to the Contractor for the Project does not exceed \$1,000,000.

Signed _____

Titled _____

Firm _____

Date _____

Note: In accordance with Public Contract Code Section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of \$250,000 or twice the Contract amount, termination of the Contract and/or ineligibility to bid on contracts for three years.

END OF IRAN CONTRACTING ACT CERTIFICATION

ECONOMIC SANCTIONS AGAINST RUSSIA CERTIFICATION

(California Executive Order N-6-22)

On March 4, 2022, the Governor issued Executive Order N-6-22 (the EO) regarding Economic Sanctions against Russia and Russian entities and individuals. The EO may be found at: <https://www.gov.ca.gov/wp-content/uploads/2022/03/3.4.22-Russia-Ukraine-Executive-Order.pdf>.

“Economic Sanctions” refers to sanctions imposed by the U.S. government in response to Russia’s actions in Ukraine, as well as any sanctions imposed under State law. The EO directs DWR to terminate funding agreements with, and to refrain from entering any new agreements with, individuals or entities that are determined to be a target of Economic Sanctions or is conducting prohibited transactions with sanctioned individuals or entities.

The Contractor hereby certifies that they have reviewed the EO and remain in compliance with all economic sanctions, that the Contractor is not the target of economic sanctions, and that the Contractor is not conducting prohibited transactions with sanctioned individuals or entities.

Signed _____

Titled _____

Firm _____

Date _____

END OF ECONOMIC SANCTIONS AGAINST RUSSIA CERTIFICATION

CONSTRUCTION CONTRACT

THIS CONTRACT made on _____ by, and between, **SUNNYSLOPE COUNTY WATER DISTRICT** (District), and _____, (Contractor). Any and all obligations of the District and Contractor, collectively “Parties” are fully set forth and described herein.

In consideration of the mutual covenants and conditions set forth in this Contract, the Parties agree as follows:

1. WORK TO BE PROVIDED

Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, transportation, and material necessary to perform and complete the Work in a good and workmanlike manner, as called for, and in the manner designated in, and in strict conformity with, the specifications in the District Notice Inviting Bids and Bid Form.

The Work is generally described as follows:

- A. The Work includes construction of new potable water facilities in John Smith Road to provide potable water service to the existing Best Road Mutual Water Company (BRMWC) water distribution system, and the abandonment of existing BRMWC wells. This work will include coordination with Sunnyslope County Water District (SSCWD), BRMWC, the County of San Benito, the California Department of Water Resources (DWR), and the California State Water Resources Control Board – Division of Drinking Water (DDW). A summary of the Work is as follows:

1. New Potable Water Service:

- a. Approximately 4,360 LF of 8” DR 18 C900 water main in John Smith Road, extending from the existing SSCWD mainline in Fairview Road, at the intersection with John Smith Road, to the existing BRMWC mainline in Heatherwood Lane.
- b. Approximately 80 LF of 8” CL 350 ductile iron water main in John Smith Road, in shallow trench section in the alignment described in Para.1. A.1.a.
- c. Six (6) new cast iron fire hydrants assemblies per SSCWD Standards.
- d. Three (3) new 1” combination air and vacuum release valves, with associated fittings and appurtenances, per SSCWD Standards.

2. Abandonment of Existing Wells:

- a. Two (2) existing groundwater wells will be abandoned following CA Department of Water Resources (DWR) Bulletin 74-81 and Bulletin 74-90, per Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.060 WELL STANDARDS of the San Benito County Code of Ordinances.
- B. The Work consists of items listed in the Base Bid Schedule. Refer to Technical Specification Section 01 20 00 for further definition.
- C. All Work in this Contract shall be subject to the Contract Documents, applicable requirements of the encroachment permit from San Benito County, and any environmental permitting requirements.
1. The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) which describes in specific detail the Contractor's program and specific measures to prevent storm water contamination. The program shall identify both common construction activities and unexpected events.
 - a. The SWPPP shall comply with requirements of the Construction Stormwater General Permit, Order 2022-0057-DWQ and Section 01 57 23 – Temporary Storm Water Pollution Control of the Technical Specifications.
 - b. In the event of a conflict between Order 2022-0057-DWQ and Section 01 57 23, the requirements of Order 2022-0057-DWQ shall take precedent.
 - c. Payment for preparing and implementing the SWPPP, throughout the Project's duration, and for providing all materials, labor, tools, equipment, and all incidentals to install, maintain, and remove when completed, all erosion and sediment control measures, shall be considered to be included in and distributed proportionately through all of the corresponding contract items of work, and no additional compensation will be allowed.
 2. Follow the requirements for Traffic Control as required by the County.

D. Work Schedule Considerations

1. Cooperate with Sunnyslope County Water District, Best Road Mutual Water Company, and County of San Benito staff, contractors, and sub-contractors, and all other agencies requiring such coordination/cooperation throughout the construction of the Work, including coordination of lay down and construction staging areas.
2. Complete all work required by Section 01 57 23 - Temporary Storm Water Pollution Control of these specifications.

The Owner and the Contractor recognize that time is of the essence of this Agreement and that the Owner will suffer financial loss if the Work is not completed within the times specified in Section 4, plus any extensions thereof allowed in accordance with Article 15 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the Owner two thousand five hundred dollars (\$2,500) for each day that expires after the time specified in Section 4 for Completion until the Work is fully complete and the Owner issues a notice of Final Completion.

6. RETAINAGE

- A. The Owner will withhold 5% as retainage from each progress payment due to the Contractor. Retainage shall be paid to the Contractor at the time of Final Payment as set forth in Article 15 of the General Conditions.
- B. In accordance with California Public Contract Code Sections 10263 and 22300, the Contractor is hereby permitted to substitute securities of the kind listed below in place of the retention withheld in accordance with this section, or any other moneys withheld by the Owner to insure performance of this contract. At the request and expense of the Contractor, securities equivalent to the amount withheld may be deposited directly with a state or federally chartered bank as the escrow agent, who shall pay such moneys to the Contractor at the time of Final Payment and upon satisfactory completion of this contract. The Owner is authorized to execute documents necessary for this purpose. The Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall be entitled to receive any interest thereon. Securities eligible for investment under this provision shall include those listed in Government Code, Section 16430, or bank or savings and loan certificates of deposit. The retention or other moneys withheld will not be released to the Contractor until the Owner has satisfied itself that the substitution of securities has been made in accordance with the provisions of this paragraph.

7. PAYMENTS

- A. Payments will be made to the Contractor for work performed at the times and in the manner provided in the Contract Documents. Payment will be made at bid prices for awarded Bid Items, plus amounts of approved Change Orders.
- B. If recommended by the Engineer, payments may include 100 % of the value of major equipment and custom fabricated items that have been delivered, stored and protected at the site and that meet other requirements of General Conditions Article 15.

- C. The period covered by each Application for Payment shall be one calendar month ending on the last day of each month. The Owner shall make payment within 30 days after the Engineer issues a Recommendation for Payment.

8. CONTRACT REPRESENTATIONS

In consideration of the Owner entering into this Agreement, the Contractor makes the following representations:

- A. The Contractor has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
- B. The Contractor has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Information Available to Bidders and accepts the limitations set forth in the General Conditions as to the extent to which the Contractor may rely on the information contained in such reports and drawings or otherwise provided by the Owner, the Design Engineer or the Engineer.
- C. The Contractor has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in this article which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as the Contractor considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Article 5 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by the Contractor for such purposes.
- D. The Contractor has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing facilities, existing utilities, existing underground or concealed utilities and existing underground facilities at or contiguous to the site and accepts the limitations set forth in the General Conditions as to the extent to which the Contractor may rely on such information or on other information provided by the Owner, the Design Engineer or the Engineer. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect to said existing facilities, existing utilities, existing underground or concealed utilities and underground facilities are or will be required by the Contractor in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Article 5 of the General Conditions.

- E. The Contractor has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- F. The Contractor has given the Engineer written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution therefor by the Engineer is acceptable to the Contractor.

9. CONTRACTOR DECLARATIONS

The Contractor declares the Work will be conducted pursuant to the following additional requirements of the State of California:

- A. **Prevailing Wage Scale:** Reference is hereby made to the rate of prevailing wage scale established by the State of California Director of Industrial Relations, the provisions of which are hereby specified as the rate of prevailing wage to be paid workers on this project, and the provisions of Article 2, Chapter 1, Part 7, Division 2 (commencing with Section 1770) of the Labor Code shall be complied with.
- B. **Hours of Labor:** Eight-hour labor constitutes a legal day's work. The Contractor shall forfeit, as penalty to the Owner, twenty-five dollars (\$25.00) for each worker employed in the execution of the contract by him or by any subcontractor, for each calendar day during which any worker is required or permitted to labor more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week, except as permitted by the provisions of Article 3, Chapter 1, Part 7, Division 2 (commencing with Section 1810) of the Labor Code of the State of California.
- C. **Apprentices:** In accordance with the provisions of Section 1777.5 of the Labor Code, and in accordance with the regulations of the California Apprenticeship Council, properly registered, apprentices may be employed in the prosecution of the work. Information relative to number of apprentices, identifications, wages, hours of employment and standards of working conditions shall be obtained from the Director of the Department of Industrial Relations, who is the Administrative Officer of the California Apprenticeship Council.
- D. **Prohibited Employment Discrimination:** Attention is directed to Section 1735 of the California Labor Code, which reads as follows:

"No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, mental condition, marital status, or sex of such persons, except as provided in Section 12940 of the Government Code, and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter."

- E. **Workers' Compensation Insurance:** In accordance with the provisions of Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860) and Chapter 4, Part 1, Division 4 (commencing with Section 3700) of the California Labor Code, the Contractor is required to secure the payment of compensation to his employees and shall for that purpose obtain and keep in effect adequate Workers' Compensation Insurance. The undersigned Contractor is aware of the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for Workers' Compensation claims or to undertake self-insurance in accordance with the provisions of that Code, and will comply with such provisions before commencing the performance of the Work in this contract.
- F. **Security for Compensation:** The Contractor hereby stipulates that the provisions of Section 1775 of the California Labor Code will be complied with. The Contractor further agrees to secure the payment of compensation to his employees in accordance with the provisions of Section 3700 of the California Labor Code.
- G. **Contractor Claims Against the Owner:** Effective January 1, 1991, the California Legislature enacted a requirement that all contract claims of \$375,000.00 or less on local government public works contracts must be submitted to mediation and judicial arbitration. Article 1.5 (Sections 20104 through 20104.6, inclusive) of Chapter 1 of Part 3 of the Public Contract Code concerning Resolution of Construction Claims, is hereby incorporated into this agreement. See Supplementary Conditions for a summary of the timing provisions in Section 20104 through 20104.6.
- H. **Contractor's License:** The Contractor declares that it possesses a valid California Contractor's License of the required class at the time of signing this Agreement. The Contractor shall affirm its license number, classification and expiration date on this Agreement.

The following statement is included in accordance with Section 7030 of the California Business and Professions Code: "Contractors are required by law to be licensed and regulated by the Contractors State License Board. Any questions concerning a Contractor may be referred to the Registrar, Contractors State License Board, P.O. Box 26000, Sacramento, California 95826."

10. **INDEMNIFICATION**

To the extent permitted by law, Contractor shall defend, indemnify and hold harmless Owner, its directors, officers, employees, and authorized volunteers from and against all claims, damages, losses and expenses, including reasonable attorneys' fees and costs to defend arising out of the performance of the work described herein, and caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone whose acts any of them may be liable, except where caused by the active

negligence, sole negligence, or willful misconduct of the Owner, its directors, officers, employees, and authorized volunteers.

11. INSURANCE

Minimum Scope and Limits of Insurance: Contractor shall procure and maintain for the duration of the contract, *and for 5 years thereafter*, insurance against claims for injuries or death to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees, or subcontractors.

Coverage - Coverage shall be at least as broad as the following:

1. **General Liability - Commercial General Liability (CGL)** - Insurance Services Office (ISO) Commercial General Liability Coverage (Occurrence Form CG 00 01) including products and completed operations, property damage, bodily injury, personal and advertising injury with limit of at least five million dollars (\$5,000,000) per occurrence or the full per occurrence limits of the policies available, whichever is greater. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location (coverage as broad as the ISO CG 25 03, or ISO CG 25 04 endorsement provided to Owner), or the general aggregate limit shall be twice the required occurrence limit.
2. **Automobile Liability** - Insurance Services Office (ISO) Business Auto Coverage (Form CA 00 01), covering Symbol 1 (any auto) with limit of one million dollars (\$1,000,000) for bodily injury and property damage each accident.
3. **Workers' Compensation Insurance** - The Contractor shall provide workers' compensation coverage as required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than \$1,000,000 per accident for bodily injury or disease. **Waiver of Subrogation** (also known as Transfer of Rights of Recovery Against Others to Us): The Contractor hereby agrees to waive rights of subrogation to obtain endorsement necessary to affect this waiver of subrogation in favor of the Owner, its directors, officers, employees, and authorized volunteers, for losses paid under the terms of this coverage which arise from work performed by the Named Insured for the Owner; this provision applies regardless of whether or not the Owner has received a waiver of subrogation from the insurer.
4. **Builder's Risk** – (Course of Construction) if necessary- insurance utilizing an “All Risk” (Special Perils) coverage form with limits equal to the completed value of the project and no coinsurance penalty provision. See **Responsibility of Work**
5. **Contractor's Pollution Liability** – (optional: if project involves environmental hazards) with limits no less than \$5,000,000 per occurrence or claim, and \$10,000,000 policy aggregate.

If the Contractor maintains broader coverage and or/higher limits than the minimums shown above, the Owner requires and shall be entitled to the broader coverage and/or higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum of insurance and coverage shall be available to the Owner)

Other Required Provisions – The Commercial General Liability policy and Contractors Pollution (if necessary) are to contain, or be endorsed to contain, the following provisions:

1. **Additional Insured Status:** Owner, its directors, officers, employees, and authorized volunteers are to be given insured status (at least as broad as ISO Form CG 20 10 11 85 or if not available, through the addition of **both** CG 20 10 10 01 and CG 20 37 10 01, with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts, or equipment furnished in connection with such work or operations. General liability coverage can be provided in the form of an endorsement to the Contractor’s insurance.
2. **Primary Coverage:** For any claims related to this project, the Contractor’s insurance coverage shall be primary at least as broad as ISO CG 20 01 04 13 as respects to the Owner, its directors, officers, employees, and authorized volunteers. Any insurance or self-insurance maintained by the Owner, its directors, officers, employees, and authorized volunteers shall be excess of the Contractor’s insurance and shall not contribute with it.

Notice of Cancellation: Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the Owner.

Acceptability of Insurers - Insurance is to be placed with insurers having a current A.M. Best rating of no less than A: VII or equivalent or as otherwise approved by Owner.

The Contractor agrees and he/she will comply with such provisions before commencing work. All of the insurance shall be provided on policy forms and through companies satisfactory to Owner. The Owner reserves the right to obtain complete, certified copies of all required insurance policies, including the policy declarations page with endorsement number. Failure to continually satisfy the Insurance requirements is a material breach of contract.

Responsibility for Work - Until the completion and final acceptance by Owner of all the work under and implied by this agreement, the work shall be under the Contractor’s responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erectations, and repairs occasioned or rendered necessary by causes of any nature whatsoever.

The Contractor shall provide and maintain **builder’s risk** (course of construction) or an installation floater (for materials and equipment) covering all risks of direct physical loss, damage or destruction to the work in the amount specified in the General Conditions, to insure against such

losses until final acceptance of the work by Owner. Such insurance shall insure at least against the perils of fire and extended coverage, theft, vandalism and malicious mischief, and collapse. The Policy shall be endorsed with Owner, its directors, officers, employees, and authorized volunteers named as loss payee, as their interest may appear. The making of progress payments to the Contractor shall not be construed as creating an insurable interest by or for Owner or be construed as relieving the Contractor or his/her subcontractors of responsibility for loss from any direct physical loss, damage or destruction occurring prior to final acceptance of the work by Owner.

Deductibles and Self-Insured Retentions - Insurance deductibles or self-insured retentions must be declared by the Contractor, and approved by the Owner. At the election of Owner the Contractor shall either cause the insurer to reduce or eliminate such self-insured retentions as respects the Owner, its directors, officers, employees, and authorized volunteers or the Contractor shall provide a financial guarantee satisfactory to the Owner guaranteeing payment of losses and related investigations, claim administration, and defense expenses. The policy language shall provide, or be endorsed to provide, that the self-insured retention may be satisfied by either the named insured or the Owner.

Verification of Coverage - Evidences of Insurance Contractor shall furnish the Owner with copies of certificates and amendatory endorsements effecting coverage required by this contract. All certificates and endorsements are to be received and approved by the Owner before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. The Owner reserves the right to require complete, certified copies of all required insurance policies, including policy Declaration pages and Endorsement pages, required by these specifications, at any time. Failure to continually satisfy the Insurance requirements is a material breach of contract.

Continuation of Coverage - The Contractor shall, upon demand of Owner deliver evidence of coverage showing continuation of coverage for at least (5) years after completion of the project. Contractor further waives all rights of subrogation under this agreement. When any of the required coverages expire during the term of this agreement, the Contractor shall deliver the renewal certificate(s) including the general liability additional insured endorsement and evidence of waiver of rights of subrogation against Owner (if builder's risk insurance is applicable) to Owner at least ten (10) days prior to the expiration date.

Sub-Contractors - In the event that the Contractor employs other Contractors (sub-contractors) as part of the work covered by this agreement, it shall be the Contractor's responsibility to require and confirm that each sub-contractor meets the minimum insurance requirements specified above (via as broad as ISO CG 20 38 04 13). The Contractor shall, upon demand of Owner, deliver to Owner copies such policy or policies of insurance and the receipts for payment of premiums thereon.

12. TERMINATION

The District may terminate this Contract for any reason by giving written notice of termination at least fourteen (14) calendar days prior to the effective termination date, which shall be specified in such notice. The District may immediately terminate this Contract for good cause. "Good cause" includes but is not limited to a breach of or failure to perform any section of this Contract or poor workmanship. In the event of such termination, the amount payable under this Contract shall be limited to payment for the Work performed prior to the date of termination.

13. INSPECTION OF SITE, RECORDS, & DOCUMENTATION

Contractor shall maintain books, records, and other documentation pertinent to their work in accordance with generally accepted accounting principles and practices. Records shall be subject to inspection by Owner or State department issuing the grant at any and all reasonable times. All records shall be preserved for at least three (3) years after issuance of the Notice of Completion and shall be made available upon request.

Owner, State, or any agent duly authorized by Owner shall have the right to access and inspect the work being performed at any and all reasonable times during the term of the contract. Contractor shall ensure that safe and suitable access is provided to the site at all reasonable times during project construction and thereafter for the term of the contract.

14. ACKNOWLEDGEMENT OF CREDIT & SIGNAGE

Contractor shall include appropriate acknowledgement of credit to the State for its support when using any portion of the project for promotion through the following statement: "Funding for this project has been provided in part from the State Department of Water Resources." Contractor shall post signage with this statement and the Department of Water Resources color logo in a prominent location at the Project site. Signage requirements are provided in Section XX of the Supplemental General Conditions.

15. AMENDMENTS & MODIFICATIONS

No modification or amendment of this Contract shall be valid unless it is set forth in writing and executed by the Parties hereto.

16. LICENSING REQUIREMENTS

Contractor is required, by law, to be licensed and regulated by Contractor's state license board and must abide by all licensing and reporting regulations.

17. APPRENTICES

Contractor agrees to comply with all provisions of the law regarding the employment of apprentices. (Labor Code §§ 1773.3, 1777.5, 1777.6 and 3077 et seq.) These Labor Code sections require Contractor employ apprentices in apprenticeshipable occupations in a ratio of not less

than one (1) apprentice for each five (5) journeyman hours, unless an exemption is granted. Contractor shall not discriminate among otherwise qualified employees as indentured apprentices on any Public Works project solely on the grounds of race, religious creed, color, national origin, ancestry, sex, or age. Only apprentices who are in training under written apprenticeship agreements shall be employed on Public Works contracts in apprenticeship occupations. The responsibility for compliance with these provisions for all apprenticable occupations rests with Contractor.

18. PREVAILING WAGE

The Work under this Contract qualifies as Public Works subject to California Labor Code Section 1720 et seq. Contractor shall comply with and be bound by all pertinent sections of the Labor Code beginning with Section 1720 regarding payment of prevailing wage rates, holiday and overtime pay, hiring of apprentices, workers compensation insurance, etc., all as set forth by the California Department of Industrial Relations (DIR). Contractor shall be registered with DIR as a Public Works Contractor and abide by all relevant reporting requirements. Contractor is responsible for maintaining all applicable payroll records and reports, which shall be made available to District for review upon written request.

19. PAYROLL RECORDS

Pursuant to Labor Code §1776, Contractor shall keep accurate records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by it in connection with the Work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following: 1) The information contained in the payroll record is true and correct; 2) The employer has complied with the requirements of Labor Code §§1771, 1811, and 1815 for any Work performed. Payroll records enumerated shall be certified and shall be available for inspection at all reasonable hours at the principal office of Contractor.

20. INDEPENDENT CONTRACTOR

In the performance of the Work, duties, and obligations under this Contract, Contractor is at all times acting and performing as an independent contractor and not as an employee of the District. No offer or obligation of permanent employment with the District is intended in any manner, and Contractor shall not become entitled by virtue of this Contract to receive from District any form of employee benefits including but not limited to sick leave, vacation, retirement benefits, workers' compensation coverage, insurance or disability benefits. Contractor shall be solely liable for and obligated to pay directly all applicable taxes, including federal and state income taxes and social security, arising out of Contractor's performance of this Contract. In connection therewith, Contractor shall defend, indemnify, and hold District harmless from any and all liability which District may incur because of Contractor's failure to pay such taxes.

21. NON-DISCRIMINATION

During the performance of this Funding Agreement, Grantee and its contractors or subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex (gender), sexual orientation, race, color, ancestry, religion, creed, national origin (including language use restriction), pregnancy, physical disability (including HIV and AIDS), mental disability, medical condition (cancer/genetic characteristics), age (over 40), marital/domestic partner status, gender identity, and denial of medical and family care leave or pregnancy disability leave. Contractors and its subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractors and its subcontractors shall comply with the provisions of the California Fair Employment and Housing Act (Gov. Code, § 12990.) and the applicable regulations promulgated thereunder (Cal. Code Regs., tit. 2, § 11000 et seq.). The applicable regulations of the Fair Employment and Housing Commission are incorporated into this Agreement by reference. Contractors and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

22. NOTICES

Notices required under this Contract shall be delivered personally or by first-class, postage pre-paid mail to the District’s and Contractor’s contract administrators at the addresses listed below:

FOR DISTRICT:	FOR CONTRACTOR:
Drew Lander General Manager 3570 Airline Highway Hollister, CA 95023 (831) 637-4670 drew@sunnyslopedwater.org	

23. GOVERNING LAWS

This Contract shall be construed and enforced according to the laws of the State of California, and the Parties hereby agree that the County of San Benito shall be the proper venue for any dispute arising hereunder.

24. DISPUTES

a. Contractor shall continue to perform under this Contract during any dispute. The Parties agree to make good faith efforts to resolve disputes as quickly as possible.

b. Claims

(1) Upon receipt of a claim by Contractor, the District shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide Contractor a written statement identifying the portions of the claim that are disputed and undisputed. The Parties may, by mutual agreement, extend the time period.

(a) Contractor shall furnish reasonable documentation to support the claim.

(b) If the District needs approval from its Board to provide Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the Board does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the District shall have up to three days following the next duly publicly noticed Board meeting after the 45-day period, or extension, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

(c) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the District issues its written statement. If the District fails to issue a written statement, paragraph (2) shall apply.

(2) If Contractor disputes the District's written response, or if the District fails to respond to a claim issued pursuant to this section within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the District shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(a) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the District shall provide Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the District issues its written statement. Any disputed portion of the claim, as identified by Contractor in writing, shall be submitted to nonbinding

mediation, with the Parties sharing the associated costs equally. The Parties shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the Parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(b) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(c) Unless otherwise agreed to by the Parties in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

(d) The District is not precluded from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the Parties' dispute.

(3) Failure by the District to respond to a claim from Contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim denied by reason of the District's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of Contractor.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against the District because privity of contract does not exist, Contractor may present to the District a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a claim for work performed by the subcontractor or by a lower tier subcontractor

on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the District shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, Contractor shall notify the subcontractor in writing as to whether Contractor presented the claim to the District and, if Contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

- c. In the event any dispute arising from or relating to this Contract results in litigation or arbitration, the prevailing party shall be entitled to recover all reasonable costs incurred, including court costs, attorneys' fees, expenses for expert witnesses (whether or not called to testify), expenses for accountants or appraisers (whether or not called to testify), and other related expenses. Recovery of these expenses shall be as additional costs awarded to the prevailing party, and shall not require initiation of a separate legal proceeding.

25. UNFAIR BUSINESS PRACTICES CLAIM

In accord with California Public Contracts Code § 7103.5, Contractor agrees to assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract. This assignment shall be made and become effective at the time the District tenders final payment to Contractor, without further acknowledgment by the Parties.

26. CONSTRUCTION OF CONTRACT

The Parties agree that each party has fully participated in the review and revision of this Contract and that any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Contract or any exhibit or amendment. To that end, it is understood and agreed that this Contract has been arrived at through negotiation, and that neither party is to be deemed the party which prepared this Contract within the meaning of Civil Code section 1654.

27. CONFLICT OF INTEREST

Contractor represents it presently has no interest and agrees not to acquire any interest during the term of this Contract which would directly or indirectly conflict in any manner or to any degree with the full and complete performance of the Work required to be rendered under this Contract.

28. NON-EXCLUSIVE CONTRACT

This Contract is non-exclusive and both Parties expressly reserve the right to contract with other entities for the same or similar services.

29. WAIVER

Any waiver of any term or condition hereof must be in writing and signed by the District. No such waiver shall be construed as a waiver of any other term or condition herein.

30. SUCCESSORS AND ASSIGNS

This Contract and all rights, privileges, duties and obligations hereunder, to the extent assignable or delegable, shall be binding upon and inure to the benefit of the Parties and their respective successors, permitted assigns and heirs. Contractor shall not assign, sell, mortgage or otherwise transfer its interest or obligations in this Contract without the prior written consent of the District.

31. COUNTERPARTS

This Contract may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same Contract.

32. AUTHORITY

Any individual executing this Contract on behalf of the District or Contractor represents and warrants hereby that he or she has the requisite authority to enter into this Contract on behalf of such party and bind the party to the terms and conditions of this Contract.

33. SEVERABILITY

If any of the provisions contained in the Contract are held illegal, invalid, or unenforceable, the enforceability of the remaining provisions shall not be impaired thereby. Limitations of liability and indemnities shall survive termination of the Contract for any cause. If a part of this Contract is invalid, all valid parts that are severable from the invalid part remain in effect. If a part of this Contract is invalid in one or more of its applications, the part remains in effect in all valid applications that are severable from the invalid applications.

34. ENTIRE CONTRACT

As of the effective date, this Contract, including the exhibits and any documents incorporated by reference, represents the entire Contract between the District and Contractor with respect to the subject matter of this Contract, and supersedes any and all prior written or oral negotiations and representations between the Parties concerning all matters relating to the subject of this Contract.

35. WARRANTY

The contractor shall guarantee the entire Work constructed by them under the Contract to be free of defects in materials and workmanship for a period of one (1) year following the date of written

Notice of Completion & Acceptance of the Work by Owner. The contractor shall agree to make, at their own expense, any repairs or replacements made necessary by defects in materials or workmanship which become evident within said guarantee period. The contractor shall make all repairs and replacements promptly upon receipt of written order from Owner. If the contractor fails to make the repairs and replacements promptly, Owner may do the Work and the contractor, and their Performance Bond shall be liable to Owner for the cost of such Work.

36. DRUG-FREE WORKPLACE CERTIFICATION

By signing this Funding Agreement, Contractor and its subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code, § 8350 et seq.) and have or will provide a drug-free workplace by taking the following actions:

- A. Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by the Government Code section 8355.
- B. Establish a Drug-Free Awareness Program, as required by Government Code section 8355 to inform employees, contractors, or subcontractors about all of the following:
 - i. The dangers of drug abuse in the workplace,
 - ii. Contractor's policy of maintaining a drug-free workplace,
 - iii. Any available counseling, rehabilitation, and employee assistance programs, and
 - iv. Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.
- C. Provide, as required by Government Code section 8355, that every employee, contractor, and/or subcontractor who works under this project:
 - i. Will receive a copy of Contractor's drug-free policy statement, and
 - ii. Will agree to abide by terms of Contractor's condition of employment, contract, or subcontract.

37. ACCIDENT PROTECTION & SAFETY

Precautions shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building codes, and construction codes shall be observed. Machinery, equipment, and other hazards shall be guarded or eliminated in accordance with the safety provisions of the Construction Safety Orders issued by the Occupational Safety and Health Standards Board of the State of California.

In the performance of this contract the Contractor shall comply with all applicable federal, state and local statutory and regulatory requirements including, but not limited to California Department of Industrial Relations (Cal/OSHA) regulations; and the U.S. Department of Transportation Omnibus Transportation Employee Testing Act, related to their scope of work and operations. In case of conflict in regulations, the most stringent shall apply. The Contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. Safety precautions shall include but shall not be limited to: adequate life protection and life saving equipment; adequate illumination; instructions in accident prevention for all employees, such as the use of machinery guards, safe walkways, scaffolds, ladders, bridges, gang planks, confined space procedures, trenching and shoring, fall protection, and other safety devices; equipment and wearing apparel as are necessary or lawfully required to prevent accidents, injuries, or illnesses (including but not limited to exposure to the Coccidioides fungus and Valley Fever); and adequate facilities for the proper inspection and maintenance of all safety measures

Contractor must obtain all applicable Division of Occupational Safety and Health (CAL-OSHA) permit(s) and others required by California Labor Code and California Government Code, prior to the initiation of any practices, work, method, operation, or process related to the work covered in the contract. Permits required by governmental authorities will be obtained at Contractor's expense.

It is a condition of this contract, and shall be made a condition of each subcontract which the Contractor enters into pursuant to this contract, that the Contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under Cal/OSHA safety and health standards.

The Contractor shall be responsible for the safeguarding of all utilities. At least two working days before beginning work, the Contractor shall call the Underground Service Alert (USA) in order to determine the location of sub-structures. The Contractor shall immediately notify Owner and the utility owner if he/she disturbs, disconnects, or damages any utility.

In accordance with Section 6705 of the California Labor Code, the Contractor shall submit to Owner specific plans to show details of provisions for worker protection from caving ground during excavations of trenches of five feet or more in depth. The excavation/trench safety plan shall be submitted to and accepted by Owner prior to starting excavation. The trench safety plan shall have details showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If such a plan varies from the shoring system standards established by the Construction Safety Orders of the California Department of Industrial Relations (Cal/OSHA), the plan shall be prepared by a California registered civil or structural engineer. As part of the plan, a note shall be included stating that the registered civil or structural engineer certifies that the plan complies with the Cal/OSHA Construction Safety Orders, or that the registered civil or structural engineer certifies that the plan is not less effective than the

shoring, bracing, sloping or other provisions of the Safety Orders. In no event shall the Contractor use a shoring, sloping, or protective system less effective than that required by said Construction Safety Orders. Submission of this plan in no way relieves the Contractor of the requirement to maintain safety in all areas. If excavations or trench work requiring a Cal/OSHA permit are to be undertaken, the Contractor shall submit his/her permit with the excavation/trench work safety plan to Owner before work begins.

IN WITNESS WHEREOF, two identical counterparts of this Contract, each of which shall for all purposes be deemed an original thereof, have been duly executed by the parties herein above named, on the day and year first herein written.

DISTRICT

CONTRACTOR

By: _____
Drew Lander

By: _____

Title: General Manager

Title: _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
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GUIDELINES FOR USE OF EJCDC® C-700, STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

1.0 PURPOSE AND INTENDED USE OF THE DOCUMENT

EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), is the foundation document for the EJCDC Construction Series. The General Conditions define the basic rights, responsibilities, risk allocations, and contractual relationship of the Owner and Contractor, and establish how the Contract is to be administered.

2.0 OTHER DOCUMENTS

EJCDC documents are intended to be used as a system and changes in one EJCDC document may require a corresponding change in other documents. Other EJCDC documents may also serve as a reference to provide insight or guidance for the preparation of this document.

These General Conditions have been prepared for use with either EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price), or EJCDC® C-525, Agreement Between Owner and Contractor for Construction Contract (Cost-Plus-Fee) (2018 Editions). The provisions of the General Conditions and the Agreement are interrelated, and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC® C-800, Supplementary Conditions of the Construction Contract (2018).

The full EJCDC Construction series of documents is discussed in the EJCDC® C-001, Commentary on the 2018 EJCDC Construction Documents (2018).

3.0 ORGANIZATION OF INFORMATION

All parties involved in a construction project benefit significantly from a standardized approach in the location of subject matter throughout the documents. Experience confirms the danger of addressing the same subject matter in more than one location; doing so frequently leads to confusion and unanticipated legal consequences. Careful attention should be given to the guidance provided in EJCDC® N-122/AIA® A521, Uniform Location of Subject Matter (2012 Edition) when preparing documents. EJCDC® N-122/AIA® A521 is available at no charge from the EJCDC website, www.ejcdc.org, and from the websites of EJCDC's sponsoring organizations.

If CSI MasterFormat™ is used for organizing the Project Manual, consult CSI MasterFormat™ for the appropriate document number (e.g., under 00 11 00, Advertisements and Invitations), and accordingly number the document and its pages.

4.0 EDITING THIS DOCUMENT

Remove these Guidelines for Use. Some users may also prefer to remove the two cover pages.

Although it is permissible to revise the Standard EJCDC Text of C-700 (the content beginning at page 1 and continuing to the end), it is common practice to leave the Standard EJCDC Text of C-700 intact and unaltered, with modifications and supplementation of C-700's provisions set forth in EJCDC® C-800, Supplementary Conditions of the Construction Contract (2018). If the Standard Text itself is revised, the

user must comply with the terms of the License Agreement, Paragraph 4.0, Document-Specific Provisions, concerning the tracking or highlighting of revisions. The following is a summary of the relevant License Agreement provisions:

1. The term “Standard EJCDC Text” for C-700 refers to all text prepared by EJCDC in the main body of the document. Document covers, logos, footers, instructions, or copyright notices are not Standard EJCDC Text for this purpose.
2. During the drafting or negotiating process for C-700, it is important that the two contracting parties are both aware of any changes that have been made to the Standard EJCDC Text. Thus, if a draft or version of C-700 purports to be or appears to be an EJCDC document, the user must plainly show all changes to the Standard EJCDC Text, using “Track Changes” (redline/strikeout), highlighting, or other means of clearly indicating additions and deletions.
3. If C-700 has been revised or altered and is subsequently presented to third parties (such as potential bidders, grant agencies, lenders, or sureties) as an EJCDC document, then the changes to the Standard EJCDC Text must be shown, or the third parties must receive access to a version that shows the changes.
4. Once the document is ready to be finalized (and if applicable executed by the contracting parties), it is no longer necessary to continue to show changes to the Standard EJCDC Text. The user may produce a final version of the document in a format in which all changes are accepted, and the document at that point does not need to include any “Track Changes,” redline/strikeout, highlighting, or other indication of additions and deletions to the Standard EJCDC Text.

5.0 LICENSE AGREEMENT

This document is subject to the terms and conditions of the **License Agreement, 2018 EJCDC® Construction Series Documents**. A copy of the License Agreement was furnished at the time of purchase of this document, and is available for review at www.ejcdc.org and the websites of EJCDC’s sponsoring organizations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents;
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 Contractor's Warranty of Title

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY GENERAL CONDITIONS

PART 1 - SCOPE

The Work to be performed under this Contract shall consist of furnishing everything necessary for the fulfillment of the Contract in strict accordance with the requirements of the Contract Documents. The Work shall be complete, and anything not expressly shown or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be accomplished by the Contractor as though originally so indicated in the Contract Documents, at no increase in cost to the OWNER. The Contractor shall obligate him/herself to satisfactorily complete the Work within the time stipulated in Paragraph 9.g. of Document 00010 – Invitation to Bid. The date of the Notice to Proceed issued by the OWNER shall constitute the starting date of the Contract. Upon issuance of the Notice to Proceed, the Contractor shall immediately begin and diligently prosecute the work to completion.

PART 2 - GENERAL

These Supplementary General Conditions amend or supplement the Standard General Conditions of the Construction Contract (General Conditions) and other provisions of the Contract Documents as indicated. All provisions which are not so amended or supplemented remain in full force and effect. Reference to Caltrans Standard Specifications shall be limited to technical special provisions and are included below in the definition of “Technical Specifications.” Other administrative and non-technical provisions of the Caltrans Standard Specifications do not apply and are replaced by the EJCDC General Conditions (2018 version).

PART 3 – SUPPLEMENTARY DEFINITIONS

Wherever in these Contract Documents the following terms are used, the intent and meaning shall be shown herein. All terms not listed in the following amended or supplementary definitions shall have the meaning assigned to them in the General Conditions:

- 3.1 CONSTRUCTION MANAGER shall be herein defined as WALLACE GROUP. The official address of the Construction Manager is the same as the ENGINEER.
- 3.2 DISTRICT shall be herein defined as SUNNYSLOPE COUNTY WATER DISTRICT (SSCWD). The official address of the District is the same as the OWNER.
- 3.3 ENGINEER as referred to in Article 1 of the General Conditions shall be WALLACE GROUP, acting either directly or through properly authorized agents acting within the scope of their particular duties delegated to them or when designated in the Contract. The official address of the Engineer is:

WALLACE GROUP
612 Clarion Court
San Luis Obispo, CA 93401

3.4 OWNER as referred to in Article 1 of the General Conditions shall be SUNNYSLOPE COUNTY WATER DISTRICT (SSCWD). The official address of the OWNER is:

SUNNYSLOPE COUNTY WATER DISTRICT
3570 Airline Highway
Hollister, CA 95023-9702

3.5 STATE shall be herein defined as the State of California Department of Water Resources.

PART 4 - PROJECT APPEARANCE

- 4.1 The Contractor shall maintain a neat appearance to the work. In any area visible to the public, the following shall apply: When practicable, broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, the material shall be removed or disposed of weekly.
- 4.2 The Contractor shall furnish trash bins for all debris from structure construction. All debris shall be placed in trash bins daily. Forms or false work that is to be re-used shall be stacked neatly concurrently with their removal. Forms and false work that are not to be re-used shall be disposed of concurrently with their removal.
- 4.3 Full compensation for conforming to the provisions in this Section, not otherwise provided for, shall be considered as included in prices paid for the various contract items of work involved and no additional compensation will be allowed, therefore.

PART 5 - WORK SEQUENCE AND CONSTRAINTS

- 5.1 Within ten (10) working days upon receiving the completed (signed) Contract, the Contractor shall initiate the submittal and review process for all materials and equipment to be used on the project.
- 5.2 The Owner will issue the Notice to Proceed no later than ninety (90) calendar days from receipt of the signed Agreement. The counting of working days will commence with the Notice to Proceed.
- 5.3 Within ten (10) working days, or at the pre-construction conference, whichever occurs first, the Contractor shall prepare a Work Plan for review and approval by the Owner and Engineer. The Work Plan shall describe all elements of the Work in sufficient detail to allow Owner and Engineer to evaluate the progression of planned activities at the Site.
- 5.4 Within one hundred twenty (120) calendar days after the Notice-to-Proceed has been issued, the project shall be completed. Liquidated damages accrue starting on the 1st

day after the expiration of calendar days. Liquidated damages will be assessed per Section 5 of the Construction Contract.

- 5.5 Contractor may NOT conduct the work associated with abandoning the existing wells prior to finishing installation, testing, approval, DDW permitting, and commencement of potable water service through the new pipeline by Sunnyslope. Well abandonment shall be the final portion of work.

PART 6 – PARTIAL ACCEPTANCE OF WORK

- 6.1 **Partial Acceptance Limited:** Unless otherwise specified in the phased construction is required, no partial acceptance of the Work will be made, and no acceptance other than the final acceptance of the completed Work will be made.
- 6.2 **Inspection and Acceptance of Parts of the Work:** No inspection, progress payment, or acceptance pertaining to specific parts of the Work shall be construed as final acceptance by SSCWD.
- 6.3 **Right to Use:** SSCWD shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the time for completing the entire Work or such portions may not have expired. If such prior use increases the cost of or delays the Work, the Contractor shall be entitled to such extra compensation, or extension of time or both, as SSCWD may determine. Should any portion of the Work in use be damaged thereby, SSCWD shall bear the expense for repairing such damage. However, if the portion being so used should reveal deficiencies of materials or Workmanship, it shall be the Contractor's responsibility to replace the defective construction.
- 6.4 **Partial Acceptance of Work:** Acceptance of any portion of the Work prior to acceptance of the whole shall not be construed as absolving the Contractor of responsibility for any item of construction or incidental work included in the Contract.

PART 7 - FINAL ACCEPTANCE AND PAYMENT

- 7.1 **Notice of Readiness:** After the Contractor has completed the Work in accordance with the Contract Documents, including the Contractor's testing and cleanup, the Contractor shall notify SSCWD by written memorandum that the Work has been completed and ready for final inspection by SSCWD.
- 7.2 **Inspection:** SSCWD will proceed to perform an inspection within ten (10) calendar days after receipt of the Contractor's notification.
- A. Items found by SSCWD to be defective will be noted to the Contractor.
 - B. After the Contractor has corrected the defective items, the procedure shall be the same as stipulated under the General Conditions.

- 7.3 Final Payment:** For and in consideration of the faithful performance of the Work, Owner will pay the Contractor the amount earned as computed from the actual measured quantities of Work performed under the Contract, and to make such payment in the manner and at the times stipulated.
- 7.4 Date of Actual Completion:** The date upon which the Work will be considered as complete shall be that date upon which the Work is accepted by the Owner.

PART 8 – SITE, RECORD, AND BOOK INSPECTIONS

Owner and the State shall have the right to inspect the work being performed at any and all reasonable times during the Project. This right shall extend to any subcontractors and shall include ensuring safe and suitable access to the project site at all reasonable times during the project. Contractor and subcontractors shall maintain books, records, and other documents pertinent to their work in accordance with generally accepted accounting principles and practices. Records are subject to inspection at any and all reasonable times. All records shall be preserved for at least three (3) years after Notice of Completion.

PART 9 – ARCHAEOLOGICAL RESOURCES

Should a potential archaeological or historical resource be discovered during construction, the Contractor shall immediately cease all work in the area of the find until a qualified archaeologist has evaluated the situation and made recommendations regarding preservation of the resource, and the Owner has provided documentation from the State describing what actions should be taken to protect and preserve the resource(s). The Contractor agrees to implement appropriate actions as directed by the Owner.

PART 10 – INSURANCE

- 10.1 Minimum Scope and Limits of Insurance:** Contractor shall procure and maintain for the duration of the contract, and for 5 years thereafter, insurance against claims for injuries or death to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees, or subcontractors.
- 10.2 Coverage:** Coverage shall be at least as broad as the following:
- A. General Liability - Commercial General Liability (CGL): Insurance Services Office (ISO) Commercial General Liability Coverage (Occurrence Form CG 00 01), including products and completed operations, property damage, bodily injury, personal and advertising injury with limit of at least five million dollars (\$5,000,000) per occurrence or the full per occurrence limits of the policies available, whichever is greater. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location (coverage as broad as the ISO CG 25 03, or ISO CG 25 04 endorsement provided to

Owner), or the general aggregate limit shall be twice the required occurrence limit.

- B. Automobile Liability: Insurance Services Office (ISO) Business Auto Coverage (Form CA 00 01), covering Symbol 1 (any auto) with limit of one million dollars (\$1,000,000) for bodily injury and property damage each accident.
- C. Workers' Compensation Insurance: The Contractor shall provide workers' compensation coverage as required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than \$1,000,000 per accident for bodily injury or disease. **Waiver of Subrogation** (also known as Transfer of Rights of Recovery Against Others to Us): The Contractor hereby agrees to waive rights of subrogation to obtain endorsement necessary to affect this waiver of subrogation in favor of the Owner, its directors, officers, employees, and authorized volunteers, for losses paid under the terms of this coverage which arise from work performed by the Named Insured for the Owner; this provision applies regardless of whether or not the Owner has received a waiver of subrogation from the insurer.
- D. Builder's Risk: (Course of Construction) if necessary- insurance utilizing an "All Risk" (Special Perils) coverage form with limits equal to the completed value of the project and no coinsurance penalty provision. See Responsibility of Work.
- E. Contractor's Pollution Liability: (optional: if project involves environmental hazards) with limits no less than \$5,000,000 per occurrence or claim, and \$10,000,000 policy aggregate.

10.3 If the Contractor maintains broader coverage and or/higher limits than the minimums shown above, the Owner requires and shall be entitled to the broader coverage and/or higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum of insurance and coverage shall be available to the Owner.

10.4 Other Required Provisions: The Commercial General Liability policy and Contractors Pollution (if necessary) are to contain, or be endorsed to contain, the following provisions:

- A. Additional Insured Status: Owner, its directors, officers, employees, and authorized volunteers are to be given insured status (at least as broad as ISO Form CG 20 10 11 85 or if not available, through the addition of both CG 20 10 10 01 and CG 20 37 10 01), with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts, or equipment furnished in connection with such work or operations. General Liability Coverage can be provided in the form of an endorsement to the Contractor's insurance.
- B. Primary Coverage: For any claims related to this project, the Contractor's insurance coverage shall be primary, at least as broad as ISO CG 20 01 04 13, as respects to the Owner, its directors, officers, employees, and authorized volunteers. Any insurance or self-insurance maintained by the Owner, its

directors, officers, employees, and authorized volunteers shall be excess of the Contractor's insurance and shall not contribute with it.

- 10.5 Notice of Cancellation:** Each insurance policy required above shall provide that coverage shall not be canceled, except with notice to the Owner.
- 10.6 Acceptability of Insurers:** Insurance is to be placed with insurers having a current A.M. Best rating of no less than A: VII, or equivalent or as otherwise approved by Owner.
- 10.7 Responsibility for Work:** Until the completion and final acceptance by Owner of all the work under and implied by this agreement, the work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erectments, and repairs occasioned or rendered necessary by causes of any nature whatsoever. The Contractor shall provide and maintain builder's risk coverage (course of construction) or an installation floater (for materials and equipment) covering all risks of direct physical loss, damage or destruction to the work in the amount specified in the General Conditions, to insure against such losses until final acceptance of the work by Owner. Such insurance shall insure at least against the perils of fire and extended coverage, theft, vandalism and malicious mischief, and collapse. The Policy shall be endorsed with Owner, its directors, officers, employees, and authorized volunteers named as loss payee, as their interest may appear. The making of progress payments to the Contractor shall not be construed as creating an insurable interest by or for Owner or be construed as relieving the Contractor or his/her sub-contractors of responsibility for loss from any direct physical loss, damage or destruction occurring prior to final acceptance of the work by Owner.
- 10.8 Deductibles and Self-Insured Retentions:** Insurance deductibles or self-insured retentions must be declared by the Contractor and approved by the Owner. At the election of Owner, the Contractor shall either cause the insurer to reduce or eliminate such self-insured retentions as respects the Owner, its directors, officers, employees, and authorized volunteers or the Contractor shall provide a financial guarantee satisfactory to the Owner guaranteeing payment of losses and related investigations, claim administration, and defense expenses. The policy language shall provide, or be endorsed to provide, that the self-insured retention may be satisfied by either the named insured or the Owner.
- 10.9 Verification of Coverage – Evidences of Insurance:** Contractor shall furnish the Owner with copies of certificates and amendatory endorsements effecting coverage required by this contract. All certificates and endorsements are to be received and approved by the Owner before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. The Owner reserves the right to require complete, certified copies of all required insurance policies, including policy Declaration pages and Endorsement pages, required by these specifications, at any time. Failure to continually satisfy the Insurance requirements is a material breach of contract.
- 10.10 Continuation of Coverage:** The Contractor shall, upon demand of Owner deliver evidence of coverage showing continuation of coverage for at least (5) years after completion of the project. Contractor further waives all rights of subrogation under this

agreement When any of the required coverages expire during the term of this agreement, the Contractor shall deliver the renewal certificate(s) including the general liability additional insured endorsement and evidence of waiver of rights of subrogation against Owner (if builder's risk insurance is applicable) to Owner at least ten (10) days prior to the expiration date.

10.11 Sub-Contractors: In the event that the Contractor employs other Contractors (sub-contractors) as part of the work covered by this agreement, it shall be the Contractor's responsibility to require and confirm that each sub-contractor meets the minimum insurance requirements specified above (via as broad as ISO CG 20 38 04 13). The Contractor shall, upon demand of Owner, deliver to Owner copies such policy or policies of insurance and the receipts for payment of premiums thereon.

PART 11 – PROGRESS MEETINGS

- 11.1** Owner shall arrange and conduct progress meetings. Meetings should be attended on a weekly basis unless specified differently by Owner and shall be attended by the Contractor's superintendent and representatives of all sub-contractors, utilities, and others that are active in the execution of the Work. Failure of Contractor to attend such meetings may result in a fine or lead to project shutdown until attendance or follow-up is performed by Contractor, at no additional cost to Owner.
- 11.2** For each meeting, an agenda and a 3-week look-ahead schedule shall be submitted and approved by Owner or Owner's Representative a minimum of 24 hours before the scheduled meeting. Any delays in submission of the 3-week schedule and daily logs may result in delay in processing the monthly pay estimate.
- 11.3** The purpose of these meetings shall be reviewing project activities and to expedite the work of any subcontractor or other organization that is not up to schedule, resolve conflicts, and in general, coordinate and expedite the execution of the Work.
- 11.4** The agenda of progress meetings shall include review of progress and schedule, of narrative report, of the latest construction schedule update, and of the record documents. Owner or Owner's Representative shall document the proceedings of the meetings within 24 hours after the meeting ends.

PART 12 – AS-BUILT RECORD CONSTRUCTION PLANS

The Contractor shall maintain one set of current and accurate redlined construction plans. Upon completion of the Work and prior to Acceptance of the Project, this redlined set of plans shall be certified by the Inspector and delivered to the Engineer.

PART 13 – CONSTRUCTION REQUIREMENTS

13.1 OBSTRUCTIONS

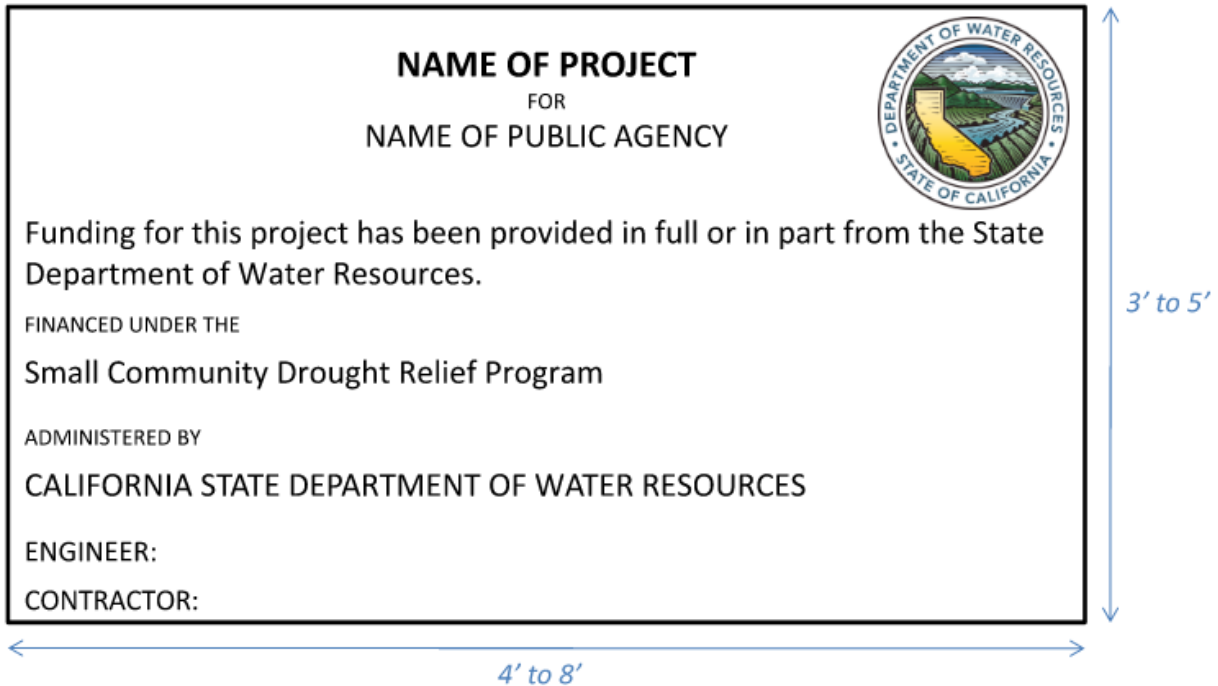
- A. Attention is directed to Article 5 of the General Conditions and these special provisions.
1. The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure.
 2. Regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert – Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert – Southern California (USA)	1-800-422-4133 1-800-227-2600

13.2 ACKNOWLEDGEMENT OF CREDIT & FUNDING SOURCE SIGNAGE

- A. Contractor shall acquire, install, and protect a posted sign at a prominent location on the project site including the Department of Water Resources (DWR) logo in color and the following statement: "Funding for this project has been provided in part from the State Department of Water Resources." Upon project completion the Contractor shall be responsible for the removal of this sign. DWR sign guidelines are provided herein:

Small Community Drought Relief Program
Program Sign Guidelines



- This is a conceptual design sketch that is NOT to scale.
- Provide adequate structural supports for sign as site conditions may require.
- Keep sign a proper distance above prevailing grade to permit public viewing.
- Size DWR logo to permit public viewing.
- Paint letters blue (Blue No.15102 in federal color standard No.595).
- DWR Logo at: <https://d3.water.ca.gov/owncloud/index.php/s/s8CFdC3cvgf9v9p/download>

13.3 EXISTING UTILITIES

- A. If it is noted on the plans or in these specifications that the shutting off of power lines or water facilities may be necessary to allow for the work, it will be the Contractor's responsibility to notify the utility of the required action a minimum of 14 days prior to the work at or around the utility.
- B. Do not disconnect or shut down any part of the existing utilities and services, except by permission of authorities having jurisdiction. Submit schedule of estimated shut-down time in order to obtain such permission, and notify all interested parties, neighbors, utilities, and municipal and county authorities, as required. Utilities to be removed shall not be removed until shut-down time can be kept to a minimum. Do not remove an existing utility line or service until the replacement line, crossover, or capping is ready to be performed.

- C. It is understood and agreed that the failure of the Contractor or its subcontractor to comply fully with the provisions enumerated in this Project Manual constitutes failure of the Contractor to exercise reasonable care and precludes Contractor's recovery from the SSCWD for any related costs or damages.
- D. Payment conforming to the Provisions of this Section will be considered as included in the prices paid for other items of work and no additional compensation will be allowed, therefore.

PART 14 – DRUG-FREE WORKPLACE CERTIFICATION

14.1 Contractor and subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code, § 8350 et seq.) and have or will provide a drug-free workplace by taking the following actions:

- A. Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by the Government Code section 8355.
- B. Establish a Drug-Free Awareness Program, as required by Government Code section 8355 to inform employees, contractors, or subcontractors about all of the following:
 - 1. The dangers of drug abuse in the workplace,
 - 2. Grantee's policy of maintaining a drug-free workplace,
 - 3. Any available counseling, rehabilitation, and employee assistance programs, and
 - 4. Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.
- C. Provide, as required by Government Code section 8355, that every employee, contractor, and/or subcontractor who works under this Funding Agreement:
 - 1. Will receive a copy of Owner's drug-free policy statement, and
 - 2. Will agree to abide by terms of Owner's condition of employment, contract, or subcontract.

END OF SUPPLEMENTAL GENERAL CONDITIONS

SUNNYSLOPE COUNTY WATER DISTRICT

CA DEPARTMENT OF WATER RESOURCES AGREEMENT NUMBER:

4600015596

BEST ROAD MUTUAL WATER COMPANY WATER SYSTEM

CONSOLIDATION PROJECT

CSI FORMATTED TECHNICAL SPECIFICATIONS

SUNNYSLOPE COUNTY WATER DISTRICT (SSCWD)

DEPARTMENT OF WATER RESOURCES AGREEMENT NUMBER 4600015596 BEST ROAD MUTUAL WATER COMPANY WATER SYSTEM CONSOLIDATION PROJECT

These technical specifications were prepared by various professionals qualified in their respective disciplines. The following professionals were responsible for preparing these technical specifications, and their initials are indicated by each specification section as being the responsible engineer of record (EOR) for corresponding sections prepared by each respective EOR. If only one professional engineer is listed below, he/she will serve as the EOR for the entirety of these Technical Specifications. The profession seal(s) on these technical specifications correspond to each individual listed and the respective specification sections each is responsible for:

- Zachary C. Markow, P.E. (ZCM), Wallace Group, License C92952



TECHNICAL SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

Division 01 – General Requirements (in conjunction with SSCWD Standards)

01 11 00	Summary of Work
01 20 00	Price and Payment Procedures
01 30 00	Administrative Requirements
01 32 16	Construction Progress Schedule
01 33 00	Submittal Procedures
01 35 00	Special Project Procedures
01 50 00	Temporary Facilities and Controls
01 57 13	Temporary Erosion and Sediment Control
01 57 23	Temporary Storm Water Pollution Control
01 70 00	Execution and Closeout Requirements

FACILITY CONSTRUCTION SUBGROUP

Division 02 – Existing Conditions

02 21 00	Surveying
02 42 00	Removal and Salvage of Construction Materials

Divisions 03 to 14 – Not Used

FACILITY SERVICES SUBGROUP

Divisions 21 to 28 – Not Used

SITE AND INFRASTRUCTURE SUBGROUP

Division 31 – Earthwork

- 31 00 00 Earthwork
- 31 23 33 Trenching and Backfilling
- 31 40 00 Shoring and Underpinning

Division 32 – Exterior Improvements

- 32 11 23 Base Courses
- 32 12 00 Flexible Paving
- 32 17 23 Pavement Markings

Division 33 – Utilities

- 33 00 00 Utilities

Divisions 34 and 35 – Not Used

PROCESS EQUIPMENT SUBGROUP

Division 40 – Process Interconnections

- 40 05 51 Common Requirements for Process Valves

Divisions 41 through 48 – Not Used

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK INCLUDED

- A. The Work includes construction of new potable water facilities in John Smith Road to provide potable water service to the existing Best Road Mutual Water Company (BRMWC) water distribution system, and the abandonment of existing BRMWC wells. This work will include coordination with Sunnyslope County Water District (SSCWD), BRMWC, the County of San Benito, the California Department of Water Resources (DWR), and the California State Water Resources Control Board - Division of Drinking Water (DDW). A summary of the Work is as follows:
1. New Potable Water Service:
 - a. Approximately 4,360 LF of 8" DR 18 C900 water main in John Smith Road, extending from the existing SSCWD mainline in Fairview Road, at the intersection with John Smith Road, to the existing BRMWC mainline in Heatherwood Lane.
 - b. Approximately 80 LF of 8" CL 350 ductile iron water main in John Smith Road, in shallow trench sections in the alignment described in Para. 1.1.A.1.a.
 - c. Six (6) new fire hydrant assemblies per SSCWD Standards.
 - d. Three (3) new 1" combination air and vacuum release valves, with associated fittings and appurtenances, per SSCWD Standards.
 2. Abandonment of Existing Wells:
 - a. Two (2) existing groundwater wells to be abandoned following CA Department of Water Resources (DWR) Bulletin 74-81 and Bulletin 74-90, per Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.060 WELL STANDARDS of the San Benito County Code of Ordinances.
- B. The Work consists of items listed in the Base Bid Schedule. Refer to Section 01 20 00 for further definition.
- C. All Work in this Contract shall be subject to the Contract Documents, applicable requirements of encroachment permits from San Benito County, and any environmental permitting requirements.
1. The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) which describes in specific detail the Contractor's program and specific measures to prevent storm water contamination. The program shall identify both common construction activities and unexpected events.
 - a. The SWPP shall comply with the requirements of the Construction Stormwater General Permit, Order 2022-0057-DWQ and Section 01 57 23 - Temporary Storm Water Pollution Control of these Technical Specifications.
 - b. In the event of a conflict between Order 2022-0057-DWQ and Section 01 57 23, the requirements of Order 2022-0057-DWQ shall take precedent.

- c. Payment for preparing and implementing the SWPPP, throughout the Project's duration, and for providing all materials, labor, tools, equipment, and all incidentals to install, maintain and remove when completed, all erosion and sediment control measures, shall be considered to be included in and distributed proportionately through all of the corresponding contract items of work, and no additional compensation will be allowed.
 - 2. Contractor shall prepare and implement a Traffic Control Plan (TCP) as required by the County.
- D. Work Schedule Considerations.
 - 1. Cooperate with Sunnyslope County Water District, Best Road Mutual Water Company, and County of San Benito staff, contractors, and sub-contractors, and all other agencies requiring such coordination/cooperation throughout the construction of the Work, including coordination of lay down and construction staging areas.
 - 2. Complete all work required by Section 01 57 13 Temporary Erosion and Sediment Control and Section 01 57 23 Temporary Storm Water Pollution Control of these specifications.
 - 3. Complete all other legal and environmental requirements applicable to the Contractor's operations and construction work for the project.

1.2 SUBMITTALS

- A. In accordance with Section 01 33 00 – Submittals, submit the following:
 - 1. Work Plan. Submit a detailed Work Plan for review and approval by Owner and Engineer. Work Plan shall be of sufficient detail to adequately describe the elements of Work, timing and sequencing of tasks and subtasks (and coordinated with Project Schedule) and in particular, tie-ins to existing water systems, coordination with all agencies, temporary erosion control and sedimentation controls, staging/laydown areas and coordination thereof, and all other aspects of the Work. Submit Work Plan at the pre-construction meeting, or within 14 calendar days following Notice to Proceed, whichever occurs first.
 - 2. Storm Water Pollution Prevention Plan. Submit the Storm Water Pollution Prevention Plan at the pre-construction meeting, or within 14 calendar days following Notice to Proceed, whichever occurs first.

1.3 WORK NOT INCLUDED

- A. Except for such auxiliary work as is shown or specified or is necessary as a part of the construction, the following work is NOT included in this Contract.
 - 1. Work shown but marked "NIC" (Not in Contract), or otherwise designated to be performed by others.

1.4 LOCATION OF SITE

- A. The Project site is located in San Benito County, in the unincorporated County area east of the City of Hollister, along John Smith Road between the intersection with Fairview Road and the intersection with Heatherwood Lane.

1.5 SPECIFICATIONS

- A. The Specifications are those bound in the Project Manual and otherwise incorporated by reference. All sections of the Project Manual, including Notice Inviting Bids and Instructions to Bidders, are part of the Contract Documents for this Work. The Project Manual consists of the Notice Inviting Bids, Instructions to Bidders, General Conditions of the Contract for Construction, Special Provisions of the Contract for Construction, including Division 01 through 40 of these Technical Specifications, California DWR Bulletin 74-81 and Bulletin 74-90, and Caltrans 2023 Standard Specifications, where referenced.

1.6 SPECIAL PROVISIONS

- A. Throughout these technical specifications, Division 01 through Division 40, where conflict exists between the Special Provisions and these Technical Specifications, requirements of the Special Provisions shall prevail.
- B. Throughout these technical specifications, reference to the "Special Provisions" shall mean Sunnyslope County Water District Supplemental General Conditions.

1.7 DRAWINGS

- A. The Drawings consist of 19 sheets prepared by Wallace Group, dated November 8, 2024.

1.8 INTERRUPTION OF SERVICES

- A. Interruptions to water service for the purpose of making connection to existing water facilities shall be made only after consultation with Owner, BRMWC, and Engineer a minimum of one week in advance of such Work and shall be at such time and of such duration as may be directed. Timing of service disruption shall be approved by Owner, and such Work shall be scheduled during dry periods with no rainfall in the forecast for the duration of the Work.

1.9 COORDINATION OF THE WORK/SEQUENCING OF WORK

- A. Permits:
 - 1. The County of San Benito will require an encroachment permit for construction of new water service facilities within County right of way. Contractor shall be responsible for securing this permit, including any permit fees, at no additional cost to Owner.
 - 2. The County of San Benito will require a permit for the abandonment of the existing BRWMC Wells, per Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.060 WELL STANDARDS of the San Benito County Code of Ordinances.
- B. General Scheduling Requirements
 - 1. Contractor may not conduct the work associated with abandoning the existing BRMWC wells prior to finishing installation, testing, approval, DDW permitting, and commencement of potable water service through the new pipeline by SSCWD. Well abandonment shall be the final work item performed.
 - 2. Submit Construction Work Plan for review and approval by Owner and Engineer, at Pre-Construction Meeting, dovetailing sequencing details with

Schedule as required in Section 01 30 00, Administrative Requirements, and other schedule constraints for permitting and coordination with on-going construction activities in the area. Incorporate schedule into overall Work Plan for approval by Owner, Engineer, and County of San Benito. Include in the Construction Work Plan, detailed water service tie-in and cut-over plans as required, detailing timing, equipment and requirements to tie into the existing SSCWD and BRMWC water distribution systems with minimal impact to water users.

- a. Submit water system tie-in plan and method statement, a minimum of 30 calendar days prior to commencing work.
 - b. Contractor shall coordinate tie-in with Owner-designated representative a minimum of 14 calendar days in advance of work.
- C. Prior to commencement of Work and within 7 calendar days of Notice to Proceed, verify and confirm, to the Owner's Representative in writing, the existing grades, elevations and conditions of the site. Any discrepancies between existing conditions and the contract documents must be brought to the Owner's attention during that time frame.
1. As first order of Work, Contractor shall pothole utilities in and along John Smith Road, from the intersection with Fairview Road to the intersection with Heatherwood Lane, to verify the location of utilities near or crossing the proposed water main alignment in those areas. Refer to Section 01 35 00 – Special Project Procedures:
 - a. This includes, but is not limited to: the existing 33" non-potable water main in Fairview Road, the existing 34" gas transmission main crossing John Smith Road near the intersection with Heatherwood Lane, and the existing 4" SSFM that runs parallel to John Smith Road, along the southern shoulder, and crosses the intersection with Heatherwood Lane.
 2. After receiving potholing report from Contractor, Owner's Representative will determine whether DDW variance waivers will be required for the following utility crossings:
 - a. 8" SD crossing near Fairview Road, as shown in Plans.
 - b. 4" SSFM crossing near Heatherwood Lane, as shown in Plans.

If DDW variance waivers are required, contractor cannot perform work within 100 LF of these locations until waiver is procured by Owner and provided to Contractor.
 3. See subsection 1.1.D. above regarding work schedule considerations, coordination, and order of work. Include and address the requirements of subsection 1.1.D. above in Contractor's Work Plan for review and approval by the City and Engineer.
- D. Prepare schedules as set forth in Section 01 30 00, Administrative Requirements.

1.10 HOURS OF WORK

- A. Perform Work of this Contract on normal workdays and within normal work hours; 7:00 am to 5:00 pm Monday through Friday. After hours work and work on Saturdays, Sundays, and Owner holidays, may be permitted if approval is received from the Owner and from the County of San Benito at least 3 working days in advance, at no additional cost to Owner. When Contractor schedules Work on non-working days or

after-hours work, the Contractor shall be responsible for the overtime costs incurred by the Owner for inspections or other related activities, unless such schedule was requested by Engineer.

- B. Continuously keep existing drainage facilities, walks, and paved areas clean and free of mud and dirt, obstacles, etc., and protect against damage.
- C. Closeout Timetable. Coordinate with Owner to establish dates for equipment, testing, acceptance periods (as required under the Contract). Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the Owner and their authorized representatives sufficient time to schedule attendance at such activities.
- D. Final Submittals: Prior to requesting final payment, obtain and submit the following items to the Engineer for transmittal to the Owner:
 - 1. Written guarantees, where required.
 - 2. Operating manuals and instructions.
 - 3. Completed record drawings per Section 01 70 00.
 - 4. Certificates of inspection and acceptance by local governing agencies having jurisdiction, including but not limited to, SSCWD and the County of San Benito.
 - 5. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.11 TRAFFIC CONTROL

- A. Prepare a traffic control plan to address traffic control, work along, and ingress/egress to and from John Smith Road, Fairview Road, and Heatherwood Lane in accordance with the latest edition of the CA MUTCD, for approval by the County of San Benito. Coordinate traffic control requirements with the Designated Representative, County of San Benito. Traffic control plans must be stamped by an engineer legally certified to develop a traffic control plan.
- B. Traffic control shall be permitted Monday through Friday, from 7am to 5pm.
- C. One full lane of traffic, regulated by flaggers, shall be left open for traffic at all times.
- D. Portable changeable message signs (PCMS) are not required for this Project.

1.12 SITE ACCESS

- A. All Work is in the County right-of-way, permanent easements, temporary construction easements, and access shall be subject to requirements specified in these technical specifications.

1.13 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Refer to Article 5 of the EJCDC General Conditions and other Division 01 Sections for Contractor responsibilities.
- B. Damage to existing improvements caused by Contractor's operations, either on-site or on adjacent sites, shall be repaired to restore damaged items to their original condition

as approved by the County Engineer and the owner of the damaged property. Cost of such repair shall be borne entirely by Contractor.

- C. Drawings indicate existing structures, drainage lines, water, gas, electrical and other similar items and utilities that are known to the Owner.
- D. Locate known existing structures and utilities before proceeding with construction. Maintain them in service, except as otherwise specified. Provide protection and repair damage to them caused by the Work at no increase in Contract price.

1.14 GEOTECHNICAL INVESTIGATION

- A. A geotechnical investigation was performed for the proposed John Smith Road water main. This report, entitled "Limited Geotechnical Engineering Study Report, Sunnyslope Water District (Best Roads Mutual Water Company Improvements), File No. 306405-001" was performed for the Owner in order to obtain relative data concerning the character of material in and upon which the Project is to be built. This report may be used for the following purposes:
 - 1. In regard to the soils and road section conditions to be encountered in and around the project area, the data contained in the report may be used for information only as to the soil and pavement section conditions encountered at the location/address shown and on the date stated. The Contractor is solely responsible for satisfying itself as to the kind and type of soil, and characteristics of road sections to be encountered in the alignment of the work, and any water or other subsurface conditions which might affect the construction of the project.
 - 2. Only where specifically called out in these specifications, the report may be used for design parameters in the preparation of shop drawings for the Project.
 - 3. Conclusions and recommendations contained in the report, which are not specifically referenced in these specifications, are not a part of the Contract.

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

- 1.01 This Section describes the methods of measurement and payment for the specific bid items. All other provisions of the Contract Documents which relate to measurement and payment are applicable, except that where conflicts occur between this section and other provisions of the technical specifications or reference specifications, this measurement and payment section shall prevail.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL

- A. All work shown, described, or otherwise required by the Contract Documents, shall be included within the given bid items.
- B. Payment for all bid items shall include full compensation for all equipment, materials, labor, tools, trucking, and all other incidental work necessary to construct complete and operational systems which conform to the Contract Documents.

3.02 MEASUREMENT AND PAYMENT FOR BID ITEMS

- A. All lengths shall be measured in a horizontal plane (plan view dimensions), unless otherwise specified. All areas measured shall be based on the specified measurement definition included in each bid item description.
- B. All work shown, described, or otherwise required by the Contract Documents, shall be included within the given bid items.
- C. Basis for the submitted bid shall be on the quantities shown for the items on the Bid Sheet.
- D. Unit definitions of Measurement and Payment
1. "Lump Sum", or "LS", shall mean a single Lump Sum Payment for the identified bid item. Partial payments may be made, based on the Engineer's estimate of the percent completion of the specified item. Provide schedule of values for lump sum bid items with pay designation of "SV" on the bid schedule. Refer to Section 01 30 00, Administrative Requirements, Para. 1.05 for submittal requirements for Schedule of Values.
 2. "Each", or "EA", shall mean the actual number of identified bid items provided. Payment for the identified bid item will be based on providing each item, complete and in place in accordance with the contract documents.

3. Measurable units of quantity expressed in “Linear Feet” or “LF”; “Cubic Yard or CY”; “Ton”; “SF” or “SY” shall mean the number of indicated measurable quantities of the bid item. Payment for the identified bid item will be based on actual and measured quantities of the bid item complete and in place in accordance with the contract documents.
 4. For extra work, and quantity changes for unit price work, refer to the General Conditions.
- E. Final Pay Quantities.
1. Bid items that are designated a Final Pay Quantity bid item by having the notation (F) or (S-F) shown on the bid sheet or by designation in this Section 01 20 00, Measurement and Payment.
 2. The quantity shown on the bid sheet for a Final Pay Quantity shall be the final pay quantity used for the purpose of payments, unless the dimensions of any portion of the item are modified by the Engineer, or the item or any portion of the item is eliminated.
 3. If the dimensions of any portion of a Final Pay Quantity bid item are changed, and the changes result in an increase or decrease in the quantity of the item, the final pay quantity will be revised by the change in quantity.
 4. If a portion of a Final Pay Quantity item, or the item is eliminated, the final pay quantity will be adjusted by the quantity eliminated.
 5. The estimated quantity shown on the bid sheet for a Final Pay Quantity bid item shall be considered as an estimate only and no guarantee is made that a quantity computed based on the details and the plans, will equal the estimated quantity shown on the bid sheet. No allowance is made in the event that a computed quantity does not equal the estimate quantity.
 6. In the case of a discrepancy between a quantity shown on the plans, and an estimated quantity shown on the bid sheet for a Final Pay Quantity item, payment will be based on the quantity shown on the bid sheet.

BASE BID

Bid Item No. 1 – Mobilization/Demobilization

- A. Units: Lump Sum
- B. Measurement: Partial payments based on Engineer’s determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Mobilization/Demobilization.
 1. Partial payment for Mobilization/Demobilization work will not be made until listed items in the schedule of values have been completed to the satisfaction of the Owner.
 2. Contractor shall be compensated no more than 70% of total bid value for Mobilization/Demobilization for mobilization; and 30% for mobilization/demobilization for demobilization following completion of Work.

- D. Scope of bid item: Mobilization/Demobilization includes, but is not limited to the following:
1. Mobilization/demobilization at the Project site.
 2. Obtaining all required bonds, insurance, and permits.
 3. Compliance with County of San Benito encroachment permit requirements, and other agency permit requirements for the Work.
 4. Posting all Cal-OSHA required notices and establishment of safety programs and injury and illness prevention plan (IIPP).
 5. Maintaining project schedule.
 6. Moving onto the site of all Contractors' facilities and equipment required for project operations.
 7. Arranging for and erection of Contractor's work areas and storage yards and coordinating such work areas and storage yards with County of San Benito, Sunnyslope County Water District staff, Best Road Mutual Water Company staff, and other agencies as necessary.
 8. Procuring and installing all grant program signage per the DWR signage requirements attached to Section 01 30 00 – Administrative Requirements.
 9. Coordination with utility companies during construction activities adjacent to utility agency facilities.
 10. Coordinating with County of San Benito, Sunnyslope County Water District staff, Best Road Mutual Water Company staff, and other agencies during construction.
 11. Providing and installing temporary communication facilities.
 12. Potholing existing utilities to verify locations of subsurface utilities and tie-in points and providing pothole reports.
 13. Providing and installing construction water and on-site sanitary facilities.
 14. Designation of the Contractor's superintendent who will be present at the job site full time.
 15. Documenting construction progress, including pre- and post-construction photographs, and progress photographs.
 16. Preparing and submitting field record drawings.
 17. Removing equipment, personnel, temporary facilities, and other construction resources at job completion.
 18. Site cleanup.
 19. All other incidental work as specified in Division 01 of these Specifications, Project Special Provisions, Project Standard Specifications, referenced Caltrans standard specifications, referenced County of San Benito special provisions, permit requirements, and as necessary to complete Mobilization/Demobilization in accordance with the Contract Documents.

Bid Item No. 2 - Construction Survey

- A. Units: Lump Sum (LS)

- B. Measurement: Partial payments based on Engineer's determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Construction Survey.
- D. Scope of bid item: Construction Survey includes, but is not limited to the following:
 - 1. Establishing horizontal control based on survey information provided in the Plans.
 - 2. All survey Work related to existing and proposed water main works, as described in Section 02 21 00 – Surveys and the Drawings.
 - 3. Re-setting monuments that may be damaged or need to be removed as part of the Work.
 - 4. Replacement of property corner markers, including proper recordation.
 - 5. Pothole surveys and pothole reports.
 - 6. All other incidental work necessary to complete Construction Survey in accordance with the Contract Documents.

Bid Item No. 3 – Erosion, Sedimentation, and Water Pollution Control

- A. Units: Lump Sum (LS)
- B. Measurement: Partial payments based on Engineer's determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Erosion, Sedimentation, and Water Pollution Control.
- D. Scope of bid item: Work for Erosion, Sedimentation, and Water Pollution Control includes, but is not limited to the following:
 - 1. Proper management of storm water, dust, sediment, and erosion with best practices, where required. Refer to Section 01 57 13 – Temporary Erosion and Sediment Control and 01 57 23 Temporary Storm Water Pollution Control.
 - 2. Complying with all reporting, monitoring, inspection and permitting requirements for protection of water quality.
 - 3. All labor, equipment and materials to perform Erosion, Sedimentation, and Water Pollution Control activities.
 - 4. All other incidental work necessary to complete Erosion, Sedimentation, and Water Pollution Control in accordance with the Contract Documents.

Bid Item No. 4 – Traffic Control

- A. Units: Lump Sum (LS)
- B. Measurement: Partial payments based on Engineer's determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Traffic Control.
- D. Scope of bid item: Work for Traffic Control includes, but is not limited to the following:

1. Traffic control in accordance with County of San Bentio requirements, as required for execution of the Work.
2. Required plans and submittals.
3. All other incidental work necessary to complete Traffic Control in accordance with the Contract Documents.

Bid Item No. 5 - Sheeting, Shoring and Bracing

- A. Units: Lump Sum (LS)
- B. Measurement: Partial payments based on Engineer's determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Sheeting, Shoring and Bracing.
- D. Scope of bid item: Work for Sheeting, Shoring and Bracing includes, but is not limited to the following:
 1. Required fees, permits, plans, and submittals, prepared by California registered civil or structural engineer.
 2. Compliance with all requirements for Cal-OSHA construction safety in the excavation of trenches and pits, and other technical requirements in Division 31 specifications, and trench details on the plans.
 3. Trench excavation plans if required.
 4. Providing adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life or limb, which shall conform to the applicable construction safety orders.
 5. All other incidental work necessary to complete Sheeting, Shoring and Bracing in accordance with the Contract Documents

Bid Item No. 6 – Connect to Existing SSCWD and BRWMC Water Mains

- A. Units: Lump Sum (LS)
- B. Measurement: Partial payments based on Engineer's determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Connect to Existing SSCWD and BRMWC Water Mains.
- D. Scope of bid item: Connect to Existing SSCWD and BRMWC Water Mains includes, but is not limited to the following:
 1. Furnish and install new C900 pipe, ductile iron adapters and fittings, and thrust blocks at new water main connections to existing water services as shown on the Plans.
 2. Removal of existing piping, fittings, blow offs, thrust blocks and blind flanges, where required.
 3. Coordination and notification requirements to water service providers for temporary disruption of service.

4. Trenching, hand-digging, exposing, backfilling, compaction, including pavement restoration, where required.
5. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents, including removal and disposal of any vegetation within the project boundary as shown in the plans.
6. Control/management of groundwaters.
7. Verification of adjacent utilities.
8. Pressure testing and disinfection per SSCWD Plans and Standards and these Specifications.
9. And all other incidental work necessary to implement Connect to Existing SSCWD and BRMWC Water Mains complete, in place, and in accordance with the Contract Documents.

Bid Item No. 7 – Furnish and Install 8” C900 PVC Water Main

- A. Units: Linear Feet (LF)
- B. Measurement: Linear feet of water line constructed per contract documents for this item, measured along horizontal projection along centerline axis of water main.
- C. Payment: The payment quantity for Furnish and Install 8” C900 PVC Water Main shall be on a unit price basis per lineal foot, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications
- D. Scope of Bid Item: Furnish and Install 8” C900 PVC Water Main shall include, but is not limited to the following:
 1. Pipe, adapters, fittings, thrust blocks, and connections to existing pipes.
 2. Identification/warning tape, tracer wire.
 3. Trenching, hand-digging, exposing, backfilling, and sub-grade compaction.
 4. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 5. Removal and disposal of any vegetation within the water main alignment, as shown in the plans, including all labor, equipment, materials, and miscellaneous costs to perform this work.
 6. Control/management of groundwaters.
 7. Verification of adjacent utilities.
 8. Pressure testing and disinfection per SSCWD Plans and Standards and these Specifications.
 9. And all other incidental work necessary to implement Furnish and Install 8” C900 PVC Water Main complete, in place, and in accordance with the Contract Documents.

Bid Item No. 8 – Furnish and Install 8” Gate Valves

- A. Units: Each (EA)

- B. Measurement: Each fully furnished and installed valve, with complete connection to water main and required valve box and riser in accordance with the Plans and Specifications.
- C. Payment: The payment quantity for Furnish and Install 8" Gate Valves shall be on a unit price basis per each item, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Furnish and Install 8" Gate Valves shall include, but is not limited to the following:
 - 1. Furnish and install valves in accordance with the Plans and Specifications.
 - 2. Tie-in to new and existing water main(s) as shown on the Plans.
 - 3. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 - 4. Control/management of groundwaters.
 - 5. Verification of adjacent utilities.
 - 6. And all other incidental work necessary to implement Furnish and Install Valves complete, in place, and in accordance with the Contract Documents.

Bid Item No. 9 – Furnish and Install 1" Air Valve Assembly

- A. Units: Each (EA)
- B. Measurement: Each fully furnished and installed assembly, with complete connection to water main.
- C. Payment: The payment quantity for Furnish and Install 1" Air Valve Assembly shall be on a unit price basis per each item, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Furnish and Install 1" Air Valve Assembly shall include, but is not limited to the following:
 - 1. Furnish and install 1" combination air and vacuum valve assembly in accordance with the Plans and Specifications, including traffic bollards, as shown in the drawings.
 - 2. Connection to new water main as shown in the plans.
 - 3. Furnish and install bollards as shown in the plans.
 - 4. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 - 5. Control/management of groundwaters.
 - 6. Verification of adjacent utilities.
 - 7. And all other incidental work necessary to implement Furnish and Install 1" Air Valve Assembly complete, in place, and in accordance with the Contract Documents.

Bid Item No. 10 – Furnish and Install Fire Hydrant Assembly

- A. Units: Each (EA)
- B. Measurement: Each fully furnished and installed assembly, with complete connection to water main.
- C. Payment: The payment quantity for Furnish and Install Fire Hydrant Assembly shall be on a unit price basis per each item, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Furnish and Install Fire Hydrant Assembly shall include, but is not limited to the following:
 - 1. Furnish and install fire hydrant assembly in accordance with the Plans and Specifications.
 - 2. Connection to new water main as shown on the drawings.
 - 3. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 - 4. Control/management of groundwaters.
 - 5. Verification of adjacent utilities.
 - 6. And all other incidental work necessary to implement Furnish and Install Fire Hydrant Assembly complete, in place, and in accordance with the Contract Documents.

Bid Item No. 11 – Furnish and Install Shallow Trench Water Main Installation

- A. Units: Linear Feet (LF)
- B. Measurement: Linear feet of shallow trench water main constructed per contract documents for this item, measured along horizontal projection along centerline axis of water main.
- C. Payment: The payment quantity for Furnish and Install Shallow Trench Water Main Installation shall be on a unit price basis per lineal foot, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Furnish and Install Shallow Trench Water Main Installation shall include, but is not limited to the following:
 - 1. 8" CL 350 Ductile Iron pipe, adapters, fittings, and connections to new C900 PVC water main, where shown in the Plans.
 - 2. Identification/warning tape, tracer wire.
 - 3. Trenching, hand-digging, exposing, backfilling, and compaction, including placement of 1-sack cement slurry backfill in accordance with the Plans and these Specifications.
 - 4. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.

5. Removal and disposal of any vegetation within the water main alignment, as shown in the plans, including all labor, equipment, materials, and miscellaneous costs to perform this work.
6. Control/management of groundwaters.
7. Verification of adjacent utilities.
8. Pressure testing and disinfection per SSCWD Plans and Standards and these Specifications.
9. And all other incidental work necessary to implement Furnish and Install Shallow Trench Water Main Installation, in place, and in accordance with the Contract Documents.

Bid Item No. 12 – Abandon Existing BRMWC Wells

- A. Units: Each (LS)
- B. Measurement: Partial payments based on Engineer’s determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Abandon Existing BRMWC Wells.
- D. Scope of Bid Item: Abandon Existing BRMWC Wells shall include, but is not limited to the following:
 1. Removal of existing well pump, motor, electrical components, and above-ground piping.
 2. Capping existing underground discharge pipe.
 3. Backfill of well casing in accordance with the Contract Documents.
 4. Trenching, hand-digging, exposing, backfilling, surface restoration, compaction, and hydroseeding.
 5. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 6. Removal and disposal of any vegetation within the well area, as shown in the plans, including all labor, equipment, materials, and miscellaneous costs to perform this work.
 7. Control/management of groundwaters.
 8. Verification of adjacent utilities.
 9. And all other incidental work necessary to implement Abandon Existing BRMWC Wells, in place, and in accordance with the Contract Documents.

Bid Item No. 13 – Storm Drain Undercrossing

- A. Units: Linear Feet (LF)
- B. Measurement: Linear feet of shallow trench water main constructed per contract documents for this item, measured along horizontal projection along centerline axis of water main.

- C. Payment: The payment quantity for Storm Drain Undercrossing shall be on a unit price basis per lineal foot, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Storm Drain Undercrossing shall include, but is not limited to the following:
1. Furnish and install 20 LF of 8" CL 350 Ductile Iron pipe, adapters, fittings, and connections to new C900 PVC water main, where shown in the Plans.
 2. Identification/warning tape, tracer wire.
 3. Trenching, hand-digging, exposing, backfilling, and compaction, including placement of 1-sack cement slurry backfill in accordance with the Plans and these Specifications.
 4. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 5. Removal and disposal of any vegetation within the water main alignment, as shown in the plans, including all labor, equipment, materials, and miscellaneous costs to perform this work.
 6. Control/management of groundwaters.
 7. Verification of adjacent utilities.
 8. Pressure testing and disinfection per SSCWD Plans and Standards and these Specifications.
 9. And all other incidental work necessary to implement Storm Drain Undercrossing, in place, and in accordance with the Contract Documents.

Bid Item No. 14 – Sanitary Sewer Force Main Undercrossing

- A. Units: Linear Feet (LF)
- B. Measurement: Linear feet of shallow trench water main constructed per contract documents for this item, measured along horizontal projection along centerline axis of water main.
- C. Payment: The payment quantity for Sanitary Sewer Force Main Undercrossing shall be on a unit price basis per lineal foot, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications.
- D. Scope of Bid Item: Sanitary Sewer Force Main Undercrossing shall include, but is not limited to the following:
1. Furnish and install 20 LF of 8" CL 350 Ductile Iron pipe, adapters, fittings, and connections to new C900 PVC water main, where shown in the Plans.
 2. Identification/warning tape, tracer wire.
 3. Trenching, hand-digging, exposing, backfilling, and compaction, including placement of 1-sack cement slurry backfill in accordance with the Plans and these Specifications.

4. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
5. Removal and disposal of any vegetation within the water main alignment, as shown in the plans, including all labor, equipment, materials, and miscellaneous costs to perform this work.
6. Control/management of groundwaters.
7. Verification of adjacent utilities.
8. Pressure testing and disinfection per SSCWD Plans and Standards and these Specifications.
9. And all other incidental work necessary to implement Sanitary Sewer Force Main Undercrossing in place, and in accordance with the Contract Documents.

Bid Item No. 15 – Class 2 Aggregate Base

- A. Units: Cubic Yard (CY)
- B. Measurement: Cubic yard of Class 2 aggregate base material placed and compacted inside the pipe trench in accordance with the Plans and Specifications, measured along the horizontal of the pipe trench and the depth of the base layer, measured from the top of the existing grade.
- C. Payment: The payment quantity for Class 2 Aggregate Base shall be on a unit price basis per cubic yard, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications
- D. Scope of Bid Item: Class 2 Aggregate Base shall include, but is not limited to the following:
 1. Furnish, place, and compact Class 2 aggregate base required for street restoration, within the pipe trench and other areas of excavation for items of Work shown in the Plans.
 2. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 3. And all other incidental work necessary to implement Class 2 Aggregate Base, in place, and in accordance with the Contract Documents.

Bid Item No. 16 – Hot Mix Asphalt

- A. Units: Tons (TON)
- B. Measurement: Ton of Hot Mix Asphalt material placed and compacted inside the pipe trench and up to the existing pavement, in accordance with the Plans and Specifications, measured along the horizontal of the pipe trench and the depth of the HMA layer, measured from the top of the existing grade.
- C. Payment: The payment quantity for Hot Mix Asphalt shall be on a unit price basis per ton, and shall be full compensation for all materials, labor, tools equipment and incidentals to acceptably construct this item in accordance with the Plans and Specifications

- D. Scope of Bid Item: Hot Mix Asphalt shall include, but is not limited to the following:
1. Furnish, place, and compact hot mix asphalt required for street restoration, within the pipe trench and other areas of excavation for items of Work shown in the Plans.
 2. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 3. And all other incidental work necessary to implement Hot Mix Asphalt, in place, and in accordance with the Contract Documents.

Bid Item No. 17 – Furnish and Install Pavement Marking and Striping

- A. Units: Lump Sum (LS)
- B. Measurement: Partial payments based on Engineer’s determination.
- C. Payment: Payment includes full compensation for all work required to complete the contract requirements for Furnish and Install Pavement Marking and Striping.
- D. Scope of Bid Item: Furnish and Install Pavement Marking and Striping shall include, but is not limited to the following:
1. Thermoplastic striping, where required and in accordance with the Plans and Specifications.
 2. Hauling and disposing of all waste, unsuitable, and excess material in accordance with the Contract Documents.
 3. And all other incidental work necessary to implement Furnish and Install Pavement Marking and Striping, in place, and in accordance with the Contract Documents.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 PROJECT CONTROL

- A. The Owner's Representative will outline and detail communication, correspondence and coordination procedures at the Project pre-construction meeting (joint meeting to be held with Sunnyslope County Water District, Best Road Mutual Water Company, the California Department of Water Resources, County of San Benito, Utility Owners, Utility Contractors and other key team members).
- B. Refer to Section 01 11 00 for details on scheduling and timing of the Work.
- C. Condition of Work in Place: Inspect and take responsibility for previously prepared or installed work of other contractors before applying subsequent materials or finishes. If work is in unsatisfactory condition, notify the Owner. Do not proceed until defective work has been corrected.

1.02 LOCATIONS, ELEVATIONS, AND LAYOUT OF WORK

- A. Property lines, right-of-way, location ties, and elevations of components of the Project to be built under this Contract are shown on the Drawings as approximate. Public Utility Easements located on the plans are based on available records as shown in Plans. Grade elevations shown for various parts of the Work are taken from a benchmark shown on the Drawings, or if not shown, will be designated by the Owner. In case of conflict therein, notify the Owner in writing before starting work.
- B. Lay out the Work and furnish surveys required for alignment and elevations of the Work, and pay all costs, therefor. Provide necessary lines, levels, locations, measurements and markers for all of the Work and be responsible for their accuracy.

1.03 PRE- AND POST-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

- A. Provide pre-construction, progress, and post-construction photographs and videos per Para. 3.10, Section 01 35 00 – Special Project Procedures.

1.04 SCHEDULES AND MEETINGS

- A. Planning and Scheduling: Provide a project schedule as outlined herein, addressing the scheduling items in Section 01 11 00.
- B. Refer to Article 2 and Article 4 of the EJCDC General Conditions and Section 01 32 16 for content and format requirements for the project schedule and all updates.
- C. Provide updated project schedules per Section 01 32 16, including realistic activity sequences and durations, allocation of labor and materials, processing of shop drawings, and samples and purchase and delivery of products requiring long lead-time procurement. Each activity shall be explicit in definition and location of work.

- D. Project Meetings: Contractor or his/her duly appointed representative shall attend project meetings at regular intervals as set by the Owner or Owner's Representative. Attendance shall be limited to the Contractor and his immediate subordinates, subcontractors where so specified, the Owner, and representatives of the Engineer and Consultants, as requested. Owner, or Owner's duly appointed representative, will keep minutes of meetings; with copies sent to all who attend. Meetings shall be held at the job site, or Owner offices depending on meeting agenda, duration of meeting or other considerations by Owner.
1. Refer to Article 2.04 of the EJCDC General Conditions regarding the pre-construction conference.

END OF SECTION

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 DESCRIPTION

This Section covers the specific requirements for the Construction Progress Schedule, using the Critical Path Schedule Method.

- A. Work Included in This Section. Principal items are:
 - 1. Critical Path Method (CPM) Schedule Printouts and Plot
 - 2. CPM Schedule Narrative

1.02 SUBMITTALS

Provide one PDF of each CPM schedule, updated schedule, and revised narrative for the Owner's review.

PART 2 PRODUCTS

2.01 GENERAL

Submit a CPM analysis for construction progress control. Clearly indicate all construction activities and sub-activities on a time-oriented basis with the critical path fully identified for all activities. Update and resubmit the schedule as indicated herein; flag all slippages and missed mileposts and provide a narrative description of proposed corrective actions.

- A. Include the following minimum information for each activity and critical path item:
 - 1. Date of initial submittal, as applicable.
 - 2. Ordering dates for long lead-time items.
 - 3. Dates for arrival of materials on site, including both Contractor and Owner Furnished Equipment (if any).
 - 4. Start of work on the item.
 - 5. Completion of work on the item.
 - 6. Start-up and check out.
 - 7. Testing.
 - 8. Final cleanup.
 - 9. Final completion.
- B. The CPM schedule shall demonstrate the Contractor's plan for fulfilling all Contract requirements and shall include review time for submittals.
- C. Progress Payment Printout. Include with the CPM schedule a computerized Job Progress Report Form. The form shall include all items listed in the cost breakdown provided to the Owner and shall include the following:

1. Total units required for the Work.
2. Units completed to-date.
3. Units completed this month.
4. Unit cost.
5. Total cost this month.
6. Total cost to-date.

The columns shall be appropriately summed indicating total project cost, total work completed to-date and total work this month. Obtain Owner's approval of printout format.

2.02 FORMAT

- A. Size. Prepare on 11 x 17-inch paper.
- B. Technique. The diagram technique to be used shall be in accordance with conventional CPM activity (I-J) technique set forth in the Associated General Contractors of America publication: "CPM in Construction, A Manual for General Contractors".
- C. Activity Descriptions. Select activity descriptions which clearly indicate the work task.
- D. Duration - Work Days Required. Indicate each CPM trade activity utilizing a standardized workday calendar. Said calendar will be based on a 5-day week. Activities shall be selected such that their durations are not less than 5 days nor more than 20 days, with the exception of long lead-time procurement. Additional nodes or activities shall be used as required.
- E. Activity Listing. Provide the following activity listings:
 1. I-J node consecutive listing with activity description starting from lowest numbered node to highest numbered node.
 2. Listing of activities by early start consecutive from first early start item to last early start item.
 3. Listing of all activities on the critical path with start and finish dates.

PART 3 EXECUTION

3.01 INITIAL SUBMITTAL

Within 10 working days after receipt of Notice of Award, or by the pre-construction kick-off meeting, whichever occurs sooner, submit for review and approval the complete CPM network for this Contract work. The network shall be prepared to assign costs to each activity item indicated for such work.

3.02 REVIEW AND APPROVAL

- A. Within 5 working days after receipt of the initial CPM network activity listing, the Owner will meet with the Contractor for joint review, correction or adjustment of the Contractor's proposed approach. Within 5 days after the joint review, the Contractor shall submit a revised CPM network reflecting comments offered during the joint review. The Owner will review this resubmission and may accept it as submitted. The accepted CPM will constitute the Contractor's project work schedule until it is subsequently revised by the Contractor.
- B. Acceptance of the CPM is not to be construed as concurrence by Owner that schedule is reasonable or achievable. Any omission of project work from the CPM network or activity listing, otherwise required for Contract compliance, shall not excuse the Contractor from completing such work within any applicable completion date as determined by the Owner.

3.03 UPDATE

- A. Twice a month or as agreed; on a date mutually agreed upon, a job-site meeting will be held to review the CPM network, activity listing, and job progress.
- B. The conditions under which a revision of the schedule will be required are as follows:
 - 1. When delay in completion of any work item or sequence of work items results in an estimated extension of project completion by either 5 working days or by 10 percent of the remaining duration of time to complete the Contract, whichever is less.
 - 2. When delays in submittals or deliveries or work stoppages are encountered, which make replanning or rescheduling of the work necessary.
 - 3. When the schedule does not represent actual prosecution and progress of the work.
 - 4. When Contract modification necessitates schedule revision, submit a subnetwork analysis of all change work with his Proposal. If approved, this subnetwork will become a part of the approved schedule.
- C. As part of this review, prepare a brief narrative report relating to the status of construction, submittals, approvals, and procurement. Indicate in the report areas where problems exist and are anticipated and recommend corrective action needed to be taken by the Owner or by the Contractor.

3.04 CONTRACTOR'S REPRESENTATIVE

Contractor shall designate an authorized representative who shall be responsible for production and review of the network diagram and who shall assume responsibility for reviewing progress of the work with the Owner. The Contractor's representative shall have direct control and complete authority to act on behalf of the Contractor; and such authority shall not be interrupted throughout the duration of the Contract, without approval of the Owner.

3.05 PROGRESS PAYMENT

The Job Progress Report will constitute the basis for monthly payment. Payment will not be made until the Job Progress Report is approved. No payment shall be made until obsolete CPMs are updated and the CPM is accepted by the Owner.

3.06 PAYMENT FOR CPM

Include all costs of preparing and updating the CPM as specified herein in the Bid Price for the Contract.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

This Section covers requirements for submittals in addition to those stated elsewhere in the Contract Documents and forms a part of all other Specification Sections in which submittals are specified or required. Refer to the specific Sections and Divisions of the Specifications for additional submittal requirements.

A. Submittal Requirements Included in This Section.

1. Number of submittal copies required.
2. CPM progress schedule.
3. Shop drawings.
4. Samples.
5. Materials lists and equipment data.
6. Instruction (operation and maintenance) manuals.
7. Installation instructions.
8. Seismic calculations.
9. Record drawings and specifications.
10. Certificates.
11. Schedule of values.

B. Submittal Requirements in General Conditions and Other Sections.

1. Product Substitution Requirements, Article 7.04 and 7.05 of the EJCDC General Conditions.
2. Applications for payments, Article 15 of the EJCDC General Conditions.
3. Section 01 70 00 – Execution and Closeout Requirements
4. Section 01 32 16 – Construction Progress Schedule
5. Schedule of testing laboratory services.
6. Written guarantees and warranties.
7. Factory test reports.
8. Manufacturers' certified reports.
9. System validation test procedures and results.

C. Agency Standards.

1. Public Agency standards included in these Contract Documents shall allow “or equal” and substitutions, except where specifically indicated otherwise, to be

considered by the Engineer per Article 7.04 and 7.05 of the EJCDC General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SUBMITTAL - GENERAL REQUIREMENTS

All items required to be submitted for review shall be furnished by and at the expense of the Contractor and any work affected by them shall not proceed without such review. Except for record documents, test plans, and instructional manuals for operation and maintenance, submittal shall be approved before the material or equipment covered by the submittal is delivered to the site.

- A. **Number of Submittals.**
1. **General.** Unless otherwise specified, all submittals shall be in electronic (PDF) file format.
 2. **Samples.** Provide the number of samples for each material or equipment item in accordance with Paragraph 3.04 herein and as required in the respective section of these Specifications.
 3. **Manufacturer's Instruction Manuals.** Provide the number of copies of the submittals in accordance with Paragraph 3.01A above and as specified in other sections of these Specifications.
- B. **Deviations From Contract Documents.** In the Submittal Transmittal, provide the following:
1. A statement that the submittal conforms to the Contract Documents; or
 2. Where Contractor's submittal deviates from the Contract Documents, provide written explanation and detail of such deviations for Engineer's review.
- C. **Method of Submittal.** Equipment which is specified in one section of the Specifications shall not be combined in a single submittal with equipment specified in other Sections of the Specifications, unless unit responsibility for a package system is required. In each transmittal the Contractor shall state the Owner's Project Number and Name, Name and Address of Contractor, Name and Address of Subcontractor, Manufacturer, Supplier or Distributor as applicable, Plan Reference and Specification Section, Articles, and paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner. Submittal transmittals shall fully index all items submitted.
- D. **Piecemeal Submittals.** Except for reinforcing steel submittals, piecemeal submittals will be returned unreviewed. However, for mechanical equipment and the like, separate submittals for embedded items, embedded metal work and anchors will be accepted for review.
- E. **Number of Submittal Re-Reviews.** The Owner will provide required submittal/re-submittal review up to three occurrences per submittal. Contractor shall reimburse the Owner the cost of Owner's, Owner's Representative's, and Engineer's time required for all subsequent reviews beyond three reviews. Such costs for excessive review of

incomplete or non-conforming submittals shall be deducted from Contractor's monthly pay requests at the time such charges are incurred.

- F. Engineer's Submittal Review Schedule. Engineer will review and return submittals within 10 working days from date of receipt from Owner's Representative. For complex submittals, Engineer may require additional review time; Contractor shall anticipate such review of complex submittals in overall Project Schedule, with no basis for Contract Time extension unless initial review time exceeds 20 working days by Engineer. Engineer will review and return re-submittals within 5 working days from the date of receipt from Owner's Representative.

3.02 CPM PROGRESS SCHEDULE

- A. Refer to Section 01 32 16 – Construction Progress Schedule.

3.03 SHOP DRAWINGS

- A. Title Block and Identification. On each shop drawing, provide a space for the Engineer's approval or correction stamp and a title block showing the following:
1. Name and address of Contractor.
 2. Name and address of Subcontractor, manufacturer, supplier, or distributor, as applicable.
 3. Name and address of Owner.
 4. Date, scale of drawings, and identification number.
 5. Contractor's review and approval stamp.
 6. Owner's Project Number (if applicable).
 7. Drawing Reference and Specification Section reference.
 8. Project Name.
- B. Preparation and Size. Details and information shall be clearly drawn, dimensioned, noted, and cross referenced. Unless otherwise approved, prepare shop drawings in PDF format, with drawings formatted to print of the same size as the Contract Drawings.
- C. Data. Unless the following data is included in instruction manuals or equipment data submitted prior to or with the shop drawings, submit with the shop drawings complete catalog and technical data for all manufactured products, materials, machinery, and equipment covered by the shop drawing submittal. Include data showing for each item, as applicable, the following information:
1. Manufacturer's specifications and details.
 2. Applicable technical data and performance curves.
 3. Preparation, assembly, and installation instruction with allowable tolerances.
 4. Connection requirements.
 5. Pre-start-up servicing and operating methods.
 6. Other data and information necessary to demonstrate that the proposed items conform to the Contract Documents.

- D. Information Required. Shop drawings shall contain details and information fully developing the pertinent Contract Document requirements and such other information as may be specified or required for approval, including but not limited to:
1. Related work with cross references to applicable portions of the Contract Documents.
 2. Dimensions, including variations between indicated dimensions and actual conditions.
 3. Physical configurations with critical dimensions for clearance, access, and servicing.
 4. List of materials, including fasteners and connectors.
 5. Structural construction and assemblies, welds shown by AWS symbols, and each fastener and connector shown by type and class.
 6. Grouting work, including grouting space and material.
 7. Concrete foundations and bases for machinery and equipment including joints, joint filler and sealer, and reinforcing.
 8. Anchor bolt details showing type and class, sizes, embedment, projections, and locations measured with respect to permanent structural features. An anchor bolt template shall be shown on the Shop Drawings and shall be furnished unless waived in writing by the Owner.
 9. Protective coatings and factory finishes fully described as to materials, number of coats, plated and metallic coating finishes, treatments, and similar information, all based on specified requirements. The term "as specified" is not acceptable for this purpose.
 10. Machinery and equipment details. Standard catalog items need not be illustrated in detail, but indicate and detail sizes, supports, and connections.
 11. Location of auxiliary items that are parts of machinery and equipment including sight glasses, petcocks, gauges, lubrication fittings and access, and maintenance monitoring devices.
 12. Piping systems and piping, including layout, fittings, valves, appurtenances, hangers and supports, and sleeves.
 13. Electrical equipment showing plans, elevations, sections, arrangements, materials, anchor bolts, supports, weights, wiring and circuit diagrams, internal connections, busses, grounding, conduit spaces, layout of instruments, gauges, meters, and other components.
 14. Underground duct banks showing typical details of conduits, joints, spacers, and means of securing conduits in place during concrete placement.
 15. Dielectric connections and materials and methods to be used to isolate dissimilar materials.
 16. Full-size lettering layouts for data plate and nameplate inscriptions.
 17. Written descriptions fully describing the operation of all control circuits, start-up sequencing, shutdown sequencing, and alarms.
- E. Details and Connections. Satisfactorily detail all connections required to complete the Work, including details necessary to make indicated or specified additions to existing work or to provide connections for future work. Design connections and parts of

strength to withstand, without adverse deflection or stress, all loads or pressures to which they may be subjected and to develop the strength of the members or parts connected. In no case shall the connections, parts, or details be inferior to those required by the Contract Documents.

- F. Related Work. The term "by others" is not acceptable for the description of related work shown in the shop drawings. Clearly note by name or description the Contractor, Subcontractor, or trade to provide such related Work; where such name or description is missing, it shall be understood and agreed that the Contractor is to furnish and install such related Work.
- G. Clearances. Do not proceed with any related Work that may be affected by piping, machinery, equipment, or other work therein until shop drawings and data showing all components, with acceptable clearances have been approved.
- H. Composite Shop Drawings with Installation Layouts. Prepare and submit drawings, wherever specified or required, to resolve tight or conflicting field conditions. Show dimensional plans and elevations of the materials or equipment of all trades in the involved area or space, and include complete information as to arrangements, locations, clearances, avoidance of interferences, access, sizes, supports, connections, services, assembly, disassembly, and installation. Composite shop drawings and layouts shall be coordinated in the field by the Contractor and his Subcontractors for proper relationship to the Work of all trades, based on field conditions, and shall be checked and approved by them before submittal. Contractor shall have competent technical personnel readily available for such coordinating and checking.

3.04 SAMPLES

- A. Identification. Label or tag each sample or set of samples identifying the manufacturer's name and address, brand name, catalog number, intended use and other data specified in Article 3.01.B herein.
- B. Colors, Patterns, and Textures. For items required to be of selected and approved colors, patterns, textures, or other finish, submit sufficient samples to show the range of shades, tones, values, patterns, textures, or other features corresponding to the instructions and requirements specified.
- C. Factory Finish Colors. Colors of material specified to be furnished with a factory finish are subject to approval. Submit duplicate samples of factory finishes showing the full range of available colors for selection and approval when requested by the Owner.

3.05 MATERIALS LISTS AND EQUIPMENT DATA

Materials lists and equipment data shall be submitted for all items proposed to be incorporated into the Work. In determining acceptability, consideration will be given to the availability of maintenance and replacement parts and materials, the availability of manufacturer's technical representatives, other factors that relate to the maintenance and repair of installed items without excessive inconvenience to the Owner, guarantees and warranties, as well as determination of conformance with the Contract Documents.

- A. Material Lists. Submittal copies of Material Lists shall be provided where specified in other Sections, and the number of copies submitted shall be as stated in Paragraph 3.01.A herein.

- B. Equipment Data. Submittal copies of equipment data shall be provided in accordance with other Sections and the number of submittals shall be as stated in Paragraph 3.01.A herein. Submittals for equipment incorporating logic circuits shall include a draft of a detailed theory of operation. Data shall be submitted in sets covering complete systems or functioning units.

3.06 INSTRUCTION (OPERATIONS AND MAINTENANCE) MANUALS

Instruction Manuals shall comply with the requirements of other Sections, and the following

- A. The manufacturer's instruction or O&M manuals required by these Specifications shall be specific to this project and to the equipment being furnished.
- B. It is the intent that the instruction manuals be a complete document on the respective equipment item(s), independent of any separate shop drawing submittals, for the information and use by operation and maintenance personnel. As such, the manuals shall contain at a minimum, all approved shop drawing data necessary to describe the respective equipment and conform to the requirements of these Contract Documents, wiring diagrams and detailed circuit operation description; and performance curves and data.
- C. The index furnished for each manual shall address all of the content categories to facilitate their being located by the reader. Categories which are considered to be not applicable or not required shall be identified as such in the index.
- D. For each class of equipment or machinery identify the name, address and telephone number of the manufacturer, supplier and closest authorized service organization or company. Include this information at the beginning of each respective equipment manual.

3.07 INSTALLATION INSTRUCTIONS

Submit two copies of manufacturers' installation instructions for material and equipment incorporated in the Work to the extent specified in other Sections and Divisions of the Specifications or requested by the Owner for its review. Installation instructions will be reviewed for general adequacy only. After review, the Contractor shall distribute copies to all those involved with the installation.

Submit this information sufficiently in advance of the Work to ensure proper coordination of the respective equipment installation into the Work. In no case furnish this information later than delivery of the respective material or equipment. Payment for materials and equipment delivered will not be approved without submittal of the respective manufacturer's installation instructions.

3.08 OTHER SUBMITTALS

Provide copies of other submittals such as calculations, manufacturer's certified reports, operational demonstration and system validation reports specified in other Sections and Divisions of the Specifications.

3.09 STORAGE INSTRUCTIONS

For each equipment and material item furnished, provide for the Owner's records 2 copies of the manufacturer's recommended instructions for storage of the respective equipment or material. The instructions shall address conditions both before installation and (for mechanical, electrical and instrumentation equipment) after installation but before placing into continuous operation.

Submit manufacturer's storage instructions either prior to delivery of the material/equipment or with the request for payment of materials delivered. Payment for materials delivered will not be approved without submittal of the manufacturer's storage instructions.

3.010 FORM OF APPROVAL

- A. Copies of submittals which are returned to the Contractor and which are subject to approval will be marked with notations A, B, B-R, C, D, or E, in which case the action so indicated shall be taken by the Contractor; alternatively, Engineering will use Submittal stamp with similar notations, defined as follows:
1. No Exceptions Taken (Resubmittal Not Required): Accepted subject to its compatibility with future submissions and additional partial submissions for portions of the work not covered in this submission. Does not constitute approval or deletion of specified or required items not shown in the partial submission. [Engineer's approval of submittal does not relieve the Contractor of full responsibility to comply with all aspects of the Contract Documents.
 2. Make Corrections Noted (Resubmittal Not Required): Same as A, except that minor corrections as noted shall be made by the Contractor.
 3. Make Corrections Noted (Resubmit for Record Purposes): Same as B, except that resubmittal is required.
 4. Amend and Resubmit: Rejected because of major inconsistencies or error which shall be resolved or corrected by the Contractor prior to subsequent review by the Design Consultant.
 5. Rejected (Resubmit): Submitted material does not conform to Drawings and Specifications in major respect, i.e., wrong size, model, capacity, or material.
 6. Received for Record Purposes Only: Applies to submittals which are required but not reviewed, such as shoring submittals.
- B. Returned copies of drawings marked with either notation A, B, or B-R authorize the Contractor to proceed with the fabrication, installation or construction, or any combination thereof, covered by such returned drawings, provided, that such fabrication, installation or construction shall be subject to the comments, if any, shown on such returned copies and to the Contract requirements whether or not specifically referenced. Although fabrication may proceed on a notation B-R, Contractor shall incorporate the comments, resubmit, and obtain notation A before release for shipment can be granted. Failure to satisfactorily address the review comments, shall result in designation of the resulting as being defective.
- C. Returned copies of drawings marked with notation C or D shall be corrected as necessary and revised drawings shall be submitted in the same manner as before.

3.011 ENGINEER'S REVIEW OF SUBMITTALS

A. Refer to Article 7.16.C of the EJCDC General Conditions.

3.012 RECORD DRAWINGS AND SPECIFICATIONS

A. Refer to Section 01 70 00, Execution and Closeout Requirements.

3.013 CERTIFICATES

Each certificate required under the Contract or in any of the following Sections shall be signed by the individual, office, or agent lawfully authorized to execute the certificate, and such authority shall be cited in the certificate by title, description, or other acceptable evidence. All certificates shall be sworn as to the correctness and validity of the contents. Where specifically required in the respective Section of the Specifications, certificates shall be notarized and duplicate copies of required certificates shall be notarized to be true copies.

3.014 SCHEDULE OF VALUES

Refer to Para. 1.05 of Section 01 30 00 – Administrative Requirements, these Specifications.

END OF SECTION

SECTION 01 35 00

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Protection of Improvements
 - 2. Protection of private and public Property
 - 3. Utility potholing
 - 4. Existing utilities
 - 5. Protection of existing pavement
 - 6. Protection of existing hardscape
 - 7. Protection of existing trees
 - 8. Excavation notification.
 - 9. Construction Documentation/Photographs/Videos
 - 10. BRMWC Well Abandonment

1.2 SUBMITTALS

- A. Potholing Report

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

- 3.1 Protect all existing utilities and improvements not designated for removal and restore damaged or temporarily relocated utilities and improvements, immediately, to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the contract documents.
- 3.2 Protect all private and public property from damage due to its activities. If any damage does occur to public or private property as a result of the Contractor's operations, the Contractor shall be responsible for the repair of the property, to pre-construction conditions or better.
- 3.3 POTHOLING
 - A. Designated Pothole Locations: The plans indicate locations where potholing is required. The cost for designated potholing shall be included in related items of Work, and no additional compensation will be provided, therefore. For all such designated locations, the Contractor shall perform the potholing and submit a written report at least 5 working days prior to performing any work or ordering

materials for the related underground facilities. The written report shall be signed by a licensed surveyor or engineer and shall include the following information:

1. Size, type, and material of the facility exposed.
2. Accurate horizontal location, determined by survey.
3. Accurate vertical location, determined by survey. The vertical location shall be the top of pipe, flow line, or bottom of the pipe, as shown on the plans, or if not designated, whichever is the critical location for the proposed crossing or connection.

Refer to Section 01 11 00, Paragraph 1.9 for work order/sequencing after completing potholing operations.

- B. Non-designated Potholing: The Contractor shall perform exploratory excavations sufficiently ahead of construction for all known crossings, either shown on the plans, or marked on the pavement/ground/surface, so as to identify any unforeseen conflicts with the proposed construction a sufficient time in advance of construction to avoid possible delays to the Contractor's work. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility. The cost of non-designated potholing shall be considered appurtenant to the bid items requiring such excavation. There will be no separate payment for non-designated potholing.

3.4 EXISTING DRY AND WET UTILITIES

- A. General: The Contractor shall protect all above ground and underground dry and wet utilities and associated improvements that may be impaired during construction operations. Water facilities requiring modification as indicated in these contract documents, shall be protected at all times and/or Contractor provisions made for temporary controls, so as to allow full functionality of these systems at all times.
- B. Contractor shall be responsible for coordination and communication with all utility agencies during construction.
- C. Locations shown: The known existing buried utilities and pipelines are shown on the Drawings in their approximate location, and also may be marked in the field by the utility representatives. The Contractor shall exercise reasonable care in avoiding damage to all utilities and be held responsible for their repair if buried facilities so located are damaged.
- D. Services Assumed: When underground distribution mains are shown on the plans or marked by the utility companies, the Contractor shall assume that every property parcel will be served by a service connection of each type of facility. Not all laterals are shown in the drawings.
- E. Work by Utilities: During the course of the Contract, work may be performed by the utility companies, Sunnyslope County Water District, Best Roads Mutual Water Company, or by the County of San Benito to inspect, operate, relocate, abandon or install facilities. The Contractor shall coordinate with the utility companies—and other agencies, as necessary—regarding such work. Such coordination shall be

included within the Contract bid and there will be no separate payment therefor. Refer to Section 01 30 00 – Administrative Requirements.

- F. Utilities to be moved: Should it become necessary to move the property of any public utility or franchise holder, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- G. Right of Access: The right is reserved to the County of San Benito and to the owners of public utilities and franchises to enter at any time upon any property owned by such entity; or upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the work of this Contract.
- H. Approval of Repairs: All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.
- I. Maintaining Service: All pipelines, power, telephone, communication cable, gas, water, irrigation, sewer, and storm drain systems within the work area shall remain continuously in service during all the operations under the Contract, unless specifically shown otherwise in the Contract Documents, or unless other arrangements satisfactory to the Engineer are made (by the Contractor) with the owner of said system.

3.5 RIGHTS-OF-WAY

- A. The Contractor shall not perform work within the right of way or easement of any agency without first obtaining approval from that agency and/or from the County of San Benito.

3.6 RESTORATION OF PAVEMENT

- A. General: All paved areas cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents.
- B. Pavement repair shall be in accordance with Section 32 12 00 – Flexible Paving, and as shown on the Plans.
- C. All temporary and permanent pavement shall conform to the Contract Documents and to the requirements of the affected pavement owner. All pavements that are subject to partial removal shall be neatly saw cut in straight lines.
- D. Pavement markers and markings, if necessary, shall be replaced in accordance with Section 32 17 32 – Pavement Markings and requirements of the agency or owner having jurisdiction.

3.7 EXISTING HARDSCAPE

- A. General: All surface concrete or other hardscape areas cut or damaged during construction shall be replaced with similar materials and of equal material and quality to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents. All such repairs and replacements shall conform to the requirements of the affected hardscape owner.
- B. Partial removal: All concrete and PCC pavement that is subject to partial removal shall be neatly saw cut in straight lines. The saw cut lines shall be extended to align with existing score lines or similar feature so as to provide a uniform appearance.

3.8 TREES WITHIN PROJECT LIMITS

- A. Contractor shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs in the Project Area. Only trees designated for removal, shall be removed. All other trees shall be protected in place.
- B. The Engineer shall be contacted prior to any root pruning. Protection of trees and tree roots, including actions directed by the Engineer, shall be considered part of the defined Work and corresponding Bid Items, and no additional compensation shall be allowed therefore.
- C. Trees shall be protected from damage during construction. Root severing or pruning shall be avoided when possible. Tunneling under roots is preferred. Roots of 2 inch or larger diameter are considered major or significant roots. After grading or trenching to the required depth, any roots exposed should be cut with a saw and sealed with a recommended tree seal compound. Pruning roots in this manner will avoid any root damage by heavy equipment. Following removal of the soil in cut area, exposed roots shall be inspected by the County for stability, smoothness of pruning cut and sealing. Any additional damage shall be repaired in the same manner, or in the manner specified by the Engineer.
- D. Whenever cuts are made in the ground near the roots of trees, appropriate measures shall be taken to prevent exposed soil from drying out. After these steps are taken, top pruning is essential. Compute approximate percent of size of roots, then green foliage should be pruned in an equal amount to the area cut in roots.
- E. Never sever more than one third of the large supporting roots during any root pruning operation. Make smooth clean cuts on large roots and apply recommended dressings to prevent decay of remaining portion of root. Prune equal foliage from the tree to compensate for root loss. If further root pruning is necessary, allow the tree one year to develop new fibrous roots and then proceed with the second root pruning and thinning operation. Timely pruning, during the growth season, will develop healthy fibrous roots and full compacted foliage. Torn or bruised roots shall be cut back to sound undamaged wood and a recommended

wound dressing applied. Trimming roots back to lateral root junction will promote new growth of lateral roots resulting in a dense root system. Cuts shall be made flush with the junction or smaller lateral roots so that stubs or snags are not left to decay.

- F. If any tree during the course of, or as a result of construction operations is injured to extent of causing its permanent disfigurement or death within the one year guarantee period, it is agreed by the parties to this Contract that actual damage to the County will be impossible to determine, and in lieu thereof, Contractor shall pay to County as fixed, agreed, one calendar day's Liquidated Damages (\$1,000) for each tree so injured.
- G. Tree Trimming:
 - 1. Trim trees only to the extent required for construction, equipment and personnel access, and as directed by Engineer.
 - 2. Properly remove and dispose of trimmings.

3.9 EXCAVATION NOTIFICATION

- A. Notify Prior to Excavation: Prior to any excavation the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.
- B. Call USA: The Contractor shall also notify Underground Service Alert (USA) **at 811** at least 2 working days, but no more than 14 calendar days, prior to such excavation. If a utility owner is not equipped to locate its utility, the Contractor shall locate it.

3.10 CONSTRUCTION PHOTOGRAPHS AND VIDEOS

- A. Provide pre-construction, construction progress, and post-construction photographs and videos as part of the Work. Photographs shall be taken with a minimum 5-megapixel digital camera, and all photos and videos shall be provided to Owner on CDs, thumb drives, or an agreed upon cloud-based storage. Photos shall be arranged in folders on the CDs, thumb drives, or cloud-based storage by date taken and clearly identified by location of Work. Provide further cataloging of photographs as required to clearly identify subject matter, if not self-evident on the photograph (such as utility identification).
- B. Pre-Construction Photographs and Videos. Arrange a meeting time with the Owner, the County, and Engineer, minimum 2 working days prior to taking photographs and videos, to allow Owner, County, and Engineer the opportunity to accompany Contractor on the pre-construction photograph session. Provide pre-construction photographs during this walk-through of the existing project site conditions at locations directed by Owner and Engineer. Submit the pre-construction photographs and videos within 10 working days following the date photographs are taken. Include at a minimum, the following:

1. Photographs, videos, and documentation of condition of all existing improvements in the areas of Work, including laydown areas to be utilized by Contractor.
 2. John Smith Road along pipeline route, including condition of existing pavement along entire length of water main installation Work.
 3. Existing condition of all storm drain, sewer utilities, gas mains and other utilities in and around the areas of Work.
 4. Existing conditions at tie-ins to SSCWD and BRMWD water systems.
 5. Condition of all pipeline alignments and haul routes.
- C. Post-Construction Photographs and Videos. Provide same coverage as required in Para. 3.10.B. Arrange a meeting time with the Owner, the County, and Engineer, minimum 2 working days prior to taking photographs, to allow Owner, County, and Engineer the opportunity to accompany Contractor on the post-construction photograph session. Submit final photographs as part of close-out submittals specified in Section 01 70 00.
- D. Progress Photographs. Provide photographs and videos of the progress of the Work, to be provided to the Owner throughout progress of the Work. Progress photographs shall be taken at a minimum, on a weekly basis. Photographs and videos shall be taken at a minimum:
1. At utility appurtenant features, such as tie-in points, fire hydrants, air valves, blowoffs, valves, etc.
 2. Erosion control measures provided as part of the Work.
 3. Existing facilities to remain, new facilities to be constructed.
 4. Staging and construction haul routes.

3.11 BRMWC WELL ABANDONMENT

- A. Abandon existing BRMWC wells in accordance with Department of Water Resources (DWR) Bulletin 74-81 and 74-90, per Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.060 WELL STANDARDS of the San Benito County Code of Ordinances. Both Bulletin 74-81 and 74-90 are attached to the end of these technical specifications.
- B. Refer to Section 02 42 00 – Removal and Salvage of Construction Materials for demolition, excavation, salvage, and resurfacing requirements.
- C. Contractor to coordinate power cabling and conduit removal with PG&E.
- D. Existing well pump discharge piping shall be cut, sealed, and capped in accordance with Section 02 42 00 – Removal and Salvage of Construction Materials.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide temporary facilities as hereunder specified, plus other unspecified temporary facilities, including labor, materials, services, utilities, and equipment, as may be required for proper performance of Contract, except as otherwise provided. Temporary facilities shall be approved by the Owner, and where applicable shall also be approved by the County of San Benito and/or Best Road Mutual Water Company. Locate facilities where and as directed and maintain the facilities in safe and sanitary condition at all times until completion of Work.
- B. At completion of work, or sooner when no longer needed, remove all temporary facilities, except where certain facilities are specified to remain or to be relocated for use under future contracts.
- C. All Work required and specified in this Section shall be included in Contractor's price for mobilization, except as otherwise provided in the Contract Documents, and no separate or additional payment will be made, therefor.

1.02 CONSTRUCTION EQUIPMENT

- A. Erect, equip, operate, and maintain construction equipment in strict accordance with applicable statutes, laws, ordinances, rules, and regulations of authorities having jurisdiction.

1.03 SAFETY PRECAUTIONS

- A. Provide and maintain barricades, fencing, shoring, and other safety precautions as required for the Work.
- B. Maintain such items for duration of Work, and repair, replace, and relocate them as necessary for safe protection.
- C. Attention is directed to Safety Orders issued by the State of California, Division of Industrial Safety. Contractor shall obtain copies of Safety Orders applicable to the type of work to be performed, and shall be governed by requirements thereof in construction operations.
- D. Fully inform each sub-contractor and material supplier as to the requirements of applicable Safety Orders.

1.04 ROADS AND ACCESSWAYS

- A. Coordinate with the County of San Benito, Sunnyslope County Water District, and Best Roads Mutual Water Company for work requiring access restriction/coordination in and

around County right-of-way, shared staging and access areas, and BRMWC property. Refer to Section 01 30 00 – Administrative Requirements.

- B. Maintain access roads and parking areas in satisfactory condition during Contract time, and repair damages attributable to Work of this Project at intervals as needed. At completion of Contract, roads, parking areas and entrance ways shall be left in condition at least equal to that existing at start of Contract, except as may be otherwise required by Contract documents.
- C. Permanent Improvements: Where Contract calls for permanent sidewalk, road, and other ground improvements, and such permanent improvements are completed, or essentially completed within construction period, Contractor does not have vested right to use such improvements as temporary facilities. At all times, protect new Work provided by County of San Benito, SSCWD, BRMWC, and any other entities working at the site. Repair all damages resulting from the Work required by these Contract Documents.
- D. Retain responsibility for permanent improvements pursuant to General Conditions. Use of permanent improvements by Contractor shall be subject to approval by the Owner and, if applicable, by the County of San Benito.

1.05 USE OF OWNER, COUNTY, AND BRMWC PROPERTY

- A. On-Site Storage and Work Areas: The Owner, the County, and BRMWC may allocate available on-site storage and work areas to Contractor, if available, subject to change as may be necessary by job progress, such as site development or other intervening work. Contractor shall be responsible for coordinating with the Owner, County, and BRMWC, and ultimately securing appropriate staging areas.
- B. Owner and County Property and Right-of-Way: Operations shall be confined to County and Owner property and public right-of-way to greatest possible extent and shall not encroach on areas other than those designated or approved for construction access.
 - 1. Ascertain, observe, and comply with rules and regulations in effect, including, but not restricted to, parking and traffic regulations, hours of allowable ingress and egress as to main arteries, and the like.
- C. Make detailed examination of such Owner, County, or BRMWC property at start of work and conditions shall be noted by Contractor and confirmed by Owner, County or BRMWC.
- D. TEMPORARY FENCE (TYPE ESA)
 - 1. Where called for on the drawings, provide temporary ESA-type fencing to protect existing trees, sensitive landscaping or other improvements shown. Install at the drip line or otherwise as shown on the drawings or directed by Engineer.
 - 2. ESA fencing shall be high visibility fabric, containing ultraviolet inhibitors, and consisting of one of the following:
 - a. Polyethylene
 - b. Polypropylene
 - c. Combined polyethylene and polypropylene
 - 3. Testing Requirements:
 - a. Sample under ASTM D 4354, Procedure C.

- b. Test under ASTM D 4759. All properties shall be based on Minimum Average Roll Value.
 - c. Identify, store, and handle under ASTM D 4873.
4. Product shall comply with the following:

Property	Specifications	Requirements
Width, inches, Min	Measured	48
Opening size inches	Measured	1" x 1" (Min) 2" x 2" (Max)
Color	Observed	Orange
Grab breaking load 1-inch grip, lb, Min. in each direction	ASTM D4632	260
Apparent elongation percent, Min., in each direction	ASTM D4632	5
Ultraviolet degradation percent of original unexposed grab breaking load 500 hr, minimum	ASTM D4355	70

5. Posts shall be wood or steel, complying with the following:
- a. Wood Posts shall be:
 - 1) Untreated fir, redwood, cedar, or pine and cut from sound timber
 - 2) Straight and free of loose or unsound knots and other defects that would render the stakes unfit for use
 - 3) Pointed on the end to be driven into the ground
 - 4) At least 2" x 2" in size and 6 feet long
 - b. Steel Posts shall be:
 - 1) "U," "T," "L," or other cross-sectional shapes that can resist failure from lateral loads.
 - 2) Be pointed at the end to be driven into the ground.
 - 3) Weigh at least 0.75-pound per foot.
 - 4) Be at least 6 feet long.
 - 5) Have a safety cap attached to the exposed end. The safety cap must be yellow, orange or red plastic and fit snugly to the metal post.

E. Protection of Existing Utilities: Protect from damage, existing utility lines not specified to be altered by Work of this Contract; any such features damaged shall be repaired or replaced to condition equal to that existing prior to commencing work of this Contract. Unless otherwise specified, maintain existing utility service at all times during construction. Utility service lines found entering site and not indicated to remain or to be incorporated in new Work, shall be plugged, capped, or otherwise abandoned by Contractor in manner satisfactory to Utility Companies whose services are involved, except as otherwise required.

1.06 CONTRACTOR'S STAGING AREA

- A. Contractor shall coordinate and provide suitable staging area for the Work.

1.07 CLEAN UP OF WORK AND DISPOSAL OF TRASH

- A. Attention of Contractor is directed to Specification Section 01 70 00 – Execution and Closeout Requirements. Keep work and storage areas clean and free of rubbish and perform protective and clean up work within one day of being so notified by Owner.
- B. Dispose of trash resulting from work. Recycle materials to the extent practicable. Remove and dispose of trash resulting from work in appropriate receptacles to be provided by Contractor, and dispose of at an approved facility. Do not use existing nearby trash containers for depositing trash and rubbish.

1.08 DUST ABATEMENT

- A. Use water wagons or spray from hoses to control dust created by outdoor work operations in areas on project property during entire period of this Contract as directed by Owner; also, satisfactorily control dust created by operations on property used, other than project property, to satisfaction of all concerned.

1.09 EROSION AND SEDIMENT CONTROL

- A. Implement applicable measures for erosion and sediment control during construction, in compliance with the erosion and sediment control requirements in these Division 01 technical specifications.

1.010 SANITARY FACILITIES

- A. Do not use sanitary facilities owned by SSCWD, BRMWC, or other County contractors.
- B. Toilet Facilities: Provide sufficient suitably enclosed chemical toilets, conforming to ANSI Z4.3., with urinal for workmen.
- C. Drinking Water Facilities: Provide clean, sanitary and adequate drinking water.

1.011 TEMPORARY WATER

- A. Make arrangements for temporary construction water as required. There is an existing fire hydrant in Fairview Road, approximately 180LF south of the intersection with John Smith Road; the owner of this facility, and whether it is connected to a potable water line, are unknown. Contractor to verify.

1.012 TEMPORARY ELECTRICITY

- A. Provide such temporary electrical facilities as necessary for the Work, and to supply temporary lighting for work operations and temporary power for portable power driven tools.
- B. Construction Requirements: Construct and maintain temporary electrical service facilities in accordance with California Code of Regulations, Title 24, Part 3, Basic Electrical Regulations, Public Utilities Commission "Rules for Overhead Line Construction" (G.O.95), and requirements of Pacific Gas and Electric (PG&E), or other utility agencies, as applicable. Contractor shall be responsible for contacting and coordinating with PG&E and other agencies, and to provide necessary applications for obtaining temporary electrical service in conformance with the project schedule.

Materials, devices, and equipment used for these facilities shall be in good and safe condition, but need not be new. Electrical service equipment and utility feed shall be of adequate amperage and voltage ratings to serve electrical loads necessary to complete the Work and to serve other required loads listed in this specification. Materials, devices, equipment and temporary electrical service facilities shall be removed from the site prior to final field observation and project closeout.

- C. Contractor-Installed Construction Power Facilities: Temporary electrical materials and equipment furnished and installed by Contractor for required facilities hereunder shall be removed after serving their purpose.

1.013 SECURITY

- A. Contractor shall be responsible for security of Work involved in this Project, during entire time of Contract. Make good all damages to work and loss of materials due to vandalism or theft, within this responsibility. Coordinate security requirements with SSCWD, County of San Benito, BRMWC, and other agencies and contractors at the job site.

1.014 WATER SERVICE TIE-IN

- A. In accordance with the approved Work Plan as required in Section 01 11 00 – Summary of Work, coordinate all Work associated with connecting to the existing SSCWD and BRMWC water systems with the respective agency. Contractor shall coordinate, with the respective agency, the limitations for the duration of water shut down while tie-in operations occur.
- B. Contractor shall provide all equipment, labor, materials and resources needed to adequately monitor and control water service tie-in operations. As part of the approved Work Plan, delineate anticipated flow conditions, required equipment to accommodate anticipated flow conditions, response times to respond to failure or malfunction of equipment, emergency contact information and staffing assignments, details of monitors and alarms.

END OF SECTION

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 GENERAL

- A. This Work shall consist of temporary measures needed to control erosion and water pollution during construction. These temporary measures shall include, but not be limited to, berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods. These temporary measures shall be installed at the locations where needed to control erosion and water pollution during the construction of the Project, as part of final site restoration at construction completion, and as directed by SSCWD, the County of San Benito, and the Engineer.
- B. This Temporary Erosion and Sediment Control Specification presented herein serves as a minimum for the requirements of erosion control during construction. Contractor has the ultimate responsibility for providing adequate erosion control and protecting water quality throughout the duration of the Project, whether specifically shown on the drawings or not. Therefore, if the provisions herein are not working sufficiently to protect the Project areas, then Contractor shall provide additional measures as required to obtain the required protection. Contractor shall include in the bid price all appropriate means and measures to adequately provide erosion and sediment control during construction, and at final Project completion and wrap up.

1.02 MEASUREMENT AND PAYMENT

- A. Payment for preparing and implementing temporary erosion and sediment control shall be included in the Erosion, Sedimentation, and Water Pollution Control item(s) of the Work that require such measures, and no additional compensation will be allowed, therefor. Refer to Section 01 20 00 – Price and Payment Procedures.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 – Submittals:
 - 1. Proposed erosion and sediment control measures for all aspects of the Work. Include such measures in the Work Plan (refer to Section 01 11 00, Summary of Work).

PART 2 - PRODUCTS

- A. Products used for Temporary Erosion and Sedimentation Control shall be per Section 21, Caltrans Standard Specifications, 2023 edition, unless otherwise specified. Materials may include hay bales, hydroseed mix, straw, fiber mats, fiber netting, wood cellulose, fiber fabric, gravel, and other suitable materials, and shall be clean, free of deleterious materials, and certified weed free.

PART 3 - EXECUTION

3.01 OTHER PERMITS

- A. Contractor shall obtain applicable permits required for this Project. Lack of listing any specific permit by the County shall not relieve the Contractor of the obligation of obtaining and complying therewith.

3.02 CONSTRUCTION

- A. Stabilization of Disturbed Areas:
 - 1. All disturbed un-paved areas shall be restored to pre-construction condition or better, and shall require soil stabilization/hydroseeding unless otherwise shown or specified.
 - 2. Temporary sediment control measures shall be established a minimum of 2 working days prior to time of exposure/disturbance.
 - 3. Permanent erosion protection measures shall be established within five (5) working days after final grading of areas.

- B. Stabilization of Sediment and Erosion Control Measures:
 - 1. Sediment barriers, perimeter dikes, and other measures intended to either trap sediment or prevent runoff from flowing over disturbed areas shall be constructed as a first step in grading and be made functional before land disturbance takes place.
 - 2. Earthen structures such as dams, dikes, and diversions shall be stabilized within five (5) days of installation.
 - 3. Stormwater outlets and drainage swales/pipes shall also be stabilized prior to any upstream land disturbing activities.

- C. Stabilization of Waterways and Outlets:
 - 1. All onsite stormwater conveyance channels used by Contractor for temporary erosion control purposes shall be designed and constructed with adequate capacity and protection to prevent erosion during storm and runoff events.
 - 2. Stabilization adequate to prevent erosion shall also be provided at the outlets of all pipes and channels.
 - 3. Storm Sewer Inlet Protection: All storm sewer inlets which are made operable during construction, or which drain stormwater runoff from the Work sites, shall be protected from sediment deposition by the use of filters or other acceptable means, subject to approval by the County and Engineer.

- D. Construction Access Routes:
 - 1. Wherever construction vehicles enter or leave a construction site, a Stabilized Construction Entrance (rumble strip) is required. Do not allow mud and debris onto to any public roads.
 - 2. Where sediment is inadvertently transported onto a public road surface, the roads shall be immediately cleaned. Sediment shall be removed from roads by shoveling or sweeping and be transported to a sediment controlled disposal area. Street washing shall be allowed only after sediment is removed.

END OF SECTION

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.01 GENERAL

- A. This section includes requirements for storm water pollution control in accordance with Caltrans Standard Specifications 2023 Sections 13-1 GENERAL and 13-3 Storm Water Pollution Prevention Plan.
- B. Delete the 2nd paragraph in Section 13-3.01A in its entirety and replace with "Discharges of storm water from the project must comply with NPDES General Permit for "Storm Water Discharges Associated with Construction and Land Disturbance Activities" (Order No. 2022-0057-DWQ, NPDES No. CAS000002) hereinafter called the "Permit.""
- C. The Risk Level for this Project is Level 2.

1.02 MEASUREMENT AND PAYMENT

- A. Delete Section 13-3.04, Payment, Caltrans 2023 Section 13-3 Storm Water Pollution Prevention Plan, and replace with the following: "Payment for preparing and implementing Storm Water Pollution Prevention Plan shall be included in the lump sum Bid Item No. 3 – Erosion, Sedimentation, and Water Pollution Control for the Work including controlling stormwater, monitoring storm water discharges, preparing and submitting the Storm Water Annual Plan, and complying with all Permit conditions."
- B. This item specifically excludes groundwater dewatering which shall be paid for under a separate bid item, with no additional compensation allowed therefor.

1.03 SUPPLEMENTAL DEFINITIONS TO CALTRANS SECTION 13-1 AND 13-3

- A. "Department" shall also mean "Owner" when specifically referring to Sunnyslope County Water District.
- B. Construction phase: Construction phases are (1) Construction including work activities for trenching, piping, site improvements, and all other improvements shown on the drawings;; and (2) Suspension where work activities are suspended and areas are inactive.
- C. LRP: Legally Responsible Person
- D. NOT: Notice of Termination
- E. QSD: Qualified SWPPP Developer.
- F. QSP: Qualified SWPPP Practitioner.
- G. PRDs: Permit Registration Documents
- H. SMARTS: Stormwater Multi Application Reporting and Tracking System
<https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp>

1.04 SUBMITTALS

- A. Comply with Caltrans Section 13-3.01C, Submittals, with the following clarifications:
 - 1. SWPPP submittal shall be within 21 calendar days of contract approval.
 - 2. Engineer's initial review period of SWPPP will be within 14 calendar days of receipt.
 - 3. Contractor's re-submittal of SWPPP shall be within 7 calendar days of receipt of Engineer's comments.
 - 4. In addition to the SWPPP copies specified, provide one additional copy of SWPPP to Owner's Representative, for submission to Region 3 Regional Water Quality Control Board.
 - 5. Contractor shall anticipate review comments from the RWQCB upon submission of SWPPP. Update and amend SWPPP within 14 calendar days of receipt of RWQCB comments to SWPPP.
 - 6. All SWPPP revisions shall be included in the lump sum bid price, and no additional compensation shall be allowed therefor.

- B. Prior to starting work, submit the following:
 - 1. The name and qualifications of the QSD, QSP and WPC
 - 2. Complete PRDs including, but not limited to, the NOI, SWPPP, Risk Determination, and CSMP for review by Engineer. Upon Engineer's approval of the submittal, Contractor shall be responsible for uploading the PRDs to SMARTS. Contractor shall notify LRP within 8 hours of successfully upload of the PRDs.

- C. BMP Status Report
 - 1. Upon completion of construction, Contractor must submit the NOT and supporting documentation for review by the Engineer/Owner's Representative. Upon Engineer's approval of the submittal, Contractor is responsible for uploading the NOT to SMARTS. Contractor shall notify LRP within 8 hours of successfully upload of the NOT.

PART 2 - PRODUCTS

- A. NOT USED

PART 3 - EXECUTION

3.01 OTHER PERMITS

- A. Contractor shall obtain any and all permits required for this Project. Lack of listing any specific permit by the Department shall not relieve the Contractor of the obligation of obtaining and complying therewith.

- 3.02 Comply with the requirements of this Section 01 57 23, Temporary Storm Water Pollution Control, and Caltrans Standard Specification 2023 Sections 13-1 and 13-3.

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Closeout Procedures.
- B. Project Record Documents.
- C. Operation and Maintenance Data.
- D. Guaranties, Warranties and Bonds.
- E. Spare Parts and Maintenance Materials.

1.02 CLOSEOUT PROCEDURES

- A. Comply with procedures in this Section. When Contractor considers Work has reached substantial completion, submit written certification that Work is ready for inspection.

1.03 INSPECTION PROCEDURES

When the Work is, in the opinion of the Contractor, substantially complete, the Contractor shall call for a punch list inspection.

- A. Inspection Procedures: On receipt of a written request for inspection, the Owner's Representative will schedule the inspection. If in the judgment of the Owner's Representative the project is not substantially complete, the Owner Representative will so advise the Contractor and discontinue the inspection.
 - 1. The Owner's Representative will repeat inspection when requested and assured that the Work has been completed.
 - 2. Results of the completed inspection will form the basis of requirements for final acceptance of the Work.
- B. Final cleaning shall be completed prior to Owner's Representative inspection and acceptance.

1.04 PROJECT RECORD DOCUMENTS ("AS-BUILTS")

- A. Per Article 7.12 of the EJCDC General Conditions, and this Section.
- B. Maintain, on current basis, record drawings showing "as-built" conditions of project, subject to monthly review by Owner's Representative. Monthly pay estimates will not be processed without review and approval of record drawings by the Owner. Written confirmation that the as-builts have been properly updated shall be submitted with each pay application request. Final Acceptance of Work will not take place until record drawings are turned over to the Owner's Representative.
- C. Store Project record documents separate from those used for construction. Protect from deterioration and loss in a secure, fire-resistive location; provide access to the

Owner's Representative(s) during normal working hours. In the event of loss of recorded data, use means necessary to again secure the data to the Owner's acceptance; such means shall include, if necessary in the opinion of the Owner, removal and replacement of concealing materials and in such case, replacements shall be to the standards originally specified.

- D. Before commencing backfilling of utilities or any other underground pipes, ducts, conduits, or structures, take photographs and/or videos detailing the relationship of below ground utilities to structure(s) or other physical reference point. Photos are to be in compliance with Section 01 35 00 – Special Project Procedures, categorized by location and indicating utilities and progress of Work, as specified. Provide photo(s) and/or video(s) of all connections, crossings, stubs, or other critical points. If the Contractor neglects to take such photographs and/or videos, Contractor shall uncover, at the Contractor's expense, the area(s) so neglected in order to provide the requisite photos.
- E. Record Drawings: Maintain a clean, undamaged full-size bond set of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately. At time of installation of new facilities, and abandonment/removal of facilities indicated to be abandoned or removed, corresponding locations of work relating to aboveground and underground utilities, structural, and other scopes of work as may be required, shall be recorded on field record drawing set by Contractor, and reviewed with Owner's Representative. Timing of entries shall be within 24 hours after receipt of information. Do not conceal work until required information is recorded.
1. Information entered on prints shall be neat, legible, and emphasized by drawing "clouds" around changed items. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the work. Date entries.
 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. At a minimum, the following information shall be inserted and dimensioned on record documents where applicable:
 - a. The exact horizontal and vertical location of all installations and abandonments in their finished condition; all abandoned facilities shall be documented by coordinates.
 - b. All changes in construction, materials and installed equipment;
 - c. Adequate dimensional data, both horizontal and vertical, to allow location of covered installations;
 - d. The identification of changes authorized by Change Order and the number of that Change Order;
 - e. All Requests for information and the number of that Request for Information;
 - f. All Field Clarifications and the number of that Field Clarification;
 - g. All the Engineer's field change directives and the number of such directives, where applicable.
 4. Symbols and designations used in preparing record drawings shall match those used in Contract Drawings.
 5. Locate and dimension work, including stubs for future connections, with reference to permanent landmarks or buildings and indicate approximate depth below finish grade.

6. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- F. Prior to final Acceptance of Work, submit Project record documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents and signature of Contractor.

1.05 GUARANTIES, WARRANTIES AND BONDS

- A. Per Article 7.17 and 14.03 of the EJCDC General Conditions.
- B. Additional Guaranties/Warranties: Provide additional guarantees/warranties (in excess of two years) where specifically required by pertinent Specification Sections.
 1. Provide duplicate copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- C. Submit guaranties/warranties prior to final payment.
 1. For equipment put into use with Owner's permission during construction, submit guaranties/warranties within 10 days after first operation.
 2. For items of work delayed beyond date of substantial completion, provide updated guaranty/warranty submittal within 10 days after acceptance, listing date of acceptance as start of guaranty/warranty period.

1.06 DISPOSAL REPORT

- A. Upon completion of Work, and prior to final payment, submit a Disposal Report. If using certified hauler and facility, submit copies of all receipts. If using other than certified facility, summarize the waste generated, sent to landfill, reused, and recycled which is attributed to Work of this Project, including copies of all receipts.
- B. Final payment will not be made until the Disposal Report is received and approved by the Owner.

1.07 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting certification of final Acceptance of the Work, complete the following:
 1. Submit a certified copy of the Owner Representative's list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance for final inspection.
- B. Final Inspection: The Owner's Representative will re-inspect the work upon receipt of notice that the work, including inspection list items from earlier inspections ("punch-list"), has been completed, except items whose completion has been delayed because of circumstances acceptable to the Owner.
 1. Upon completion of final inspection, the Owner's Representative will prepare and submit to the Owner, a certificate of final acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If after the inspection, the Owner determines that the Work is complete, the Owner will accept the Work per the Article 15.06 of the EJCDC General Conditions.

PART 2 PRODUCTS – (NOT USED)

PART 3 EXECUTION – (NOT USED)

END OF SECTION

SECTION 02 21 00

SURVEYING

PART 1 GENERAL

1.01 SUMMARY

- A. The work under this section includes all construction surveying, setting grades and layout of facilities, and locating, resetting and recording monuments.

1.02 SUBMITTALS

- A. Written report of potholing for the locations identified on the plans.

1.03 LICENSE REQUIREMENTS

- A. All survey work shall be performed under the direction of a Surveyor licensed in the State of California.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONSTRUCTION STAKING:

- A. Engineer has provided basis of survey/survey control on the drawings. Use defined survey control to establish horizontal and vertical control of all facilities to be constructed by this contract.
- B. Set stakes for streets, paving, curbs and walks, underground facilities, structures, and other facilities shown on the Plans.
- C. Survey facilities exposed for identified required potholes.

3.02 PROPERTY CORNER RESTORATION:

- A. Comply with applicable survey monument requirements in the San Benito County Code of Ordinances.
- B. Re-establish centerline monuments and property corner monuments disturbed by the Contractors activities, by a California licensed surveyor, and file the appropriate corner record or record of survey.

- C. Property corner markers shall be assumed to exist at all intersections of property lines shown on the plans. Centerline monuments shall be assumed to exist at the intersection of all street centerlines shown on the plans.

3.03 POTHOLING REPORT

- A. Comply with Section 01 35 00 – Special Project Procedures, Para. 3.3.A.

3.04 REPORTING REQUIREMENTS

- A. Elevation reports and certificates shall be on the same elevation datum as the Contract Drawings, unless directed otherwise by the Engineer.
- B. Elevation reports and certificates shall identify the following:
 - 1. Elevation datum
 - 2. Elevation benchmark
 - 3. Surveyor's Stamp and Signature

END OF SECTION

SECTION 02 42 00

REMOVAL AND SALVAGE OF CONSTRUCTION MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface demolition
 - 2. Underground pipe and structure removal
 - 3. Underground pipe and structure abandonment
 - 4. Removing demolished materials
 - 5. Salvaging Materials to District
 - 6. Monitoring well abandonment

1.2 SUBMITTALS

- A. Include with the Work Plan Submittal, Section 01 11 00, Summary of Work, a preliminary list of items to be removed, salvaged and demolished, for review by Engineer and Owner. Include in the Work Plan, details for existing BRMWC well abandonment.
- B. Project Record Documents: Accurately record actual locations of:
 - 1. Pipes and structures removed and to be removed
 - 2. Pipes and structures to be abandoned in place

1.3 QUALITY ASSURANCE

- A. Conform to applicable codes for procedures when hazardous or contaminated materials are discovered. Refer to Article 5 of the EJCDC General Conditions.

1.4 SCHEDULING

- A. Describe demolition, removal, and salvage procedures and include in the project schedule.
- B. Comply with the requirements for site access, traffic management, and maintaining utility service.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the site before demolition. Notify the Owner's Representative immediately of any item(s) in question.
 - 1. Do not remove equipment and utilities that are necessary for continued operation of the water distribution system, without the prior approval of the Owner. Notify Owner and Owner's Representative a minimum of two working days prior to removing any active utilities and equipment from service.
- B. Verify with Owner that hazardous material abatement is complete before beginning demolition (Owner is not aware of any hazardous materials). If Contractor suspects buildings, facilities, or structures to be demolished may contain asbestos, lead-based paint, and/or other hazardous materials, notify the Owner immediately of the situation and do not proceed with demolition until such time confirmation of the nature of the material(s) has been determined. Delays caused by encountering hazardous materials shall be addressed per the corresponding sections of the General Conditions.

3.2 PREPARATION

- A. Call Local Underground Service Alert (USA) not less than two working days, but no more than 14 calendar days, before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Notify affected utility companies before starting work and comply with utility's requirements. Refer to Section 01 35 00 – Special Project Procedures, Para. 3.9.
- C. Erect and maintain temporary barriers including warning signs and lights, and similar measures, for protection of plant personnel and the public.

3.3 DEMOLITION REQUIREMENTS

- A. Use of explosives is not permitted.
- B. Conduct demolition to minimize dust and other airborne debris.
- C. Apply water to minimize dust. Provide hoses and water connections required for this purpose.
- D. Do not burn or bury materials on site. Leave site in clean condition.

3.4 SURFACE DEMOLITION

- A. Within the limits shown and where indicated on the drawings, remove and dispose:
 - 1. All asphalt paving.

- a. Base materials may be recycled and re-used for all applications where recycled base materials meet the specified material requirements of Sections 32 11 00 - Base Courses, 31 00 00 - Earthwork, and 31 23 33 - Trenching and Backfilling.
 - 2. All concrete foundations, to at least 24 inches below existing grade.
 - 3. All buildings, structures, cabling, motors, pumps, panels, tanks, and equipment associated with the existing BRWMC wells and water treatment facilities.
 - 4. All other surface features indicated to be removed such as landscape, fencing, and other surface improvements.
 - 5. All native vegetation removed by clearing and grubbing operations.
- B. Coordinate the demolition with the construction schedule to maintain access and utility service(s).
 - C. Rough grade the site as described in Section 31 00 00 - Earthwork.
 - D. Continuously clean-up and remove demolished materials from site to an authorized dump site. Do not allow materials to accumulate on site.

3.5 BURIED PIPE AND STRUCTURE REMOVAL

- A. Where removal or abandonment in place is not explicitly stated on the plans, Contractor shall remove and dispose of indicated utility to be abandoned.
- B. Coordinate the demolition with the construction schedule to maintain access and utility service.
- C. Backfill excavations as described in Section 31 00 00, Earthwork.
- D. Maintain utility service as described in Section 01 50 00, Temporary Facilities and Controls.
- E. Record termination or capped location on Record Documents.
- F. Continuously clean-up and remove demolished materials from site to an authorized dump site. Do not allow materials to accumulate on site.
- G. Handling, Removal Abandonment of Asbestos Cement Pipe (if encountered):
 - 1. Remove and dispose of asbestos cement pipe (ACP) in accordance with State of California requirements and the contract documents. Removal of ACP shall be performed by a contractor licensed and certified by Cal/OSHA for such removal. Also refer to Article 5 of the EJCDC General Conditions regarding encountering hazardous materials.
 - a. Follow the AWWA guidelines for handling, removing and disposing of ACP as stated in the applicable sections of AWWA Standards C400, C401, C402, and C403 covering asbestos cement transmission and distribution pipe.

- b. Accomplish the removal of ACP by removing intact pipe sections, where possible. Pothole and expose the ACP at least two days prior to removal to verify extent of pipe to be removed and appropriateness of proposed "asbestos cement pipe removal and disposal plan".
 - c. Perform all cutting and handling of asbestos cement pipe in accordance with the State of California requirements. Provide sufficient supervision and perform monitoring to assure conformance with State requirements. Under no circumstances shall the Contractor utilize methods of removal that result in the release of asbestos fibers into the air.
2. Equipment:
- a. Snap cutting tools shall be used for the removal of asbestos cement pipe whenever the removal of intact pipe sections is not possible.
 - b. Power "cut off" saws, hand-saws, and other devices and methods that result in the release of asbestos fibers into the air shall not be used for the removal of ACP.
 - c. The pipe shall be wetted prior to the snapping operation being performed.
 - d. Use of a hammer and chisel to gradually split an ACP coupling lengthwise may only be performed if the "asbestos cement pipe removal and disposal plan" developed by the Contractor incorporates measures to prevent the release of asbestos fibers into the air and is approved by the Owner.
 - e. Encapsulate: If during the removal of ACP broken edges occur, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulate or approved equal.
3. Continuously wet the ACP around the snap cutting tool during the removal operation. All personnel handling the ACP shall wear properly fitted respirators during the removal and bagging operations and shall be trained in the use of the respirator equipment. All pedestrian traffic shall be rerouted to maintain 30 feet clear of the removal point. Dispose of liquid and solid waste as follows:
- a. All removed sections or pieces of ACP shall be bagged and prepared for disposal immediately after removal as described below.
 - b. Transport and dispose of all sections and pieces of ACP in accordance with State requirements at a legally operating landfill that accepts construction debris. All sections or pieces of ACP shall be wetted and double wrapped or bagged with 6 mil plastic wrap immediately after removal. The outer wrap shall be securely held in place with tape in a manner to prevent the release of airborne asbestos fibers.
- H. Perform all related excavation, backfill, and surfacing. Refer to Sections 31 00 00 - Earthwork, 31 23 33 - Trenching and Backfilling, and 32 11 00 - Base Courses.

3.6 MAINTAINING WATER SERVICE

- A. Construct, maintain, and remove temporary facilities necessary to maintain water service, including fire flow capacity.
- B. Prepare the construction schedule so that the water system may be constructed and tested prior to connections to existing mains.
- C. Schedule water main tie-ins during off-peak hours and subject to the approval of the Engineer, and utility agencies (SSCWD, BRMWC).

3.7 SALVAGE

- A. Unless directed otherwise by the Engineer, the following items shall be salvaged and delivered to the Owner at an on-site location designated by the Owner. If the Owner determines that such items are not salvageable, Contractor shall remove and dispose of the items at no additional cost to the Owner.
 - 1. Well pumps, motors, and associated electrical components

3.8 BRMWC WELL ABANDONMENT

- A. Abandon existing BRMWC wells in accordance with Department of Water Resources (DWR) Bulletin 74-80 and 74-90, and Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.060 WELL STANDARDS of the San Benito County Code of Ordinances.
- B. Contractor shall remove well pump, motor, and associated electrical components, and shall remove all above-ground piping. Where well pump discharge piping is routed underground, Contractor shall expose, cut, and seal underground piping. Underground piping shall be sealed by filling the first 12 inches of the abandoned piping with non-shrink grout.
- C. Per Paragraph 3.4 of this Section, Contractor shall remove and dispose of all concrete foundations to at least 24" below existing grade. Contractor to restore site to existing grade with native fill material per Section 31 23 33 – Trenching and Backfilling. Resurface disturbed areas per Paragraph 3.10.B, this Section.

3.9 DISPOSAL

- A. Dispose of all items removed and not salvaged. Comply with all laws and regulations regarding transport and disposal of waste. Pay all disposal and transport fees.

3.10 RESURFACING

- A. Provide temporary or permanent resurfacing, following backfilling, as follows:
 - 1. Cold-mix asphalt paving may be used for the temporary resurfacing of excavations within paved areas that will have public traffic, and where the paved surface will be removed or replaced under this contract. Cold-mix

shall be a minimum of 2-1/2 inches thick and shall be maintained in a smooth condition.

2. Temporary steel trench plates may be used as specified in Section 31 23 33 - Trenching and Backfilling.
 3. Permanent resurfacing within paved areas shall in accordance with the Plans and as specified in Section 32 12 00 – Flexible Paving.
- B. Refer to Section 01 57 13 – Temporary Erosion and Sediment Control for resurfacing requirements in unpaved areas.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Excavation (cut)
 - 2. Embankment (fill)
 - 3. Clearing and Grubbing
 - 4. Subgrade Preparation
- B. Excavation includes excavating all materials, of whatever character and subsurface conditions, as required for the construction of the project, including but not limited to the following:
 - 1. Excavation for roadways.
 - 2. Excavation for the construction of pavement and hardscape areas.
 - 3. Excavation for structure foundations.
 - 4. Excavation for ditches and channels.
 - 5. Excavation for mass grading.
 - 6. Excavation for finish grading.
 - 7. Overexcavation of areas to be recompacted.
- C. Embankment (fill) includes the construction of embankments and placing of material, including the following:
 - 1. Embankment for roadways.
 - 2. Embankment for the construction of pavement, and hardscape areas.
 - 3. Backfilling of structures, channels, and ditches.
 - 4. Embankment for mass grading
 - 5. Embankment for finish grading
 - 6. The placement of native, select, and other backfills.
- D. Clearing and grubbing includes the removal of all objectionable materials within the area to be graded. Earthwork shall include all clearing and grubbing.
- E. Whenever the term finished grade is used, it shall mean the finished surface of the completed facility.

1.02 SUBMITTALS

- A. Delivery certifications (load slips) for all aggregate base supplied.
- B. Delivery certifications (load slips) for all imported fill and backfill.
- C. Delivery certifications (load slips) for concrete slurry backfill.
- D. Furnish, without additional cost to the Owner, such quantities of import or native materials as may be required by the Engineer for test purposes.

PART 2 PRODUCTS

2.01 MATERIALS

- A. No materials shall be delivered to the site that are not in conformance with these specifications, or unless accepted by the Engineer in writing.
- B. Select Backfill: Backfill designated as “select”, or “sand” shall conform to be the Caltrans Standard Specifications, Paragraph 19-3.02F(2) for Sand Bedding.
- C. Cement Slurry Backfill: Cement Slurry backfill shall be 1-sack mix sand-cement slurry and shall conform to the material requirements described in Caltrans Standard Specifications, Section 19-3.02E.
- D. Native Material: The Soils Engineering Report identifies the on-site soil materials. Native materials excavated from local plant site area shall not be used pipe bedding or shading fill but may be used as general fill as approved by the Soils Engineer in the Soils Report.
- E. General Fill Material:
 - 1. Onsite materials: The on-site materials generally consist of artificial fill, clayey sand, sandy lean clay, and sandy fat clay, to approximately 10-foot depth. See Paragraph 2.01D above. Fill material shall not contain rocks over 3-inches. When fill material includes rocks, the rocks shall be placed in a sufficient soil matrix to ensure that voids caused by nesting of rocks will not occur and that the fill can be properly compacted.
 - 2. Imported materials: Imported non-expansive material to be used as fill shall be clean soil free of rocks, debris, contamination, or other objectionable material.
- F. Imported Nonexpansive Material: Imported nonexpansive material shall be coarse grained (ASTM D 2488-00) and shall have an expansion index of less than 10 (ASTM D 4829-03). Nonexpansive materials proposed for import shall be approved by the Engineer prior to being transported to the site and shall be subject to further sampling and/or review during construction.
- G. Crushed Gravel: Crushed gravel shall be free draining crushed rock conforming to ASTM C33 #67 stone. Float Rock or river run gravel is not acceptable.
- H. Class 2 Base: $\frac{3}{4}$ " minus, per Caltrans Section 26.

2.02 DEFINITIONS

- A. Compaction: Maximum dry density as defined by ASTM D 1557-02.
- B. Field density: ASTM D 2922-01
- C. Subgrade: The grading plan below an aggregate base or sand layer.

PART 3 EXECUTION

3.01 EARTHWORK MAINTENANCE

- A. The Contractor shall be responsible for all maintenance related to the earthwork operations, both on and offsite. The contractor shall maintain all areas clean of dust, mud and debris, and shall control erosion during the earthwork operations
- B. **Street Cleaning:** The Contractor shall exercise care in the use of public and private roads and shall repair at his own expense any damage thereto caused by his operations. Such repair shall be to the satisfaction of the owner or agency having jurisdiction over the road. The Contractor shall take whatever means are necessary to prevent tracking mud onto existing roads and shall keep roads free of debris. The Contractor shall utilize street cleaning machines as necessary to maintain the streets free of dirt and debris from its operations at all times.
- C. **Dust Control:** Take proper and efficient steps to control dust. Contractor to supply water for dust control.
- D. **Storage of Materials:** Neatly place excavated materials far enough from the excavation to prevent stability problems. Keep the materials shaped so as to cause the least possible interference with drainage. Provide all such erosion control measures as are required to prevent loss of material or damage to property. The cost of maintaining and protecting stockpiled materials shall be considered to be included in the price paid for excavating, filling, or furnishing the materials, and there will be no separate payment allowed, therefore.
- E. **Existing Facilities:** Maintain access to existing facilities to permit continued operation as required by the Owner. Maintain access for fire fighting equipment and to fire hydrants.
- F. **Erosion Control** shall be as shown on the drawings and as specified in Section 01 57 13 – Temporary Erosion and Sediment Control.
- G. **Finished Condition:** Grades shall be maintained in a finished condition and true to grade until acceptance of the contract as complete.

3.02 CLEARING AND GRUBBING

- A. Protect existing trees designated to remain by placing orange ESA fencing at the drip line or as shown on the drawings prior to any clearing and grubbing or other earthwork.
- B. Voids created by the above removals shall be filled and recompactd with the material and to the requirements of the area in question.
- C. Properly dispose of all removed objectionable material.

3.03 EXCAVATION (CUT)

- A. The Contractor shall perform all construction excavation, including hand digging, shoring, de-watering, asphaltic concrete removal, concrete removal, and grading necessary or required for the construction of the Work as covered by these Specifications and indicated on the Drawings. The excavation shall include, without classification, the removal and disposal of all materials of whatever nature encountered, including water and all other obstructions that would interfere with the proper construction and completion of the required work.
- B. Barriers: Barriers shall be placed around all excavations and at such places as may be necessary to warn all pedestrian and vehicular traffic of such excavations.
- C. Sawcutting Pavement: Where trenching or excavation occurs in paved areas to remain, the pavement shall be saw-cut and broken ahead of the trenching or excavation operation. The extent of paving removed shall be limited to the minimum necessary for the excavation. However, the sawcut limits shall be extended for the following reasons:
 - 1. To form neat, straight and square lines.
 - 2. To include areas of pavement damaged by the Contractor.
 - 3. To allow for sloped trench walls.
- D. 2:1 Slopes: Finished cut slopes shall not exceed the steepness shown on the plans. If no steepness is designated, the maximum slope shall be 2 horizontal to 1 vertical.

3.04 EMBANKMENT (FILL)

- A. The Contractor shall perform all construction embankment and filling including shoring, de-watering, backfilling, structural fill, non-structural fill, sand and aggregate bases, compaction and grading necessary or required for the construction of the Work as covered by these Specifications and indicated on the Drawings. Embankment (fill), shall include, without classification, the preparation, placement, compaction and finishing of all earth materials to the lines and grades prescribed by the Contract Documents.
- B. Scarification: Areas to receive fill shall be prepared by clearing and grubbing, and scarifying to a minimum depth of 12 inches, moisture conditioning and recompacting to the minimum relative compaction specified for the fill to be placed above.
 - 1. Voids created by dislodging cobbles and/or debris during scarification shall be backfilled and recompacted, and the dislodged materials shall be removed from the work area.
 - 2. Obtain approval from the Engineer prior to placing fill on a prepared foundation.
- C. General fill and backfill soils shall be placed in level lifts not exceeding 8 inches in loose thickness, moisture conditioned, and compacted. All materials used as fill shall be cleaned of all debris and any rocks larger than 3 inches in diameter. When fill material contains rocks, the rocks shall be placed in a sufficient soils

matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

- D. Benching: Fill slopes that are 25 percent (4 to 1) or steeper, shall have a foundation prepared by benched at the toe of slope. The bench shall be constructed as shown on the plans, or if not shown, by excavating a 2-foot deep by 10-foot wide level bench along the toe of slope. The bottom of the bench shall be scarified and backfilled as specified in this section for fill.
- E. Moisture Content: At the time of compaction, the moisture content of fill materials shall be such that the specified relative compaction will be obtained, and the fill will be in a firm and stable condition. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered included in the contract price paid for excavating or furnishing the material and no additional compensation will be allowed, therefore.
- F. Compaction: Fill shall be placed and compacted as indicated on the plans or specifications. If no compaction level is specified, the following shall be used as the minimum relative compaction.
 - 1. Upper 8 inches of subgrade, sandy material 95%
 - 2. Upper 8 inches of subgrade, clayey material 92%
 - 3. All aggregate Bases 95%
 - 4. Other fill areas: 90%
 - 5. Trench Backfill: Per Section 31 23 33 -Trenching and Backfill
 - 6. Select Backfill 95%
 - 7. Native fill material: Per Soils Report
- G. 2:1 Slopes: Finished fill slopes shall not exceed the steepness shown on the plans. If no steepness is designated, the maximum slope shall be 2 horizontal to 1 vertical.

3.05 PAVEMENT SUBGRADE PREPARATION

- A. Pavement subgrade preparation shall be in accordance with Section 26-1.03 of the Caltrans Standard Specifications, except as specified herein. Sub-grade preparation shall include excavation and backfill to subgrade and all related removal of existing facilities and materials. Existing native materials shall be removed and disposed of to the depth necessary to achieve a prepared and compacted sub-grade.
- B. Subgrade shall be scarified to a minimum depth of 24 inches below ground surface or 12 inches below structural section, whichever is deeper. The soil shall then be moisture conditioned for proper compacting and then compacted to a relative compaction of not less than 95%.
- C. Tolerances: The Subgrade elevation shall not vary more than 0.05 feet above or below the elevation specified in the plans, except that if the subgrade elevation is more than 0.05 feet below the specified grading plane, the Contractor may place

and compact Class 2 aggregate base to raise the surface to within tolerances. There shall be no additional payment for such Class 2 aggregate base.

- D. Proof-rolling: Proof-roll the subgrade with rubber-tired construction equipment in the presence of the Engineer. The subgrade shall be firm and unyielding when proof-rolled.

3.06 UNSUITABLE SOIL

- A. Unsuitable soil is soil that due to its nature, cannot be properly compacted to or is yielding and cannot provide support for the overlying structural section.
- B. A condition of soil moisture exceeding optimum moisture content to a degree that causes yielding or prevents proper compaction shall not be cause to consider soil as unsuitable.
- C. The Engineer shall determine whether soil shall be considered unsuitable. If the soil is determined to be unsuitable, the Engineer may direct the Contractor to follow an alternative method of construction to provide additional support. Such alternative measures will be paid for as extra work.

3.07 WET SOIL

- A. If wet soils are encountered, the Contractor shall take such measures as are required to dry the soil to a degree that it can be compacted and form a firm and unyielding surface. These measures shall be included in the bid items requiring such compaction and there shall be no separate payment, therefore.

3.08 TESTING

- A. Material Quality: When requested by the Engineer, the Contractor shall provide samples of earthwork materials furnished or excavated in sufficient quantities for materials testing. There shall be no additional payments made for providing such samples. Should any materials fail to meet the Contract requirements, the Contractor shall remove all such nonconforming material and replace it with conforming material at no cost to the Owner.
- B. Field Testing and Observation:
 - 1. The Contractor shall coordinate his activities to allow for the following inspection by the Owner:
 - a. Review and test materials proposed for use.
 - b. Observe excavations prior to backfilling or pouring concrete.
 - c. Observe placement and test compaction of fill.
 - 2. The Contractor shall excavate holes for in-place soil sampling. The Owner will pay for initial testing. If initial tests fail inspection, the failed portions shall be removed, re-compacted, and re-tested. The Contractor shall be responsible for the costs of additional inspection and re-testing resulting from non-compliance.
- C. Testing Methods:
 - 1. Relative Compaction: In-place density divided by the maximum dry density laboratory compaction expressed as percentage.

2. Durability Index: Manual of Test, State of California, Department of Transportation
 - a. R Value Testing: California Test 301
 - b. Specific Gravity: ASTM D854.
 - c. Laboratory Compaction: ASTM D1557, Method A or C
 - d. In-place Density: ASTM D1556 or ASTM D2922
 - e. Particle Size Analysis of Soils: ASTM D422
 - f. Plastic Limit and Plasticity Index: ASTM D4318
 - g. Soil Classification: ASTM D2487
 - h. In-place Moisture Content: ASTM D3017

3.09 CONTROL OF WATER

- A. General: The Contractor shall be responsible for the control of surface drainage and subsurface water throughout the construction project.
- B. Surface Water: The Contractor shall be responsible for furnishing temporary drainage facilities to convey and dispose of surface water falling on or passing over the site.
- C. Disposal of Water: Dispose of water in such a manner as to cause no injury or nuisance to public or private property or be a menace to public health. De-watering devices must be adequately filtered to prevent the removal of fines from the soil.
- D. Maintain soil moisture content throughout construction. Do not allow desiccation cracks to occur within the project area. If desiccation cracks are allowed to occur, the soils that have cracked due to desiccation shall be removed, moisture conditioned, and recompacted at the Contractors' expense.

3.010 DISPOSAL OF EXCAVATED MATERIAL

- A. Use as trench backfill: Excavated material shall not be used as trench or select backfill, unless it is designated as such in these specifications or if approved in writing by the Engineer. Excavated material may be used as subsequent backfill provided requirements of Paragraph 2.01E of this Section are met. Also refer to Section 31 23 33 - Trenching and Backfilling.
- B. Export: Where excavated material will not be reused onsite, the Contractor shall haul the material away. The Contractor is responsible for determining the nature of the material to be exported, for the proper location to deliver the material to, for obtaining all permits and processing, and for the proper placement and handling of the material at the offsite location.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Trench excavation.
 - 2. Trench backfill.
 - 3. Control of surface waters and groundwater.
 - 4. Temporary and permanent resurfacing.
 - 5. OSHA compliance, sheeting, shoring, and bracing
- B. SUBMITTALS
 - 1. Delivery certifications (load slips) for all aggregate base and backfill.
 - 2. Delivery certifications (load slips) for concrete slurry backfill.
 - 3. Material samples, as may be required by the Engineer for test purposes.

PART 2 PRODUCTS

- 2.01 Select Backfill: Refer to Section 31 00 00 – Earthwork.
- 2.02 Slurry Cement Backfill: Cement Slurry backfill shall be 1-sack mix sand-cement slurry and shall conform to the material requirements described in Caltrans 2023 Standard Specifications, Section 19-3.02E.
- 2.03 Native Material as Trench Backfill: Local native soil materials shall not be used as trench backfill in the pipe zone, unless approved in writing by the Engineer. Native material may be used as subsequent backfill provided requirements of Paragraph 2.01E, Section 31 00 00, are met, and such material is approved for use by the Engineer.
- 2.04 Bedding: Select Backfill per Paragraph 2.01B, Section 31 00 00.
- 2.05 Pipe Zone Material: Imported or native non-expansive material per Paragraph 2.01F, Section 31 00 00.

PART 3 EXECUTION

3.01 GENERAL

- A. Per Article 3, Paragraph 3.01B of the General Conditions, Contractor shall install pipeline as closely as possible to alignment and grade indicated on the Drawings, except for minor adjustments to avoid architectural and structural features, make minor adjustments in horizontal and vertical alignment and deflection to tie-in to existing pipelines and to meet general intent of pipeline layout. Minor adjustments to pipeline layout, which may require fittings, couplings, joint deflection, or other minor adjustment, are considered Contractor means and

methods and are not necessarily shown on the drawings. Contractor shall make such minor adjustments as necessary, at no additional cost to Owner.

3.02 TRENCH EXCAVATION

- A. Trenches shall be constructed in accordance with the details shown on the Drawings, and the following:
 - 1. Excavation limits: Excavate trenches to the minimum and maximum trench widths shown in the drawings.
- B. Open Trench Construction: Trench construction shall be by open trench excavation unless shown otherwise on the plans.
- C. Maximum Length of Open Trench: Except by permission of the Engineer, the maximum length of open trench shall be 200 feet, or the length of pipe that can be installed in a single day, whichever is less. The length of the open trench includes open excavation, areas with active pipe laying and backfilling, and those areas not yet temporarily resurfaced.
- D. Utility Crossings: Protect all existing facilities to be crossed. Hand digging of trenches may be necessary.
- E. Trench Excavation in Existing Paved Areas to be Restored to Pre-Construction Condition: In paved areas, the trench excavation limits shall be sawcut. The sawcut lines shall be straight and neat in appearance and shall be parallel or perpendicular to the trench construction, unless allowed by the Engineer. The sawcut limits shall be extended as necessary to include the entire excavation, and any edges damaged during construction.
- F. Trench Excavation in Areas of New Pavement: The trench excavation limits need not be sawcut in areas where new pavement will be installed. All trench excavation and backfilling operations shall be completed prior to final paving.
- G. The Contractor may elect to use sloped wall construction, provided that adequate room is left for parking, utility protection, and traffic according to the traffic control plan and any encroachment permit or other Owner requirements. The Contractor shall receive no additional compensation for additional excavation, backfill, or for replacing the additional pavement required due to selection of a sloped trench construction.
- H. Over-Excavation: If the trench is over excavated below the limits necessary, backfill and compact to 95 percent relative compaction with Select Backfill per Para. 2.01. There shall be no additional payment to the Contractor for over-excavations not directed by the Engineer.
- I. Unsuitable Material: Unsuitable soil is soil that due to its nature cannot be properly compacted to or is yielding and cannot provide support for the overlying structural section. Excessive moisture content shall not be cause for a material to be considered unsuitable. The Engineer shall determine whether soil shall be considered unsuitable. If the soil is determined to be unsuitable, the Engineer may direct the Contractor to remove the material and replace it with Select

Backfill or other material as directed by the Engineer. Such alternative measures will be paid for as extra work.

- J. Wet soil: A condition of soil moisture exceeding optimum moisture content to a degree that causes yielding or prevents proper compaction shall not be cause to consider soil as unsuitable. If wet soils are encountered, the Contractor shall take such measures as are required to dry the soil to a degree that it can be compacted and form a firm and unyielding surface. These measures, which may include gravel bedding in lieu of sand bedding, wrapped in filter fabric as directed by the Soils Engineer, shall be included in the bid items requiring trench construction. There shall be no separate payment, therefore.
- K. Trenches in Fill Areas: For trenches to be excavated through fill, including previously placed trench backfill (such as at manholes or for building connections), the structural backfill shall be first compacted at a level at least 3 feet from the top of the piping or conduit elevation and then retrenched to pipe grade.
- L. Disposal: Disposal of excavated material shall be as specified in Section 31 00 00 - Earthwork.

3.03 PIPE BEDDING AND PIPE ZONE

- A. Unless shown otherwise on the plans, trench bedding shall be defined as that material 6" below the pipe, supporting, surrounding, and extending 12" above the top of pipe.
- B. Unless shown otherwise on the plans or specifications, trench bedding and pipe zone material shall be granular material compacted to 90% and meeting a sand equivalent of 30 or greater.
- C. Bedding Placement: Sand bedding shall be placed to provide uniform support for the pipe or conduit prior to lowering the pipe or conduit in place. Holes shall be shaped for pipe bells, and the bedding shall be rounded to the shape of the pipe barrel. If the bedding exceeds 6 inches below the bottom of the pipe, it shall be compacted to a relative compaction of 90% prior to placing the pipe. Bedding shall be completed and compacted prior to placing any pipe zone backfill.
- D. Cement Slurry Bedding Placement: Prior to placing cement slurry bedding, the Contractor shall employ a method to prevent the pipe from floating or shifting position. If the pipe or conduit does float or shift position, the contractor shall be responsible for removing and reinstalling the pipe or conduit. Plugs and/or barriers shall be used to prevent the cement slurry from flowing to unwanted areas of the trench or into the pipe.
- E. After placing cement slurry bedding, subsequent backfill may not be placed for 8 hours unless the subsequent backfill is also cement slurry, except that if concrete sand is used for the aggregate and the in-place material is free draining, backfilling may commence as soon as the surface water is gone.

3.04 TRENCH BACKFILL

- A. Inspection Prior to Backfill: Backfill material shall not be placed over the pipe or conduit until after the joints have been completed and inspected by the Engineer.
- B. Protect pipes from flotation during backfill and compaction.
- C. Backfill in existing paved areas where the depth of cover will be 2 feet or less shall be cement slurry.
- D. Placement of Trench Backfill: Trench Backfill shall be placed in level lifts not exceeding 8 inches in loose thickness, moisture conditioned, and mechanically compacted.
- E. The minimum compaction (percent of maximum dry density) shall be:
 - 1. 90 percent for general trench compaction in pipe bedding, pipe zone and subsequent backfill.
 - 2. Per Para. 3.04.F, Section 31 00 00 - Earthwork
- F. Compaction of backfill by jetting or flooding shall not be allowed.
- G. No Trenches Left Open: All trenches shall be backfilled to the surface as soon as possible after the installation of the facilities. Prior to stopping work each day, all open trenches shall be backfilled to the surface or protected with non-skid, traffic-rated steel plates.
- H. If steel plates are used, they shall comply with the Caltrans Construction Manual.

3.05 TRENCH RESURFACING

- A. Surface Restoration: Unless another surface is shown on the plans or specifications, the surface shall be restored to the materials that existed prior to trenching.
- B. Temporary Paving: Prior to final paving, trenches in paved areas shall be surfaced with cold mix. Cold mix shall be a minimum of 3 inches thick. The Contractor shall maintain the cold mix in a smooth condition, flush with the adjacent pavement throughout the time that it is in place.
- C. Steel Traffic Plates: When approved by the Engineer, steel traffic plates may be used in lieu of backfilling and temporary paving. Steel plates shall be skid-resistant and placed in accordance with Caltrans Standards. Cold mix shall be used to provide smooth transition around the traffic plates. The Contractor shall monitor the condition of the traffic plates and maintain their placement to provide a safe driving condition.

3.06 TESTING

- A. Compaction Testing: The Owner will hire an independent testing company to perform compaction testing. The Contractor shall make the trench available to the tester, at the depths and locations required by the Engineer. When testing requires personnel to enter into a deep trench, the Contractor shall provide all shoring or other methods necessary for a safe working condition in compliance

with the approved trench safety plan, The cost of providing safe access to the trench backfill for testing purposes shall be included in the bid items requiring such trench backfill, and there will be no separate payment, therefore.

- B. Failed Compaction Tests: The Owner will pay for the initial cost of compaction tests. Should any initial or subsequent test indicate that the material fails to meet the required level of compaction, the Contractor shall be responsible for all such measures necessary to bring the material into compliance, at no additional cost to the Owner. The backfill shall then be retested. The Contractor is responsible for the cost of such retesting following a failed test, and the Owner may deduct the cost of such from the amounts owed under the Contract.

3.07 OSHA COMPLIANCE

- A. Excavation Safety: The Contractor's attention is directed to the provisions in Sections 6705, and 6707 of the State Labor Code, California Civil Code Section 832, the United States Department of Labor Rules 29 CFR, Part 1926, the Cal-OSHA Construction Safety Orders, Section 5.47, Safety and Trenching of these Specifications.
- B. Trench Safety Plan: Prior to performing excavation for any trench over five feet in depth, the Contractor shall submit for approval by the Engineer, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of trenches. If such Plan complies with the Construction Safety Orders, it shall be submitted at least 5 working days prior to the start of trench excavation. If such plan varies from the Cal-OSHA Construction Safety Orders, the plan shall be prepared and signed by a registered Civil Engineer and shall be submitted at least 4 weeks prior to any trench excavation. No trenching shall begin until such a plan has been approved by the Owner or Owner's Representative (Engineer).
- C. Permit: The Contractor shall have a Cal-OSHA permit as required by California Labor Code Section 6500. Prior to beginning any excavation, the Contractor shall submit a copy of the Cal-OSHA permit and shall identify in writing the Competent Person designated to be in charge of trench safety for this project.
- D. Submittals: The Contractor shall provide the following submittals:
 - 1. Cal-OSHA compliance: Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the construction safety orders. Failure to comply with any of the Cal-OSHA rules, orders, and regulations shall be sufficient cause for the Engineer to immediately suspend all work. No compensation for costs incurred by such emergency suspension will be allowed.
 - 2. Designation of the Competent Person for trench safety as defined by OSHA.
- E. Adjacent Improvements: Provide support for excavations adjacent to existing improvements and structures to prevent damage or settlement. Attention is directed to the Soils Engineering Report and to Section 832 of the Civil Code of the State of California relating to lateral and subjacent supports.

- F. Removal of trench supports: The support for excavation shall remain in place until the pipeline or structure has been completed. During the backfilling of the pipeline or structure, the shoring, sheeting, and bracing shall be carefully removed so there shall be no voids created and no caving, lateral movement, or flowing of the subsoil.

END OF SECTION

SECTION 31 40 00

SHORING AND UNDERPINNING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. General. Provide protective installation consisting of shores, wales, braces, posts, piling, sheeting, anchorages and fastenings, both temporary and permanent, for accomplishment and protection of work. All shoring and underpinning support systems shall be the responsibility of the Contractor and shall comply with all applicable Federal and California OSHA safety regulations.
- B. Work Included.
 - 1. Shoring and sheeting for structure excavation.
 - 2. Temporary sheeting and bracing for piping work.
 - 3. Materials for permanent sheeting and bracing.

1.02 QUALITY ASSURANCE

- A. Material Standards. Furnish lumber for shores, wales, and sheeting of grading required by the American Lumber Standards for the particular application.

1.03 SUBMITTALS

- A. Submit for record purposes only, not for review or approval, calculations of the shoring system including sheeting size, wales, rakers, anchor system, struts, earth anchors, anchor piles, tie rods or any other components pertinent to the design prior to the start of any work involving sheeting and bracing. All designs submitted shall be signed by an engineer duly registered in the State of California.

1.04 JOB CONDITIONS

- A. The description of job conditions under Section 31 00 00 – Earthwork, forms a part of this subsection. Federal, state and local requirements for safety of job personnel and public apply to work under this Section.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber.
 - 1. Temporary Shores, Wales and Sheeting. Furnish structural grade planks, beams, and posts as defined and specified for stress-grade lumber in the American Lumber Standards. Lumber may be rough, untreated, in random lengths, and shall be of standard dimensions.

2. Permanent Sheeting. When permanent sheeting is called for on the Drawings, provide and install planks, beams, posts and timbers of unseasoned, rough, new southern yellow pine or Douglas Fir meeting the requirements of ASTM Standard D25, Class "C". In lieu of the above, lumber dressed to standard dimensions, dried and treated in accordance with Standard T-3 of the American Wood Preservers' Association may be utilized.
- B. Fastenings. Provide fastenings for permanent sheeting as recommended in the National Design Specification for stress-grade lumber and its fastening.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install sheeting and bracing for trench and structure excavation progressively as the removal of excavated material requires. Butt planks to exclude groundwater and fines, preventing the erosion of voids outside sheeting.
- B. In soft, wet ground drive sheeting to a lower level as excavation progresses so that sheeting is embedded in undisturbed earth.
- C. Bracing of sheet piling may be permitted to penetrate the structural concrete only as approved by the Engineer.
- D. Install wales and struts at close intervals so as to prevent displacement of the surrounding earth and to maintain safe conditions in the work area. Any damage proven to result from improper installations shall be the responsibility of the Contractor.
- E. Withdraw individual planks alternately as the backfill is raised, maintaining sufficient sheeting and bracing to protect the Work and workmen. Remove bracing completely. Where unstable conditions occur in the underlying strata from any cause, and withdrawal of sheeting will endanger the Work, a portion of the sheeting, including bracing, may be left in place with approval of the Engineer.
- F. Remove all wood within the zone extending below a depth of four (4) feet from finished grade. Leaving such material in place shall not be cause for an increase in Contract Price.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Aggregate Base Courses

1.02 SUBMITTALS

- A. Submit the following:
 - 1. Material total value and product data for products having recycled content.
 - 2. Material total value and product data for products extracted or harvested AND manufactured within 500 miles of the Project.
 - 3. Provide testing results demonstrating conformance to the requirements of this Section and the County Standards.

PART 2 PRODUCTS

2.01 AGGREGATE BASE COURSES

- A. In accordance with Para. 2.01.H, Section 31 00 00 – Earthwork.
- B. No materials shall be delivered to the site that are not in conformance with these Technical Specifications, or unless accepted by the Engineer in writing.

PART 3 EXECUTION

3.01 GENERAL

- A. Aggregate base course shall be placed using the means and methods described in Section 31 00 00 – Earthwork and Section 31 23 00 – Trenching and Backfill.
- B. Layer thickness of new aggregate base course shall meet existing layer thickness, or minimum layer thickness specified on the trench details, whichever is greater.

3.02 TESTING

- A. Refer to Para. 3.08, Section 31 00 00 – Earthwork.

END OF SECTION

SECTION 32 12 00

FLEXIBLE PAVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Asphaltic concrete (AC) paving.
 - 2. Aggregate or other base coarse.
 - 3. Surface sealer.
 - 4. Aggregate subbase course.
 - 5. Grinding (cold plane) AC paving.

1.02 REFERENCES

- A. Caltrans Standard Specifications, 2023 as published by the California Department of Transportation.
- B. Caltrans Standard Plans, 2023 as Published by Caltrans, including amendments effective prior to bid opening.

1.03 SUBMITTALS

- A. Product Data:
 - 1. AC Mix Design.
 - 2. Delivery certifications (load slips) indicating the specification and tonnage for all AC pavement delivered to the site.
 - 3. Delivery certifications (load slips) indicating the specification and tonnage for all base materials delivered to the site.
- B. Material Samples:
 - 1. AC Samples for testing.
 - 2. Base material samples for testing.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Conform to the requirements of the California Air Resources Board (CARB) and the local Air Pollution Control District.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate Base: Refer to Section 32 11 23 – Base Courses, these specifications.
- B. Asphalt Concrete: Per Section 39, "Asphalt Concrete", of the Caltrans Standard Specifications and in accordance with the following:
 - 1. Asphalt for roads and driveways:
 - a. Type A HMA, $\frac{3}{4}$ ".
 - b. The viscosity grade of the paving asphalt shall be PG 64-10 for all asphalt unless otherwise stated.

- C. If the finished surface of the asphalt concrete on the traffic lanes does not meet the specified surface tolerances, it shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat on the areas which have been ground), (2) removal and replacement, or (3) placing an overlay of asphalt concrete a minimum of 2.5 inches thick. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.
- D. If abrasive grinding is used to bring the finished surface to specified surface tolerances, additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. All ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the requirements in Section 42-3.03, "Construction", of the Caltrans 2023 Standard Specifications.
- E. Paint Binder: Paint Binder (Tack Coats), if required, shall conform to Section 39, "Asphalt Concrete", Section 94, "Asphaltic Emulsions", of the Caltrans 2023 Standard Specifications and the following:
 - 1. Paint Binder shall be asphaltic emulsion Type SS-1h.
- F. If the paving asphalt percentages are not within the limits specified, and/or the viscosity is not the grade specified, the asphalt concrete shall be removed unless the Owner determines that said asphalt concrete is structurally adequate and may remain in place.

PART 3 - EXECUTION

3.01 CALTRANS SPECIFICATION

- A. All execution shall be per Caltrans Section 39, except as herein specified. Ambient, surface, and mix temperatures shall be per Caltrans Section 39 Construction requirements for Type A HMA. Compaction shall be no less than 91.0% and no more than 97.0% of maximum theoretical density per California Test 375; however, correlation of a gage may be made with only 5 cores with the approval of the Engineer.

3.02 SUBGRADE PREPARATION

- A. Refer to Section 31 00 00 – Earthwork.

3.03 AGGREGATE BASE

- A. Refer to Section 32 11 33 – Base Courses.

3.04 PLACING ASPHALT CONCRETE PAVEMENT

- A. The Contractor shall place the pavement as shown on the Plans, in kind, matching existing lines and grades per pre-construction conditions. Unless shown otherwise, the street crown shall provide a minimum 2 percent slope from the centerline toward the road shoulders/edges.
- B. Existing manhole rims, valve lids, vaults and all other structures within the area to be paved shall be adjusted as required to fit the new pavement, and new concrete collars shall be provided.
- C. A drop-off of more than 0.15 foot will not be allowed at any time between adjacent lanes open to public traffic.

- D. Where pavement reconstruction is to occur, permanent trench resurfacing shall not be performed as a separate effort. Permanent trench resurfacing shall be performed as a part of the overall pavement reconstruction effort so that the structural section and appearance is uniform.
- E. Asphalt paving includes adjusting the frames and covers of all manholes, valves, monument wells, etcetera, with new concrete rings to the final paving grade. The cost for raising frames and covers to grade shall be included in the amount for asphalt concrete paving, and there shall be no separate payment, therefore.

3.05 TOLERANCES

- A. Pavement thickness of new asphalt pavement shall meet existing pavement thickness, or minimum pavement thickness specified on the trench details, whichever is greater. Pavement surface tolerances shall allow new paving to be up to 0.01' higher than downslope adjacent paving, and up to 0.01' lower than upslope adjacent paving when conforming to existing pavement.
- B. If the finished surface of the asphalt concrete on the street pavement does not meet the specified surface quality or tolerances, it shall be brought within tolerance by either (1) abrasive grinding, (2) removal and replacement, or (3) placing a 2.5" minimum thick overlay of asphalt concrete. The method will be selected by and will be the option of the Engineer. The corrective work shall be at the Contractor's expense.
- C. If abrasive grinding, or removal and replacement, is used to bring the finished surface to specified surface tolerances, additional grinding or removal shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at the nearest traffic lane line or pavement edge, and in each longitudinal direction so that the grinding or removal begins and ends at lines perpendicular to the traffic lane line, within any ground area. All ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the requirements in the first paragraph and the last 4 paragraphs in Section 42-2.03 "Construction," of the Standard Specifications.
- D. Milled surface shall be swept clean and tack coat (SS-1h) shall be applied at a rate of 0.1 Gal/SY. This rate shall be adjusted as necessary for proper coverage.

END OF SECTION

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Traffic stripes and pavement markings.

1.02 REFERENCES

- A. Caltrans Standard Specifications, 2023 as published by the California Department of Transportation.
- B. Caltrans Standard Plans, 2023 as Published by Caltrans, including amendments effective prior to bid opening.

1.03 SUBMITTALS

- A. Submit the following:
 - 1. Per Caltrans 2023 Standard Specifications, Section 84, except as noted herein.

PART 2 PRODUCTS

2.01 PAVEMENT STRIPING AND MARKINGS

- A. In accordance with Caltrans 2023 Standard Specifications, Section 84, except as noted herein:
 - 1. Unless otherwise shown or specified, all pavement markings shall be thermoplastic in accordance with Caltrans Standard Specification 84-2.02C
- B. No materials shall be delivered to the site that are not in conformance with these specifications, or unless accepted by the engineer in writing.

PART 3 EXECUTION

3.01 GENERAL

- A. In accordance with Caltrans 2023 Standard Specifications, Section 84, except as noted herein.

END OF SECTION

SECTION 33 00 00

UTILITIES

PART 1 GENERAL

1.01 DESCRIPTION

Furnish and install all Ductile Iron (DI) and AWWA C900-22 compliant Polyvinyl Chloride (PVC) water piping, valves, fittings and appurtenances shown and specified in accordance with the requirements of the Contract documents. The pipelines shall be complete with all necessary fittings, couplings, supports, anchors and restraint, connectors, lining and coatings, testing, disinfection (where applicable), excavation, backfill, to provide a complete and functional installation. Coordinate alignment and installation of all new site utilities, protection of existing utilities in place, tie-in to existing utilities where shown on the plans. It shall be the Contractor's responsibility to coordinate alignments of utilities and tie-ins required as part of the Work, at no additional cost to the Owner.

1.02 SUBMITTALS

In accordance with Section 01 33 00 – Submittal Procedures, submit manufacturer's Literature for pipe, couplings, valves, fittings, linings and coatings, restrained joints, tape wrap, warning tape, tracer wire, and other pipeline components.

1.03 QUALITY ASSURANCE

A. MANUFACTURER REQUIREMENTS

1. C900 PVC pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in AWWA C900-22.
2. Ductile Iron (DI) pipe shall be tested at the casting facility for properties required to meet all applicable parameters as outlined in AWWA C151-23

1.04 DELIVERY, STORAGE AND HANDLING

- A. General. Pipe shall at all times be handled with equipment designed to prevent damage to the pipeline, and interior and exterior coating of the pipeline, if applicable. Hammering or otherwise means of impact to pipe walls shall not be allowed.
- B. Shipping. When making shipments, all chains, cables and hold-down equipment shall be carefully padded where in contact with the pipe.
- C. Unloading. Unloading from the trucks shall be done with care using slings. No pipe shall be allowed to fall from trucks. Pipe shall only be unloaded using a crane or fork lift.
- D. Gaskets. Gaskets shall be stored in containers or wrappers which will protect the gaskets from ozone and other atmospheric deterioration.

1.05 WARRANTY

- A. Unless otherwise specified, all pipe shall be warrantied for one year per the pipe suppliers' standard terms.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE

- A. Unless approved otherwise by the Engineer, all PVC pipe shall be AWWA C900-22, minimum DR 18 integral bell-joint type. All bell joints shall conform to ASTM D3139 with gaskets in accordance with ASTM F477.
- B. Joints: All joints shall be integral locking bell joints, restrained mechanical joints with a split ring restraining clamp, or special PVC restrained fittings. Acceptable restrained joint fittings are manufactured by EBAA Iron, Uni-Flange, and Smith-Blair, Inc. or approved equal.
- C. Pipe color: Blue, or white/black with blue striping.

2.01 DUCTILE IRON PIPE, 3 INCH THROUGH 12 INCH (BURIED AND EXPOSED)

- A. Pipe and Specials. Unless otherwise specified elsewhere, ductile iron pipe shall be pressure Class 350 for 12" diameter and smaller pipe, and shall conform to the requirements of ANSI/AWWA Specifications: ANSI/AWWA C150/A21.50 and AWWA/ANSI C-151/A21.51.
- B. Fittings. Fittings in pipelines rated at 175 psi and less shall conform to the requirements of ANSI/AWWA C110/A21.10, Class 350 for up to 12 inches.
- C. Lining and Coating.
 - 1. Mortar Lining. Per AWWA C104, with seal coat per ANSI Specification A21.4.
 - 2. Coatings:
 - a. Buried Service: Unless specified otherwise, the exterior of all buried ductile iron fittings shall be coated with a 1 mil asphaltic coating in accordance with AWWA C151, Section 51-9, and polyethylene encased per AWWA C105.
- D. Joints. Exposed joints shall be flanged or restrained mechanical joints unless otherwise shown on Drawings. Buried joints shall be push-on or mechanical joints, and restrained mechanical joints where restraint is specified. Joints shall conform to the requirements of ANSI A21.15 (AWWA C115) or A21.11 (AWWA C111). Restraining of joints shall be as recommended in the Ductile Iron Pipe Research Association (DIPRA) Handbook of Ductile Iron Pipe.

2.02 TRACER WIRE

- A. Tracer wire shall be insulated, stranded, AWG 10-gauge wire.

2.03 FITTINGS FOR PRESSURE PIPE, 4-INCH THROUGH 16-INCH

- A. Fittings shall be ductile iron in accordance with AWWA C110, AWWA C153, or AWWA C606, latest revisions, and in accordance with SSCWD Standard Specifications and Drawings.
- B. Nuts and bolts: All fittings shall utilize 304 stainless steel bolts and nuts, unless otherwise specified, and shall have anti-seize substance applied to the threads during installation.

C. Type of fitting: Unless specified otherwise, fittings shall be of the type listed below:

Buried: Mechanical joint or restrained joint.
Above ground/Exposed: Flanged.

D. Long Radius Bends: All 90 degree bends shall be long radius bends. Long radius bends shall be as manufactured by American Ductile iron Pipe Co, US Pipe Co, or equal.

E. Pressure Rating:

Flanged joints: 4" - 64" 250 psi

Push-on, restrained push-on,
or mechanical joints: 4" - 24" 350 psi

Grooved joints: 4" - 36" 250 psi

Grooved couplings: 4" - 18" 250 psi

F. Gaskets: Rubber gasket joints for ductile iron pressure pipe and fittings shall be styrene butadiene rubber (SBR), ethylene propylene rubber (EPT, EPDM), or chloroprene (Neoprene, CR), in accordance with the requirements of AWWA C111.

2.04 FLANGES

A. All flanges shall conform to AWWA C207 Class D or ANSI B16.1 Class 150. Bolt holes in all flanges shall straddle the field vertical centerline.

2.05 WARNING TAPE. All buried "wet" piping (water service) shall be provided with warning tape, of pigmented polyolefin material, which is chemically inert and will not degrade upon contact with moist soil. Tape shall have tensile strength of 2,500 psi and elongation of 800% per ASTM D-882. Tape shall be 3" wide, Marked "CAUTION WATER MAIN", terra-tape or approved equal.

1. Potable Water – Blue with black lettering

2.06 POLYETHYLENE ENCASEMENT

All Ductile Iron fittings, and all valves buried underground shall be encased with loose polyethylene film unless otherwise stated on the plans or in these specifications.

A. Loose polyethylene film encasement shall be not less than 10 mils thick, and shall be applied per the requirements of the latest revised Standard of ANSI/AWWA C 105/A21.5 entitled, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids," shall be closely followed.

B. Pipe wrap tape, 10 mil minimum, duct tape or equivalent, not less than 2" wide shall be used to secure the polyethylene film. Tape shall extend around the pipe at least twice at each end of the piece of film being installed.

2.07 TAPE WRAP FOR STEEL AND DUCTILE IRON PIPE

- A. Provide tape wrap on metal pipe where pipe transitions from above ground to below ground.
 - 1. Wrap shall extend a minimum of 3 inches above finished grade.
 - 2. Wrap shall extend a minimum of 12 inches below grade.
- B. Tape wrap shall be cold-applied tape wrap per AWWA C209.

2.08 THRUST BLOCKS

- A. Unless otherwise noted, thrust blocks shall be constructed of Class 520-C-2500 PCC.

PART 3 EXECUTION

3.01 GENERAL

- A. Care and Handling of Materials. All materials shall be carefully handled in all steps of fabrication, storing, loading, transporting, unloading, storing at the site, and installation, using the means and following the procedures submitted with the approved shop drawings. Transport, hauling, handling, and storage of pipe shall be in accordance with manufacturer's recommendations and the stipulations in Para. 1.04 of these specifications.
- B. Installation:
 - 1. The interior of pipe, fittings, and couplings shall be clean and free from contamination when installed and effective means shall be taken to prevent the entrance of foreign matter during progress of the work. The types and sizes of pipes and fittings to be used shall be as specified herein and as shown on the Drawings. Where fittings are omitted from the Drawings, they shall be the same size as the piping and in all cases shall conform to the plumbing code requirements.
 - 2. All pipe shall be carefully placed and supported at the proper lines and grades and where practicable shall be sloped to permit complete drainage. Piping runs shown on the Drawings shall be followed as closely as possible, except for minor adjustments to avoid architectural and structural features. If relocations are required, they shall be approved by the Owner.

3.02 TRENCH CONSTRUCTION

- A. Comply with trench detail shown on the plans, and Section 31 23 33 – Trenching and Backfilling

3.03 PIPE LAYING

- A. Install in accordance with the latest version of AWWA C900 and to the grade and invert elevations shown on the plans. Allow on-site visual inspection by Owner's Representative of all piping prior to backfilling, upon request.
- B. Temporary Plugs: When, for any reason, pipe laying is discontinued for an hour or more, the open end of each line shall be closed with a close-fitting stopper.

3.04 JOINT RESTRAINT

- A. Joint Restraint at Bends: Provide joint restraint at all bends for pressure pipes. For buried pipe, restrained fittings or flanged connections shall be used as the joint restraint, unless indicated or shown on the drawings.
- B. Concrete Thrust Blocks: Concrete thrust blocks shall be installed at locations shown in the Plans. Shall be sized according to the details in the Plans, SSCWD Standard Detail B-10-1, and adjusted for soil conditions and test pressure of the pipeline as indicated in Detail B-10-1.
- C. Restrained Joint Adapters:
 - 1. Restrained joint adapters shall be installed in accordance with the manufacturer's instructions.
 - 2. When used underground, the joint adapter shall be wrapped with 10 mil polyethylene. Ends of wrap shall be taped, three (3) layers minimum, with 10 mil pipe wrap tape.

3.05 WARNING TAPE

- A. Warning tape shall be placed in the trench with the piping, as shown in the plans. All splices shall be made by tying ends of tape together. The tape shall be placed at depth of cover and distance above pipe crown as shown in the Plans.

3.06 TRACER WIRE

- A. Tracer wire shall be placed on top of pipe per standard trench detail shown in Plans.
 - 1. Where valve boxes exist, pull wire into each valve box and terminate with wire nuts.
 - 2. Where valve boxes do not exist, extend wire above ground surface or concrete pad by 6 inches, and terminate with a wire nut. Affix loose end of wire to exposed pipe using tape wrap per Para. 2.07.

3.07 TESTING

- A. Perform the following tests in the presence of the Owner or Owner's Representative. Contractor shall provide minimum 3 working day notice to Owner prior to performing tests. In the event of a failed test, correct all deficiencies and retest. The contractor is responsible for all costs associated with retesting following failed tests, and the Owner may deduce such costs from the payments due.
 - 1. Hydrostatic pressure and leakage test per SSCWD Construction Standards.
 - a. Test pressure: Unless otherwise specified, all pressure piping (ductile iron, steel, PVC Schedule and C900 pipe) shall be subjected to a 150 psi test pressure, per SSCWD Construction Standards.
 - 2. Bacteriological test per Title 15 PUBLIC WORKS, Chapter 15.05 WATER, §15.05.036 QUALITY STANDARDS of the San Benito County Code of Ordinances. Contractor shall chlorinate all new water mains per AWWA C651-14. Contractor shall wait a minimum 48 hours after chlorine flushing before collecting sample. Bacteriological testing will be performed by a certified laboratory under separate contract by the Owner. Contractor shall pay for all failed tests, and shall re-disinfect pipeline until favorable test results are achieved.

3. Tracer wire continuity.

END OF SECTION

SECTION 40 05 51

COMMON RESULTS FOR PROCESS VALVES

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section includes materials, testing, and installation of manually operated and actuated process and miscellaneous valves and appurtenances. This section includes:
 - 1. Gate Valves
 - 2. Air & Vacuum Valves
 - 3. Fire Hydrants

1.02 REFERENCES

- A. ASTM A126 Class B "Gray Iron Castings for Valves, Flanges and Pipe Fittings"
- B. ASME B16.1 "Pipe Flanges and Flanged Fittings"
- C. AWWA C509 "Resilient-Seated Gate Valves for Water Supply Service"
- D. AWWA C111 "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"
- E. NSF/ANSI 61 "Drinking Water System Components - Health Effects"
- F. NSF/ANSI 372 "Drinking Water System Components - Lead Content"

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00 - Submittal Requirements, and the following:
 - 1. Manufacturer's catalog data and detail construction sheets showing all valve parts and describing material of construction by material and specification (such as AISI, ASTM, SAE, or CDA), demonstrating compliance with this Section.
 - 2. Show valve dimensions including laying lengths. Show dimensions and orientation of valve operators, as installed on the valves.
 - 3. Show valve linings and coatings.
 - 4. Copy of certified hydrostatic shell tests and seat tests at the factory, as applicable for each valve.

1.04 WARRANTY

- A. General: All valves and associated equipment shall be warranted by the manufacturer for defects in materials and workmanship for a period of one year (12 months) from date of substantial completion.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

- A. Provide valves complete with extension stems, worm gear operators, operating nuts, and wrenches required for operation, and as indicated on the drawings for exposed and buried valves. Valves shall have the name of the manufacturer, and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

2.02 VALVES

- A. Unless otherwise shown, all valves shall be non-rising stem, epoxy-coated resilient wedge gate valves per AWWA C509, with double O-ring seals.
- B. Air and Vacuum Valves:
 - 1. Unless otherwise show, all Air and Vacuum Valves shall be APCO Series 143C combination air and vacuum release valves (CAV), or approved equal. CAV shall be of the size called out on the drawings, single body, double-orifice.

2.03 VALVE OPERATORS

- A. Operators for Buried Valves
 - 1. Provide direct acting 2-inch square AWWA operating nuts for all buried and submerged valves less than 6-inches, and for buried and submerged gate valves less than 24-inches.
 - 2. Provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed operators designed for buried or submerged service.
 - 3. Operating Torque Requirement for Buried Valves: Operators on buried valves shall be designed to produce the required torque on the operating nut with a maximum input of 150-foot-pounds.
 - 4. Opening Direction: Valve operators, handwheels, or levers shall open by turning counterclockwise.

2.04 VALVE BOXES FOR BURIED VALVES

- A. Per SSCWD Standard Detail W-2. Valve lids shall be labeled as follows:
 - 1. Potable water, "WATER"
- B. Manufacturers: Valve boxes shall be Christy G5 with G5C traffic lid, or approved equal.

2.05 EXTENSION STEMS FOR BURIED VALVE OPERATORS

- A. Where the depth of the valve is such that its operating nut is more than 30-inches below grade, provide operating extension stems to bring the operating nut to within the specified tolerance stated above. Extension stems shall be steel and shall be complete with 2-inch-square operating nut. Provide stem with a 1/8-inch center guide to keep stem centered. Do not use pinned couplings.
- B. Provide 8" diameter SDR 35 PVC riser extending from top of valve to no more than 6" below AC finish grade.

2.06 BOLTS, NUTS, AND GASKETS FOR FLANGED VALVES

- A. Nuts and bolts: All fittings shall utilize 304 stainless steel bolts and nuts, unless otherwise specified, and shall have anti-seize applied to the threads during installation.

2.07 PAINTING AND COATING

- A. Buried Valves: All valves shall be epoxy-coated in accordance with AWWA C509.

2.08 FIRE HYDRANTS

- A. Unless otherwise shown, shall be CLOW 860 Cast Iron/Ductile Iron per SSCWD Standard Detail W-1-1.

PART 3 EXECUTION

3.01 JOINTS

- A. Flanged Joints: Boltholes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing; lubricate threads with oil and graphite and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove nuts and bolts, reseal or replace the gasket; reinstall or re-tighten the bolts and nuts; and re-test the joint. Joints shall be watertight.
- B. Threaded Joints: Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

3.02 VALVE INSTALLATION

- A. Valves in Horizontal Piping: Unless otherwise indicated in the drawings, install valves in horizontal runs of pipe with their operating stems vertical.
- B. Backfill: Backfill within 24-inches of valves shall be clean washed sand in accordance with the requirements of Section 31 23 33 - Trenching and Backfilling.

3.03 VALVE BOXES

- A. Firmly support valve boxes and keep them centered and plumb over the operating nut of the valve. Do not use beveled sections of pipe at the top of the valve extension pipe. The final valve box elevation shall be flush with the finished pavement surface.

3.04 VALVE LEAKAGE TESTING

- A. Test valves for leakage at the same time that the connecting pipelines are tested. See Section 33 33 00 – Utilities, Para.3.08 for pressure testing requirements.

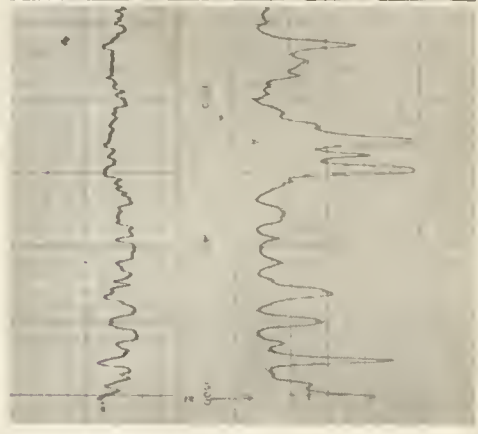
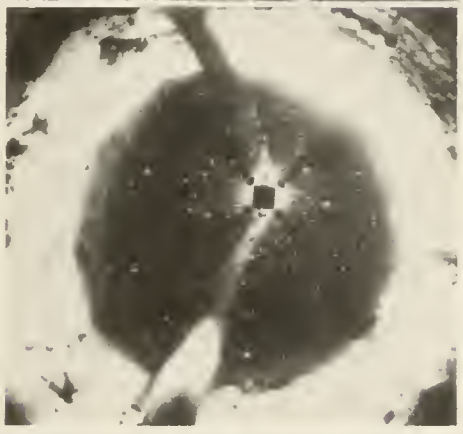
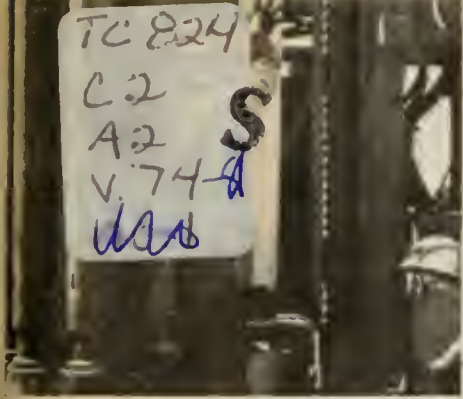
END OF SECTION

ATTACHMENT 1

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WATER WELL STANDARDS: STATE OF CALIFORNIA

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Water Resources



Water Well Standards: State of California

Bulletin 74-81
December 1981

THE COVER

The photographs on the cover show modern water well construction activities, materials, and equipment. Starting at the upper left corner and proceeding clockwise, they are:

1. Joining sections of thermoplastic well casing.
2. Air rotary construction with foam.
3. Welding sections of wire wound well screen.
4. Installing steel well casing in deep well.
5. Portion of borehole ("electric") log.
6. Downhole photography—view of encrustations.
7. Plastic casing—thermoset material.
8. Joining well screen to blank steel casing.
9. Center—fully developed well (note absence of sand).

**Department of
Water Resources**

Bulletin 74-81

**Water Well
Standards:
State of California**

December 1981

**Huey D. Johnson
Secretary for Resources
The Resources
Agency**

**Edmund G. Brown Jr.
Governor
State of
California**

**Ronald B. Robie
Director
Department of
Water Resources**



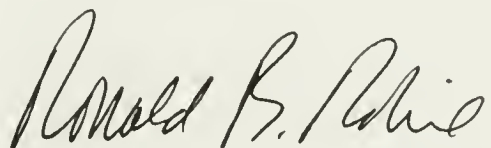
FOREWORD

Our ground water resources are becoming increasingly important to all Californians. In an ordinary year, about 40 percent of the water used in the State is derived from underground sources. During the 1976-77 drought, however, that figure rose to 53 percent. To ensure the continued utility of our underground resources, they must be protected. Standards for both the construction of water wells and the destruction of abandoned wells can help protect ground water quality.

Furthermore, deficiencies in the design and construction of wells usually result in higher operating and maintenance costs. The establishment and implementation of well standards in an area provide more assurance that wells are likely to require less maintenance and will have longer useful lives.

Since the initial printing of these standards in February 1968, 30 counties and 132 cities have enacted ordinances, based on Bulletin 74, governing the construction, alteration, and destruction of all water wells within their boundaries. (At that time, three other counties already had ordinances in effect.) These ordinances specify that water wells be constructed, or destroyed when their useful lives are over, in accordance with the guidelines contained in the Department of Water Resources' standards.

Changes in the field of well construction (methods, equipment and materials), together with the experiences of applying the 1968 standards, warrant revising and updating them. As a result, this new edition is being issued. Counties and cities that have not yet done so are urged to consider enacting well construction standards to protect the quality of ground water supplies for the benefit of their citizens. Where standards are in effect, consideration should be given to revising them to reflect the modifications presented in this bulletin.



Ronald B. Robie, Director
Department of Water Resources
The Resources Agency

Copies of this report are available without charge from:

State of California
Department of Water Resources
P. O. Box 388
Sacramento, CA 95802

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The California Water Commission serves as a policy advisory body to the Director of Water Resources on all California water resources matters. The nine-member citizen Commission provides a water resources forum for the people of the State, acts as liaison between the legislative and executive branches of State Government, and coordinates Federal, State, and local water resources efforts.

CHAPTER I. INTRODUCTION

About 40 percent of the water used in California comes from underground. During the 1976-77 drought the proportion rose to 53 percent. In some locations water from wells or springs is the only water available. The Department estimates that there are 500,000 to 750,000 water wells (irrespective of condition or whether used or idle) scattered throughout the State. Most are situated in the 400 significant ground water basins in California, although many thousands are located in the hilly and mountainous areas. They range from hand dug wells to carefully designed large production wells drilled to great depths.

If our ground water supplies are to remain useful to us, we are obligated to protect their quality. It is ironic that one way in which ground water quality can decline is through the well. This occurs when, because of inadequate construction, wells provide a physical connection between sources of pollution and usable water. The geologic environment has some natural defenses against pollutants, but each time we penetrate that environment, we may carelessly establish avenues for their uncontrolled introduction. Abandoned wells pose a particularly serious threat, not only to ground water quality but also to the safety of humans, especially children, and to animals. Such wells are frequently and conveniently forgotten and once out of mind, there is little chance of preventing them from eventually becoming a problem.

The potential for such problems is growing because the number of wells is increasing. Around 15,000 new wells are constructed each year. In 1977, at the height of the 1976-77 drought, an estimated 28,000 wells (about double an average year) were drilled in the State. The number of wells abandoned each year is not known.

A properly constructed or adequately destroyed well should maintain, as far as practicable, those subsurface conditions which, prior to construction of the well, prevented the entrance of unsanitary and inferior-quality water into usable ground water supplies. Standards for the construction of water wells and for the destruction of so-called "abandoned" wells can be a significant factor in the protection of ground water quality and should contribute to the betterment of the health and welfare of the people of the State.

Impairment of the quality of ground water of the State through improper construction or abandonment of wells has long been one of the concerns of the Legislature. In 1949 it enacted legislation which, among other matters, directed the Department of Public Works to investigate and survey conditions of damage to quality of underground water caused by improperly constructed, abandoned or defective wells and to report to the appropriate regional water pollution control board its recommendations for minimum

standards of well construction (Chapter 1552, Statutes of 1949). These investigative and reporting responsibilities are now lodged in the Department of Water Resources by Water Code Section 231, which reads as follows:

231. The department, either independently or in cooperation with any person or any county, state, federal or other agency, shall investigate and survey conditions of damage to quality of underground waters, which conditions are or may be caused by improperly constructed, abandoned or defective wells through the interconnection of strata or the introduction of surface waters into underground waters. The department shall report to the appropriate California regional water quality control board its recommendations for minimum standards of well construction in any particular locality in which it deems regulation necessary to protection of quality of underground water, and shall report to the Legislature from time to time, its recommendations for proper sealing of abandoned wells.

During the 1965 and 1967 General Sessions, the Legislature again reviewed the matter of standards for water well construction. As a result, it established a procedure for implementing standards developed under Section 231 by enacting Chapter 323, Statutes of 1967, which added Sections 13800 through 13806 to the Water Code. The wording of these sections was amended in 1969 when the Legislature enacted the Porter-Cologne Water Quality Control Act (Chapter 482, Statutes of 1969). In Section 13800, the Department of Water Resources' reporting responsibility is enlarged upon:

13800. The department, after such studies and investigation pursuant to Section 231 as it finds necessary, on determining that water well and cathodic protection well construction, maintenance, abandonment, and destruction standards are needed in an area to protect the quality of water used or which may be used for any beneficial use, shall so report to the appropriate regional water quality control board and to the State Department of Health Services. The report shall contain such recommended standards for water well and cathodic protection well construction, maintenance, abandonment, and destruction as, in the department's opinion, are necessary to protect the quality of any affected water.

The State Department of Health Services also has a concurrent interest in problems caused by improperly constructed, defective, or "abandoned" wells. This interest is evidenced in the "California Safe Drinking Water Act" (Chapter 7 of Part 1 of Division 5 of the Health and Safety Code, State of California), which deals with the health aspects of public water supplies. Under this authorization, the Department of Health Services requires a water purveyor to apply for an amended water permit before a new well is constructed and connected to the water system. Before the

amended (or new) permit is issued a thorough review is made of (a) the location of the well with respect to potential contamination hazards, (b) design and construction of the well necessary to prevent contamination or the exclusion of undesirable water, and (c) the bacterial and chemical quality of the water produced. The Department may issue a permit if it finds that the water "under all circumstances is pure, wholesome; and potable and does not endanger the lives or health of human beings." Specific water quality and monitoring standards have been adopted by regulation. If at any time water produced from an existing well fails to comply with such standards, the Department may require changes or modifications of the well, provisions of appropriate water treatment, or cause the curtailed use, even destruction of the well, in order to assure a safe supply to the public.

In summary, the responsibility of the Department of Water Resources is to advise the Legislature and appropriate state agencies on the maintenance of ground water quality, including protection against adverse effects caused by improper well construction or the abandonment of wells. This responsibility applies to all wells, irrespective of purpose. The responsibility of the Department of Health Services is to investigate, evaluate, and approve public water supplies including the design and construction of water wells.

This report was prepared by the Department of Water Resources in fulfillment of its responsibilities under the provisions of Section 231 of the Water Code, and in cooperation with the State Department of Health Services.

Statement of the Problem

Wells themselves do not cause ground water quality to deteriorate. Rather, it is inadequate construction, or, in the case of wells that no longer serve a useful purpose, their improper destruction, that can result in the deterioration of ground water quality. Depending on the circumstances, such quality deterioration may affect the water supplying a single well, or if the pollution is substantial, a sizable segment of a ground water basin.

The impairment of water quality in an individual well, or group of wells, is the most common. Ground water supplies have been responsible for a sizable portion of the water-borne disease outbreaks reported in the United States. Most of these outbreaks occurred where wells were so poorly constructed that they allowed contaminants to enter the well. Contaminants entering improperly constructed wells are not limited to disease organisms. There is also a growing number of case histories concerning undesirable chemicals, both toxic and nontoxic, that have gained access to ground water and adversely affected wells a short distance away.

The mechanism of water quality impairment caused by faulty wells affecting large segments of a ground water basin is not well defined. In most instances, a number of factors have been involved; the wells have served primarily to facilitate the impairment. The most noteworthy examples in

California of widespread water quality deterioration are in coastal ground water basins that have been subjected to seawater intrusion.

Inadequately constructed or improperly "abandoned" wells are not the sole cause of water quality degradation in a California ground water basin. A small quantity of contaminants entering one well may not have far-reaching effect. However, (1) the construction of thousands of new wells in California each year, (2) the fact that many are becoming more closely spaced, and (3) the growing number of wells being neglected or indiscriminately abandoned indicate that the potential for impairing ground water quality is growing. Then, when pollutants move along the lines of natural water movement, the effects will be long-lasting and difficult, if not impossible, to correct.

Inadequately constructed or improperly destroyed wells facilitate the impairment of ground water quality (see Figures 1 and 2) in five principal ways:

1. When the well is located too close to sources of pollution or contamination or downstream from them so that the well can be directly affected by flow from these sources (Figure 1A). Ironically, sometimes the source of pollution is a nearby abandoned well.

2. When the surface portion of the well is constructed without protective features so that contaminated or polluted waters can flow directly into the well through one or more of several possible openings in or under the pump. Usually under these circumstances only the water in or adjacent to the well is affected (Figure 1B and 1C).

3. When the annular space (the space between the outside of the casing and the wall of the hole) lacks an adequate vertical seal and surface water or shallow sub-surface water flows into the well along the outside of the casing. (Note that although the annular space may be filled with granular filter material, i.e., the familiar "gravel-pack", no seal exists and undesirable water can move downward or laterally.) This type of defective well is particularly susceptible (Figure 1D) to contamination.

4. When, during well construction (or the destruction of abandoned wells), aquifers that produce poor quality water are ineffectively sealed off, allowing the interchange of water with one or more aquifers and thus significantly impairing the quality of water in those aquifers. The well now provides a physical connection between these aquifers (Figure 2).

5. When the well is used intentionally, accidentally, or carelessly for the disposal of waste allowing direct contamination of the ground water to occur. Such disposal is prohibited by law except under specially approved circumstances.

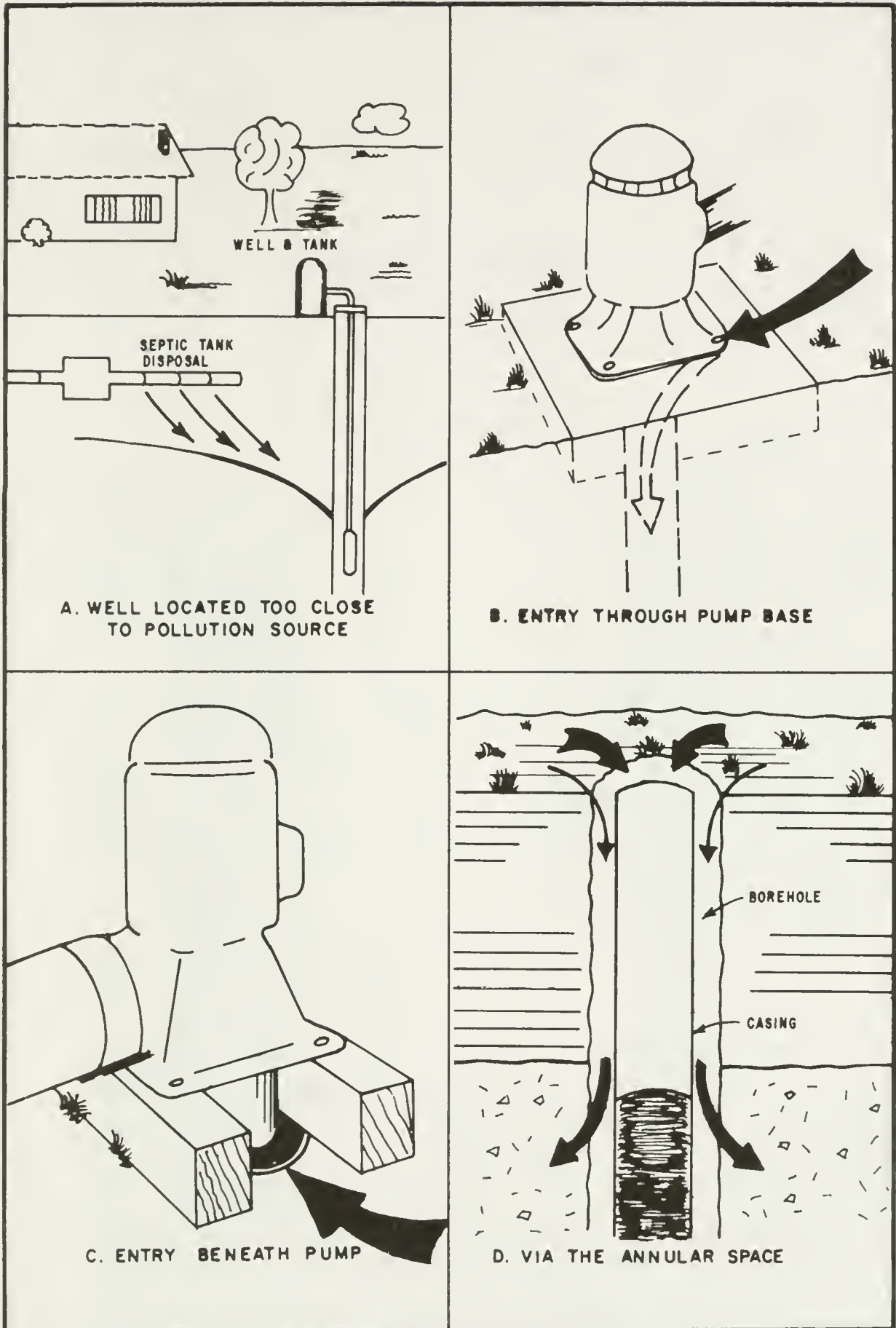


Figure 1. AVENUES OF ENTRANCE FOR POLLUTANTS TO WELLS

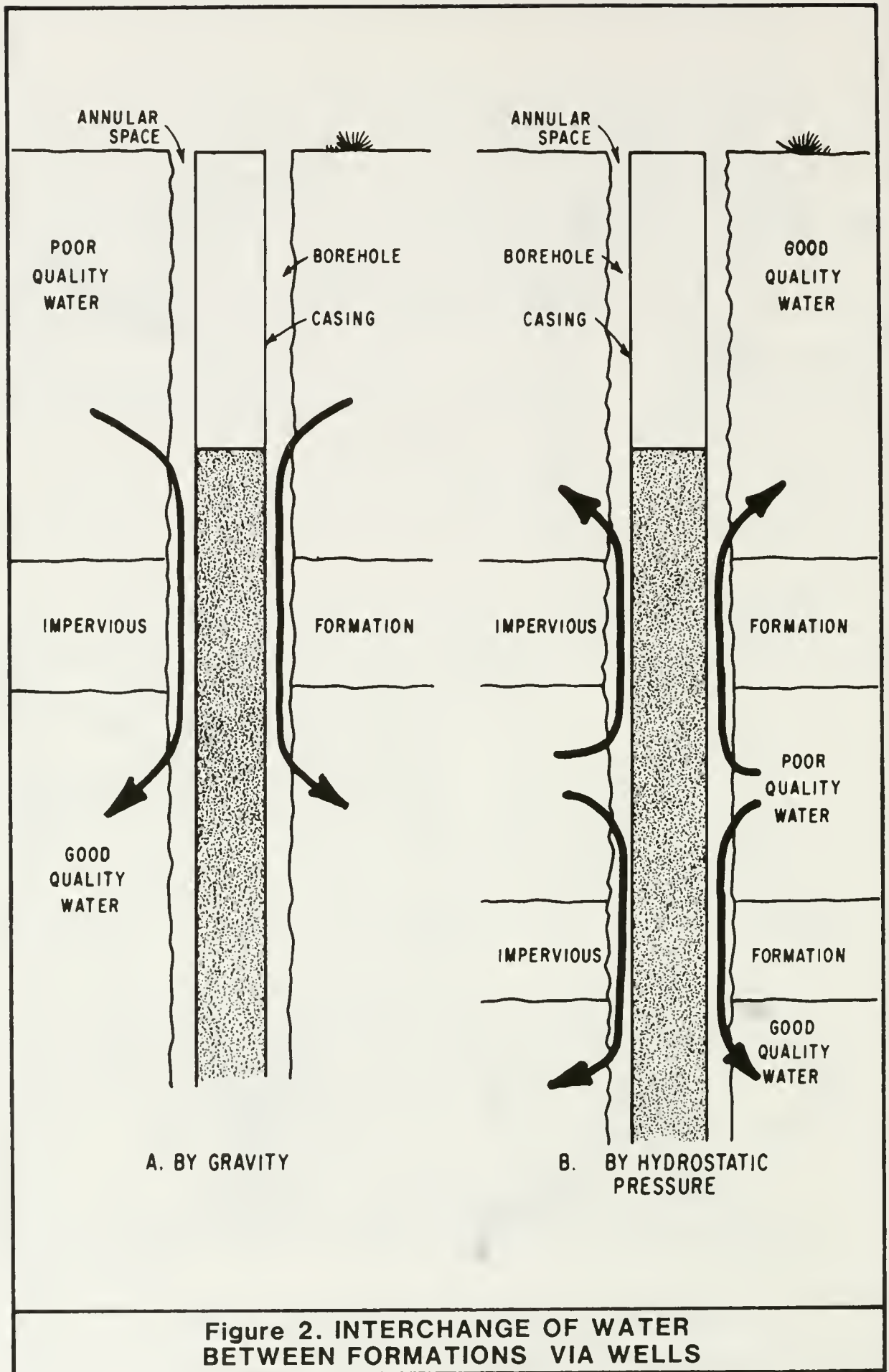


Figure 2. INTERCHANGE OF WATER BETWEEN FORMATIONS VIA WELLS

Irrespective of the probability of occurrence and which form of deterioration takes place, wells should be constructed or destroyed such that they do not contribute to the impairment of the quality of California's ground water supplies. Moreover, while the well construction industry, advisory groups, and regulatory agencies want to protect the quality of the State's ground water supplies as well as assure that wells are adequately constructed, there is no broad, uniform approach for so doing in California. The resolution of this problem requires the development of standards for water well construction and destruction that will ensure the protection of the State's ground waters as they exist in the ground or as they pass through the well for use. Such standards should be capable of execution by the average competent well driller using commercially available equipment and materials, without imposing undue financial burden on the well owner.

Well standards do more than protect the quality of the ground water resource; they also provide a degree of consumer protection. When standards are established and implemented in an area, well owners have more assurance that their wells will be constructed properly. Proper construction could mean less maintenance with an extended well life. Most well owners do not realize that deficiencies in design and construction (including failure to close-off access to pollutants described above) are likely to result in higher operating and maintenance costs.

A subject touched upon earlier is the safety hazard posed by the unused or "abandoned" well. While safety is not a matter involving the maintenance of ground water quality, it should be a concern to all those involved with water wells. Any abandoned excavation is a threat to the safety of people, especially children and animals. Further, State law (Section 24400 of the California Health and Safety Code) requires that abandoned excavations be fenced, covered, or filled. Yet, children (and sometimes adults) and livestock do fall into abandoned wells and other excavations.

By properly destroying abandoned wells, we can easily eliminate this safety hazard.

Developing the Standards

The Department of Water Resources began formulating standards for the construction of water wells and the destruction of abandoned wells shortly after the enactment of Water Code Section 231 in 1949. The Department made a comprehensive survey of existing laws and regulations governing well construction and abandonment in the then 47 other states and in the counties and cities of California. This survey culminated in the publication of "Water Quality Investigations Report No. 9 - Abstracts of Laws and Recommendations Concerning Water Well Construction and Sealing in the United States", April 1955. Although the report is over 25 years old, it remains a useful source of background information. The Department has continued to keep informed of practices in other states, particularly those in which

standards have been established, and changes in the status of California county well ordinances.

Concurrently the Department assembled and evaluated information on the development of well standards in California. The information was grouped into three broad categories: (1) ground water geology and hydrology, (2) impairment of ground water quality, and (3) water well construction practices. The latter included suggestions and recommendations on methods and materials from representatives of state and federal agencies, steel companies, casing fabricators, pump manufacturers, water well drilling contractors, and other organizations and individuals concerned with the development and use of ground water.

This activity culminated in the publication of the standards in their initial draft form, "Recommended Minimum Well Construction and Sealing Standards for Protection of Ground Water Quality State of California", Bulletin 74, Preliminary Edition, July 1962. In March and April 1965, the Department conducted a series of public hearings in conjunction with the Department of Health Services at six cities in the State. Discussion and comments received centered on two areas: (1) the standards recommended, and (2) means of implementation. Most of those concerned felt that the standards, as written, were too general. Accordingly, the Department decided to redraft them.

Following a review of all prior material and comments received during the period 1963 through 1966, the Department published an interim edition of the chapter containing the standards in February 1967. Two public hearings on the interim edition were held in May 1967, and written comments were received as part of the record. These were also joint hearings with the Department of Health Services.

The eight hearings produced correspondence and an extensive file of transcripts containing information, opinions, and suggestions, which would fill several volumes, if published.

In February 1968 the standards were issued in their current form.

For the most part, the standards can be applied anywhere in the State under practically any conditions. The procedures for closing-off the avenues of access, properly locating a well, destroying an abandoned well, etc., in Del Norte County, at the northwest corner of California, are similar to those in western Fresno County. Similarly, sealing-off the water in one or more zones or aquifers, to prevent its migration to other zones or aquifers, may be just as desirable for a well in western Merced County as it is at one on the Oxnard plain of Ventura County although, perhaps, for different reasons. However, in specific areas of the State it has been necessary to define the existing geologic and hydrologic conditions and the circumstances under which these standards should be applied. For example, it is

helpful to describe the areal and vertical extent of geologic materials where sealing is needed to prevent the migration of poor quality water.

Thus, the Department maintained a concurrent and subsequent activity consisting of studies and reports describing the application of standards in designated areas of California. And, in addition to Bulletin 74, the Department issued a number of reports containing well standards for those areas (see Table 1).^{1/}

The 1981 Edition

The foreword to the 1968 edition stated that:

"Whereas the standards in this report are as final as they can be at the present time, the Department will revise them from time to time. We recognize that, as with other published standards, to be effective and useful they must be revised and updated in light of both changes in practice and degree of success achieved in their application."

Sufficient changes in the field of water well construction and experience with applying the 1968 standards warrant revising them. Foremost among the changes in construction practices are:

1. The development and use of plastic materials for casing in water wells. A subject only alluded to in the 1968 edition, the use of plastic well casing and screen has had phenomenal growth in the United States. So much has the usage increased that a national materials standard has been developed and a manual of installation practices has just been published.

2. The use of the air rotary drilling method for constructing wells in the hard rock areas of the State. Although this method of drilling was in use in 1968, its use has mushroomed since then. The equipment is very effective and very fast. Coupled with the use of plastic well casing, the method has made the construction of a well several hundred feet deep in one day a common event in hard rock areas.

3. Rapid growth in the use of well screens in place of perforated casing in the intake sections of wells.

4. Increased use of the reverse-circulation method of well drilling for large diameter deep wells in unconsolidated formations. It too is an extremely fast method.

^{1/} One other report, Bulletin 74-1, "Cathodic Protection Well Standards: State of California", March 1973 deals with another kind of well. Cathodic protection wells house devices used to alleviate electrolytic corrosion of pipelines, tanks, and similar installations. Such wells may also function as instruments for the deterioration of ground water quality. For that reason, standards for their construction and destruction have also been issued.

TABLE 1
 REPORTS ISSUED UNDER
 WATER WELL STANDARDS PROGRAM^{1/}

Area of Study	DWR Bulletin No.	Publication Date ^{2/3/}
Mendocino County	62	November 1958 Supplement 8/7/69 ^{4/}
Alameda County	74-2	P.E. December 1962 F.E. June 1964 Supplement 10/20/69 ^{4/}
Del Norte County	74-3	P.E. March 1964 F.E. August 1966
Central, Hollywood and Santa Monica Basins (Los Angeles County)	74-4	October 1965 Final Supplement August 1968
San Joaquin County	74-5	March 1965 Final Supplement July 1969
Fresno County	74-6	September 1968
Arroyo Grande Basin (San Luis Obispo Co.)	74-7	July 1971
Shasta County	74-8	August 1968
Ventura County	74-9	August 1968
West Coast Basin (Los Angeles County)	107	August 1962 Supplement 8/16/68 ^{4/}
Coachella Valley Area (Riverside County)	<u>5/</u>	August 1979

^{1/} Listed by DWR Bulletin Number.

^{2/} Publications issued prior to June 1971 are out-of-print. Copies may be borrowed or inspected at Department's district offices, county offices administering well ordinances and local libraries.

^{3/} P.E. - Preliminary Edition; F.E. - Final Edition.

^{4/} Following the enactment of Sections 13800 through 13806 of the Water Code in 1967 supplemental memoranda reports summarizing the material presented in these publications and recommending the establishment of standards in these areas were issued.

^{5/} Unnumbered memorandum report.

Other factors include:

1. Population growth in the hilly and mountainous rural areas of California, which has resulted in a heavy demand for individual and community water supplies in those areas.

2. The 1976-77 drought, the most severe in a half-century, which caused a heavy demand for new wells, replacement wells, and well deepenings. It also produced an increased awareness of the significance of the State's ground water resources.

3. The increasing cost of energy for pumping. In terms of well construction and operation, this has meant greater interest in the design of efficient wells and in well maintenance (previously, a much neglected activity).

These as well as other considerations led to the decision to revise the 1968 edition.

This edition is composed of this chapter, Chapter II, "Standards", and five appendixes.

While there have been a number of modifications and additions to them, the 23 sections of Chapter II, "Standards", are as listed in the 1968 edition. All references to existing laws, standards, and publications have been updated and, where appropriate, additional explanation is provided. Every effort has been made to clarify wording to ensure its understanding. A number of figures illustrating the standards have been included.

Many technical terms concerning ground water and water well construction are frequently misunderstood or misinterpreted. The term "seal" or "sealing", for example, has several meanings in the jargon of the well driller, geologist, and engineer, depending on what part of the well installation is under discussion. In this report, we have tried to ensure that the technical terms used are understandable.

A list of definitions appears in Appendix A. Certain definitions are made a part of the standards and are presented in Chapter II. Appendixes B, C, and D describe sealing methods, disinfection, and water quality sampling respectively.

Numerous publications relating to the construction of water wells and to the development, use, and protection of ground waters have been reviewed in preparation of this report. Included is a considerable body of literature on well construction that has been written since 1968. They are listed in Appendix E in alphabetical order by author.

Establishing and Enforcing Standards

Authority for establishing and enforcing standards for construction and destruction of water wells has always rested with the 58 counties and 429 cities in California.

Where public water supplies are concerned, additional requirements may be prescribed by the Department of Health Services. Prior to the release of the 1968 edition of this report, only three counties and a few cities had adopted ordinances regulating the construction of water wells. In 1967, legislation was enacted authorizing the State (through the California Regional Water Quality Control Boards) to require cities and counties to adopt satisfactory ordinances governing well standards in critical areas. If they did not, the State would adopt such ordinances for the cities and counties. (This procedure is outlined in Sections 13800 through 13806 of the Water Code.)

Today, 33 counties have well ordinances establishing standards for the construction of all wells within their boundaries. They are listed in Table 2. Six other counties have adopted ordinances that deal with specific kinds of wells or conditions (as, for example, individual domestic wells only). While this latter group of ordinances provides protection for the users of water from the specified wells in these areas, they do little to protect the quality of the ground water resource (in contrast with the 33 counties listed in Table 2). Table 3 lists the six counties with ordinances for specific kinds of wells. Thirty-four of the total of 39 county ordinances specify the standards presented in the 1968 edition, with modifications where appropriate (all of which are more stringent than those in the 1968 edition).

One-third of the 429 cities in California have also adopted well ordinances. Many cities have working arrangements or agreements with county governments so it is difficult to state the exact number of cities employing well construction standards. Cities with ordinances are situated in the following counties (number of cities with ordinances in parenthesis):

Alameda (4)	Orange (26)	San Joaquin (6)
Fresno (8)	Placer (1)	San Luis Obispo (6)
Kern (1)	Riverside (1)	San Mateo (5)
Los Angeles (51)	Sacramento (1)	Santa Barbara (2)
Merced (3)	San Bernardino (1)	Stanislaus (1)
Nevada (1)	San Diego (10) <u>1/</u>	Sutter (1)
		Ventura (9)

1/ Since it has no ground water resource, the eleventh city in San Diego County, Coronado, has no ordinance.

TABLE 2
COUNTY ORDINANCES IN CALIFORNIA
CONCERNING THE CONSTRUCTION AND DESTRUCTION OF WELLS
(As of December 1981)

County	Ordinance Number	Date Adopted	Remarks
Alameda	73-68	7/17/73	
Butte	1845	8/2/77	
Contra Costa	1189	1/14/58	
Del Norte	73-30	11/12/73	
Fresno	470-A-39	10/22/74	
Humboldt	897	12/21/72	
Inyo	309	10/4/76	
Kings	365	1/13/76	
Los Angeles	10075	9/1/70	
Madera	412	3/16/76	
Mariposa	373	9/18/73	
Mendocino	1135	8/28/73	
Merced	752	6/10/75	
Mono	75-459	8/26/75	
Monterey	1967	5/29/73	
Napa	335	12/1/70	
Orange	2607	7/18/72	
Placer	1498B	5/9/72	Amended 1977, 1981
Sacramento	508	10/26/55	
San Bernardino	1954	10/15/74	
San Diego	4286	4/3/74	
San Joaquin	1862	12/21/71	
San Luis Obispo	1271	5/7/73	
San Mateo <u>1/</u>	2413	1/11/77	
Santa Barbara	2769	9/29/75	
Santa Clara <u>2/</u>	75-6	10/14/75	Ordinance of the Santa Clara Valley Water Dist.
Santa Cruz	1577	2/16/71	
Shasta	479	6/30/69	
Sonoma	1594	12/18/72	
Stanislaus	NS443	6/5/73	
Tulare	1758	8/13/74	Amended 4/16/76
Ventura	2372	8/31/70	Amended 10/1/79
Yolo	765	9/7/76	

1/ Predecessor ordinance numbers 1100 (12/15/55) and 2324 (7/8/75).

2/ Separate ordinance for subdivision wells - NS1203.22 (4/21/64).

TABLE 3
COUNTY ORDINANCES IN CALIFORNIA
WITH LIMITED APPLICATION TO WELLS
(As of December 1981)

County	Ordinance Number	Date Adopted	Application
Kern	G1225	12/16/69	Community water supply wells
	G3321	9/21/81	Agricultural wells
Marin	1463	1965	Domestic water supply
Plumas	786	5/15/73	Domestic wells only
Riverside	340A	5/3/48 <u>1/</u>	Provisions concern permit
San Francisco	659	1952	Individual domestic wells only
Sierra	420	5/7/74	Well construction only

1/ Amended December 1, 1952 and December 23, 1957.

Design and Performance Guidelines

While the standards presented here (see Chapter II following) are designed to protect the continued utility of the State's ground water resources, they are only incidentally related to the effective use of these resources. Events of the past decade have emphasized the need for conservation of water and energy. Furthermore, consumers (in this case, well owners) have become more aware of problems resulting from inefficient operation (as reflected in increased energy consumption) and inadequate maintenance.

Accordingly, this section was prepared to provide well owners and drillers with guidelines for measuring performance that will lead to the design and construction of more efficient wells as well as those requiring less maintenance.

Testing for Capacity

Every well owner is interested in how much water the well will produce and how dependable the production will be with time. To make that determination a capacity test or performance test must be made. Usually this involves installing a pump and operating it at the expected production rate over a certain length of time. There is considerable variation in actual practice on how such tests are performed depending on the dimensions of the well, including expected capacity and intended use as well as geologic conditions at the site. Obviously, for a small capacity well, i.e., one that produces under 50 gallons (190 litres) per minute, the test would not be as elaborate as it would be for a high capacity well but is no less important.

The amount of water needed is determined by the intended use of the water. For example, on the average, each person in a household uses 100 gallons (380 litres) of water a day. To the daily household use must be added seasonal uses such as lawn and garden irrigation, swimming pools, etc. Table 4 lists the volume of water supplied from a small capacity well, assuming continuous pumping for 24 hours. Thus, a well supplying one to three gallons (4 to 11 litres) per-minute is a reasonable amount for a single family dwelling. Additional amounts, such as for watering livestock or irrigating small acreages of crops, must be added to these values. Table 4 also indicates that a family of four could subsist on the water supplied by a well pumping constantly at the rate of only one-quarter gallon (0.95 litre) per minute. Unfortunately, at this rate there is little margin for error.

Small Capacity Wells. Performance tests for small capacity wells are relatively simple. A widely used test for small capacity wells is a pump test which lasts for four hours or until an apparently stable pumping level has been achieved at a rate equal to that expected for the permanent pump. However, in the hilly and mountainous "hard rock" areas of the State there are no defined aquifers and supplies are related to fracture patterns, the nature and extent of the soil mantle, faults, changes in stratigraphy, etc. In such areas the production potential of a well cannot be accurately assessed. Further, wells in these areas often exhibit a satisfactory initial production, which then declines due to poor recharge characteristics of the surrounding material. In such situations a longer than usual test, upwards of 12 to 24 hours (and longer) duration, may be desirable.

Bailing or air-blow tests give an approximate indication of production. They do not provide information of the accuracy needed to determine well capacity or to design an efficient pump system. (Air lift testing differs from air-blow testing. It involves pumping with air, not blowing the water out of the well as is the case with the air-blow test.)

The ability of the water level in a small capacity well to recover should be observed. If the water level fails to return to nearly its original level after 24-hours, the reliability of the producing zone is open to question.

Large Capacity Wells. Where large capacity wells are concerned, capacity tests are more elaborate and extensive. Such wells are usually located in defined, productive ground water basins, where considerable information on existing conditions is normally available to aid in the evaluation of their performance. All should be pump tested; bailer tests are of little value. The test pump should be capable of pumping 125 percent of the desired yield of the well. Pumping should be continued at a uniform rate until the "cone of depression" reflects any boundary condition that could affect the performance of the well. This could be as short as six hours and as long as several days, depending on aquifer characteristics and knowledge

TABLE 4
VOLUME OF WATER PUMPED CONTINUOUSLY
FROM SMALL CAPACITY WELLS

Pumping Rate	Total Pumped in 24-Hours	
<u>Gallons (litres) per minute</u>	<u>Gallons</u>	<u>Litres</u>
0.25 (1)	360	1 360
0.5 (2)	720	2 720
1 (4)	1,440	5 450
2 (8)	2,900	11 000
3 (11)	4,300	16 300
5 (19)	7,200	27,200
10 (38)	14,400	54 500
50 (190)	72,000	273 000

of the aquifer(s) in which the well is situated. The discharge rate and drawdown established should be maintained for a specified time period. The ratio of the discharge rate to the drawdown is called the specific capacity of the well for that time period. The units for specific capacity are gallons per minute per foot (litres per minute per metre) of drawdown. Static water levels must be measured in advance of the test and after the test during recovery.

Detailed descriptions of procedures and methods used in conducting pump tests for large capacity wells and for analyzing and interpreting the results are too lengthy to be included in this publication. Such information will be found in literature on ground water and on the design of water wells.

Well Efficiency

Well efficiency is defined as the ratio of the theoretical drawdown in the formation to the actual drawdown in the well. The difference between the two is caused by frictional energy losses of the water as it moves from within the formation to the pump intake. Thus, well efficiency describes the effectiveness of a well in yielding water. Well efficiency should not be confused with pumping-plant (motor and pump) or "wire-to-water" efficiency used to measure pumping-plant performance.

It should be obvious that well efficiency is related to the cost of pumping and the use of energy. If efficiency improves, pumping costs and energy consumption will drop. Thus, optimum well design is no less important where a small capacity well is concerned than it is for one with a large capacity. Unfortunately, design and construction practices that produce efficient wells are often sacrificed in order to save on the cost of constructing a well, particularly in the case of small capacity wells. However, the increased cost of design and construction can be offset by decreased

maintenance and operating costs over the long run, although it should be recognized that there is a limit to what can be achieved when compared to expenditure. Current design and construction technology is capable of producing wells with efficiencies of 80 to 90 percent. Pumping-plant or "wire-to-water" efficiency is currently at 65-70 percent.

Sanding

Irrespective of size or composition, any loose material entering a well is usually called "sand", and wells that regularly produce significant quantities of loose material are termed "sanders". The continued influx of sand to a well results in damage to pumps and leads eventually to decreased capacity, and thus a reduction in well efficiency. Further, enough sand may pass through the well to create cavities in the aquifer around the intake section of the well. As a result, such cavities can collapse and damage the well casing or screen. While most wells pump a minor amount of sand, excessive sanding is usually caused by poor well design or inadequate development.

Uncased ("Open-bottom") Wells. Casing serves to hold up the walls of the borehole and provide a path for the movement of the water. In formations with material that will not loosen and be carried away by the inflowing water, such as crystalline rock and other "hard rock" formations, the practice is to leave the intake sections uncased. (Theoretically in such instances, well efficiency would be 100 percent.) Unfortunately, in certain areas some drillers, believing the underlying material to be fully consolidated or attempting to save on costs, have drilled open-bottom wells that later produced sand. Furthermore, as pumps lowered following declining water levels, such wells developed sanding problems. This occurred in several areas in the Central Valley during the 1976-77 drought. In such instances, the wells should have been completely cased to prevent caving and the intake section screened to prevent the entrance of sand.

Inadequately Designed Intake Sections. Sanding is often the result of poor selection of screen size or perforation dimensions and/or, where used, filter material (the "gravel pack"). The well screen aperture (slot) openings or the perforation size, together with the length of screen or perforated section, should be selected to provide sufficient open area to allow the desired quantity of water to enter with minimal friction losses while keeping out 90 to 95 percent of the natural aquifer material or filter material.

Artificial filter materials perform a similar function. In addition to allowing the water to enter the well openings and preventing the entrance of fine-grained material, artificial filters are also used to increase the effective diameter of the well and increase the yield of certain wells by allowing numerous thin aquifers to produce water. On the other hand they need not be used unless there are conditions that make their use desirable or necessary.

Artificial filters are desirable when the aquifer has a "uniformity coefficient"^{1/} of less than 2.5 (some authorities recommend a value of less than 3), or in poorly consolidated rock, i.e., rock that tends to cave when pumping occurs.

Detailed information on the design of intake sections, including the selection of well screen aperture openings and artificial filter materials, will be found in most publications dealing with ground water and water wells, a number of which are listed in Appendix E.

Incomplete Development. Well construction causes compaction of unconsolidated material about the walls of the drilled hole and drilling fluid also invades these walls, forming a mud cake. In consolidated rocks, cuttings, fine particles and mud can be forced into joints and fractures. Thus, the borehole walls become clogged, reducing the potential yield and causing the drawdown to be increased. Proper well development breaks down the compacted walls (or opens fractures) and draws the material into the well where it can be removed. Obviously, the more thorough the development the better the well will perform. Adequacy of development is largely a matter of experience and judgment. The success of development can be measured by the amount of sand produced during interrupted pumping and the final specific capacity of the well.

Testing for Sand. The sand content should be tested after development and performance (pump) testing. Sand production should be measured by a centrifugal sand sampler^{2/} or other acceptable means. Following development (i.e., stabilization of the formation and/or gravel pack) and pump testing, the sand content should not exceed a concentration of 5 ppm (parts per million) by weight 15 minutes after the start of pumping.

Sand production exceeding this limit indicates that the well may not be completely developed or may not have been properly designed. In that event, redevelopment may be appropriate or as an alternative, a sand separator installed. In existing wells should this value be exceeded significantly, rehabilitation (redevelopment) or repair is probably needed. Again, as an alternative, a sand separator may need to be installed.

^{1/} The uniformity coefficient is a ratio that describes the variation in grain size of granular aquifer material. It is defined as the ratio of the particle size of a material at which 60 percent of the particles are finer and 40 percent are coarser (called D_{40}) to the "effective" grain size (i.e., the particle size of the material at which ten percent of the particles are finer and 90 percent are coarser) (D_{90}). The value of the uniformity coefficient for a material of one grain size is unity; for a heterogeneous sand it might be 30.

^{2/} Such a device is described in the Journal of the American Water Works Association, Volume 46, No. 2, February 1954.

Water Well Drillers' Reports

Detailed and comprehensive knowledge of the occurrence and quality of California's ground water resources is vital to protecting, conserving, and properly developing them. The data obtained during the construction of water wells are primary sources of geologic and hydrologic information. In 1949 the Legislature concluded that such information would be invaluable in the event of underground pollution, and would provide a fund of geologic information regarding the State's ground water resources. As a result, legislation was passed requiring the filing of a report with the Department. The report is called the Water Well Drillers' Report and its submittal is also a requirement of these standards (see Chapter II, Section 7 "Reports"). Additional information about the report is presented in "Guide to the Preparation of the Water Well Drillers' Report", Department of Water Resources, October 1977.

Comments and Public Hearings on Draft Edition

Where a publication is of general interest or its subject is one on which there can be a diversity of opinion, it is the policy of the Department of Water Resources to issue it in preliminary form and solicit comments from interested organizations and individuals and the general public. Since the standards for the construction of wells and the destruction of abandoned wells recommended herein are for application throughout the State, and because they are specified by many counties and cities (in ordinances or regulations), a draft edition was prepared and distributed for comment (April 14, 1981). In addition, four public hearings or meetings (of an informal nature) were held to obtain the views of persons interested in, or concerned with, the construction and use of water wells. These hearings were conducted in cooperation with the Department of Health Services represented by its Sanitary Engineering Section since this report contains provisions which pertain to the public health aspects of water well construction. The hearings were held during June 1981 at Berkeley, Fresno, Redding and Los Angeles. In response to a number of requests, the comment period was extended to September 1981.

Fifty-five persons representing 33 individuals and organizations attended the four hearings. Five formal (written) statements were presented and 16 persons commented verbally. In addition, written comments were received from 33 other organizations and individuals. Those submitting written comments are listed in Table 5. Copies of the written comments are available for inspection in the Department's file in Sacramento.

All comments were carefully reviewed and considered. As might be expected, opinions differed on the applicability of certain standards, guidelines, and procedures. There is, of course, some validity in each point-of-view, which forms the basis for reconsideration. Many comments were incorporated in this final draft. Others were not used for various reasons. Most of the comments dealt mainly with (1) the

TABLE 5
 ORGANIZATIONS SUBMITTING WRITTEN COMMENTS
 ON DRAFT OF BULLETIN 74-81

<u>Organization</u>	<u>Representative</u>	<u>Date of Comments</u>
Alameda Co. Water District	E. L. Lenahan	5/19/81
Associated Drilling Contractors	D. D. Mickel	8/7/81
Associated Drilling Contractors Tri Counties Branch	R. L. Strahan	6/9/81
Associated Drilling Contractors Tri Counties Branch	R. L. Strahan	9/14/81
Associated Drilling Contractors	D. B. Trunnell	5/20/81
Ballard & Foote Drilling	R. H. Foote Jr.	7/28/81
Buena Vista Water Storage Dist.	H. K. Russell	6/10/81
C & N Pump and Well Company	F. Clough	5/1/81
California Regional Water Quality Control Board - Central Valley Region	W. S. Johnson	8/27/81
California Regional Water Quality Control Board - Los Angeles Region	R. M. Hertel	9/10/81
California Regional Water Quality Control Board - San Francisco Bay Region	S. R. Ritchie	5/20/81
California Regional Water Quality Control Board - Santa Ana Region	R. R. Nicklen	6/8/81
California Water Service Company	G. W. Adrian	8/5/81
Clark Well & Equipment Co., Inc.	R. L. Clark	9/3/81
Coachella Valley Water District	L. O. Weeks	6/8/81
DeLucchi Well & Pump, Inc.	J. DeLucchi	6/25/81
Dougherty Pump & Drilling	C. L. Fasnacht	6/13/81
Dow Chemical U.S.A.	J. Jones	6/11/81
Fresno Co. Department of Health	C. Auernheimer	6/4/81
Robert Garcia Well & Pump Co.	R. E. Garcia	8/28/81
Harding-Lawson Associates	F. C. Kresse	8/28/81
Richard A. Hendry, Attorney- at-Law	R. A. Hendry	6/19/81
Michael F. Hoover	M. F. Hoover	5/20/81
Los Angeles Co. Department of Health Services	N. F. Hauret	6/10/81
Luhdorff & Scalmanini	E. E. Luhdorff Jr.	6/10/81
Monterey Co. Flood Control and Water Conservation District	R. R. Smith	6/9/81
Department of the Navy	W. N. Sorbo	6/17/81
Placer County Health Department	M. A. Winston	8/28/81
Santa Clara Valley Water Dist	J. L. Richardson	7/9/81
Santa Cruz Co. Environmental Health Services	L. R. Talley	5/28/81

TABLE 5
 ORGANIZATIONS SUBMITTING WRITTEN COMMENTS
 ON DRAFT OF BULLETIN 74-81 (Continued)

<u>Organization</u>	<u>Representative</u>	<u>Date of Comments</u>
Southern California Water Co.	D. F. Kostas	8/20/81
Stanislaus Co. Department of Environmental Resources	J. Aud	6/25/81
State Water Resources Control Board	C. Whitney	6/16/81
Joseph B. Summers, Civil Engineer, Inc.	J. B. Summers	6/5/81
Joseph B. Summers, Civil Engineer, Inc.	R. L. Reynolds	8/28/81
Tulare Lake Basin Water Storage District ¹	B. L. Graham	6/5/81
Ventura Co. Environmental Health Department	D. W. Koeppe	6/8/81
Ventura Co. Public Works Agency	G. J. Nowak	8/14/81
Water Well Surveys	W. C. Wigley	6/16/81
Well Products West, Inc.	C. Willis	6/12/81
Well Products West, Inc.	C. Willis	8/4/81
Woodward-Clyde Consultants	J. A. Gilman	6/24/81

standards in Chapter II (following) more specifically sections 1, 8, 9, 10, 11, 12, 13, 21 and 23; (2) the Design and Performance Guidelines section of this chapter; and (3) Appendixes B, C and D, which deal with methods and procedures.

CHAPTER II. STANDARDS

The standards presented in this chapter are intended to apply to the construction (including major reconstruction) or destruction of water wells throughout the State of California. However, under certain circumstances, adequate protection of ground water quality may require more stringent standards than those presented here; under other circumstances, it may be necessary to substitute other measures which will provide protection equal to that provided by these standards. Such situations arise from practicalities in applying any standards or, in this case, from anomalies in ground water geology or hydrology. Since it is impractical to prepare standards for every conceivable situation, provision has been made for deviation from the standards as well as for additional ones. However, the Department believes that for most conditions encountered in the State, the standards presented in this report are satisfactory for the protection of ground water quality.

In the past, the Department expended considerable effort in defining areas where standards should be applied to prevent the mixing of waters of differing qualities in specific ground water areas in California. For example, ground waters of varying quality in the San Joaquin Valley are naturally separated by a confining bed commonly called the "Corcoran Clay". The standards presented in this chapter continue to support the findings and recommendations made regarding the application of standards to the specific areas previously studied. (See Table 1, Chapter I.)

Part I. General

Section 1. Definitions.1/

A. Well or Water Well. As defined in Section 13710 of the Water Code, well or water well:

"...means any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. This definition shall not include: (a) oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells; or (b) wells used for the purpose of (1) dewatering excavations during construction, or (2) stabilizing hillsides or earth embankments."

B. Community Water Supply Well. A water well used to supply water for domestic purposes in systems subject to Chapter 7, Part 1, Division 5 of the California Health and Safety Code. Included are wells supplying public water systems classified by the Department of Health Services as

1/ Technical terms are defined in Appendix A.

"Noncommunity water systems" and "State small water systems" (California Waterworks Standards, Title 22, California Administrative Code). Such wells are variously referred to as "Municipal Wells", "City Wells" or "Public Water Supply Wells".

C. Individual Domestic Well. A water well used to supply water for the domestic needs of an individual residence or systems of four or less service connections (or "hook-ups" as they are often called).

D. Industrial Wells. Water wells used to supply industry on an individual basis (in contrast to supplies provided through community systems).

E. Agricultural Wells. Water wells used to supply water only for irrigation or other agricultural purposes, including so-called "stock wells".

F. Recharge or Injection Wells. Wells constructed to introduce water into the ground as a means of replenishing ground water basins, repelling the intrusion of seawater or disposing of waste water.^{1/}

G. Air-conditioning Wells. Wells constructed to return to the ground water which has been used as a coolant in air conditioning processes. Because the water introduced into these wells is degraded (from the standpoint of temperature), such wells have been construed as waste discharges and are, therefore, subject to the water quality control laws (Division 7 of the Water Code and Division 5 of the Health and Safety Code).

H. Horizontal Wells. Water wells drilled horizontally or at an angle with the horizon (as contrasted with the common vertical well). This definition does not apply to horizontal drains or "wells" constructed to remove subsurface water from hillsides, cuts, or fills (such installations are used to prevent or correct conditions that produce landslides).

I. Observation and Monitoring Wells. Wells constructed for the purpose of observing or monitoring ground water conditions.

^{1/} Included are wells used for the injection of reclaimed waste water. Injection wells are also used to dispose of unusable waste water into formations containing water of unusable quality (such as highly mineralized waters) or dry, nonproductive formations. These latter wells can penetrate usable ground water zones but are not permitted to open into usable water (Chapter 7, Division 7, California Water Code; Section 4458, California Health and Safety Code; and Chapter 1, Division 3, California Public Resources Code.) "Dry" wells, "drainage" wells, and sewer wells also fall into this category. Their existence and operation is also subject to the aforementioned provisions of the State law.

J. Test Wells. Wells constructed for the purpose of obtaining the information needed to design a well prior to its construction. Such wells are not to be confused with "test holes" or "exploration holes" which are temporary in nature (i.e., uncased excavations whose purpose is the immediate determination of existing geologic and hydrologic conditions). Test wells are cased and can be converted to observation or monitoring wells and under certain circumstances to production wells.

K. Inactive or Standby Well. A well not routinely operating but capable of being made operable with a minimum of effort.

L. Enforcing Agency. An agency designated by duly authorized local, regional or state government to administer laws or ordinances pertaining to well construction. For community water supply wells the enforcing agency is the State Department of Health Services or the local health department.

Section 2. Application to Type of Well.

Except as prescribed in Sections 3 and 4 (following) these standards shall apply to all types of wells described in Section 1. Before a change of use is made of a well, compliance shall be made with the requirements for the new use as specified herein.1/

Section 3. Exemption Due to Unusual Conditions.

If the enforcing agency finds that compliance with any of the requirements prescribed herein is impractical for a particular location because of unusual conditions or if compliance would result in construction of an unsatisfactory well, the enforcing agency may waive compliance and prescribe alternative requirements which are "equal to" these standards in terms of protection obtained.

Section 4. Exclusions.

The standards prescribed in Part II, "Construction", do not apply to exploration and test holes. However, the provisions of Section 7 "Reports" (following) and Part III, "Well Destruction", do apply to these holes.

Springs are excluded from these standards.2/

1/ An example would be an agricultural well converted to use as a community water supply well.

2/ Methods which can be used to protect water supplies furnished by springs and infiltration galleries are described in "Manual of Individual Water Supply Systems", U. S. Environmental Protection Agency, Office of Drinking Water (EPA-430/9-74-007).

Section 5. Special Standards.

A. In locations where existing geologic or ground water conditions require standards more restrictive than those described herein, such special additional standards may be prescribed by the enforcing agency.

B. Special standards are necessary for the construction of recharge or injection wells,^{1/} horizontal wells and other unusual types of wells. Design of these wells is subject to the approval of the enforcing agency.

Section 6. Well Drillers.

The construction, alteration, or destruction of wells shall be performed by contractors licensed in accordance with the provisions of the Contractors License Law (Chapter 9, Division 3, of the Business and Professions Code) unless exempted by that act.

Section 7. Reports.

Reports concerning the construction, alteration, or destruction of water wells shall be filed with the California Department of Water Resources in accordance with the provisions of Sections 13750 through 13755 (Division 7, Chapter 10, Article 3) of the California Water Code.^{2/}

Part II. Well Construction

Section 8. Well Location with Respect to Contaminants and Pollutants.

A. All wells shall be located an adequate horizontal distance from potential sources of contamination and pollution.^{3/}

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- ^{1/} A program to protect underground drinking water sources from endangerment by the subsurface emplacement of fluids through well injection is required under the Federal Safe Drinking Water Act (Public Law 93-523) signed into law December 16, 1974. On June 24, 1980, the U. S. Environmental Protection Agency issued rules and regulations establishing technical criteria and standards governing the construction of injection wells. Revisions were made August 27, 1981, and October 1, 1981. These regulations are Part 146 of Title 40, Protection of Environment, of the Code of Federal Regulations (40CFR146).
 - ^{2/} Information about the report is contained in "Guide to the Preparation of the Water Well Drillers Report", Department of Water Resources, October 1977.
 - ^{3/} Such potential sources of contamination and pollution include: sewers, both sanitary and storm sewers, leaching fields (from septic tanks), sewage and industrial waste ponds, barnyard and stable areas, feedlots, solid waste disposal sites, tanks and pipelines (both above ground and buried) for storage and conveyance of petroleum products or chemicals, etc.

Most of the factors involved in determining safe distances in a particular area are usually not known. Based on past experience and general knowledge, the following horizontal distances are considered safe where dry upper unconsolidated formations, less permeable than sand, are encountered:1/2/

Sewer, watertight septic tank, or pit privy	50 feet (15 metres)
Subsurface sewage leaching field	100 feet (30 metres)
Cesspool or seepage pit	150 feet (45 metres)
Animal or fowl enclosure	100 feet (30 metres)

Where in the opinion of the enforcing agency adverse conditions exist, the above distances shall be increased or special means of protection, particularly in the construction of the well, shall be provided.

B. In addition, if possible, the well shall be located up the ground water gradient (upstream) from the specified sources of contamination. By doing so this provides assurance that potential contamination would be moving naturally away from the area of production. However, in an unconfined aquifer consideration shall also be given to the possibility of reversal of gradient near the well due to pumping (see Figure 3), the pumping of nearby wells, or general decline of the water table.3/

C. The top of the casing shall terminate above grade or above any known conditions of flooding by drainage or runoff from the surrounding land. For community water supply wells this level is defined as above the

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- 1/ Because of the many variables involved in the determination of the safe horizontal distance of a well from potential sources of contamination and pollution, no one set of distances will be adequate and reasonable for all conditions. In areas where adverse conditions exist, the distances listed should be increased. Conversely, where especially favorable conditions exist or where special means of protection, particularly in construction of the well are provided, lesser distances may be acceptable if approved by the enforcing agency.
 - 2/ If the well is a radial collector well, these distances apply to the furthest extended points of the well.
 - 3/ When water is pumped from a well a drawdown "cone of depression" is formed in the water surface surrounding the well and ground water in the area of the cone flows toward the well. Similar cones formed by nearby wells can influence the shape of the cone or enlarge the area being drawn upon resulting in a change in direction of flow.

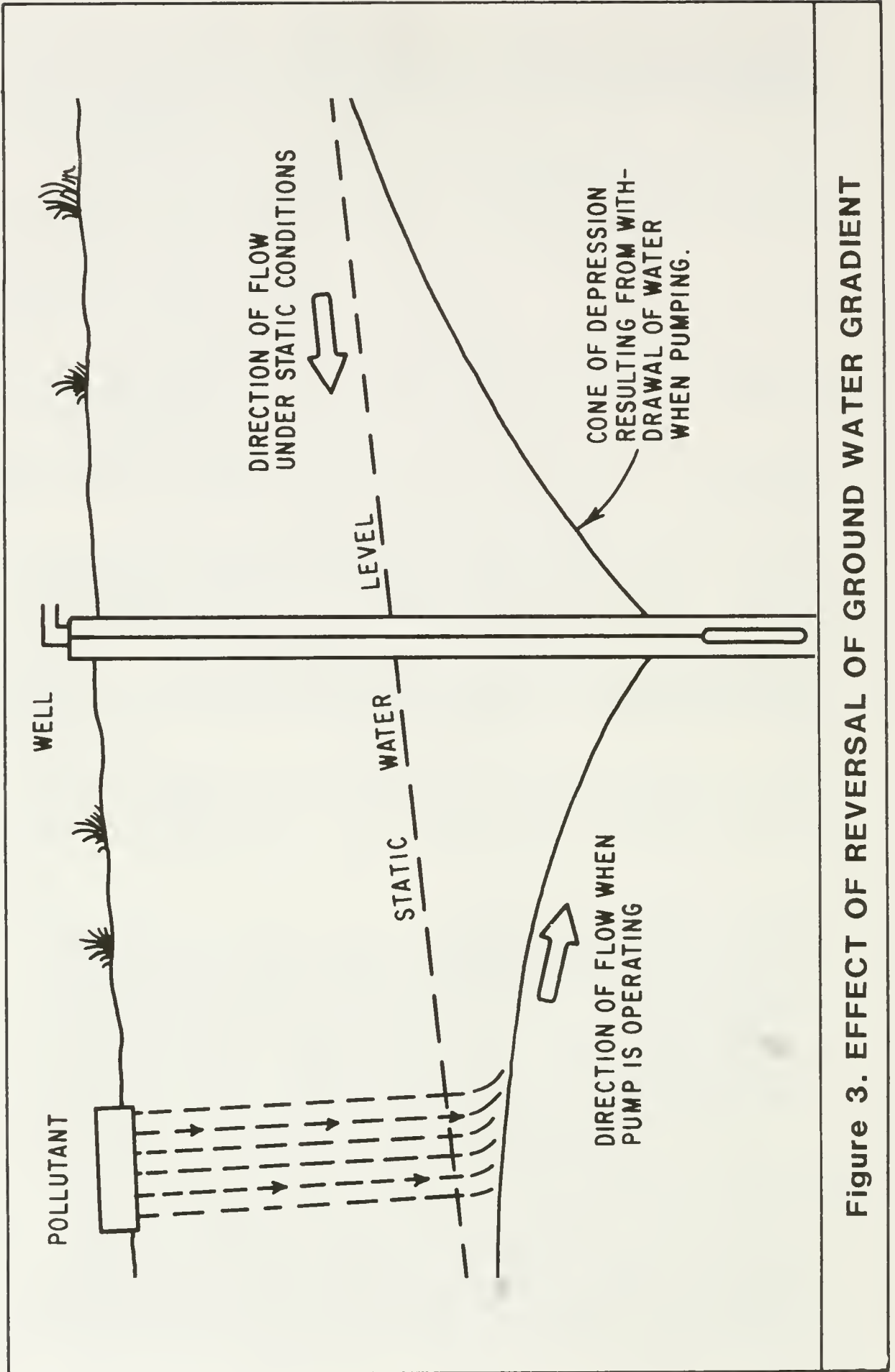


Figure 3. EFFECT OF REVERSAL OF GROUND WATER GRADIENT

"...floodplain of a 100 year flood..." or above "...any recorded high tide, ...", (Section 64417, "Siting Requirements", Title 22 of the California Administrative Code).1/

In addition, the area around the well shall slope away from the well and surface drainage shall be directed away from the well.

D. Where a well is to be near a building, the well shall be far enough from the building so that the well will be accessible for repair, maintenance, etc.

Section 9. Sealing the Upper Annular Space.

The space between the well casing and the wall of the drilled hole (the annular space) shall be effectively sealed to protect it against contamination or pollution by entrance of surface and/or shallow, subsurface waters.2/

A. Minimum depth of seal below ground surface for various uses of wells:

<u>Types</u>	<u>Minimum Depth^{3/} of Seal (below ground surface)</u>
Community Water Supply Wells	50 feet (15 metres)
Individual Domestic Wells	20 feet ^{4/} (6.1 metres)
Industrial Wells	50 feet ^{4/} (15 metres)
Agricultural Wells	20 feet ^{4/5/} (6.1 metres)
Air-Conditioning Wells	20 feet ^{4/} (6.1 metres)
Observation and Monitoring Wells	20 feet ^{6/} (6.1 metres)

-
- 1/ If compliance with this requirement for community water supply wells is not possible, the enforcing agency should be contacted regarding alternative means for protection.
 - 2/ Annular seals are also installed to provide protection for the casing against corrosion, to assure structural integrity of the casing, and to stabilize the upper formation.
 - 3/ In those cases where it is not possible to meet or, when necessary, increase, the lateral distances from pollution sources described in Section 8 of these standards, an alternative (or special) means of protection for the well is to increase the depth of the seal.
 - 4/ Exceptions are shallow wells where the water to be developed is at a depth less than 20 feet (6 metres). In this instance, the depth of seal may be reduced but in no case less than 10 feet (3 metres) and special precautions taken in locating the well with respect to sources of pollution.
 - 5/ The annular space shall be sealed to a depth of 50 feet (15 metres) from the surface when the well is close to sources of pollution listed in Section 8.
 - 6/ Because they are constructed to measure specific conditions, the annular space in such wells is usually sealed to make the intake section "depth-discrete". Depending on the circumstances, this depth may be very shallow.

In areas^{1/} where freezing is a potential problem, the top of the seal may be below ground surface but in no case more than 4 feet (1.2 metres) below ground surface.

B. Sealing Conditions.^{2/} Following are requirements to be observed in sealing the annular space:

1. Wells situated in unconsolidated, caving material. An oversized hole, at least 4 inches (100 millimetres) greater in diameter than the production casing, shall be drilled and a conductor casing installed to the depth of seal specified in Part A of this section. The space between the conductor casing and the production casing shall be filled with sealing material. The conductor may be withdrawn as the sealing material is placed (see Figure 4A).

2. Wells situated in unconsolidated material stratified with significant clay layers. If a clay formation is encountered within 5 feet (1.5 metres) of the bottom of the seal described in Part A of this section, the seal should be extended 5 feet (1.5 metres) into the clay formation (thus the depth of seal could be as much as another 10 feet or 3 metres). An oversized hole at least 4 inches (100 millimetres) greater in diameter than the production casing, shall be drilled and the annular space filled with sealing material (see Figure 4B).

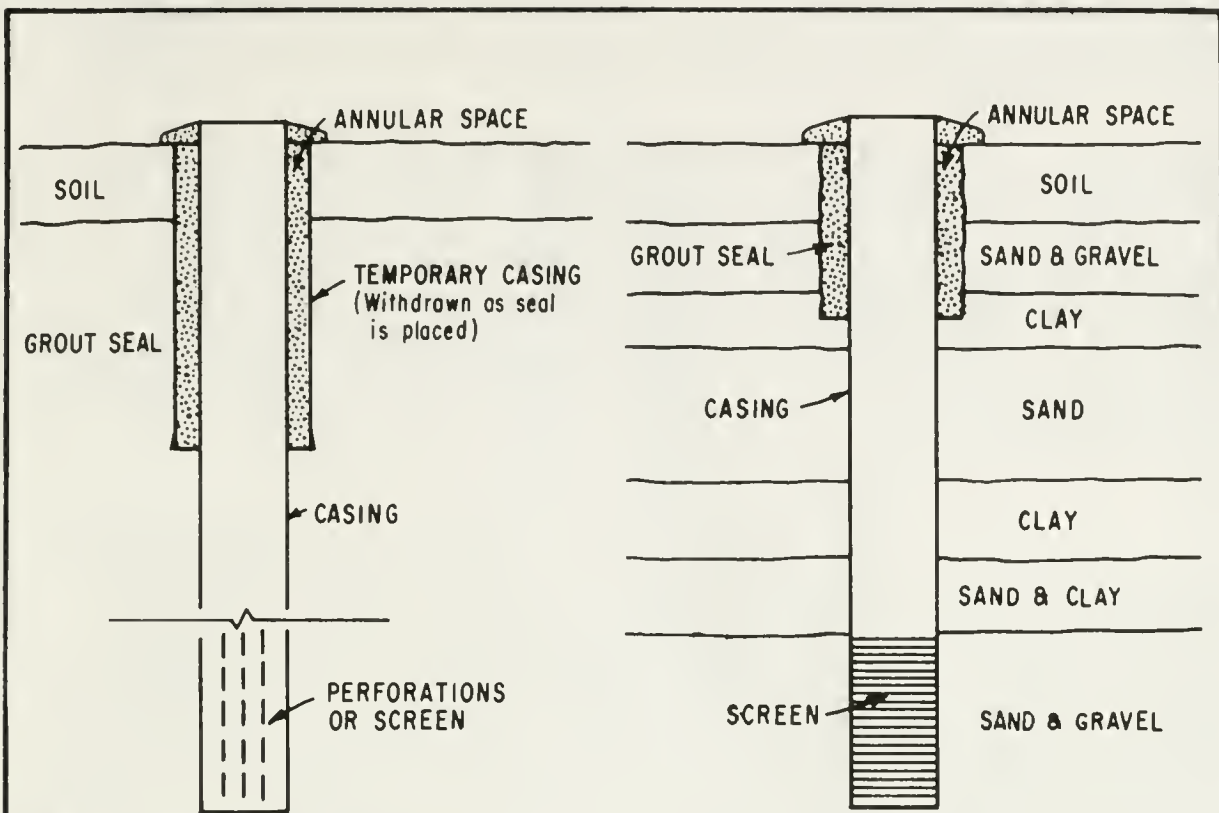
If caving material is present, a conductor casing shall be installed and the annular space sealed as described in 1, above.

3. Wells situated in soft consolidated formations (extensive clays, sandstones, etc.). An oversized hole, at least 4 inches (100 millimetres) greater in diameter than the production casing, shall be drilled to the depth of seal specified in Part A of this section and the space between the production casing and the drilled hole shall be filled with sealing material (see Figure 4C).

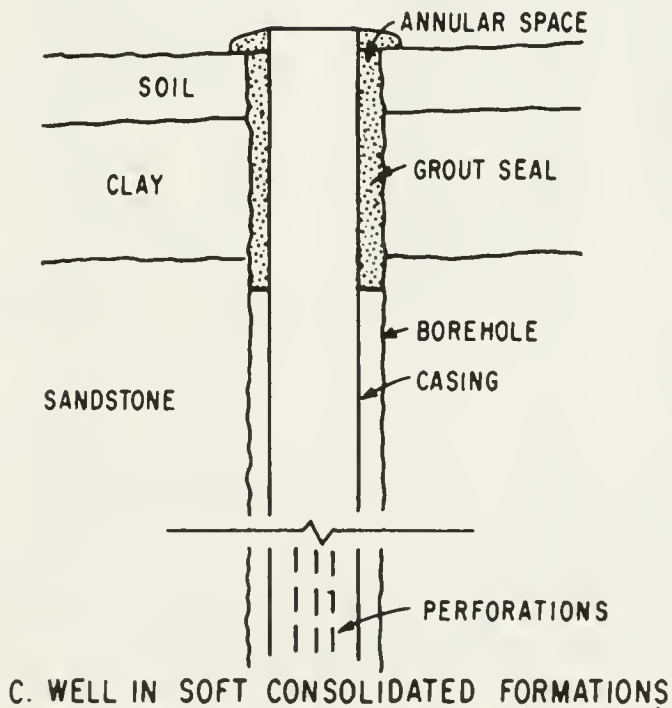
If a conductor casing is to be installed (to establish a foundation for the construction of the remainder of the well) the oversized hole shall be at least 4 inches (100 millimetres) greater in diameter than the conductor

^{1/} Defined here as those areas in which the mean length of freeze-free period as described by the National Weather Service is less than 100 days, i.e., temperatures at or below 32°F (0°C) are likely to occur on any day during a period of 265 or more days each year. In general geographic terms, these areas are the northeastern part of the State (parts of Modoc, Lassen, and Siskiyou Counties), the north Lahontan area (essentially the eastern slopes of the Sierra Nevada and subsidiary valleys north of Mount Whitney and Mono Lake) and at Lake Arrowhead in the San Bernardino Mountains.

^{2/} Methods of sealing are described in Appendix B.



A. WELL DRILLED IN UNCONSOLIDATED CAVING MATERIAL B. WELL IN UNCONSOLIDATED STRATIFIED FORMATIONS



C. WELL IN SOFT CONSOLIDATED FORMATIONS

Figure 4. SEALING CONDITIONS FOR UPPER ANNULAR SPACE-UNCONSOLIDATED AND SOFT, CONSOLIDATED FORMATIONS

casing and the annular space between the conductor casing and the drilled hole filled with sealing material to the depth specified in Part A of this section.

4. Wells situated in "hard" consolidated formations (crystalline or metamorphic rock). An oversized hole shall be drilled to the depth specified in Part A of this section and the annular space filled with sealing material. If there is significant overburden, a conductor casing may be installed to retain it. If the material is heavily fractured, the seal should extend into solid material. If the well is to be open-bottomed (lower section uncased), the casing shall be seated in the sealing material (see Figure 5A).

5. Gravel packed wells.

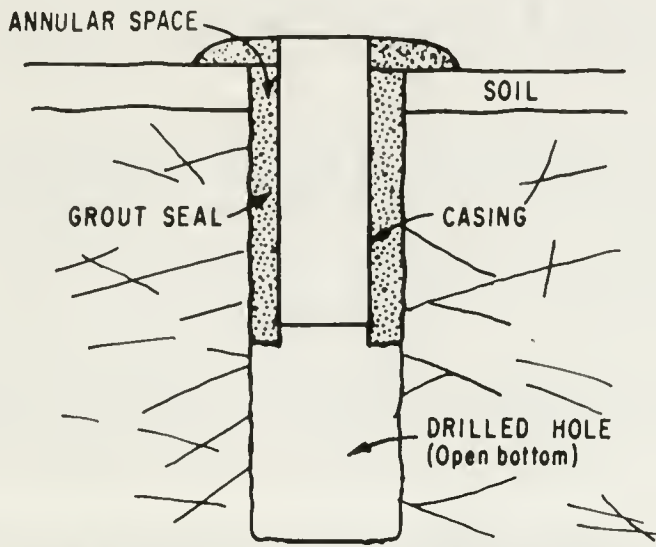
a. With conductor casing. An oversized hole, at least 4 inches (100 millimetres) greater than the diameter of the conductor casing, shall be drilled to the depth specified in Part A of this section and the annular space between the conductor casing and drilled hole filled with sealing material. (In this case the gravel pack may extend to the top of the well but to prevent contamination by surface drainage, a welded cover shall be installed over the top in the space between the conductor casing and the production casing, see Figure 5B).

b. Without conductor casing. An oversized hole at least 4 inches (100 millimetres) greater in diameter than the production casing, shall be drilled to the depth specified in Part A of this section and the annular space between the casing and drilled hole filled with sealing material. If gravel fill pipes are installed through the seal, the annular seal shall be of sufficient thickness to assure that there is a minimum of 2 inches (50 millimetres) between the gravel fill pipe and the wall of the drilled hole. The gravel pack shall terminate at the base of the seal (see Figure 5C). If a temporary conductor casing is used, it shall be removed as the sealing material is placed.

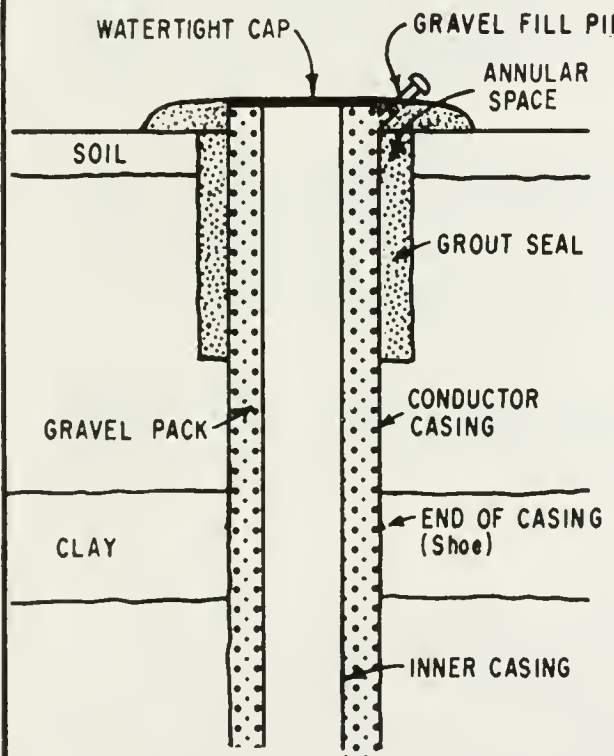
6. For wells situated in circumstances differing from those described above, the sealing conditions shall be as prescribed by the enforcing agency.

7. Converted wells. Wells converted from one use to another, particularly those constructed in prior years without annular seals, shall have annular seals installed to the depth required in Part A of this section and at the thickness described in Part E. Where it is anticipated that a well will be converted to another use, the enforcing agency may require the installation of a seal to the depth specified for community water supply wells.1/

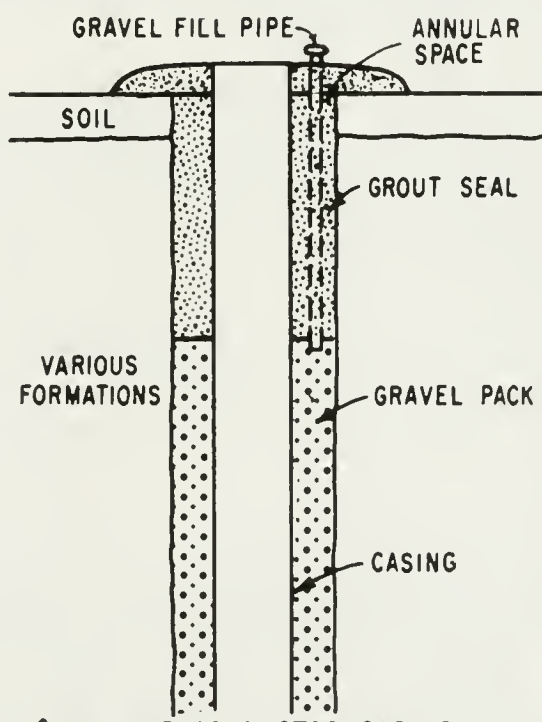
1/ This statement presumes that land use planning has taken place and that zoning requirements are in effect.



A. WELL DRILLED IN ROCK FORMATION



B. WITH CONDUCTOR CASING



C. WITHOUT CONDUCTOR CASING

GRAVEL PACKED WELLS

Figure 5. SEALING CONDITIONS FOR UPPER ANNULAR SPACE-
HARD ROCK FORMATIONS AND GRAVEL PACKED WELLS

C. Conductor Casing. For community water supply wells, the minimum thickness of steel conductor casing shall be 1/4 inch (6 millimetres) for single casing or a minimum of No. 10 U. S. Standard Gage for double casing. Steel used for conductor casing shall conform to the specifications for steel casing described in Section 12.

D. Sealing Material. The sealing material shall consist of neat cement grout, sand-cement grout, bentonite clay, or concrete. Cement used for sealing mixtures shall meet the requirements, including the latest revision thereof, of ASTM 1/ C150 "Standard Specification for Portland Cement" types I (common construction cement) III (high early strength) and V (for high sulfate resistance, i.e., corrosive waters). 2/ Water used for sealing mixtures shall be clean and of a potable quality. Materials used as additives for Portland cement mixtures in the field shall meet the requirements, and latest revision thereof, of ASTM C494 "Standard Specification for Chemical Admixtures for Concrete".

1. Neat cement grout shall be composed of one sack of Portland cement (94 pounds or 43 kilograms) to 4-1/2 to 6-1/2 (depending on cement type and additives used) gallons (17 to 25 litres) of clean water.

2. Sand-cement grout shall be composed of not more than two parts by weight of sand and one part of Portland cement to 4-1/2 to 6-1/2 (depending on cement type and additives used) gallons (17 to 25 litres) of clean water per sack of cement.

3. Concrete 3/ used shall be "Class A" (6 sacks of Portland cement per cubic yard or 0.76 cubic metre) or "Class B" (5 sacks per cubic yard or 0.76 cubic metre). 4/ Aggregates shall meet the requirements, including the latest revision thereof, of ASTM C33 "Standard Specification for Concrete Aggregates".

4. Special quick-setting cement, retardents to setting, and other additives, including hydrated lime to make the mix more fluid (up to 10 percent of the volume of cement), and bentonite (up to 5 percent) to make the mix more fluid and to reduce shrinkage, may be used.

1/ American Society for Testing and Materials.

2/ Corresponding API (American Petroleum Institute) cement classes are: Type I - API Class A, Type III - API Class C.

3/ Concrete is useful in sealing large-diameter wells where the volume of annular seals required is likely to be substantial. However, unless care is exercised during placement, the coarse aggregate may become separated from the cement.

4/ A popular concrete mix among drillers consists of 8 sacks of Portland cement per cubic yard (0.76 cubic metre) and uniform aggregate of 3/8 inch (9.5 millimetres) diameter.

5. Bentonite clay^{1/} mixtures shall be composed of bentonite clay and clean water thoroughly mixed before placement so that there are no balls, clods, etc.

6. Used drillers' mud or cuttings or chips from drilling the borehole shall not be used as sealing material.

7. The minimum time that must be allowed for materials containing cement to "set" before construction operations on the well may be resumed shall be:

- a. Type I cement - 72 hours
- b. Type III cement - 48 hours
- c. Type V cement - 6 hours

When necessary these times may be reduced by the use of "accelerators", i.e., additives designed specifically to shorten setting time.

8. Where thermoplastic casing is used, caution should be exercised to control the heat generated during the curing of the cement (called "heat of hydration"). This is of special concern where casing of thinner wall thicknesses are to be installed. The addition of bentonite to the cement mixture (up to 8 percent) or circulating water inside the casing will lower the temperature of the cement. Additives which accelerate the curing process also tend to increase the heat generated and should not be used where thermoplastic casing is installed.

E. Thickness of Seal. The thickness of the seal shall be at least a nominal 2 inches,^{2/} and not less than three times the size of the largest coarse aggregate used in the sealing material.

F. Placement of Seal.

1. Before placing the seal all loose cuttings, drilling mud, or other obstructions shall be removed from the annular space by flushing.

^{1/} Clay in the form of a mud-laden fluid is similar to and has the advantages of neat cement and sand-cement grout. There is a disadvantage in that clay may separate from the fluid. Clay should not be used where structural strength or stability of the seal is required, where flowing or moving water might break it down, or where it might dry out. Although there are other types of clay available, none have the sealing properties (particularly the ability to expand dramatically) comparable to bentonite. Therefore, only bentonite clays are recommended.

^{2/} In other words, the borehole shall be nominally 4 inches (100 millimetres) larger in diameter than the nominal casing diameter (thus creating a 2-inch, or-50 millimetre annular space).

2. Before sealing commences a packer or similar retaining device or a small quantity of sealant may be placed and permitted to set at the bottom of the interval to be sealed to form a foundation for the seal.

3. The sealing material shall be applied, when possible, in one continuous operation from the bottom of the interval to be sealed to the top. Where the seal is to be very deep (i.e., greater than 100 feet or 30 metres) a short segment at least 10 feet (3 metres) in length may be installed first, allowed to "set" or partially "set" and then the remainder of the seal placed in one continuous operation.

4. Gravity installation of sealant without the aid of a tremie or grout pipe shall not be used unless the interval to be sealed is dry and in no case where the interval is over 30 feet (9 metres) in depth.

Section 10. Surface Construction Features.

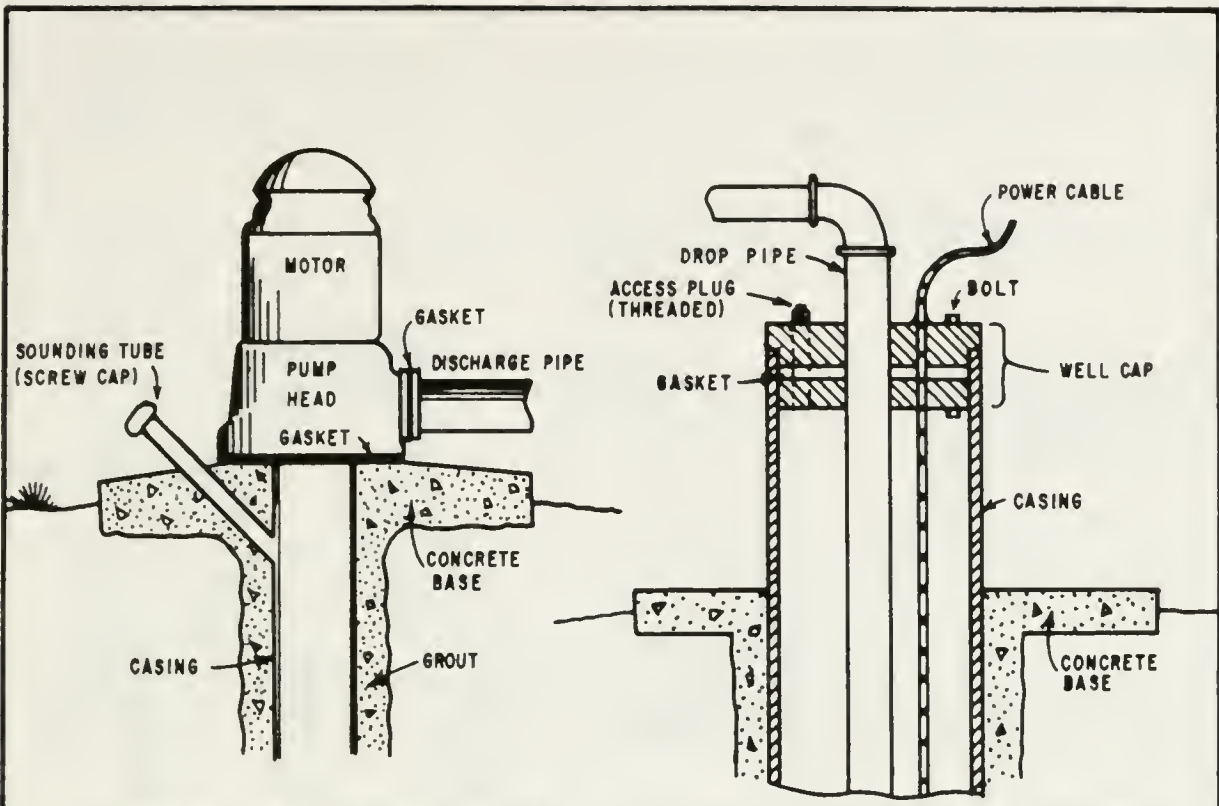
A. Openings. Openings into the top of the well which are designed to provide access to the well, i.e., for measuring, chlorinating, adding gravel, etc., shall be protected against entrance of surface waters or foreign matter by installation of watertight caps or plugs. Access openings designed to permit the entrance or egress of air or gas (air or casing vents) shall terminate above the ground and above known flood levels and shall be protected against the entrance of foreign material by installation of down-turned and screened "U" bends (see Figures 6 and 7).

All other openings (holes, crevices, cracks, etc.) shall be sealed.

A "sounding tube",^{1/} taphole with plug, or similar access (see Figure 6) for the introduction of water level measuring devices shall be affixed to the casing of all wells. For wells fitted with a "well cap" the cap shall have a removable plug for this purpose.

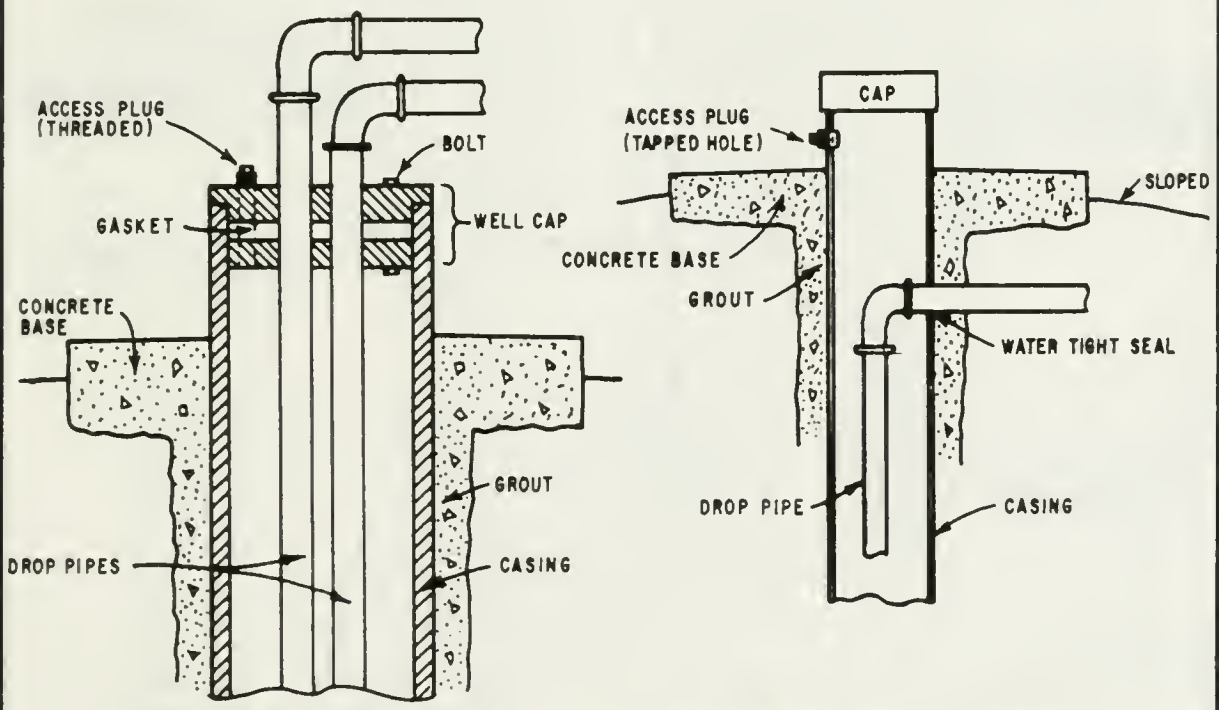
1. Where the pump is installed directly over the casing, a watertight seal (gasket) shall be placed between the pump head and the pump base (slab), or a watertight seal (gasket) shall be placed between the pump base and the rim of the casing, or a "well cap" shall be installed to close the annular opening between the casing and the pump column pipe (see Figures 6 and 7).

^{1/} A "sounding tube" or similar access is necessary so that the water level in the well can be periodically determined. Knowledge of the water level, both static and pumping levels, is vital to the maintenance of the well and pump and for determining the efficiency of pump. Such information will lead to few and less costly repairs and reduce operating costs.



TURBINE PUMP INSTALLATION

SUBMERSIBLE PUMP INSTALLATION



JET PUMP INSTALLATION

BELOW GROUND DISCHARGE

Figure 6. TYPICAL SURFACE CONSTRUCTION FEATURES

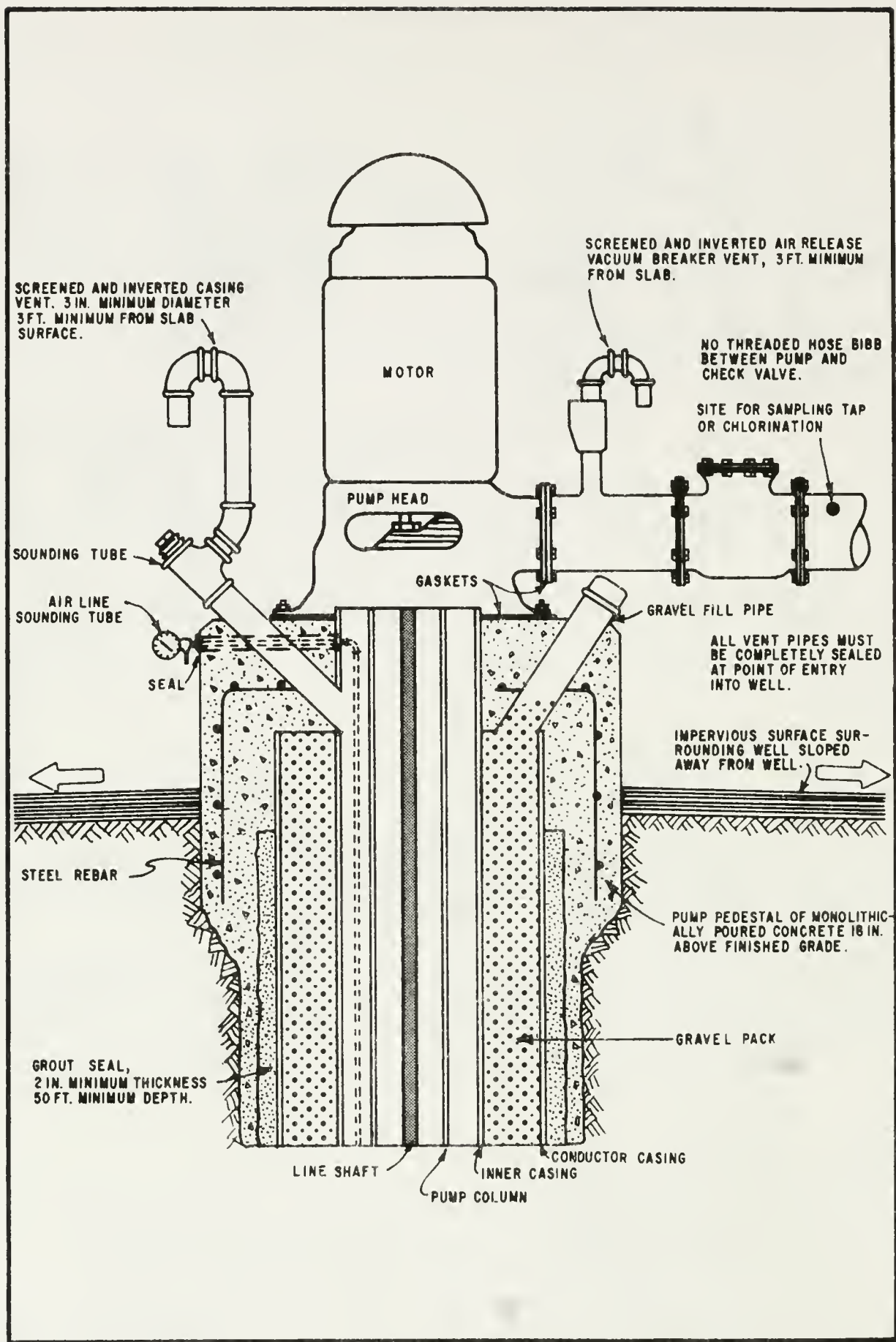


Figure 7. SURFACE CONSTRUCTION FEATURES COMMUNITY WATER SUPPLY WELL

2. Where the pump is offset from the well or where a submersible pump is used, the opening between the well casing and any pipes or cables which enter the well shall be closed by a watertight seal or "well cap".

3. If the pump is not installed immediately or if there is a prolonged interruption in construction of the well, a watertight cover shall be installed at the top of the casing.

4. A watertight seal or gasket shall be placed between the pump discharge head and the discharge line; or, in the event of a below-ground discharge, between the discharge pipe and discharge line (see Figures 6 and 7).

5. If a concrete base or slab (sometimes called a pump block or pump pedestal) is constructed around the top of the casing, it shall be free from cracks, honeycombs or other defects likely to detract from its watertightness. The joint between the base and the annular seal must also be watertight. The base shall slope away from the well casing. The minimum thickness of the concrete base shall be 4 inches (100 millimetres).^{1/}

6. Where the well is to be gravel packed and the pack extends to the surface, a watertight cover shall be installed between the conductor casing and the inner casing (see also Section 9, Part B, Item 5 and Figure 5).

B. Well Pits. Because of their susceptibility to contamination and pollution, the use of well pits should be avoided whenever possible. A substitute device called a pitless adapter^{2/} or pitless adapter unit (a variation) may be used in place of a well pit.

C. Enclosure of Well and Appurtenances. In community water supply wells, the well and pump shall be located in a locked enclosure to exclude access by unauthorized persons.

^{1/} This value is for small (under 10 inches or 250 millimetres in diameter) individual domestic well installations. The shape and dimensions of pump bases varies with the size, weight, and type of pumping equipment to be installed and the bearing capacity of the soil on which it is situated. A variety of designs have been used. For large diameter turbine pump installations the Vertical Turbine Pump Association has developed a standard design for a square, concrete pump base that is based on weight, including full pump column and soil bearing capacity. (See Bibliography, Appendix E.)

^{2/} Pitless adaptors and units were developed for use in areas where prolonged freezing occurs and below ground (below frost line) discharges are common. Both the National Sanitation Foundation and Water Systems Council have developed standards for their manufacture and installation. (See Bibliography, Appendix E.)

D. Pump Blowoff. When there is a blowoff or drain line from the pump discharge, it shall be located above any known flood levels and protected against the possibility of backsiphonage or backpressure. The blowoff or drain line shall not be connected to any sewer or storm drain except when connected through an air gap.

E. Air Vents. In community water supply wells to minimize the possibility of contamination caused by the creation of a partial vacuum during pumping, a casing vent shall be installed (Figure 7). In addition, to release air trapped in the pump column when the pump is not running, air release vents shall be installed (Figure 7). Air vents are also recommended for other types of wells except those having jet pump installations requiring positive pressure (which cannot have a vent).

F. Backflow Prevention.^{1/} All pump discharge pipes not discharging to the atmosphere shall be equipped with a check valve or similar device to prevent backflow and/or backsiphonage into the well when the pump shuts down. The check valve shall be installed between the pump head and the connection to the distribution system or standpipe.

Section 11. Disinfection and Other Sanitary Requirements.

A. Disinfection.^{2/} All wells producing water for domestic use (i.e., drinking or food processing) shall be disinfected following construction, repair, or when work is done on the pump, before the well is placed in service.

B. Gravel. Gravel used in gravel-packed wells shall come from clean sources and should be thoroughly washed before being placed in the well. Gravel purchased from a supplier should be washed at the pit or plant prior to delivery to the well site.

During placement of the gravel in the annular space disinfectants (usually calcium hypochlorite in tablet or granular form) shall be added to the gravel at a uniform rate (two tablets per cubic foot or one pound of the granular form per cubic yard).

C. Lubricants. Mud and water used as a drilling lubricant shall be free from sewage contamination. Oil and water used for lubrication of the pump and pump bearing shall also be free from contamination.

^{1/} The potential for the accidental contamination of wells through backflow or backsiphonage is high, particularly where there is the possibility of interconnection with other systems or in systems where agricultural chemicals (fertilizers, pesticides, etc.) are being injected.

^{2/} A procedure for disinfecting a well is described in Appendix C.

Section 12. Casing.

A. Casing Material.^{1/} Requirements pertaining to well casing are to insure that the casing will perform the functions for which it is designed, i.e., to maintain the hole by preventing its walls from collapsing, to provide a channel for the conveyance of the water, and to provide a measure of protection for the quality of the water pumped.

1. Well casing shall be strong and tough enough to resist the forces imposed on it during installation and those forces which can normally be expected after installation.

2. Steel is the material most frequently used for well casing, especially in drilled wells. The thickness of steel used for well casing shall be selected in accordance with good design practices applied with due consideration to conditions at the site of the well.^{2/} There are three principal classifications of steel materials used for water well casing, and all are acceptable for use so long as they meet the following conditions.

^{1/} Abbreviations used are: API-American Petroleum Institute; ASTM-American Society for Testing and Materials; AWWA-American Water Works Association.

^{2/} Selection of casing depends on its ability to resist external forces as well as factors affecting the casing serviceability. The maximum theoretical external pressure under which a particular well casing of a specific diameter and thickness will collapse can be calculated. However, other considerations such as the effect of driving the casing into place or other impact forces which may have an effect on the ability of a particular casing to resist external pressures, cannot be calculated with accuracy. Good design practices preclude the selection of a casing of a particular thickness for use where it will experience external pressures approaching the maximum or where unknown forces might magnify the effect of the external forces. Instead it is customary for designers to introduce factors of safety which tend to ensure that the casing selected will resist all probable forces imposed upon it. Consequently, experience and sound judgment, coupled with these factors or safety, have so far proved to be the best guide in selecting the proper casing. Suggested thicknesses for steel casing for various depths and diameters are to be found in material published by the various steel manufacturers and fabricators and in publications on the design of water wells. The suggested thicknesses contained in such publications are not to be considered a part of these standards.

a. Standard and line pipe. This material shall meet one of the following specifications, including the latest revision thereof:

- (1) API Std. 5L, "Specification for Line Pipe".
- (2) API Std. 5LX, "Specification for High-Test Line Pipe".
- (3) ASTM A53, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless".
- (4) ASTM A120, "Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses".
- (5) ASTM A134, "Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (sizes NPS 16 and over)".
- (6) ASTM A135, "Standard Specification for Electric-Resistance-Welded Steel Pipe".
- (7) ASTM A139, "Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (sizes 4 inches and over)".
- (8) ASTM A211, "Standard Specification for Spiral-Welded Steel or Iron Pipe".
- (9) AWWA C200, "AWWA Standard for Steel Water Pipe 6 Inches and Larger".

b. Structural Steel. This material shall meet one of the following specifications of the American Society for Testing and Materials, including the latest revision thereof:

- (1) ASTM A36, "Standard Specification for Structural Steel".
- (2) ASTM A242, "Standard Specification for High Strength Low Alloy Structural Steel".
- (3) ASTM A283, "Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality".

- (4) ASTM A441, "Tentative Specification for High-Strength Low Alloy Structural Manganese Vanadium Steel".
- (5) ASTM A570, "Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality".

c. High strength carbon steel sheets referred to by their manufacturers and fabricators as "well casing steel". At present, there are no standard specifications concerning this material. However, the major steel producers market products whose chemical and physical properties are quite similar. Each sheet of material shall contain mill markings which will identify the manufacturer and specify that the material is well casing steel which complies with the chemical and physical properties published by the manufacturer.

d. Stainless steel casing shall meet the provisions of ASTM A409, "Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High Temperature Service".

3. Plastic is also used as casing for water wells in many locations under a variety of circumstances.^{1/} Because large-diameter (10 inches or 250 millimetres and larger) plastic casing has not been used extensively and especially at depths exceeding 300 feet (90 metres), special care must be exercised in the design and construction of wells that will employ these sizes. Particular attention should be given to the effect on thermoplastic casing of heat generated during cementing operations (see also Part B, "Installation of Casing" of this section, item 8, Part D, "Sealing Material" of Section 9, and discussion of plastic casing in Chapter I).

There are two groups of plastic materials available: thermoplastics and thermosets. Thermoplastics soften with the application of heat and rearden when cooled. Thus they can be repeatedly reformed. Thermosets cannot be reformed. During manufacture their molecules are permanently "set" by heat, chemical action or a combination of both. Thermoplastics used for plastic casing are ABS (acrylonitrile butadiene styrene), PVC (polyvinyl chloride) and SR (styrene rubber). The thermosetting plastic used for casing is fiberglass.

^{1/} Information about the selection and installation of thermoplastic casing will be found in "Manual on the Selection and Installation of Thermoplastic Water Well Casing", a joint publication of the National Water Well Association and the Plastic Pipe Institute.

a. Thermoplastics. This material shall meet the requirements of ASTM F480, "Standard Specification for Thermoplastic Water Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR)" including the latest revision thereof.^{1/} SDR is the ratio of pipe diameter to wall thickness.

b. Thermosets. This material shall meet the requirements of the following specifications including the latest revisions thereof:

- (1) ASTM D2996, "Standard Specification for Filament Wound Reinforced Thermosetting Resin Pipe".
- (2) ASTM D2997, "Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe".
- (3) ASTM D3517, "Standard Specification for Reinforced Plastic Mortar Pressure Pipe".
- (4) AWWA C950, "AWWA Standard for Glass-Fiber-Reinforced Thermosetting-Resin Pressure Pipe".

c. All plastic casing used for community water supply wells and individual wells shall meet the provisions of National Sanitation Foundation Standard No. 14 for Plastic Piping System Components and Related Materials.^{2/}

d. Plastic casing should not be stored in direct sunlight or subjected to freezing temperatures for extensive periods of time. Further, it should be stored so as to prevent sagging or bending.

4. Concrete pipe used for casing should conform to the following specifications, including the latest revision thereof:

- (a) ASTM C14, "Standard Specifications for Concrete Sewer, Storm Drain, and Culvert Pipe".

^{1/} Certain sizes of ABS and PVC plastic pipe products made in Schedule 40 and 80 (and others) wall thicknesses correspond to or overlap some of the sizes described in ASTM F480. However, this does not mean that they are equivalent products. They are classified in ASTM F480 as well casing specials referencing ASTM Specifications D1527 (for ABS pipe) and ASTM D1785 and D2241 (for PVC pipe).

^{2/} NSF Standard No. 14 includes the requirements of ASTM F480 described in paragraph a, preceding.

- (b) ASTM C76, "Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe".
- (c) AWWA C300, "AWWA Standard for Reinforced Concrete Pressure Pipe Steel Cylinder Type, for Water and Other Liquids".
- (d) AWWA C301, "AWWA Standard for Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids".

5. Other materials,^{1/} except as listed in No. 6 below, may be used as casing for water wells, subject to the approval of the enforcing agency.

6. Galvanized sheet metal pipe ("downspout"), or natural wood shall not be used as casing.

B. Installation of Casing. All casing shall be placed with sufficient care to avoid damage to casing sections and joints. All joints in the casing above the perforations or screens shall be watertight. The uppermost perforations shall be at least below the depth specified in Section 9, Part A, "Depth of Seal". Casing shall be equipped with centering guides to ensure even thickness of annular seal and/or gravel pack.

1. Metallic casing. Steel casing may be joined by either welding or by threading and coupling. Welding shall be accomplished in accordance with standards of American Welding Society or the most recent revision of the American Society of Mechanical Engineers Boiler Construction Code. Where casing is driven, (as is generally the case when the cable tool method of construction is used), the casing shall be equipped with a "drive shoe" at the lower end.

2. Plastic (non-metallic) casing.^{2/} Depending on the type of material and its fabrication, plastic casing may be joined by solvent welding or mechanically joined (threaded or otherwise coupled). The solvent cement used for solvent welding shall meet the specifications for the type of plastic used and shall be applied in accordance with the manufacturer's instructions, particularly those pertaining to setting time required for the joint to develop handling strength. An adapter shall be used to join plastic casing to metallic casing or screen.

^{1/} Such as wrought iron, asbestos cement pipe, and synthetic woods, all of which have been successfully employed as casing in California or elsewhere. Their present use is limited to special cases. Specifications for most of these materials are published by either ASTM or AWWA.

^{2/} Information about the installation of thermoplastic casing will be found in "Manual on the Selection and Installation of Thermoplastic Water Well Casing", a joint publication of the National Water Well Association and the Plastic Pipe Institute.

Plastic casing or screen shall not be driven or otherwise subjected to impact forces during installation. The effects of heat generated by curing cement on plastic casing are discussed in Section 9, Part B, paragraph 8.

Section 13. Sealing-off Strata.

In areas where a well penetrates more than one aquifer, and one or more of the aquifers contains water that, if allowed to mix in sufficient quantity, will result in a significant deterioration of the quality of water in the other aquifer(s) or the quality of water produced, the strata producing such poor-quality water shall be sealed off to prevent entrance of the water into the well or its migration to other aquifer(s).

A. Strata producing the undesirable quality water shall be sealed off by placing impervious material opposite the strata and opposite the confining formation(s). (See Figure 8.) The seal shall extend above and below the strata no less than 10 feet (3 metres) even should the confining formation be less than 10 feet (3 metres) in thickness. In the case of "bottom" waters, the seal shall extend 10 feet (3 metres) in the upward direction. The sealing material shall fill the annular space between the casing and the wall of the drilled hole in the interval to be sealed, and the surrounding void spaces which might absorb the sealing material. The sealing material shall be placed from the bottom to the top of the interval to be sealed.

In areas where deep subsidence may occur (as, for example, portions of the San Joaquin Valley) provision shall be made for maintaining the integrity of the annular seal in the event of subsidence. Such preventive measures may include the installation of a "sleeve" or "slip joint" in the casing, which will allow vertical movement in the casing without its collapse.

B. Sealing material shall consist of neat cement, cement grout, or bentonite clay (see Section 9, Part D for description of the various materials).

C. Sealing shall be accomplished by a method approved by the enforcing agency.^{1/}

Section 14. Well Development.

Developing, redeveloping, or conditioning of a well shall be done with care and by methods which will not cause damage to the well or cause adverse subsurface conditions that may destroy barriers to the vertical movement of water between aquifers.

The following methods used in developing, redeveloping, or conditioning a well when done with care are acceptable: (a) overpumping, (b) surging by use of a

^{1/} Suggested methods for sealing-off strata are presented in Appendix B.

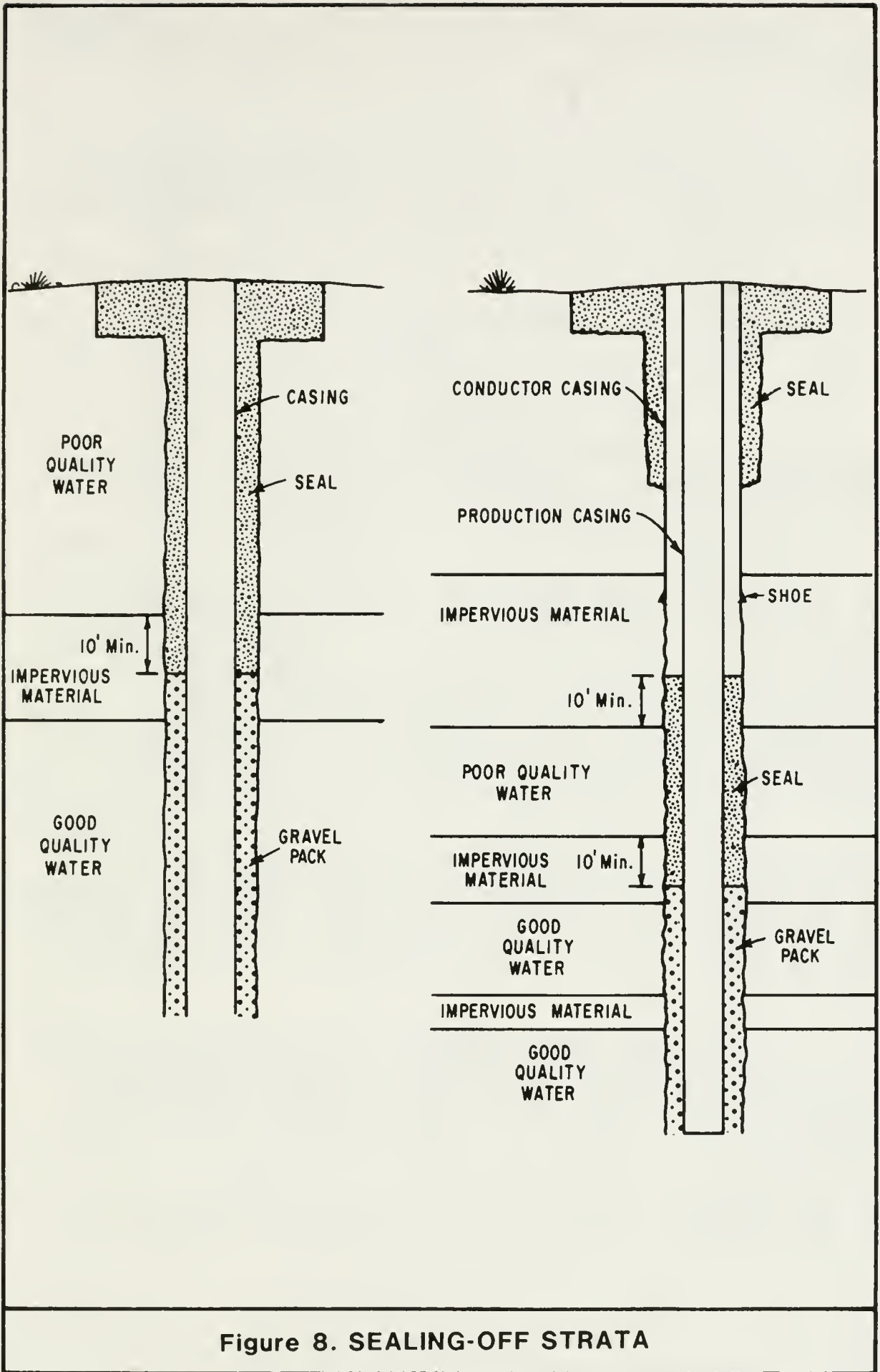


Figure 8. SEALING-OFF STRATA

plunger, (c) surging with compressed air, (d) backwashing or surging by alternately starting and stopping the pump, (e) jetting with water, (f) introduction of chemicals designed for this purpose, and (g) a combination of the above.

The use of explosives for development should be done only by persons trained to handle them. Further, they should be used with special care where two or more distinct aquifers separated by a natural barrier have been penetrated.

Where chemicals or explosives have been used, the well shall be pumped until these agents have been removed.

Section 15. Water Quality Sampling.^{1/}

The requirements to be followed with respect to water quality sampling are:

A. Community Water Supply Wells and Certain Industrial Wells. The water from all community water supply wells and industrial wells which provide water for use in food processing shall be sampled immediately following development and disinfection, and appropriate analysis made.

Rules and regulations governing the constituents to be tested, type of testing, etc., for community water supply systems are contained in Chapter 15, "Domestic Water Quality and Monitoring", of Title 22, California Administrative Code. Water analysis shall be performed by a laboratory certified by the California Department of Health Services. A copy of the laboratory analysis shall be forwarded to the California Department of Health Services or to the local health department. Approval of the enforcing agency must be obtained before the well is put into use.

Except where there is free discharge from the pump (that is, there is no direct connection to the water delivery system such as to a sump), a sample tap (see Figure 7) shall be provided on the discharge line so that water representative of the water in the well may be drawn for laboratory analysis. The tap shall be located so as to prevent back siphonage to the pump discharge when the pump is shut off (e.g., on the system side of the check valve).

B. Other Types of Wells. To determine the quality of water produced by a new well it should be sampled immediately following construction and development. Appropriate analyses shall be made based upon the intended uses of the water.

^{1/} The collection of water quality samples is described in Appendix D.

Section 16. Special Provisions for Large Diameter Shallow Wells.

A. Use as Community Water Supply Wells. Because shallow ground waters are often of poor quality and because they are easily contaminated, the use of bored or dug wells, or wells less than 50 feet (15 metres) deep, to provide community water supplies shall be avoided (unless there is no other feasible means for obtaining water). When used for this purpose, these wells shall be located at least 250 feet (76 metres) from any underground sewage disposal facility.

B. Bored Wells. All bored wells shall be cased with concrete pipe or steel casing whose joints are watertight from 6 inches (150 millimetres) above the ground surface to the depths specified in Section 9, Part A. Except where corrugated steel pipe is used as casing, the minimum thickness of the surrounding concrete seal shall be 3 inches (75 millimetres). Where corrugated steel pipe is employed, the joints are not watertight and a thicker annular seal (no less than 6 inches or 150 millimetres) shall be installed.

C. Dug Wells. All dug wells shall be "curbed" with a watertight curbing extending from above the ground surface to the depths specified in Section 9, Part A. The curbing shall be of concrete poured-in-place or of casing (either precast concrete pipe or steel) surrounded on the outside by concrete.

If the curbing is to be made of concrete, poured-in-place, it shall not be less than 6 inches (150 millimetres) thick. If precast concrete pipe or steel casing is used as part of the curbing, the space between the wall of the hole and the casing shall be filled with concrete to the depths specified in Section 9, Part A. The minimum thickness of the surrounding concrete shall be 3 inches (75 millimetres).

D. Casing Material. Either steel (including corrugated steel pipe) or concrete may be used for casing bored or dug wells. Corrugated aluminum pipe is not recommended for use as casing.^{1/}

^{1/} Aluminum placed in an aggressive soil is subject to electrolytic corrosion. When the soil pH is very high (over 8.0) or very low (under 6.0) this could present problems and, therefore, the soil pH ought to be checked. In addition, galvanic corrosion is likely to take place unless the pump is also made of aluminum. Accordingly, the use of most of the aluminum alloys currently available is not recommended.

1. Steel used in the manufacture of casing for bored and dug wells should conform to the specifications for casing material described in Section 12. Minimum thickness of steel casing for bored and dug wells shall be:

<u>Diameter</u>		<u>U. S. Standard Gage or Plate Thickness</u>
<u>Inches</u>	<u>Millimetres</u>	
18	450	8 gage (4.18 millimetres)
24	600	1/4 inch (6.35 millimetres)
30	750	1/4 inch (6.35 millimetres)
36	900	1/4 inch (6.35 millimetres)
42	1050	1/4 inch (6.35 millimetres)
48	1150	1/4 inch (6.35 millimetres)

Corrugated steel pipe used as casing shall meet the specifications (including the latest revision) of ASTM¹/ A444, "Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the HOT-DIP Process for Culverts and Under-drains". The minimum thickness of sheet used shall be 0.109 inches (2.8 millimetres).

2. Concrete casing can consist of either poured-in-place concrete or precast concrete pipe. Poured-in-place concrete should be sufficiently strong to withstand the earth and water pressures imposed on it during, as well as after, construction. It should be properly reinforced with steel to furnish tensile strength and to resist cracking, and it should be free from honeycombing or other defects likely to impair the ability of the concrete structure to remain watertight. Aggregate small enough to place without "bridging" should be used. Poured-in-place concrete shall be "Class A" (6 sacks of Portland cement per cubic yard or 0.76 cubic metre) or "Class B" (5 sacks per cubic yard or 0.76 cubic metre).

Precast concrete pipe is usually composed of concrete rings from 1 to 6 feet (0.3 to 1.8 metres) in diameter and approximately 3 to 8 feet (0.9 to 2.4 metres) long. To serve satisfactorily as casing, these rings should be free of blemishes that would impair their strength or serviceability. Concrete pipe shall conform to the specifications listed in Section 12, Part A, item 4.

E. Covers. All bored and dug wells shall be provided with a structurally sound, watertight, cover made of concrete or steel.

¹/ American Society for Testing and Materials.

Section 17. Special Provisions for Driven Wells ("Well Points").

A. If the well is to be used as an individual domestic well, an oversize hole with a diameter at least 3 inches (75 millimetres) greater than the diameter of the pipe shall be constructed to a depth of 6 feet (1.8 meters) and the annular space around the pipe shall be filled with neat cement, cement grout, or bentonite mud.

B. The minimum wall thickness of steel drive pipe shall be not less than 0.140 inches (3.5 millimetres).

C. Well points made of thermoplastic materials should not be driven but jetted or washed into place.

Section 18. Rehabilitation, Repair and Deepening of Wells.

A. Rehabilitation is the treatment of a well by chemical or mechanical means (or both) to recover lost production caused by incrustation or clogging of screens or the formation immediately adjacent to the well. The following methods used for rehabilitating a well when done with care are acceptable: (1) introduction of chemicals designed for this purpose, (2) surging by use of compressed air, (3) backwashing or surging by alternately starting or stopping the pump, (4) jetting with water, (5) sonic cleaning, (6) vibratory explosives, and (7) combinations of these. Methods which produce an explosion (in addition to the use of vibratory explosives mentioned above) are also acceptable provided, however, they are used with great care, particularly where aquifers are separated by distinct barriers to the movement of ground water.

In those cases where chemicals or explosives have been used, the well shall be pumped until all traces of them have been removed.

B. In the repair of wells, material used for casing shall meet the requirements of Section 12 "Casing" of these provisions. In addition, the requirements of Section 11, Part A "Disinfection" and, when applicable, Section 14 "Sealing-off Strata" shall be followed.

C. Where wells are to be deepened, the requirements of Sections 11, 12, 13, 14, and 15 of these standards shall be followed.

Section 19. Temporary Cover.

Whenever there is an interruption in work on the well such as overnight shutdown, during inclement weather, or waiting periods required for the setting up of sealing materials, for tests, for installation of the pump, etc., the well opening shall be closed with a cover to prevent the introduction of undesirable material into the well and to insure the public safety. The cover shall be held in place or "weighted-down" in such a manner that it cannot be removed except with the aid of equipment or through the use of tools.

During prolonged interruptions (i.e., one week or more), a semipermanent cover shall be installed. For wells cased with steel, a steel cover, tack-welded to the top of the casing, is adequate.

Part III. Destruction of Wells

Section 20. Purpose of Destruction.

A well that is no longer useful^{1/} (including exploration and test holes) must be destroyed in order to:

1. Assure that the ground water supply is protected and preserved for further use.
2. Eliminate the potential physical hazard.

Section 21. Definition of "Abandoned" Well.

A well is considered "abandoned" when it has not been used for a period of one year, unless the owner demonstrates his intention to use the well again for supplying water or other associated purpose^{2/} (such as an observation well or injection well). The well shall then be considered "inactive". As evidence of his intentions for continued use, the owner shall properly maintain the well in such a way that:

1. The well has no defects which will allow the impairment of quality of water in the well or in the water-bearing formations penetrated.
2. The well is covered such that the cover is watertight and cannot be removed except with the aid of equipment or the use of tools.
3. The well is marked so that it can be clearly seen.
4. The area surrounding the well is kept clear of brush or debris.

^{1/} Very often wells are prematurely abandoned and destroyed. However, proper maintenance will ensure that they will continue to produce for many years. The maintenance program should include regular measurement of the water level (depth to water from ground surface), determination of water quality, pump tests (for determination of pump and well efficiency) and cleaning.

^{2/} Although it should be obvious, the reader is reminded that an "abandoned" well should never be used for the disposal of trash, garbage, sewage (except where sewage is reclaimed for recharging the ground water basin, and then only in accordance with the provisions of Section 4458 of the California Health and Safety Code and Section 13540 of the Water Code).

If the pump has been removed for repair or replacement, the well shall not be considered "abandoned". During the repair period, the well shall be adequately covered to prevent injury to people and to prevent the entrance of undesirable water or foreign matter.

Observation or test wells used in the investigation or management of ground water basins by governmental agencies or engineering or research organizations are not considered "abandoned" so long as they are maintained for this purpose. However, such wells shall be covered with an appropriate cap, bearing the label, "Observation Well", and the name of the agency or organization, and preferably shall be locked when measurements are not being made. When these wells are no longer used for this purpose or for supplying water, they shall be considered "abandoned".

Section 22. General Requirement.

All "abandoned" wells and exploration or test holes shall be destroyed. The objective of destruction is to restore as nearly as possible those subsurface conditions which existed before the well was constructed taking into account also changes, if any, which have occurred since the time of construction. (For example, an aquifer which may have produced good quality water at one time but which now produces water of inferior quality, such as a coastal aquifer that has been invaded by seawater.)

Destruction of a well shall consist of the complete filling of the well in accordance with the procedures described in Section 23 (following).

Section 23. Requirements for Destroying Wells.

A. Preliminary Work. Before the well is destroyed, it shall be investigated to determine its condition, details of construction, and whether there are obstructions that will interfere with the process of filling and sealing. This may include the use of downhole television and photography for visual inspection of the well.

1. If there are any obstructions, they shall be removed, if possible, by cleaning out the hole.

2. Where necessary, to ensure that sealing material fills not only the well casing but also any annular space or nearby voids within the zone(s) to be sealed, the casing should be perforated or otherwise punctured.

3. In some wells, it may be necessary or desirable to remove a part of the casing. However, in many instances this can be done only as the well is filled. For dug wells, as much of the lining as possible (or safe) should be removed prior to filling.

B. Filling and Sealing Conditions. Following are requirements to be observed when certain conditions are encountered:

1. Well wholly situated in unconsolidated material in an unconfined ground water zone (Figure 9A). If the ground water supplies are within 50 feet (15 metres) of the surface, the upper 20 feet (6 metres) shall be sealed with impervious material and the remainder of the well shall be filled with clay, sand, or other suitable inorganic material (see item D, this section).

2. Well penetrating several aquifers or formations. In all cases the upper 20 feet (6 metres) of the well shall be sealed with impervious material.

In areas where the interchange of water between aquifers will result in a significant^{1/} deterioration of the quality of water in one or more aquifers, or will result in a loss of artesian pressure, the well shall be filled and sealed so as to prevent such interchange. Sand or other suitable inorganic material may be placed opposite the producing aquifers and other formations where impervious sealing material is not required. To prevent the vertical movement of water from the producing formation, impervious material must be placed opposite confining formations above and below the producing formations for a distance of 10 feet (3 metres) or more. The formation producing the deleterious water shall be sealed by placing impervious material opposite the formation, and opposite the confining formations for a sufficient vertical distance (but no less than 10 feet or 3 metres) in both directions, or in the case of "bottom" waters, in the upward direction. (See Figure 9B.)

In locations where interchange is in no way detrimental, suitable inorganic material may be placed opposite the formations penetrated. When the boundaries of the various formations are unknown, alternate layers of impervious and pervious material shall be placed in the well.

^{1/} Determining the significance of interchange of waters whose qualities vary and of the loss of artesian pressures, requires extensive knowledge of the ground water basin in question. The Department of Water Resources has over the years, and frequently in cooperation with agencies such as the U. S. Geological Survey, undertaken a number of ground water studies and amassed considerable information and data about the subject. Although much is known about the State's ground water supplies, detailed studies sufficiently accurate to define interchange problems have been made only in certain areas. In still other areas, there is only partial definition of the problem. Examples of areas where definition has been made are the coastal plain of Los Angeles County and the eastern part of the Santa Clara Valley in Alameda County. An excellent example of a "bottom" water is the saline connate water underlying the Central Valley at varying depths.

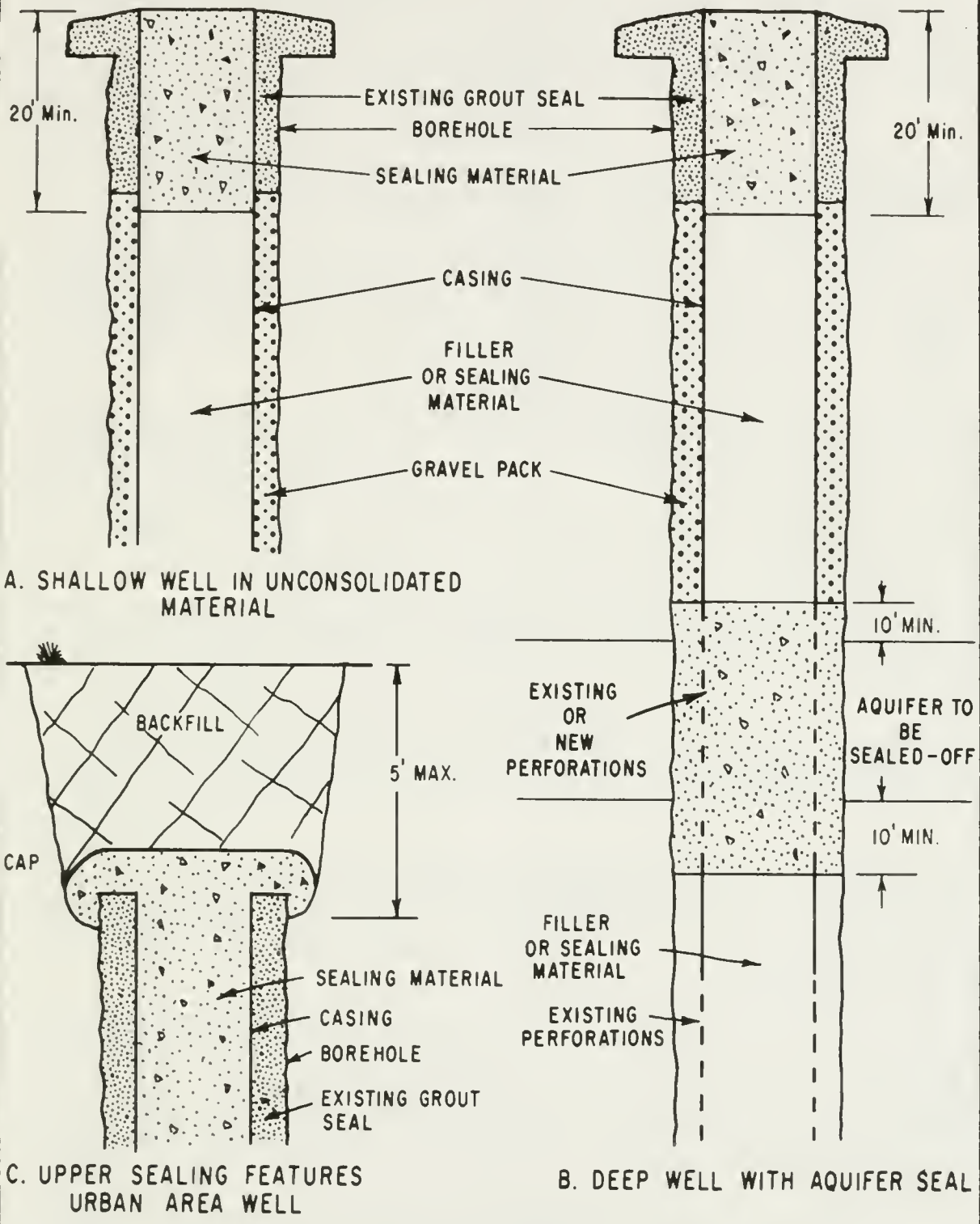


Figure 9. PROPERLY DESTROYED WELLS

3. Well penetrating creviced or fractured rock. If creviced or fractured rock formations are encountered just below the surface, the portions of the well opposite this formation shall be sealed with neat cement, sand-cement grout, or concrete. If these formations extend to considerable depth, alternate layers of coarse stone^{1/} and cement grout or concrete may be used to fill the well. Fine grained material shall not be used as fill material for creviced or fractured rock formations.

4. Well in noncreviced, consolidated formation. The upper 20 feet (6.1 metres) of a well in a noncreviced, consolidated formation shall be filled with impervious material. The remainder of the well may be filled with clay or other suitable inorganic material.

5. Well penetrating specific aquifers, local conditions. Under certain local conditions, the enforcing agency may require that specific aquifers or formations be sealed off during destruction of the well.

C. Placement of Material. The following requirements shall be observed in placing fill or sealing material in wells to be destroyed:

1. The well shall be filled with the appropriate material (as described in item D of this section) from the bottom of the well up.

2. Where neat cement grout, sand-cement grout, or concrete is used, it shall be poured in one continuous operation.

3. Sealing material shall be placed in the interval or intervals to be sealed by methods that prevent free fall, dilution, and/or separation of aggregates from cementing materials.

4. Where the head (pressure) producing flow is great, special care and methods must be used to restrict the flow while placing the sealing material. In such cases, the casing must be perforated opposite the area to be sealed and the sealing material forced out under pressure into the surrounding formation.

5. In destroying gravel-packed wells, the casing shall be perforated or otherwise punctured opposite the area to be sealed. The sealing material shall then be placed within the casing, completely filling the portion adjacent to the area to be sealed and then forced out under pressure into the gravel envelope.

6. When pressure is applied to force sealing material into the annular space, the pressure shall be maintained for a length of time sufficient for the cementing mixture to set.

^{1/} The limiting dimensions of coarse stone are usually considered to range between 1/4 and 4 inches (6.3 to 100 millimetres).

7. To assure that the well is filled and there has been no jamming or "bridging" of the material, verification shall be made that the volume of material placed in the well installation at least equals the volume of the empty hole.

D. Materials. Requirements for sealing and fill materials are as follows:

1. Impervious Sealing Materials. No material is completely impervious. However, sealing materials shall have such a low permeability that the volume of water passing through them is of small consequence.

Suitable impervious materials include neat cement, sand-cement grout, concrete, and bentonite clay, all of which are described in Section 9, paragraph D, "Sealing Material" of these standards; and well-proportioned mixes of silts, sands, and clays (or cement), and native soils that have a coefficient of permeability of less than 10 feet (3 metres) per year.^{1/} Used drilling muds are not acceptable.

2. Filler Material. Many materials are suitable for use as a filler in destroying wells. These include clay, silt, sand, gravel, crushed stone, native soils, mixtures of the aforementioned types, and those described in the preceding paragraph. Material containing organic matter shall not be used.

E. Additional Requirements for Wells in Urban Areas.

In incorporated areas or unincorporated areas developed for multiple habitation, to make further use of the well site, the following additional requirements must be met (see Figure 9C):

1. A hole shall be excavated around the well casing to a depth of 5 feet (1.5 metres) below the ground surface and the well casing removed to the bottom of the excavation.

2. The sealing material used for the upper portion of the well shall be allowed to spill over into the excavation to form a cap.

3. After the well has been properly filled, including sufficient time for sealing material in the excavation to set, the excavation shall be filled with native soil.

F. Temporary Cover. During periods when no work is being done on the well, such as overnight or while waiting for sealing material to set, the well and surrounding excavation, if any, shall be covered. The cover shall be sufficiently strong and well enough anchored to prevent the introduction of foreign material into the well and to protect the public from a potentially hazardous situation.

^{1/} Examples of materials of this type are: very fine sand with a large percentage of silt or clay, inorganic silts, mixtures of silt and clay, and clay. Native materials should not be used when the sealing operation involves the use of pressure.

APPENDIX A
DEFINITION OF TERMS

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The following terms are defined as used in this report:

Abandoned Well - A well whose use has been permanently discontinued or which is in such a state of disrepair that no water can be produced. Because abandonment is a state that also involves intent on the part of the well owner, a definition that prescribes a set of conditions and a time limit for use in applying standards appears in Section 21 of Chapter II, "Standards", of this report.

Active Well - An operating water well.

Annular Space - The space between two well casings or between the casing and the wall of the drilled hole.

Aquifer - A geologic formation, group of formations or part of a formation that is water bearing and which transmits water in sufficient quantity to supply springs and pumping wells.

Artesian Well - A well which obtains its water from a confined aquifer. The water level in an artesian well stands some distance above the top of the aquifer it taps. Where the pressure is sufficient to force the water level above the surface of the ground, the well is termed a flowing artesian well.

Bailer - A long narrow bucket with a valve in the bottom used to remove cuttings or fluids from a well.

Bentonite - A highly plastic colloidal clay composed largely of montmorillonite used as a drilling fluid additive or as a sealant.

Casing - A tubular retaining structure which is installed in the well bore to maintain the well opening.

Clay - A fine-grained geologic material (grain size less than 0.004 mm in diameter) which has very low permeability.

Conductor Casing - A tubular retaining structure installed in the upper portion of a well between the wall of the drilled hole and the inner well casing.

Cone of Depression - A depression in the water table or piezometric surface of a ground water body that is in the shape of an inverted cone and develops around a well which is being pumped. It defines the area of influence of the pumping well.

Confined Ground Water - Ground water under pressure whose upper surface is the bottom of an impermeable bed or a bed of distinctly lower permeability than the material in which the confined water occurs. Confined ground water moves under the control of the difference in head between the intake and discharge areas of the water body.

Connate Water - Water entrapped in the interstices of a sedimentary rock at the time it was deposited. These waters may be fresh, brackish, or saline in character. Usually applies only to water found in geologically older formations.

Consolidated Material - A geologic material whose particles are stratified, cemented, or firmly packed together; usually occurs at depth, e.g., sandstone.

Contamination - Defined in Section 13050 of the California Water Code:

"(k) 'Contamination' means an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. 'Contamination' shall include any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

Destroyed Well - A well that has been properly filled so that it cannot produce water nor act as a vertical conduit for the movement of ground water.

Deterioration - An impairment of water quality.

Drilled Well - A well for which the hole is excavated by mechanical means such as the rotary or cable tool methods.

Driller's Mud - A fluid composed of water and clay used in the drilling (primarily rotary) operation. The mud serves to remove cuttings from the hole, to clean and cool the bit, to reduce friction between the drill stem and the sides of the hole, and to plaster the sides of the hole. Such fluids range from relatively clear water to carefully prepared mixtures of special purpose compounds.

Drive Shoe - A forged steel collar with a cutting edge fastened onto the bottom of the casing to shear off irregularities in the hole as the casing advances, and to protect the lower edge of the casing as it is driven.

Gravel Packed Well - A well in which filter material (sand, gravel, etc.) is placed in the annular space between the casing and the borehole to increase the effective diameter of the well, and to prevent fine-grained material from entering the well during pumping.

Ground Water - That part of the subsurface water which is in the zone of saturation.

Ground Water Basin - A ground water basin consists of an area underlain by permeable materials which are capable of storing or furnishing a significant water supply; the basin includes both the surface area and the permeable materials beneath it.

Grout - A fluid mixture of cement and water of a consistency that can be forced through a pipe and placed as required. Various additives, such as sand, bentonite, and hydrated lime, are used to meet certain requirements. For example, sand is added when a considerable volume of grout is needed.

Impairment - A change in quality of water which makes it less suitable for beneficial use.

Impermeable - That property of a geologic material that renders it incapable of allowing water to move through it perceptibly under the pressure differences ordinarily found in subsurface water.

Impervious Strata - A geologic unit which will not transmit water in sufficient quantity to furnish an appreciable supply to wells or springs.

Inactive Well - A well not routinely operated but capable of being made an operating well with a minimum of effort.

Packer - A device used to plug or seal a well at a specific point; frequently used as retainers to keep grout in position until it "sets".

Perforations - Openings in a well casing to allow the entrance of ground water into the well. Perforations may be made either before or after installation of the casing.

Permeability - The capacity of a geologic material for transmitting a fluid. The degree of permeability depends upon the size and shape of the openings and the extent of the interconnections.

Pollution - Defined in Section 13050 of the California Water Code:

"(1) 'Pollution' means an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects: (1) such waters for beneficial uses, or (2) facilities which serve such beneficial uses. 'Pollution' may include 'contamination'."

Pressure Grouting - A method of forcing grout into specific portions of a well, such as the annular space, for sealing purposes.

Quality of Water or Water Quality -- Defined in Section 13050 of the California Water Code:

"(g) 'Quality of the water' or 'quality of the waters' refers to chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use."

Screen or Well Screen - A factory-perforated casing used in a well that maximizes the entry of water from the producing zone and minimizes the entrance of sand.

Tremie - A tubular device or pipe used to place grout in the annular space. Originally designed for placing concrete under water, the discharge end of the tube is kept submerged in the freshly deposited grout so as not to break the seal while filling the annular space.

Unconfined (free) Ground Water - Ground water that has a free water table, i.e., water not confined under pressure beneath relatively impermeable rocks.

Unconsolidated Material -- A sediment that is loosely arranged or unstratified, or whose particles are not cemented together occurring either at the surface or at depth.

Waste - Defined in Section 13050 of the California Water Code:

"(d) 'Waste' includes sewage and any/all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature, including such waste placed within containers of whatever nature prior to, and for purposes of, disposal."

APPENDIX B

SUGGESTED METHODS FOR SEALING
THE ANNULAR SPACE AND FOR SEALING-OFF STRATA

APPENDIX B

SUGGESTED METHODS FOR SEALING THE ANNULAR SPACE AND FOR SEALING-OFF STRATA

Sealing the Annular Space

The annular space is the space between the well casing and wall of the drilled hole created during construction. This space must be adequately sealed to prevent the entrance of surface drainage or poor quality subsurface water, which may contaminate or pollute the well. This seal will also protect the casing against corrosion and possible structural failure.

A number of acceptable sealing methods are presented in this appendix. Other methods may be suggested by individual well drillers on the basis of their experience and availability of equipment. An acceptable method should provide for the complete filling of the sealing interval with the appropriate sealing material to the specified depth.

General

Prior to sealing, the annular space should be flushed to remove any loose formation material or drilling mud that might obstruct the operation. The use of centralizers -- devices which are affixed to the casing at regular intervals to prevent it from touching the walls of the hole, thereby keeping the casing centered in the borehole -- are recommended. This assures that the seal is not less than the desired minimum thickness. It is particularly significant for large diameter wells where the casing exceeds 10 inches (250 millimetres) in diameter.

The use of a tremie or grout pipe for the introduction of the sealing material into the annular space is preferred. Where a tremie or grout pipe is used, the minimum annular space should be 2 inches (50 millimetres) and the minimum tremie size should be a nominal 1-1/2 inches (38 millimetres) in diameter.

Gravity installation without a grout pipe or tremie should not be attempted when the sealing interval contains water or cannot be visually inspected (with the aid of a mirror or light). Where sealing material is to be introduced under water or the interval cannot be observed from the surface, methods involving "positive" placement (by a tremie or grout pipe, pumping or other application of pressure) must be used.

The sealing material must always be introduced at the bottom of the interval to be sealed. This prevents "bridging" (jamming) or segregation (separation of large aggregate from the mixture in sand-cement or concrete grouts) of the sealing material and eliminates gaps.

Sealing should be accomplished in one continuous operation. Where the sealing interval will exceed 100 feet (30.5 metres) in length, consideration must be given to the collapse strength of the casing. Further, because of the weight of such extensive seals, consideration must also be given to the installation of stronger retaining devices and to staging the placement of the seal (as, for example, the installation of a short segment of rapid-setting sealant in advance of the main body of sealing material; the former becomes a foundation to support the extensive seal).

Sealing Methods

The following methods can be used to seal the upper portion of the annular space. Except for the first, these methods are illustrated on Figure 10. The first method is frequently used where short seals, under 20 feet (6 metres) deep, are placed in dry material.

Gravity Installation (Without Tremie). In this method sealing material is poured into the annular space without the use of a tremie or grout pipe. It cannot be used where the annular space contains water and is limited to intervals less than 30 feet (9 metres) deep. When used, visual observation (with the aid of a mirror or light) should be made during placement of the seal.

Grout Pipe Method. In this method, the seal is placed in the annular space by gravity through a grout pipe (or tremie) suspended in the annular space (see Figure 10).

1. Drill the hole large enough to accommodate the grout pipe (at least 4 inches or 100 millimetres, greater in diameter than the diameter of the casing).

2. In caving formations, install a conductor casing.

3. Provide a packer or grout retainer in the annular space below the interval to be sealed.

4. Extend the grout pipe down the annular space between the casing and the wall or conductor to near the bottom of the interval to be sealed just above the retainer.

5. Add grout in one continuous operation, beginning at the bottom of the interval to be sealed. The bottom end of the grout pipe should remain submerged in the sealing material during the entire time it is being placed. The grout pipe is gradually withdrawn as the sealing material is placed. Where a conductor casing is used to hold back caving material, it may be withdrawn as the sealing material is placed.

Pumping-Exterior Placement. For this method the same procedure as described for the Grout Pipe Method (above) is followed except that the material is placed by pumping instead of by gravity flow. The grout pipe must always be full of sealing material and its bottom end must remain submerged in the sealing material until the interval has been filled.

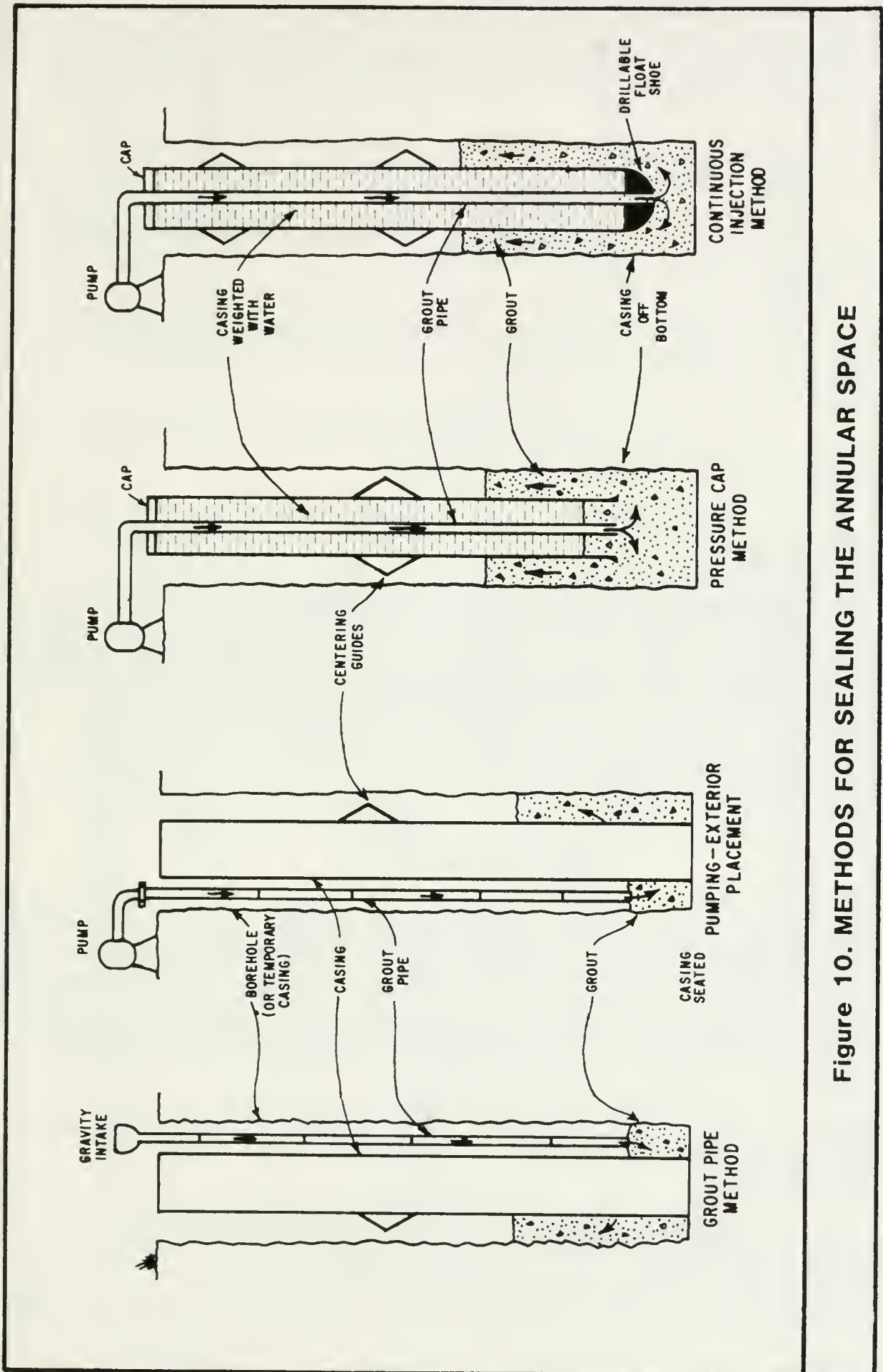


Figure 10. METHODS FOR SEALING THE ANNULAR SPACE

Pressure Cap Method. In the pressure cap method, the grouting is done with the hole drilled about 2 feet (0.6 metre) below the bottom of the conductor casing and the remainder of the well drilled after the grout is in place and set. The grout is placed through a grout pipe set inside the conductor casing.

1. The casing is suspended about 2 feet (0.6 metre) above the bottom of the drilled hole and filled with water.
2. A pressure cap is placed over the conductor casing and grout pipe extended through the cap and casing to the bottom of the hole.
3. The grout is forced through the pipe, up into the annular space around the outside of the conductor casing, to the ground surface.
4. When the grout has set, the pressure cap and the plug formed during grouting are removed and drilling of the rest of the well is continued.

Because there is the possibility that coarse aggregate will "jam" the grout pipe, concrete cannot be used as a sealant when this method is used.

Continuous Injection. This method, called the Normal Displacement Method in the oil industry (which developed it), involves pumping grout through a tube or pipe centered in the casing via a "float shoe" fitted at the bottom of the casing. The grout is forced up into the annular space to the ground surface as is the case with the pressure cap method (above). The tube is detached and flushed. The float shoe, which has a back pressure valve, is drilled out. Because there is the possibility that coarse aggregate will "jam" the grout pipe, concrete cannot be used with this method.

Sealing-off Strata

When the hole for a well is drilled, a strata may be found that produces water of undesirable quality. To prevent the movement of this water into other strata and to maintain the quality of the water to be produced by the well, such strata must be sealed-off. Also, where a highly porous non-water producing strata is encountered, it too must be sealed-off to prevent the loss of water or hydraulic pressure from the well.

The following methods can be used in sealing-off strata or zones (see Figure 11). In addition, several of the methods described for sealing the upper annular space can also be used.

Pressure-Grouting Method. This method can be employed where a substantial annular space exists between the well casing and the wall of the drilled hole.

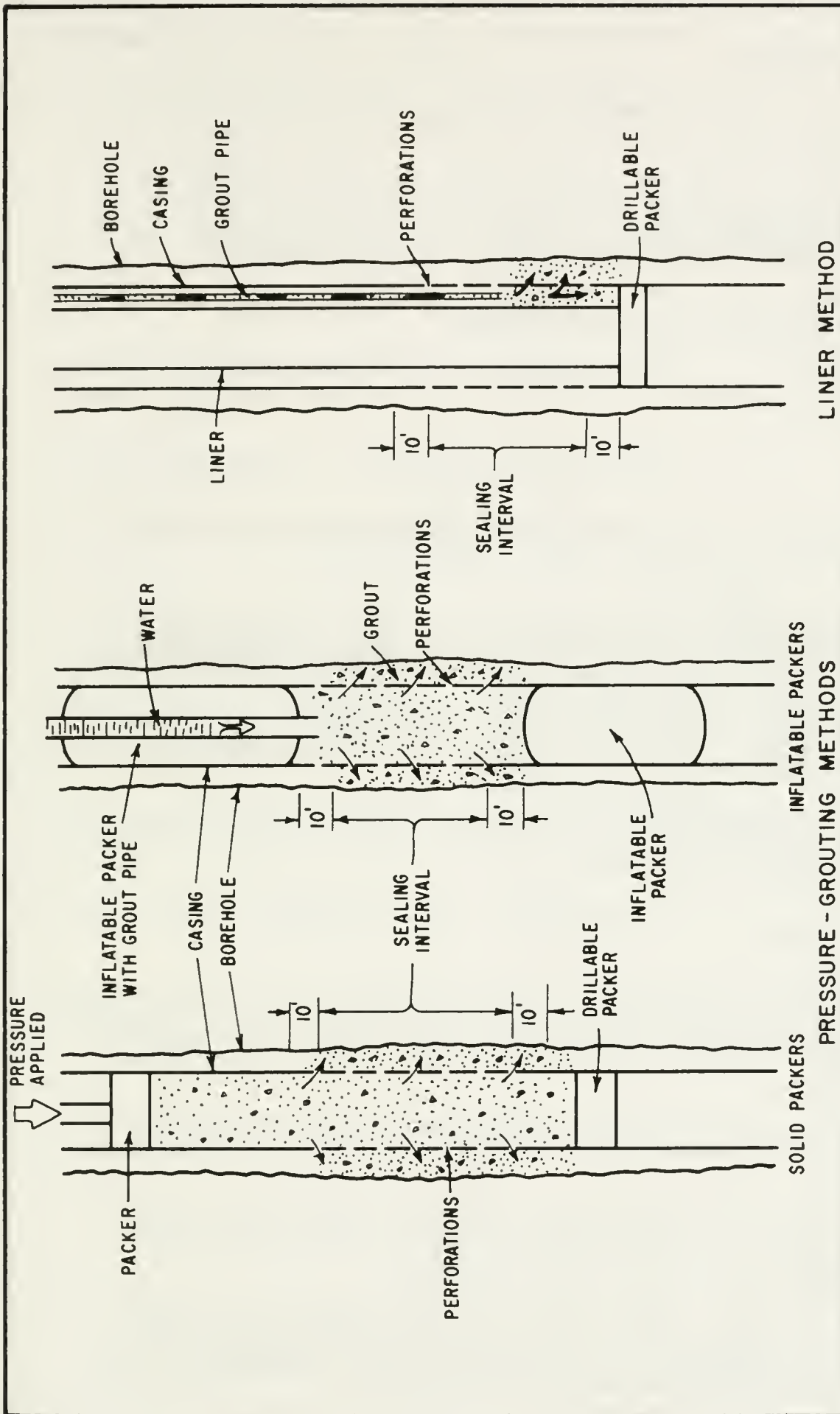


Figure 11. METHODS FOR SEALING-OFF STRATA

1. Perforate the casing opposite the interval to be sealed.
2. Place a packer or other sealing device in the casing below the bottom of the perforated interval.
3. Use a dump bailer or grout pipe to place grout in the casing opposite the interval to be sealed. Sufficient grout shall be placed to fill the annular space and extend out into the strata to be sealed-off.
4. Place a packer or other sealing device in the casing above the perforations.
5. Apply pressure to the top packer to force the grout through the perforations into the interval to be sealed.
6. Maintain pressure until the material has set.
7. Drill out the packers and other material remaining in the well.

Frequently, an assembly consisting of inflatable (balloon) packers and grout pipe is used. The packers are placed to enclose the interval to be sealed, they are inflated and the grout pumped down the hose (which passes through the upper packer) into the interval to be sealed. Water is then pumped into the interval, squeezing the grout through the perforations. When the grout is sufficiently hardened, the packers are deflated and removed.

Liner Method. Where the annular space between the casing and the wall of the drilled hole is minimal, the liner method can be employed.

1. Perforate the casing opposite the interval to be sealed.
2. Place a smaller diameter metal liner, about 2 inches (50 millimetres) less in diameter, inside the casing opposite the perforated interval to be sealed, and extend it at least 10 feet (3 metres) above and below the perforated interval.
3. Provide a grout retaining seal at the bottom of the annular space between the liner and the well casing.
4. Extend the grout pipe into the opening between the liner and casing, and fill the annular space with grout in one continuous operation.
5. The bottom end of the grout pipe should remain submerged in the sealing material during the entire time it is being placed. The grout pipe is gradually withdrawn as the sealing material is placed.

APPENDIX C

SUGGESTED PROCEDURES FOR
DISINFECTING WELLS

APPENDIX C

SUGGESTED PROCEDURES FOR DISINFECTING WELLS

Disinfection of all wells is recommended to eliminate pathogenic organisms as well as organisms that can grow in wells and thereby cause clogging and effect the quality of water produced. Disinfection of the well is the final act of well construction or repair before it is placed in service. Wells should also be disinfected following repair or replacement of the pump and/or well maintenance. The procedures described in this appendix are recommended for disinfected wells; however, other methods may be used provided it can be demonstrated that they will yield comparable results. For new wells, disinfection should take place following development (this will assure that the well is purged of drilling mud, dirt and other debris that reduces the effectiveness of the disinfection), testing for yield, and installation of the pump. When there is a delay in pump installation, interim or partial disinfection should be undertaken.

Disinfection involves seven steps:

1. A chlorine solution containing at least 50 mg/l (or parts per million) available chlorine, is added to the well. Table 6 lists quantities of various chlorine compounds required to dose 100 feet (30 metres) of water-filled casing at 50 mg/l for diameters ranging from 2 to 24 inches (50 to 600 millimetres). For wells that have been repaired or when the pump has been repaired or replaced and, bringing the well back into service quickly is desired, the solution should contain at least 100 mg/l available chlorine. To obtain this concentration, double the amounts shown in Table 6.
2. The pump column or drop pipe shall be washed with the chlorine solution as it is lowered into the well.
3. After it has been placed into position, the pump shall be turned on and off several times (i.e., "surged") so as to thoroughly mix the disinfectant with the water in the well. Pump until the water discharged has the odor of chlorine. Repeat this procedure several times at one-hour intervals.
4. The well shall be allowed to stand without pumping for 24 hours.

5. The water shall then be pumped to waste until the presence of chlorine is no longer detectable. The absence of chlorine is best determined by testing for available chlorine residual using a test kit designed for this purpose.*

Disposal of the waste should be away from trees, shrubs, or lawns and into storm sewers, drainage ditches, etc. Note that heavily chlorinated water should not be wasted into the plumbing system of homes that utilize individual sewage disposal systems (septic tanks). Such strong disinfectants could neutralize the bacteria needed to stabilize the sewage and also could damage the soil absorption system.

6. A bacteriological sample shall be taken and submitted to a laboratory for examination (see Appendix D).

7. If the laboratory analysis shows the water is not free of bacterial contamination, the disinfection procedure should be repeated. Depending on the level of contamination, it may be necessary to use a higher concentration chlorine solution (several times that shown in Table 6). The water should then be retested. If repeated attempts to disinfect the well are unsuccessful, a detailed investigation to determine the cause of the contamination should be undertaken.

Where small individual domestic wells to be treated are of unknown depth or volume, at least one pound (0.45 kilograms) of calcium hypochlorite (70 percent available chlorine) or two gallons (7.5 litres) of household bleach (sodium hypochlorite), such as Clorox or Purex, may be used in lieu of the chemicals shown in Table 6.

*Testing for available chlorine residual is simple and inexpensive. Test kits can be obtained from chemical supply houses, swimming pool suppliers, etc.

TABLE 6

CHLORINE COMPOUND REQUIRED TO DOSE 100 FEET (30 METRES)
OF WATER-FILLED CASING AT 50 MILLIGRAMS PER LITRE^{1/}

Diameter of Casing In. (mm)	Chlorine Compounds		
	(70%) Calcium Hypochlorite ^{2/} (Dry Weight) ^{3/}	(25%) Chloride of Lime (Dry Weight) ^{3/}	(5.25%) Sodium Hypochlorite ^{4/} (Liquid Measure)
2 (50)	¼ oz (7 g)	½ oz (14 g)	2 oz (59 ml)
4 (100)	1 oz (28 g)	2 oz (57 g)	9 oz (266 ml)
6 (150)	2 oz (57 g)	4 oz (113 g)	20 oz (0.6 l)
8 (200)	3 oz (85 g)	7 oz (0.2 kg)	2-1/8 pts (1.0 l)
10 (250)	4 oz (113 g)	11 oz (0.3 kg)	3-1/2 pts (1.7 l)
12 (300)	6 oz (0.2 kg)	1 lb (0.45 kg)	5 pts (2.4 l)
16 (400)	10 oz (0.3 kg)	2 lb (0.9 kg)	1 gal (3.8 l)
20 (510)	1 lb (0.45 kg)	3 lb (1.4 kg)	1-2/3 gal (6.3 l)
24 (610)	1½ lb (0.7 kg)	4 lb (1.8 kg)	2-1/3 gal (8.8 l)

^{1/} Some authorities recommend a minimum concentration of 100 mg/l. To obtain this concentration, double the amounts shown.

^{2/} HTH, Perchloron, Pittchlor, etc.

^{3/} Where dry chlorine is used, it should be mixed with water to form a chlorine solution prior to placing it into the well. Note that dry chlorine should always be added to water, not vice versa. Further, the chemical should be added slowly. These precautions are necessary to lessen the possibility of a violent chemical reaction.

^{4/} Household bleaches such as Chlorox, Purex, etc.

APPENDIX D
COLLECTION OF WATER QUALITY SAMPLES

APPENDIX D

COLLECTION OF WATER QUALITY SAMPLES

Water from all new wells should be sampled in order to determine the quality of the water that is being produced. The type of analysis that will be made is dependent on the expected use of the water. For example, individual domestic wells should be sampled for determination of bacterial quality and chemical quality. The water from agricultural wells is generally examined only for the presence of specific chemicals unless there is the likelihood that there will be incidental domestic use of the water, in which case the bacterial quality ought to be determined too.

Recommendations regarding the types of analyses to be performed for the various uses of water will be found in numerous references on water quality and ground water; however, it is best to consult with local agencies such as county farm advisors, health departments or water service agencies (irrigation or water districts). Sampling of community water supply wells is covered by requirements of the California Department of Health Services.^{1/}

Bacterial Sampling

For individual domestic wells, technical advice regarding the collection of bacteriological samples may be obtained from the local health departments or from the laboratories that will examine the sample. If no technical assistance is available, the following procedure will suffice: A sterile sample bottle, preferably one provided by the laboratory, must be used. It is extremely important that nothing except the water to be analyzed come in contact with the inside of the bottle or the cap; the water must not be allowed to flow over an object or over the hands and into the bottle while it is being filled. If the water is collected from a sample tap, turn on the tap and allow the water to flow for 2 or 3 minutes before collecting the sample.^{2/} Do not rinse the sample bottle. The sample should be delivered to the laboratory as soon as possible and in no case more than 30 hours after its collection. During delivery, the sample should be kept as cool as possible (but not frozen).

^{1/} Refer to Section 4026, California Health and Safety Code and Chapter 15, "Domestic Water Quality and Monitoring" of Title 22, California Administrative Code.

^{2/} An alternative is to sterilize the tap first with a propane torch or similar device.

Chemical Sampling

Generally, a routine mineral analyses (determination of the concentrations of the common minerals such as calcium, sodium, chloride, sulfate, etc.) plus analyses for selected minor elements will suffice, particularly where there is no prior knowledge of the chemical quality of the water in the area where the well is located. Where quality conditions in the surrounding area are known, a more selective analysis may be made. For specified uses it may also be desirable to make analysis for concentrations of certain constituents (such as iron and manganese in the case of domestic water or boron in irrigation water). Organic chemicals are not routinely determined. Information or advice on chemical quality conditions may be obtained from local agencies such as the county farm advisors, health departments, etc.

The sample should be collected after the well has been pumped long enough to remove standing water and development and disinfectant chemicals, and to ensure that water from the producing formation(s) has entered the well. The water sample should be collected in a chemically clean container, preferably one obtained from the laboratory that will perform the analysis. The container should be rinsed several times with the water to be sampled prior to collecting the sample. The laboratory performing the analysis should issue instructions regarding the quantity of sample required and whether or not preservatives are needed. However, one-half gallon (1.9 litres) is usually sufficient for a routine mineral analysis; one gallon (3.8 litres) when analysis for minor elements (i.e., iron, manganese, etc.) is also required. Sample quantities for organic chemicals vary according to the type of analysis, and range from very small amounts up to several gallons (litres). In addition, where organic chemicals are to be determined, special sampling procedures and equipment may be required. This is particularly true for volatile organic compounds.

In all cases the temperature of the water should be determined immediately upon collection of the sample.

APPENDIX E
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APPENDIX E

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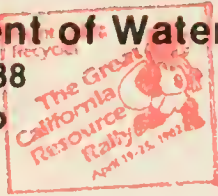
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ATTACHMENT 2

DWR BULLETIN 74-90
CALIFORNIA WELL STANDARDS (SUPPLEMENTAL TO BULLETIN 74-81)

California Well Standards



Water wells

Monitoring wells

Cathodic protection wells



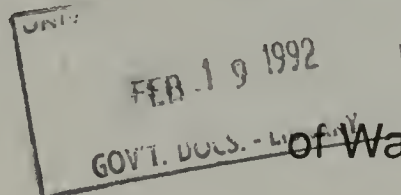
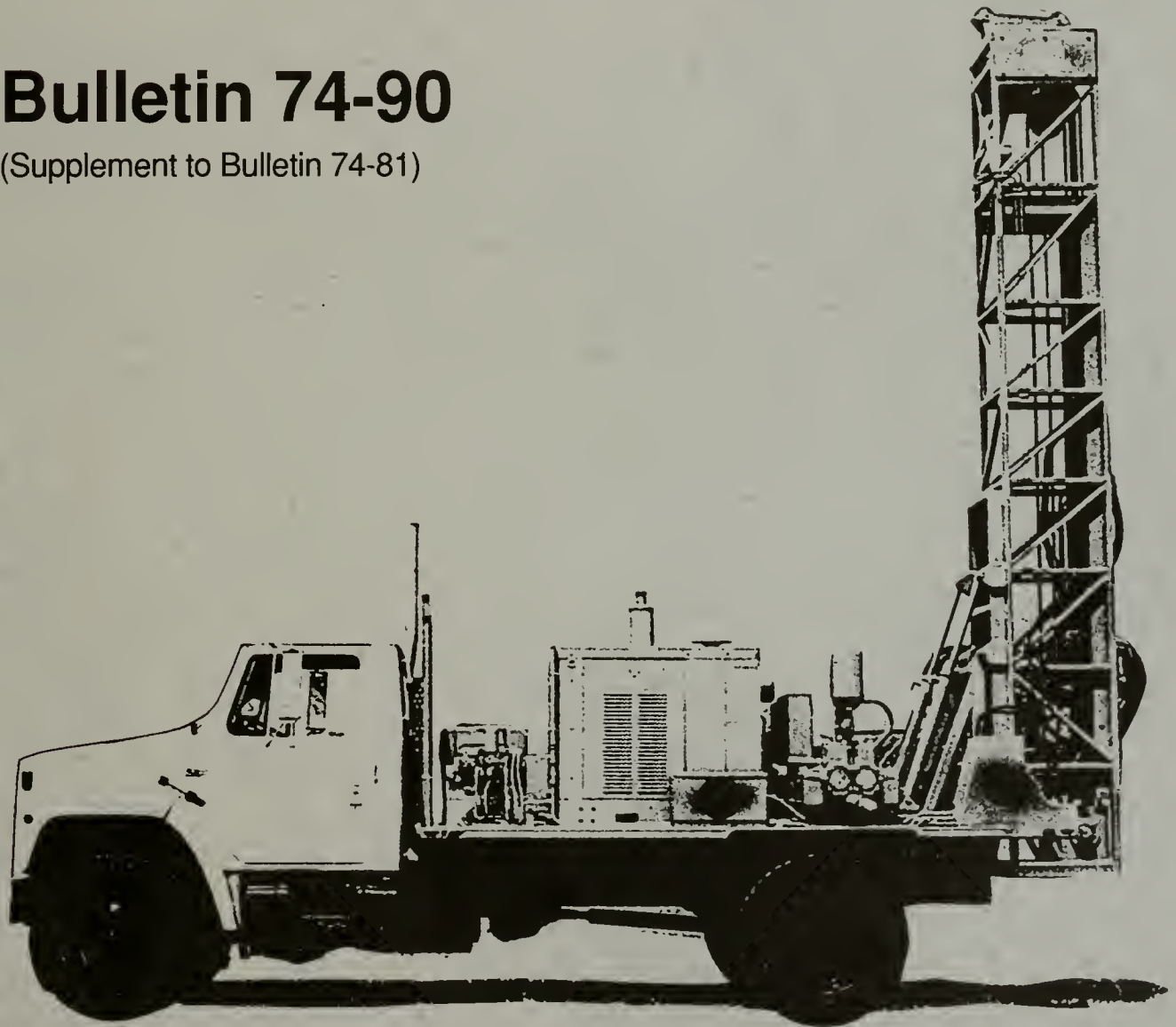
California
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California Well Standards

Water wells • Monitoring wells • Cathodic protection wells

Bulletin 74-90

(Supplement to Bulletin 74-81)



California
Department
of Water Resources
June 1991

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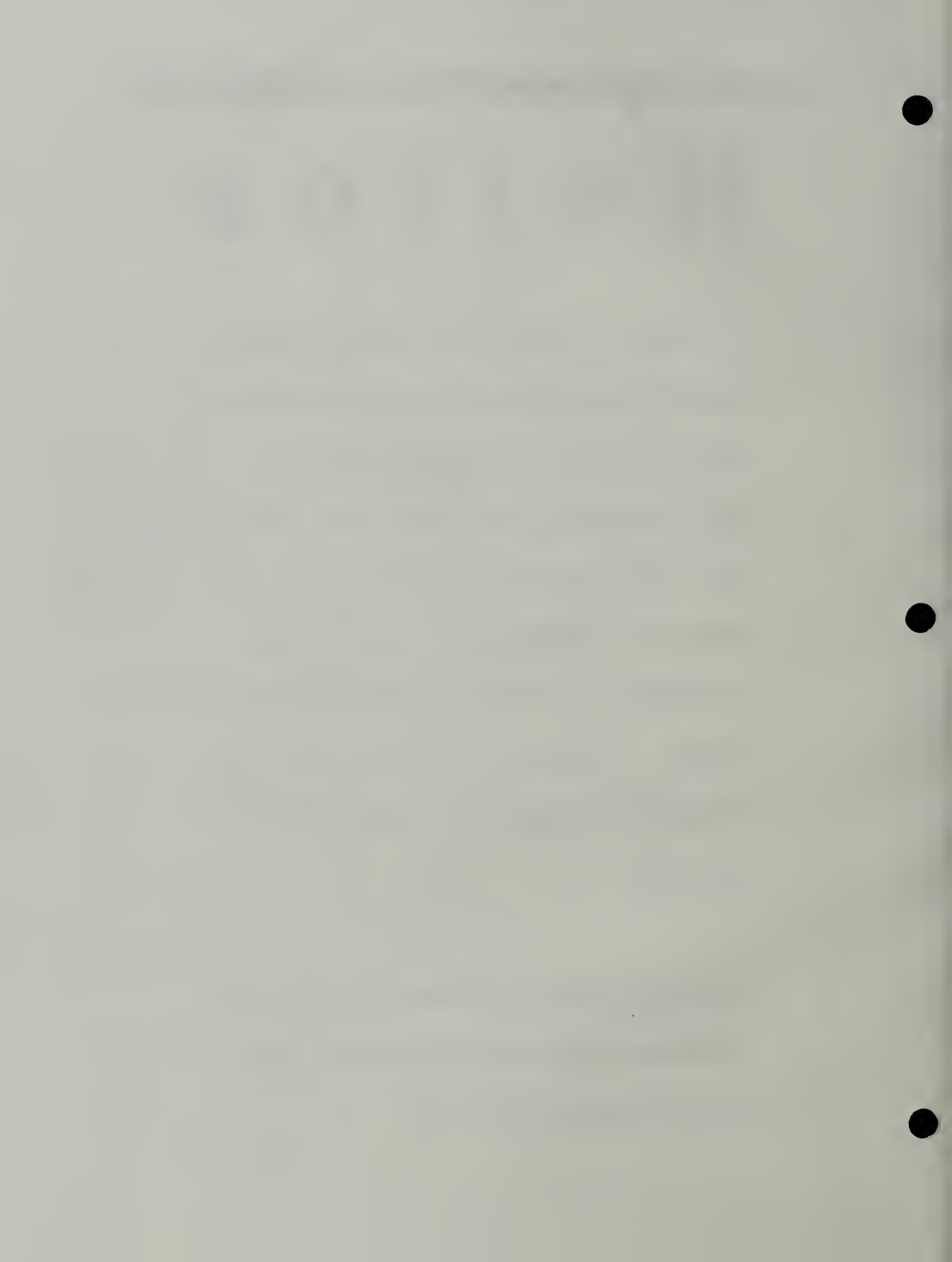
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Notice

This Bulletin is temporarily considered to be a draft. The California Department of Water Resources plans to adopt this Bulletin as final after a public review and comment period. The Department will announce in the future when this Bulletin is final. The Department will also announce any changes to this Bulletin. Announcement will be made through the Department's well standards mailing list.

This page should be removed from this Bulletin when it is announced that the Bulletin has been approved as final.



California Well Standards

Water wells • Monitoring wells • Cathodic protection wells

Bulletin 74-90

(Supplement to Bulletin 74-81)

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California
Department
of Water Resources
June 1991

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FOREWORD

During an average year about forty percent of California's water supply comes from ground water. Ground water is used for agricultural, industrial, domestic, and municipal water supplies. Protecting the quality of California's ground water is essential to California's future.

Improperly constructed wells can allow pollution of ground water to the point that the water is either unusable or it requires expensive treatment. The California Water Code requires the Department of Water Resources (DWR) to develop minimum standards for water wells, monitoring wells, and cathodic protection wells to protect ground water quality.

This bulletin is a supplement to DWR Bulletin 74-81, *Water Well Standards: State of California, December 1981*. Standards in Bulletin 74-81 and this bulletin are **minimum** requirements for construction, alteration, maintenance, and destruction of water wells, monitoring wells, and cathodic protection wells in California.

This bulletin was prepared in cooperation with the State Water Resources Control Board. The Board adopted a model water well, monitoring well, and cathodic protection well ordinance that implements DWR well standards. All California cities and counties, and some water agencies are required to enact local well ordinances that meet or exceed DWR standards, or they must enforce the Board's model ordinance as if it were their own.

Sometimes well standards adopted by local agencies must be more stringent than DWR's statewide standards because of local conditions. Local agencies play a critical role in protecting ground water quality.

Continued cooperation is needed between the public, industry, local agencies, and the State to ensure that these well standards remain adequate and are put into practice. California's water supply future depends on this cooperation.

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Department of Water Resources



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Department of Water Resources
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The CALIFORNIA WATER COMMISSION serves as a policy advisory body to the Director of the Department of Water Resources on all California water resource matters. The nine-member citizen commission provides a water resources forum for the people of the State, acts as liaison between the legislative and executive branches of State government, and coordinates federal, State, and local water resources efforts.

CALIFORNIA WELL STANDARDS

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ACKNOWLEDGEMENTS

This bulletin was prepared after consideration of comments and suggestions from public agencies and private parties. State agencies that provided input include:

- State Water Resources Control Board,
- Regional Water Quality Control Boards,
- Department of Health Services, and,
- California Integrated Waste Management Board.

Many comments and suggestions were received from California cities, counties, and water agencies. Private parties that provided input include the California Groundwater Association, individual well contractors, well construction material and equipment suppliers, and consultants. The Department of Water Resources thanks all persons that provided comments during the preparation of this bulletin.

GENERAL
INTRODUCTION



GENERAL INTRODUCTION

Improperly constructed, altered, maintained, or destroyed wells are a potential pathway for introducing poor quality water, pollutants, and contaminants to good-quality ground water. The potential for ground water quality degradation increases as the number of wells and borings in an area increases.

Improperly constructed, altered, maintained, or destroyed wells can facilitate ground water quality degradation by allowing:

- Pollutants, contaminants, and water to enter a well bore or casing;
- Poor quality surface and subsurface water, pollutants, and contaminants to move between the casing and borehole wall;
- Poor quality ground water, pollutants, and contaminants to move from one stratum or aquifer to another; and,
- The well bore to be used for illegal waste disposal.

Permanently inactive or "abandoned" wells that have not been properly destroyed pose a serious threat to water quality. They are frequently forgotten and become dilapidated with time, and thus can become conduits for ground water quality degradation. In addition, humans and animals can fall into wells left open at the surface.

History of DWR Standards

The Department of Water Resources has responsibility for developing standards for wells for the protection of water quality under California Water Code Section 231. Water Code Section 231 was enacted in 1949.

Statewide standards for water wells were first formally published in 1968 as DWR Bulletin 74, *Water Well Standards: State of California*. Standards for cathodic protection wells followed in 1973 as Bulletin 74-1, *Cathodic Protection Well Standards: State of California*. Bulletins 74 and 74-1 are now out of print.

A revised edition of Bulletin 74 was published in 1981 as Bulletin 74-81 *Water Well Standards: State of California*. Bulletin 74-81 is enclosed in the back cover of this report.

The law for establishing and implementing well standards was changed significantly in 1986 by Assembly Bill 3127 and Senate Bill 1817 (now Chapters 1152 and 1373, Statutes of 1986). Assembly Bill 3127 (Water Code Section 13801) requires that:

- (1) By September 1, 1989, the State Water Resources Control Board adopt a model well ordinance implementing DWR standards.
- (2) By January 15, 1990, all counties and cities, and water agencies where appropriate, adopt a well ordinance that meets or exceeds DWR well standards.
- (3) By February 15, 1990, the Board's model ordinance is to be enforced by any county, city, or water agency failing to adopt a well ordinance.

Senate Bill 1817 amended the Water Code to specifically include monitoring wells. It was previously assumed that monitoring wells were included in the collective term "well" used in the law.

As a first step in carrying out provisions of the amended law, the State Water Resources Control Board contracted with DWR to:

- (1) Review and update water well standards in Bulletin 74-81;
- (2) Establish minimum standards for monitoring wells; and,
- (3) Update and replace cathodic protection well standards in Bulletin 74-1.

This Bulletin is a supplement to Bulletin 74-81. It was developed to satisfy the Department's contract with SWRCB, to respond to Department responsibilities under the Water Code, and to keep pace with technical advances during the ten-year period following publication of Bulletin 74-81.

An initial draft of this supplement was published in three sections and was sent to interested organizations and individuals for comment during the Fall of 1988. The Department held public hearings in Los Angeles, November 15, 1988 and in Oakland, November 17, 1988 to discuss the draft supplemental standards and receive public comment.

Several sets of written comments for the draft supplemental standards were received by DWR. Written and verbal comments on the standards were reviewed and appropriate changes were incorporated into *Final Draft Bulletin 74-90, California Well Standards; Water Wells, Monitoring Wells, Cathodic Protection Wells; Supplement to Bulletin 74-81*, January 1990.

Final Draft Bulletin 74-90 was published in November 1989 and was sent to interested organizations and individuals for comment. Comments were reviewed and appropriate changes were incorporated into this final bulletin.

Additional discussion on the history of DWR well standards is contained in Bulletin 74-81.

Relationship of DWR Well Standards Publications

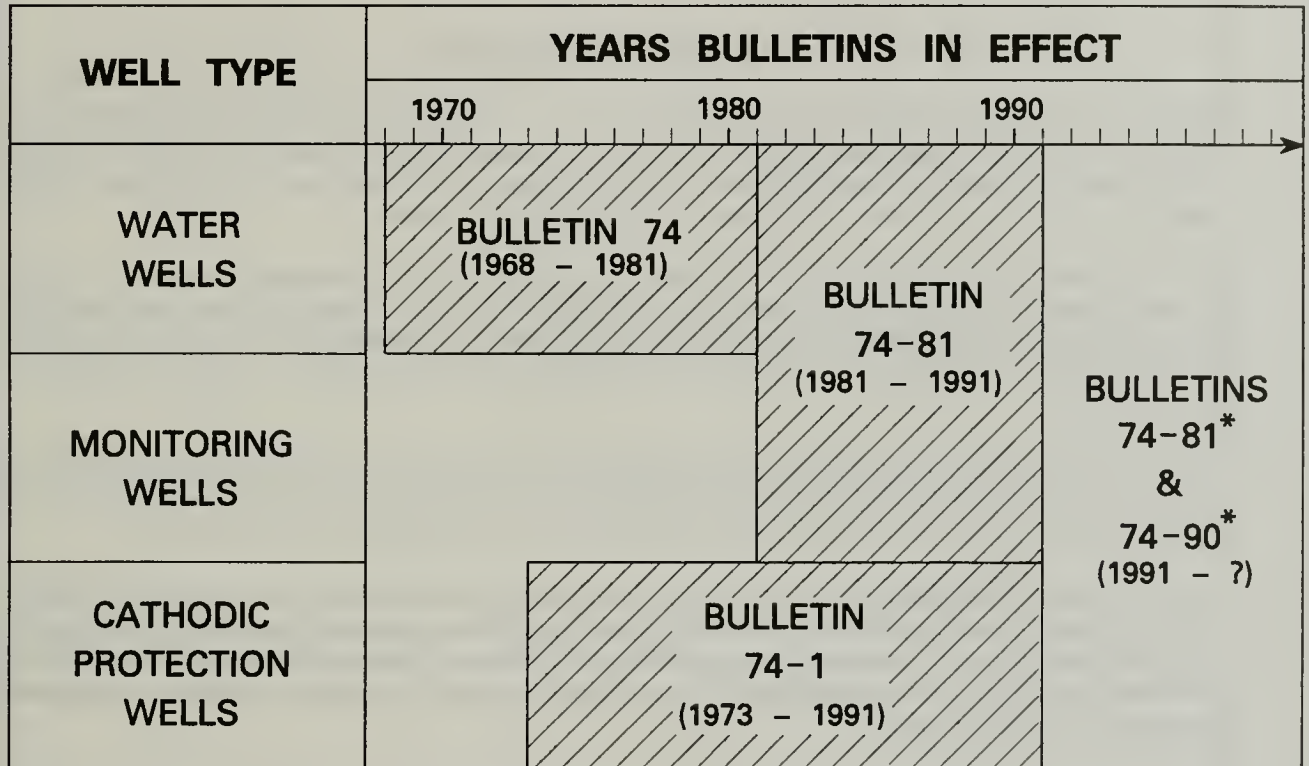
DWR Bulletins 74-81 and 74-1 provided the Department's standards for water wells and cathodic protection wells just prior to this supplement. DWR standards for monitoring wells were generally the same as for water wells prior to this supplement and were included in Bulletin 74-81. The relationship of the various DWR well standards bulletins is illustrated in Figure 1.

Revised standards for water wells in this supplement replace only portions of the water well standards contained in Bulletin 74-81. This supplement is to be used together with Bulletin 74-81 for a complete description of DWR Water Well Standards.

Monitoring well standards are presented separately in this supplement and are in parallel form to the water well standards. Because many physical similarities exist between water wells and monitoring wells, the water well standards are referred to frequently in the monitoring well standards. Water well and monitoring well standards must be considered together for the construction, alteration, maintenance, and destruction of monitoring wells.

Cathodic protection well standards in this supplement replace those in Bulletin 74-1. Because of similarities between cathodic protection wells and water wells, water wells standards are referred to frequently in the cathodic protection well standards. Cathodic protection well standards and water well standards must be considered together for the construction, alteration, maintenance, and destruction of cathodic protection wells.

**Figure 1. YEARS DWR WELL STANDARDS
BULLETINS IN EFFECT**



* Both bulletins are now required for water well, monitoring well, and cathodic protection well standards.

Organization of This Supplement

Standards in this supplement are presented in three parts:

- (1) Revisions of some water well standards in Bulletin 74-81.
- (2) Standards for monitoring wells.
- (3) Updated standards for cathodic protection wells that were originally published in Bulletin 74-1.

Selected technical terms used in this supplement are listed and defined in Appendix A. A list of references is contained in Appendix B.

Limitations of Standards

Well standards contained in Bulletin 74-81 together with well standards in this supplement (Bulletin 74-90) are recommended *minimum* statewide standards for the protection of ground water quality. *The standards are not necessarily sufficient for local conditions.* Local enforcing agencies may need to adopt more stringent standards for local conditions to ensure ground water quality protection.

In some cases, it may be necessary for a local enforcing agency to substitute alternate measures or standards to provide protection equal to that otherwise afforded by DWR standards. Such cases arise from practicalities in applying standards, and from variations in geologic and hydrologic conditions. Because it is impractical to prepare "site-specific" standards covering every conceivable case, provision has been made for deviation from the standards.

Standards in Bulletin 74-81 and this supplement (Bulletin 74-90) *do not ensure* proper construction or function of any type of well. Proper well design and construction practices require the use of these standards together with accepted industry practices, regulatory requirements, and consideration of site conditions.

It is the ultimate responsibility of the well owner and/or the owner's technical and/or contractor representative(s) to ensure that a well does not constitute a significant pathway for the movement of poor-quality water, pollutants, or contaminants; does not constitute a public nuisance or hazard; and, adequately performs a desired function. The Department accepts no responsibility for improper design, construction, alteration, maintenance, function, or destruction of individual wells.

Applicability

Construction standards presented in this supplement apply to all water wells, monitoring wells, and cathodic protection wells constructed after the date of this supplement. Alteration, maintenance, and destruction standards presented in this supplement apply to all water wells, monitoring wells, cathodic protection wells, and "borings" regardless of their original date of construction. Standards contained in Bulletin 74-81 remain in effect except where modified by this supplement (Bulletin 74-90).

WATER WELLS

REVISIONS TO WATER WELL STANDARDS

INTRODUCTION

Revisions to standards in DWR Bulletin 74-81, Chapter II, are presented in this section. All standards in Bulletin 74-81 that are not revised by this supplement (Bulletin 74-90) remain unchanged and in effect. The organization and numbering system used for the revisions is the same as that in Bulletin 74-81.

Table 1, page 10, below, lists portions of Bulletin 74-81 that are replaced by this supplement (Bulletin 74-90). The user of this supplement should strike-out the replaced sections and paragraphs in the copy of Bulletin 74-81 that is enclosed in the back cover of this supplement.

Table 1

Deletions in Bulletin 74-81

Page	Portions of Bulletin 74-81 Replaced by this Supplement, Bulletin 74-90
24	Subsection I
25	Subsections J and L
26	Subsection A of Section 8, and Footnote No. 3
27	Entire Page, Including All Footnotes
29	Entire Page, Including All Footnotes
30	Entire Page, Including All Footnotes
32	Remainder of Item 3
34	Subsection D, and All Footnotes
35	Entire Page, Including All Footnotes
36	Item 2, Item 3, and Item 4
39	Item 5, Subsection B, and All Footnotes
40	Subsection F, and Footnote No. 1
43	Item 3, and Footnote No. 1
44	Remainder of Item 3, and Both Footnotes
45	Item 5, and Item 6, Subsection B, and Both Footnotes
46	Remainder of Subsection B, Section 14
48	Remainder of Section 14
52	Section 21, Footnote No. 2
53	Remainder of Section 21, Item 1
54	Item 1

STANDARDS

Part I. General

Section 1. Definitions.

Definitions A through H, and K (page 23 of Bulletin 74-81) are unchanged. The definition for observation and monitoring wells under Definition I has been deleted and replaced with a definition for "exploration hole." Observation or monitoring wells are now addressed in monitoring well standards in this supplement.

The new definition under Definition I is:

- "I. Exploration Hole (or Boring). An uncased, temporary excavation whose purpose is the determination of hydrologic conditions at a site."

Definitions J and L have been revised to read as follows:

- "J. Test Wells. Wells constructed to obtain information needed for design of other wells. Test wells should not be confused with "exploration holes", which are temporary. Test wells are cased and can be converted to other uses such as ground water monitoring and, under certain circumstances, to production wells.
- L. Enforcing Agency. An agency designated by duly authorized local, regional, or State government to administer and enforce laws or ordinances pertaining to the construction, alteration, maintenance, and destruction of water wells. The California State Department of Health Services or the local health agency is the enforcing agency for community water supply wells."

Sections 2 through 7 (page 25 of Bulletin 74-81) are unchanged.

Part II. Well Construction

Section 8. Well Location With Respect to Pollutants and Contaminants, and Structures.

Note: The title of Section 8 has been revised.

Section 8 (page 26 of Bulletin 74-81) has been revised to read as follows:

"A. Separation. All water wells shall be located an adequate horizontal distance from known or potential sources of pollution and contamination. Such sources include, but are not limited to:

- sanitary, industrial, and storm sewers;
- septic tanks and leachfields;
- sewage and industrial waste ponds;
- barnyard and stable areas;
- feedlots;
- solid waste disposal sites;
- above and below ground tanks and pipelines for storage and conveyance of petroleum products or other chemicals; and,
- storage and preparation areas for pesticides, fertilizers, and other chemicals.

Consideration should also be given to adequate separation from sites or areas with known or suspected soil or water pollution or contamination.

The following horizontal separation distances are generally considered adequate where a significant layer of unsaturated, unconsolidated sediment less permeable than sand is encountered between ground surface and ground water. These distances are based on present knowledge and past experience. Local conditions may require greater separation distances to ensure ground water quality protection.

Potential Pollution or Contamination Source	Minimum Horizontal Separation Distance Between Well and Known or Potential Source
Any sewer line (sanitary, industrial, or storm; main or lateral)	50 feet
Watertight septic tank or subsurface sewage leaching field	100 feet
Cesspool or seepage pit	150 feet
Animal or fowl enclosure	100 feet

If the well is a radial collector well, minimum separation distances shall apply to the furthest extended point of the well.

Many variables are involved in determining the "safe" separation distance between a well and a potential source of pollution or contamination. No set separation distance is adequate and reasonable for all conditions. Determination of the safe separation distance for individual wells requires detailed evaluation of existing and future site conditions.

Where, in the opinion of the enforcing agency adverse conditions exist, the above separation distances shall be increased, or special means of protection, particularly in the construction of the well, shall be provided, such as increasing the length of the annular seal.

Lesser distances than those listed above may be acceptable where physical conditions preclude compliance with the specified minimum separation distances and where special means of protection are provided. Lesser separation distances must be approved by the enforcing agency on a case-by-case basis.

- B. Gradients. Where possible, a well shall be located up the ground water gradient from potential sources of pollution or contamination. Locating wells up gradient from pollutant and contaminant sources can provide an extra measure of protection for a well. However, consideration should be given that the gradient near a well can be reversed by pumping, as shown in Figure 3 (page 28 of Bulletin 74-81), or by other influences.
- C. Flooding and Drainage. If possible, a well should be located outside areas of flooding. The top of the well casing shall terminate above grade and above known levels of flooding caused by drainage or runoff from surrounding land. For community water supply wells, this level is defined as the:

"...floodplain of a 100 year flood..." or above "...any recorded high tide...",
(Section 64417, *Siting Requirements*, Title 22 of the California Code of Regulations.)

If compliance with the casing height requirement for community water supply wells and other water wells is not practical, the enforcing agency shall require alternate means of protection.

Surface drainage from areas near the well shall be directed away from the well. If necessary, the area around the well shall be built up so that drainage moves away from the well.

- D. Accessibility. All wells shall be located an adequate distance from buildings and other structures to allow access for well modification, maintenance, repair, and destruction, unless otherwise approved by the enforcing agency."

Section 9. Sealing the Upper Annular Space.

Note: Sealing requirements are also described in Appendix B, page 67 of Bulletin 74-81.

Section 9 (page 29 of Bulletin 74-81) has been revised to read as follows:

"The space between the well casing and the wall of the drilled hole, often referred to as the annular space, shall be effectively sealed to prevent it from being a preferential pathway for movement of poor-quality water, pollutants, or contaminants. In some cases, secondary purposes of an annular seal are to protect casing against corrosion or degradation, ensure the structural integrity of the casing, and stabilize the borehole wall.

- A. Minimum Depth of Annular Surface Seal. The annular surface seal for various types of water wells shall extend from ground surface to the following minimum depths:

Well Type	Minimum Depth Seal Must Extend Below Ground Surface
Community Water Supply	50 feet
Industrial	50 feet
Individual Domestic	20 feet
Agricultural	20 feet
Air-Conditioning	20 feet
All Other Types	20 feet

1. Shallow ground water. Exceptions to minimum seal depths can be made for shallow wells at the approval of the enforcing agency, where the water to be produced is at a depth less than 20 feet. In no case shall an annular seal extend to a total depth less than 10 feet below land surface. The annular seal shall be no less than 10 feet in length.

Caution shall be given to locating a well with a 'reduced' annular seal with respect to sources of pollution or contamination. Such precautions include horizontal separation distances greater than those listed in Section 8, page 12, above.

2. Encroachment on known or potential sources of pollution or contamination. When, at the approval of the enforcing agency, a water well is to be located closer to a source of pollution or contamination than allowed by Section 8, page 12, above, the annular space shall be sealed from ground surface to the first impervious stratum, if possible. The annular seal for all such wells shall extend to a minimum depth of 50 feet.
3. Areas of freezing. The top of an annular surface seal may be below ground surface in areas where freezing is likely, but in no case more than 4 feet below ground surface. 'Freezing' areas are those where the mean length of the freeze-free period described by the National Weather Service is less than 100 days. In other words, 'freezing' areas are where temperatures at or below 32 degrees Fahrenheit are likely to occur on any day during a period of 265 or more days each year. In general, these areas include:
 - portions of Modoc, Lassen, and Siskiyou Counties;
 - portions of the North Lahontan area including the eastern slope of the Sierra Nevada and related valleys north of Mount Whitney and Mono Lake; and,
 - the area of Lake Arrowhead in the San Bernardino Mountains.
4. Vaults. At the approval of the enforcing agency, the top of an annular surface seal and well casing can be below ground surface where traffic or other conditions require, if the seal and casing extend to a watertight and structurally sound subsurface vault, or equivalent feature. In no case shall the top of the annular surface seal be more

than 4 feet below ground surface. The vault shall extend from the top of the annular seal to at least ground surface.

The use of subsurface vaults to house the top of water wells below ground surface is rare and is discouraged due to susceptibility to the entrance of surface water, pollutants, and contaminants. Where appropriate, pitless adapters should be used in place of vaults.

B. Sealing Conditions. The following requirements are to be observed for sealing the annular space.

1. Wells drilled in unconsolidated, caving material. An 'oversized' hole, at least 4 inches greater in diameter than the outside diameter of the well casing, shall be drilled and a conductor casing temporarily installed to at least the minimum depth of annular seal specified in Subsection A, page 14, above. Permanent conductor casing may be used if it is installed in accordance with Item 3, page 16, below, and Item 5 (page 32 of Bulletin 74-81) and if it extends at least to the depth specified in Subsection A, above. One purpose of conductor casing is to hold the annular space open during well drilling and during the placement of the well casing and annular seal.

Temporary conductor casing shall be withdrawn as sealing material is placed between the well casing and borehole wall, as shown in Figure 4A (page 31 of Bulletin 74-81). Sealing material shall be placed at least within the interval specified in Subsection A, above. The sealing material shall be kept at a sufficient height above the bottom of the temporary conductor casing as it is withdrawn to prevent caving of the borehole wall.

Temporary conductor casing may be left in place in the borehole after the placement of the annular seal only if it is impossible to remove because of unforeseen conditions and not because of inadequate drilling equipment, or if its removal will seriously jeopardize the integrity of the well and the integrity of subsurface barriers to pollutant or contaminant movement. Temporary conductor casing may be left in place only at the approval of the enforcing agency on a case-by-case basis.

Every effort shall be made to place sealing material between the outside of temporary conductor casing that cannot be removed and the borehole wall to fill any possible gaps or voids between the conductor casing and the borehole wall. At least two inches of sealing material shall be maintained between the conductor casing and well casing. At a minimum, sealing material shall extend through intervals specified in Subsection A, above.

Sealing material can often be placed between temporary conductor casing that cannot be removed and the borehole wall by means of pressure grouting techniques, as described below and in Appendix B (page 67 of Bulletin 74-81). Other means of placing sealing material between the conductor casing and the borehole wall can be used, at the approval of the enforcing agency.

Pressure grouting shall be accomplished by perforating temporary conductor casing that cannot be removed, in place. The perforations are to provide passages for sealing material to pass through the conductor casing to fill any spaces and voids between the casing and borehole wall. Casing perforations shall be a suitable size and density to allow the passage of sealing materials through the casing and the proper distribution

of sealing material in spaces between the casing and borehole wall. At a minimum, the perforations shall extend through the intervals specified in Subsection A, above, unless otherwise approved by the enforcing agency.

Temporary conductor casing that must be left in place shall be perforated immediately before sealing operations begin to prevent drilling or well construction operations from clogging casing perforations. Once the casing has been adequately perforated, sealing material shall be placed inside the conductor casing and subjected to sufficient pressure to cause the sealing material to pass through the conductor casing perforations and completely fill any spaces or voids between the casing and borehole wall, at least within the intervals specified in Subsection A, above. Sealing material shall consist of neat cement, or bentonite prepared from powdered bentonite and water, unless otherwise approved by the enforcing agency.

Sealing material must also fill the annular space between the conductor casing and the well casing within required sealing intervals.

2. Wells drilled in unconsolidated material with significant clay layers. An 'oversized' hole, at least 4 inches greater in diameter than the outside diameter of the well casing, shall be drilled to at least the depth specified in Subsection A, page 14, above, and the annular space between the borehole wall and the well casing filled with sealing material in accordance with Subsection A, above (see Figure 4B, page 31 of Bulletin 74-81). If a significant layer of clay or clay-rich deposits of low permeability is encountered within 5 feet of the minimum seal depth prescribed in Subsection A, above, the annular seal shall be extended at least 5 feet into the clay layer. Thus, the depth of seal could be required to be extended as much as another 10 feet. If the clay layer is less than 5 feet in total thickness, the seal shall extend through its entire thickness.

If caving material is present within the interval specified in Subsection A, a temporary conductor casing shall be installed to hold the borehole open during well drilling and placement of the casing and annular seal, in accordance with the requirements of Item 1, page 15, above. Permanent conductor casing may be used if it is installed in accordance with Item 3, below and Item 5 (page 32 of Bulletin 74-81) and it extends to at least the depth specified in Subsection A, above.

3. Wells drilled in soft consolidated formations (extensive clays, sandstones, etc.). An 'oversized' hole, at least 4 inches greater in diameter than the outside diameter of the well casing, shall be drilled to at least the depth specified in Subsection A, page 14, above. The space between the well casing and the borehole shall be filled with sealing material to at least the depth specified in Subsection A, above, as shown by Figure 4C (page 31 of Bulletin 74-81).

If a permanent conductor casing is to be installed to facilitate the construction of the well, an oversized hole, at least 4 inches greater in diameter than the outside surface of the permanent conductor casing, shall be drilled to the bottom of the conductor casing or to at least the depth specified in Subsection A, above, and the annular space between the conductor casing and the borehole wall filled with sealing material. In some cases, such as in cable tool drilling, it may be necessary to extend permanent conductor casing beyond the depth of the required depth of the annular surface seal in order to maintain the borehole. Sealing material is not required between conductor

casing and the borehole wall other than the depths specified in Subsection A, above, and Section 13, below (page 46 of Bulletin 74-81)."

Items 4 through 7 (page 32 of Bulletin 74-81) are unchanged. Item 8 has been added, as follows:

- "8. Wells that penetrate zones containing poor-quality water, pollutants, or contaminants. If geologic units or fill known or suspected to contain poor-quality water, pollutants, or contaminants are penetrated during drilling, and, the possibility exists that poor-quality water, pollutants, or contaminants could move through the borehole during drilling and well construction operations and significantly degrade ground water quality in other units before sealing material can be installed, then precautions shall be taken to seal off or 'isolate' zones containing poor-quality water, pollutants, and contaminants during drilling and well construction operations. Special precautions could include the use of temporary or permanent conductor casing, borehole liners, and specialized drilling equipment. The use of conductor casing is described in Item 1, page 15, above."

Subsection C (page 34 of Bulletin 74-81) is unchanged. Subsections D, E, and F (page 34 of Bulletin 74-81) have been changed to read as follows:

- "D. Sealing Material. Sealing material shall consist of neat cement, sand cement, concrete, or bentonite. Cuttings from drilling, or drilling mud, shall not be used for any part of the sealing material.
1. Water. Water used to prepare sealing mixtures should generally be of drinking water quality, shall be compatible with the type of sealing material used, be free of petroleum and petroleum products, and be free of suspended matter. In some cases water considered nonpotable, with a maximum of 2,000 milligrams per liter chloride and 1,500 mg/l sulfate, can be used for cement-based sealing mixtures. The quality of water to be used for sealing mixtures shall be determined where unknown.
 2. Cement. Cement used in sealing mixtures shall meet the requirements of American Society for Testing and Materials C150, *Standard Specification for Portland Cement*, including the latest revisions thereof.

Types of Portland cement available under ASTM C150 for general construction are:

- Type I - General purpose. Similar to American Petroleum Institute Class A.
- Type II - Moderate resistance to sulfate. Lower heat of hydration than Type I. Similar to API Class B.
- Type III - High early strength. Reduced curing time but higher heat of hydration than Type I. Similar to API Class C.
- Type IV - Extended setting time. Lower heat of hydration than Types I and III.
- Type V - High sulfate resistance.

Special cement setting accelerators and retardants and other additives may be used in some cases. Special field additives for Portland cement mixtures shall meet the requirements of ASTM C494, *Standard Specification for Chemical Admixtures for Concrete*, and latest revision thereof.

Hydrated lime may be added up to 10 percent of the volume of cement used to make the seal mix more fluid. Bentonite may be added to cement-based mixes, up to 6 percent by weight of cement used, to improve fluid characteristics of the sealing mix and reduce the rate of heat generation during setting.

Dry additives should be mixed with dry cement before adding water to the mixture to ensure proper mixing, uniformity of hydration, and an effective and homogeneous seal. The water demand of additives shall be taken into account when water is added to the mix.

Minimum times required for sealing materials containing Portland cement to set and begin curing before construction operations on a well can be resumed are:

- Types I and II cement - 24 hours
- Type III cement - 12 hours
- Type V cement - 6 hours

Type IV cement is seldom used for annular seals because of its extended setting time.

Allowable setting times may be reduced or lengthened by use of accelerators or retardants specifically designed to modify setting time, at the approval of the enforcing agency.

More time shall be required for cement-based seals to cure to allow greater strength when construction or development operations following the placement of the seal may subject casing and sealing materials to significant stress. Subjecting a well to significant stress before a cement-based sealing material has adequately cured can damage the seal and prevent proper bonding of cement-based sealants to casing(s).

If plastic well casing is used, care shall be exercised to control the heat of hydration generated during the setting and curing of cement in an annular seal. Heat can cause plastic casing to weaken and collapse. Heat generation is a special concern if thin-wall plastic well casing is used, if the well casing will be subject to significant net external pressure before the setting of the seal, and/or if the radial thickness of the annular seal is large. Additives that accelerate cement setting also tend to increase the rate of heat generation during setting and, thus, should be used with caution where plastic casing is employed.

The temperature of a setting cement seal can be lowered by circulating water inside the well casing and/or by adding bentonite to the cement mixture, up to 6 percent by weight of cement used.

Cement-based sealing material shall be constituted as follows:

- a. Neat Cement. For Types I or II Portland cement, neat cement shall be mixed at a ratio of one 94-pound sack of Portland cement to 5 to 6 gallons of 'clean' water. Additional water may be required where special additives, such as bentonite, or 'accelerators' or 'retardants' are used.
- b. Sand Cement. Sand-cement shall be mixed at a ratio of not more than 188 pounds of sand to one 94-pound sack of Portland cement (2 parts sand to 1 part cement, by weight) and about 7 gallons of clean water, where Type I or Type II Portland cement is used. This is equivalent to a '10.3 sack mix.' Less

water shall be used if less sand than 2 parts sand per one part cement by weight is used. Additional water may be required when special additives, such as bentonite, or 'accelerators' or 'retardants' are used.

- c. Concrete. Concrete is often useful for large volume annular seals, such as in large-diameter wells. The proper use of aggregate can decrease the permeability of the annular seal, reduce shrinkage, and reduce the heat of hydration generated by the seal.

Concrete shall consist of Portland cement and aggregate mixed at a ratio of at least six-94 pound sacks of Portland cement per cubic yard of aggregate. A popular concrete mix consists of eight-94 pound sacks of Type I or Type II Portland cement per cubic yard of uniform 3/8-inch aggregate.

In no case shall the size of the aggregate be more than 1/5 the radial thickness of the annular seal. Water shall be added to concrete mixes to attain proper consistency for placement, setting, and curing.

- d. Mixing. Cement-based sealing materials shall be mixed thoroughly to provide uniformity and ensure that no 'lumps' exist.

Ratios of the components of cement-based sealing materials can be varied depending on the type of cement and additives used. Variations must be approved by the enforcing agency.

3. Bentonite. Bentonite clay in 'gel' form has some of the advantages of cement-based sealing material. A disadvantage is that the clay can sometimes separate from the clay-water mixture.

Although many types of clay mixtures are available, none has sealing properties comparable to bentonite clay. Bentonite expands significantly in volume when hydrated. Only bentonite clay is an acceptable clay for annular seals.

Unamended bentonite clay seals should not be used where structural strength of the seal is required, or where it will dry. Bentonite seals may have a tendency to dry, shrink and crack in arid and semi-arid areas of California where subsurface moisture levels can be low. Bentonite clay seals can be adversely affected by subsurface chemical conditions, as can cement-based materials.

Bentonite clay shall not be used as a sealing material if roots from trees and other deep rooted plants might invade and disrupt the seal, and/or damage the well casing. Roots may grow in an interval containing a bentonite seal depending on surrounding soil conditions and vegetation.

Bentonite-based sealing material shall not be used for sealing intervals of fractured rock or sealing intervals of highly unstable, unconsolidated material that could collapse and displace the sealing material, unless otherwise approved by the enforcing agency. Bentonite clay shall not be used as a sealing material where flowing water might erode it.

Bentonite clay products used for sealing material must be specifically prepared for such use. Used drilling mud and/or cuttings from drilling shall not be used in sealing material.

Bentonite used for annular seals shall be commercially prepared, powdered, granulated, pelletized, or chipped/crushed sodium montmorillonite clay. The largest dimension of pellets or chips shall be less than 1/5 the radial thickness of the annular space into which they are placed.

Bentonite clay mixtures shall be thoroughly mixed with clean water *prior to placement*. A sufficient amount of water shall be added to bentonite to allow proper hydration. Depending on the bentonite sealing mixture used, 1 gallon of water should be added to about every 2 pounds of bentonite. Water added to bentonite for hydration shall be of suitable quality and free of pollutants and contaminants.

Bentonite preparations normally require 1/2 to 1 hour to adequately hydrate. Actual hydration time is a function of site conditions and the form of bentonite used. Finely divided forms of bentonite generally require less time for hydration, if properly mixed.

Dry bentonite pellets or chips may be placed directly into the annular space below water, where a short section of annular space, up to 10 feet in length, is to be sealed. Care shall be taken to prevent bridging during the placement of bentonite seal material.

E. Radial Thickness of Seal. A minimum of two inches of sealing material shall be maintained between all casings and the borehole wall, within the interval to be sealed, except where temporary conductor casing cannot be removed, as noted in Subsection B, page 15, above. A minimum of two inches of sealing material shall also be maintained between each casing, such as permanent conductor casing, well casing, gravel fill pipes, etc., in a borehole within the interval to be sealed, unless otherwise approved by the enforcing agency. Additional space shall be provided, where needed, for casings to be properly centralized and spaced and allow the use of a tremie pipe during well construction (if required), especially for deeper wells.

F. Placement of Seal.

1. Obstructions. All loose cuttings, or other obstructions to sealing shall be removed from the annular space before placement of the annular seal.
2. Centralizers. Well casing shall be equipped with centering guides or 'centralizers' to ensure the 2-inch minimum radial thickness of the annular seal is at least maintained. Centralizers need not be used in cases where the well casing is centered in the borehole during well construction by use of removable tools, such as hollow-stem augers.

The spacing of centralizers is normally dictated by the casing materials used, the orientation and straightness of the borehole, and the method used to install the casing.

Centralizers shall be metal, plastic, or other non-degradable material. Wood shall not be used as a centralizer material. Centralizers must be positioned to allow the proper placement of sealing material around casing within the interval to be sealed.

Any metallic component of a centralizer used with metallic casing shall consist of the same material as the casing. Metallic centralizer components shall meet the same metallurgical specifications and standards as the metallic casing to reduce the potential for galvanic corrosion of the casing.

3. Foundation and Transition Seals. A packer or similar retaining device, or a small quantity of sealant that is allowed to set, can be placed at the bottom of the interval to be sealed before final sealing operations begin to form a foundation for the seal.

A transition seal, up to 5 feet in length, consisting of bentonite, is sometimes placed in the annular space to separate filter pack and cement-based sealing materials. The transition seal can prevent cement-based sealing materials from infiltrating the filter pack. A short interval of fine-grained sand, usually less than 2 feet in length, is sometimes placed between the filter pack and the bentonite transition seal to prevent bentonite from entering the filter pack. Also, fine sand is sometimes used in place of bentonite as the transition seal material.

Fine-sized forms of bentonite, such as granules and powder, are usually employed for transition seals if a transition seal is to be placed above the water level in a well boring. Coarse forms of bentonite, such as pellets and chips, are often used where a bentonite transition seal is to be placed below the water level.

Transition seals should be installed by use of a tremie pipe, or equivalent. However, some forms of bentonite may tend to bridge or clog in a tremie pipe.

Bentonite can be placed in dry form or as slurry for use in transition seals. Water should be added to the bentonite transition seal prior to the placement of cement-based sealing materials where bentonite is dry in the borehole. Care should be exercised during the addition of water to the borehole to prevent displacing the bentonite.

Water should be added to bentonite at a ratio of about 1 gallon for every 2 pounds of bentonite to allow for proper hydration. Water added to bentonite for hydration shall be of suitable quality and free of pollutants and contaminants.

Sufficient time should be allowed for bentonite transition seals to properly hydrate before cement-based sealing materials are placed. Normally, 1/2 to 1 hour is required for proper hydration to occur. Actual time of hydration is a function of site conditions.

The top of the transition seal shall be sounded to ensure that no bridging has occurred during placement.

4. Timing and Method of Placement. The annular space shall be sealed as soon as practical after completion of drilling or a stage of drilling. In no case shall the annular space be left unsealed longer than 14 days following the installation of casing.

Sealing material shall be placed in one continuous operation from the bottom of the interval to be sealed, to the top of the interval. Where the seal is more than 100 feet in length, the deepest portion of the seal may be installed first and allowed to set or partially set. The deep initial seal shall be no longer than 10 feet in length. The remainder of the seal shall be placed above the initial segment in one continuous operation.

Sealing material shall be placed by methods (such as the use of a tremie pipe or equivalent) that prevent freefall, bridging, or dilution of the sealing material, or separation of sand or aggregate from the sealing material. Annular sealing materials

shall not be installed by freefall unless the interval to be sealed is dry and no deeper than 30 feet below ground surface.

5. Ground Water Flow. Special care shall be used to restrict the flow of ground water into a well boring while placing material, where subsurface pressure causing the flow of water is significant.
6. Verification. It shall be verified that the volume of sealing material placed at least equals or exceeds the volume to be sealed.
7. Pressure. Pressure required for placement of sealing materials shall be maintained long enough for cement-based sealing materials to properly set."

Section 10. Surface Construction Features.

Subsection A, Item 5; Subsection B; and Subsection F (page 39 of Bulletin 74-81) have been changed. The remainder of Section 10 (page 36 of Bulletin 74-81) is unchanged.

"A. Openings.

5. Bases. A concrete base or pad, sometimes called a pump block or pump pedestal, shall be constructed at ground surface around the top of the well casing and contact the annular seal, unless the top of the casing is below ground surface, as provided by Subsection B, page 23, below.

The base shall be free of cracks, voids, or other significant defects likely to prevent water tightness. Contacts between the base and the annular seal, and the base and the well casing, must be water tight and must not cause the failure of the annular seal or well casing. Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the enforcing agency.

The upper surface of the base shall slope away from the well casing. The base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the enforcing agency. The base shall be a minimum of 4 inches thick.

A minimum base thickness of 4 inches is normally acceptable for small diameter, single-user domestic wells. The base thickness should be increased for larger wells. Shape and design requirements for well pump bases vary with the size, weight, and type of pumping equipment to be installed, engineering properties of the soil on which the base is to be placed, and local environmental conditions. A large variety of base designs have been used. The Vertical Turbine Pump Association has developed a standard base design for large lineshaft turbine pumps. This design consists of a square, concrete pump base whose design is dependent on bearing weight and site soil characteristics.

Where freezing conditions require the use of a pitless adapter, and the well casing and annular seal do not extend above ground surface or into a pit or vault, a concrete base or pad shall be constructed as a permanent location monument for the covered well. The base shall be 3 feet in length on each side and 4 inches in thickness, unless

otherwise approved by the enforcing agency. The base shall have a lift-out section, or equivalent, to allow access to the well. The lift-out shall facilitate inspection and repair of the well.

- B. Well Pits or Vaults. The use of well pits, vaults, or equivalent features to house the top of a well casing below ground surface shall be avoided, if possible, because of their susceptibility to the entrance of poor-quality water, contaminants and pollutants. Well pits or vaults can only be used if approval is obtained from the enforcing agency. A substitute device, such as a pitless adapter or pitless adapter unit (a variation), should almost always be used in place of a vault or pit.

Pitless adapters and units were developed for use in areas where prolonged freezing occurs, and below ground (frost line) discharges are common. Both the National Sanitation Foundation and Water Systems Council have developed standards for the manufacture and installation of pitless adapters and units. (See Appendix E, Bibliography, page 85 of Bulletin 74-81.)

If a pit or vault is used it shall be watertight and structurally sound. The vault shall extend from the top of the annular seal to at least ground surface.

The vault shall contact the annular seal in a manner to form a watertight and structurally sound connection. Contacts between the vault and the annular seal, and the vault and the well casing, if any, shall not fail or cause the failure of the well casing or annular seal.

Where cement-based annular seal materials are used, the vault shall be set into or contact the annular seal material before it sets, unless otherwise approved by the enforcing agency. If bentonite-based sealing material is used for the annular seal, the vault should be set into the bentonite before it is fully hydrated.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation.

The sealing material surrounding a vault shall extend from the top of the annular seal to ground surface unless precluded in areas of freezing. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the sealing material shall be emplaced in a 'continuous pour'. In other words, cement-based sealing material shall be placed between the vault and excavation and contact the cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight but shall allow the venting of gases. The lid shall be fitted with a security device to prevent unauthorized access. The outside of the lid shall be clearly and permanently labeled 'WATER WELL'. The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at, or above, grade so that drainage is away from the vault. The top of the well casing contained within the vault shall be covered in accordance with requirements under Subsection A, above, (page 36, Bulletin 74-81) so that water, contaminants, and pollutants that may enter the vault will not enter the well casing. The cover shall be provided with a pressure relief or venting device for gases.

- F. Backflow Prevention. All pump discharge pipes not discharging or open to the atmosphere shall be equipped with an automatic device to prevent backflow and/or back siphonage into a well. Specific backflow prevention measures are required for drinking water supply wells, as prescribed in Title 17, Public Health, California Code of Regulations (Sections 7583-7585 and 7601-7605, effective June 25, 1987).

Irrigation well systems, including those used for landscape irrigation, and other well systems that employ, or which have been modified to employ, chemical feeders or injectors shall be equipped with a backflow prevention device(s) approved by the enforcing agency."

Section 12. Casing.

Items 3, 5, and 6 of Subsection A (page 43 of Bulletin 74-81) have been revised. The remainder of Subsection A is unchanged. Subsection B (page 45 of Bulletin 74-81) has been revised. The revisions are as follows:

"A. Casing Material.

3. Plastic. Two basic types of plastic are commonly used for plastic well casing: thermoplastics and thermosets. Thermoplastics soften with the application of heat and reharden when cooled. Thermoplastics can be reformed repeatedly using heat and sometimes can unexpectedly deform. Attention should be given to the effect of heat on thermoplastic casing from the setting and curing of cement. Additional discussion on sealing material and heat generation is in Section 9, Subsection D, 'Sealing Material'.

Thermoplastics used for well casing include ABS (acrylonitrile butadiene styrene), PVC (polyvinyl chloride), and SR (styrene rubber). PVC is the most frequently used thermoplastic well casing in California. Styrene rubber is seldom used.

Unlike thermoplastics, thermoset plastics cannot be reformed after heating. The molecules of thermoset plastic are 'set' during manufacturing by heat, chemical action, or a combination of both. The thermoset plastic most commonly used for well casing is fiberglass.

- a. Thermoplastics. Thermoplastic well casing shall meet the requirements of ASTM F480, *Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80*, including the latest revision thereof. (Note: A 'dimension ratio' is the ratio of pipe diameter to pipe wall thickness.)

Pipe made in Schedule 40 and 80 wall thicknesses and pipe designated according to certain pressure classifications are listed in ASTM F480, as well as casing specials referencing the following ASTM specifications:

- (1) ABS Pipe. ASTM D1527, *Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.*
- (2) PVC Pipe. ASTM D1785, *Standard Specification for (Poly Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.*
- (3) Pressure-Rated PVC Pipe. ASTM D2241, *Standard Specifications for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).*

Thermoplastic well casing that may be subject to significant impact stress during or after installation shall meet or exceed the requirements for impact resistance classification set forth in Section 6.5 of ASTM F480. Casing that may be subject to significant impact forces includes, but is not limited to; casing that is installed in large diameter, deep boreholes; and casing through which drilling tools pass following installation of the casing in a borehole.

- b. Thermoset Plastics. Thermoset casing material shall meet the following specifications, as applicable, including the latest revisions thereof:
 - (1) Filament Wound Resin Pipe. ASTM D2996, *Standard Specification for Filament Wound Reinforced Thermosetting Resin Pipe.*
 - (2) Centrifugally Cast Resin Pipe. ASTM D2997, *Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe.*
 - (3) Reinforced Plastic Mortar Pressure Pipe. ASTM D3517, *Standard Specification for Reinforced Plastic Mortar Pressure Pipe.*
 - (4) Glass Fiber Reinforced Resin Pressure Pipe. AWWA¹ C950, *AWWA Standard for Glass-Fiber-Reinforced Thermosetting-Resin Pressure Pipe.*
 - c. Drinking Water Supply. All plastic casing used for drinking water supply wells, including community supply well and individual domestic wells, shall meet the provisions of National Sanitation Foundation Standard No. 14, *Plastic Piping Components and Related Materials* and any revision thereof. The casing shall be marked or labeled following requirements in NSF Standard No. 14. Standard No. 14 includes the requirements of ASTM F480.
 - d. Storage, Handling, and Transportation. Plastic casing shall not be stored in direct sunlight or subjected to freezing temperatures for extended periods of time. Plastic casing shall be stored, handled, and transported in a manner that prevents excessive mechanical stress. Casing shall be protected from sagging and bending, severe impacts and loads, and potentially harmful chemicals.
 - e. Large Diameter Wells. Because large diameter plastic casing has not been used extensively at depths exceeding 500 feet, special care shall be exercised with its use in deep wells.
5. Unacceptable Casing Materials. Galvanized sheet metal pipe such as 'downspout,' tile pipe, or natural wood shall not be used as well casing.
 6. Other Materials. Materials in addition to those described above may be used as well casing, subject to enforcing agency approval."

Subsection B (page 45 of Bulletin 74-81) has been revised as follows:

- "B. Casing Installation. All well casing shall be assembled and installed with sufficient care to prevent damage to casing sections and joints. All casing joints above intervals of perforations

¹ American Water Works Association.

or screen shall be watertight. Any perforations shall be below the depths specified in Section 9, Subsection A, page 14, above.

Casing shall be equipped with centering guides or 'centralizers' to ensure the even radial thickness of the annular seal and filter pack.

1. Metallic Casing. Metallic casing may be joined by welds, threads, or threaded couplings. Welding shall be accomplished in accordance with the standards of the American Welding Society or the most recent revision of the American Society of Mechanical Engineers Boiler Construction Code. Metallic casing shall be equipped with a 'drive shoe' at the lower end if it is driven into place.
2. Plastic Casing. Plastic casing may be joined by solvent welding or mechanically joined by threads or other means, depending on the type of material and its fabrication. Solvent cement used for solvent welding shall meet specifications for the type of plastic casing used. Solvent cement shall be applied in accordance with solvent and casing manufacturer instructions. Particular attention shall be given to instructions pertaining to required setting time for joints to develop strength.

The following specifications for solvent cements and joints for PVC casing shall be met, including the latest revisions thereof:

- a. ASTM D2564, *Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.*
- b. ASTM D2855, *Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.*

Plastic casing or screen shall not be subjected to excessive stress during installation and shall not be driven into place. Care shall be taken to ensure that plastic casing and joints are not subjected to excessive heat from cement-based sealing material.

A specifically designed adapter shall be used to join plastic casing to metallic casing or screen."

Section 14. Well Development.

Section 14 (page 46 of Bulletin 74-81) has been revised as follows:

"Development, redevelopment, or reconditioning of a well shall be performed with care, by methods that will not damage the well structure or destroy natural barriers to the movement of poor quality water, pollutants, and contaminants.

Acceptable well development, redevelopment, or reconditioning methods include:

- Overpumping;
- Surging or swabbing by use of 'plungers';
- Surging with compressed air;
- Backwashing or surging by alternately starting and stopping a pump;
- Jetting with water;

- Introducing specifically-formulated chemicals into a well; and,
- Combinations of the above.

Hydraulic fracturing (hydrofracturing) is sometimes an acceptable well development and redevelopment method when properly performed. Good quality water shall be used in hydrofracturing. The water shall be disinfected prior to introduction into a well. Material used as 'propping' agents shall be free of pollutants and contaminants, shall be compatible with the use of a well, and shall be thoroughly washed and disinfected prior to placement in a well.

Development, redevelopment, or reconditioning by use of specially designed explosive charges is in some cases, another acceptable development method. Explosives shall be used with special care to prevent damage to the well structure and to any natural barriers to the movement of poor-quality water, pollutants, and contaminants. Explosives shall only be used by properly-trained personnel.

Wells subjected to chemicals or explosives during development, redevelopment, or reconditioning operations shall be thoroughly pumped to remove such agents and residues immediately after the completion of operations. Chemicals, water, and other wastes removed from the well shall be disposed of in accordance with applicable local, State, and federal requirements. The enforcing agency should be contacted regarding the proper disposal of waste."

Part III. Destruction of Wells

Section 21. Definition of "Abandoned" Well.

Section 21 (page 52 of Bulletin 74-81) has been revised as follows:

"A well is considered 'abandoned' or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use the well again. In accordance with Section 24400 of the California Health and Safety Code, the well owner shall properly maintain an inactive well as evidence of intention for future use in such a way that the following requirements are met:

- "(1) The well shall not allow impairment of the quality of water within the well and ground water encountered by the well.
- (2) The top of the well or well casing shall be provided with a cover, that is secured by a lock or by other means to prevent its removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. The cover shall be watertight where the top of the well casing or other surface openings to the well are below ground level, such as in a vault or below known levels of flooding. The cover shall be watertight if the well is inactive for more than five consecutive years. A pump motor, angle drive, or other surface feature of a well, when in compliance with the above provisions, shall suffice as a cover.
- (3) The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well.
- (4) The area surrounding the well shall be kept clear of brush, debris, and waste materials."

If a pump has been temporarily removed for repair or replacement, the well shall not be considered 'abandoned' if the above conditions are met. The well shall be adequately covered to prevent injury to people and animals and to prevent the entrance of foreign material, surface water, pollutants, or contaminants into the well during the pump repair period."

Section 23. Requirements for Destroying Wells.

Subsection A, Item 1 (page 53 of Bulletin 74-81) and Subsection B, Item 1, (page 54, of Bulletin 74-81) have been changed. The remainder of Section 23 is unchanged.

Subsection A, Item 1 has been revised as follows:

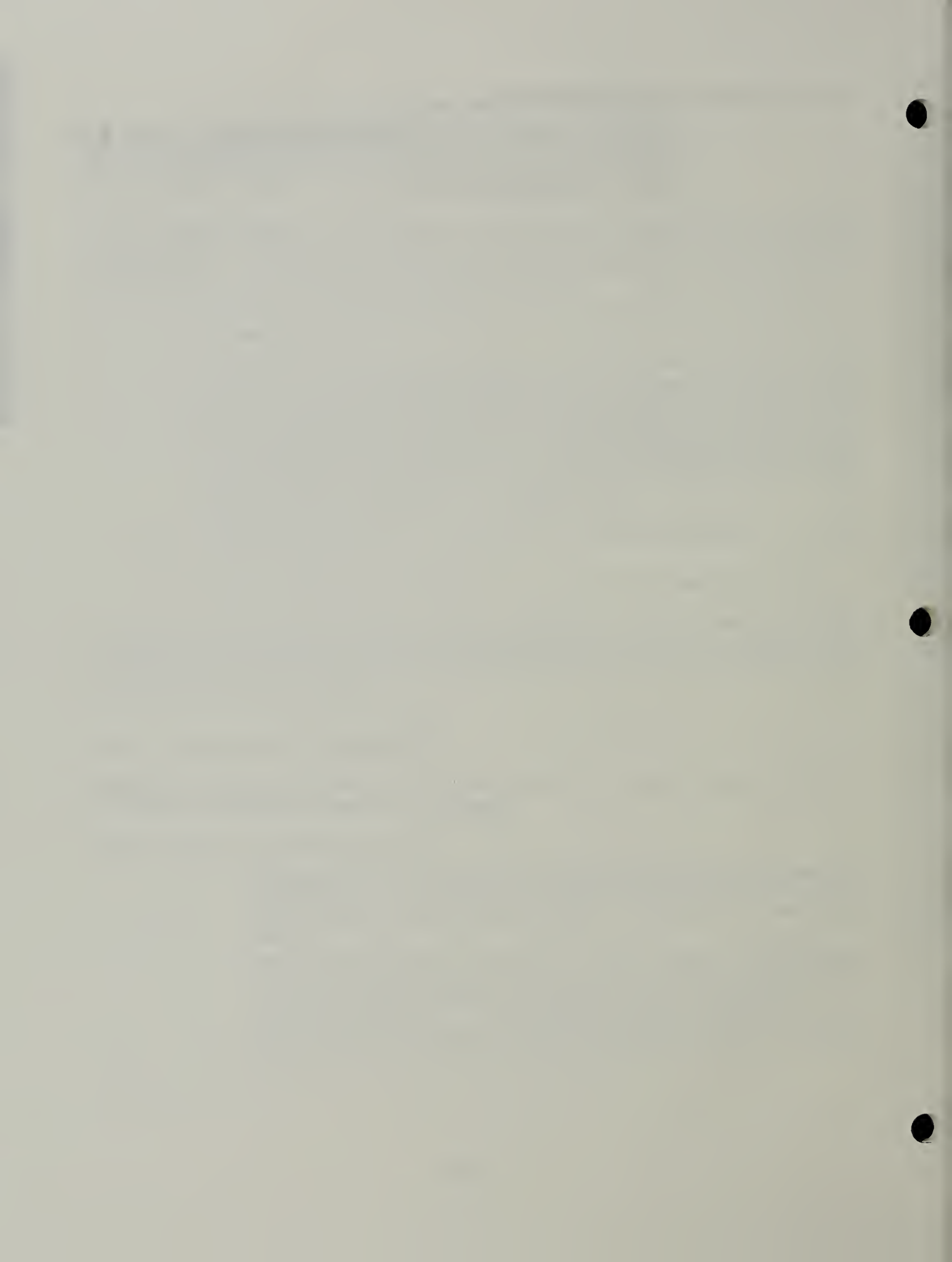
- "1. Obstructions. The well shall be cleaned, as needed, so that all undesirable materials, including obstructions to filling and sealing, debris, oil from oil-lubricated pumps, or pollutants and contaminants that could interfere with well destruction are removed for disposal.

The enforcing agency shall be notified as soon as possible if pollutants and contaminants are known or suspected to be in a well to be destroyed. Well destruction operations may then proceed only at the approval of the enforcing agency.

The enforcing agency should be contacted to determine requirements for proper disposal of materials removed from a well to be destroyed."

Subsection B, Item 1 has been revised as follows:

- "1. Wells situated in unconsolidated material in an unconfined ground water zone. In all cases the upper 20 feet of the well shall be sealed with suitable sealing material and the remainder of the well shall be filled with suitable fill, or sealing material. (See Figure 9A, page 55 of Bulletin 74-81.)"



MONITORING WELLS



MONITORING WELL STANDARDS

INTRODUCTION

Ground water monitoring wells are principally used for observing ground water levels and flow conditions, obtaining samples for determining ground water quality, and for evaluating hydraulic properties of water-bearing strata. Monitoring wells are sometimes referred to as "observation wells."

The quality of water intercepted by a monitoring well can range from drinking water to highly polluted water. In contrast, production or "water wells" are usually designed to obtain water from productive zones containing good-quality water.

The screen or perforated section of a monitoring well usually extends only a short length to obtain water from, or to monitor conditions within, an individual water-bearing unit or zone. Water wells are often designed to obtain water from multiple water-bearing strata. Although there are usually differences between the design and function of monitoring wells and water wells, water wells sometimes are used as monitoring wells, and vice versa.

Monitoring wells, along with other types of wells, can provide a pathway for the movement of poor-quality water, pollutants, and contaminants. Because monitoring wells are often purposely located in areas affected by pollutants and contaminants, they pose an especially significant threat to ground water quality if they are not properly constructed, altered, maintained, and destroyed.

The California Legislature amended the California Water Code in 1986 specifically to include requirements for monitoring well standards. Monitoring wells were previously assumed by the Department to be covered by the collective term "well" in the law.

History of Monitoring Wells

Monitoring wells were first used mainly for water level measurement. These wells were often referred to as piezometers in reference to the "piezometric surface" of ground water. In recent years, the term "piezometric surface" is often replaced by "potentiometric surface." However, the term "piezometer" is still sometimes used for monitoring wells installed only for water level measurement.

Many water level monitoring wells constructed in the past were relatively large in diameter in comparison to today's monitoring wells. Wells up to 10-inches in diameter were often constructed to accommodate various means of water level measurement, including floats for mechanically-operated, continuous water level recorders. Many inactive water wells that could accommodate mechanical water level recording equipment were used as monitoring wells.

Modern electronic water level measuring and recording devices now allow for small-diameter water-level monitoring wells. Some continuous water-level measurement devices can be used in wells less than 2-inches in inside diameter.

The use of monitoring wells for ground water sampling for chemical analysis has increased significantly in the past two decades. The following factors have all served to increase the frequency and scope of ground water quality investigations and the number of monitoring wells constructed:

- Advances in analytical and environmental chemistry;
- Increased knowledge of the adverse effects of chemicals on humans;
- Public awareness of ground water pollution;
- The advent of federal ground water quality protection legislation in the 1970s, and,
- Statutes relating to ground water quality enacted by the California Legislature.

Since the 1970s an entire industry has developed around ground water quality monitoring and monitoring well construction. Numerous private firms are involved in providing technical services for the design and implementation of ground water quality investigations. Many firms are involved in the manufacture, distribution, and marketing of materials and equipment used in constructing and operating monitoring wells.

Most monitoring wells constructed today are used to assess:

- The nature and distribution of pollutants and contaminants in ground water;
- The nature and distribution of naturally occurring chemical constituents;
- Subsurface hydrologic conditions; and,
- Hydraulic properties of strata as they relate to pollutant and contaminant movement.

Some monitoring wells are designed to be multipurpose. Monitoring wells can sometimes be used as "extraction" or "injection" wells for mitigation of pollution or contamination.

Although a significant number of monitoring wells constructed today are for detection and assessment of ground water quality impairment, many monitoring wells are constructed for evaluating ground water supply conditions by allowing ground water level measurement and/or aquifer testing. Still others are constructed for observing water levels associated with excavations and irrigated agriculture.

During 1989, approximately 20 percent of all well drilling in California was for monitoring wells, based on well driller's reports received by the Department of Water Resources. Monitoring wells have been constructed in nearly all California counties. The largest concentrations of water quality monitoring wells occur in metropolitan areas of the State. Large numbers of monitoring wells are installed for detection and assessment of leaks from underground storage tanks.

Types of Monitoring Wells

For the purpose of these standards, the term "monitoring well" is limited to wells designed to monitor subsurface water in the saturated zone, existing at or above atmospheric pressure (ground water); rather than water, water vapor, and/or gases contained in the unsaturated or vadose zone. Monitoring devices used for the unsaturated zone differ significantly from those used for the saturated (ground water) zone.

As shown in Figure 2, three basic types of monitoring wells or "installations" are:

- Individual monitoring wells;
- Nested monitoring wells; and,
- Clustered monitoring wells.

Individual monitoring wells consist of a single casing "string" within a borehole, as illustrated in Figures 2 and 3. Individual monitoring wells are installed in unique locations apart from one another. They are the most common type of monitoring well constructed in California.

Figure 2. MONITORING WELL TYPES

(NOTE: Schematic, not to scale)

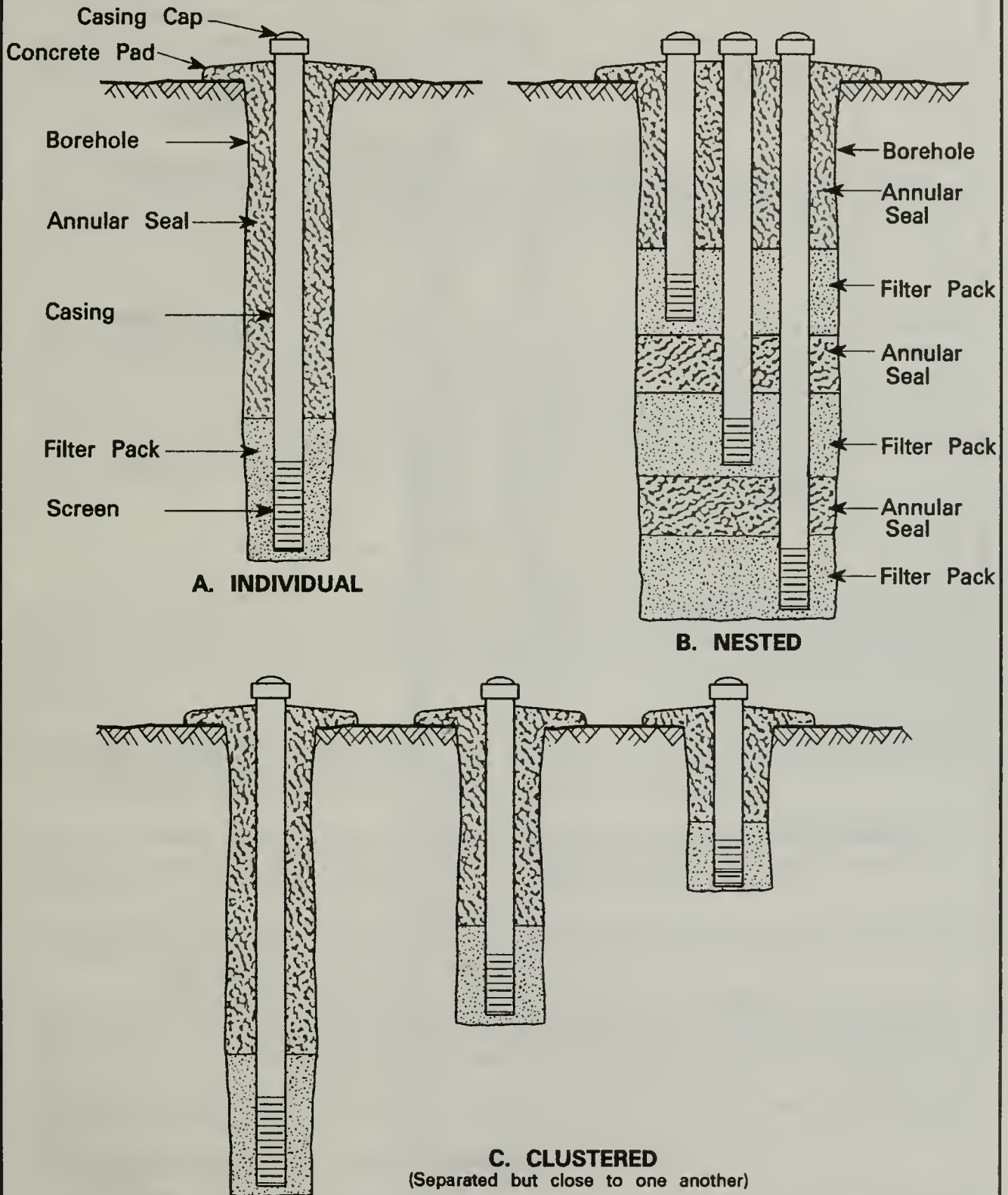
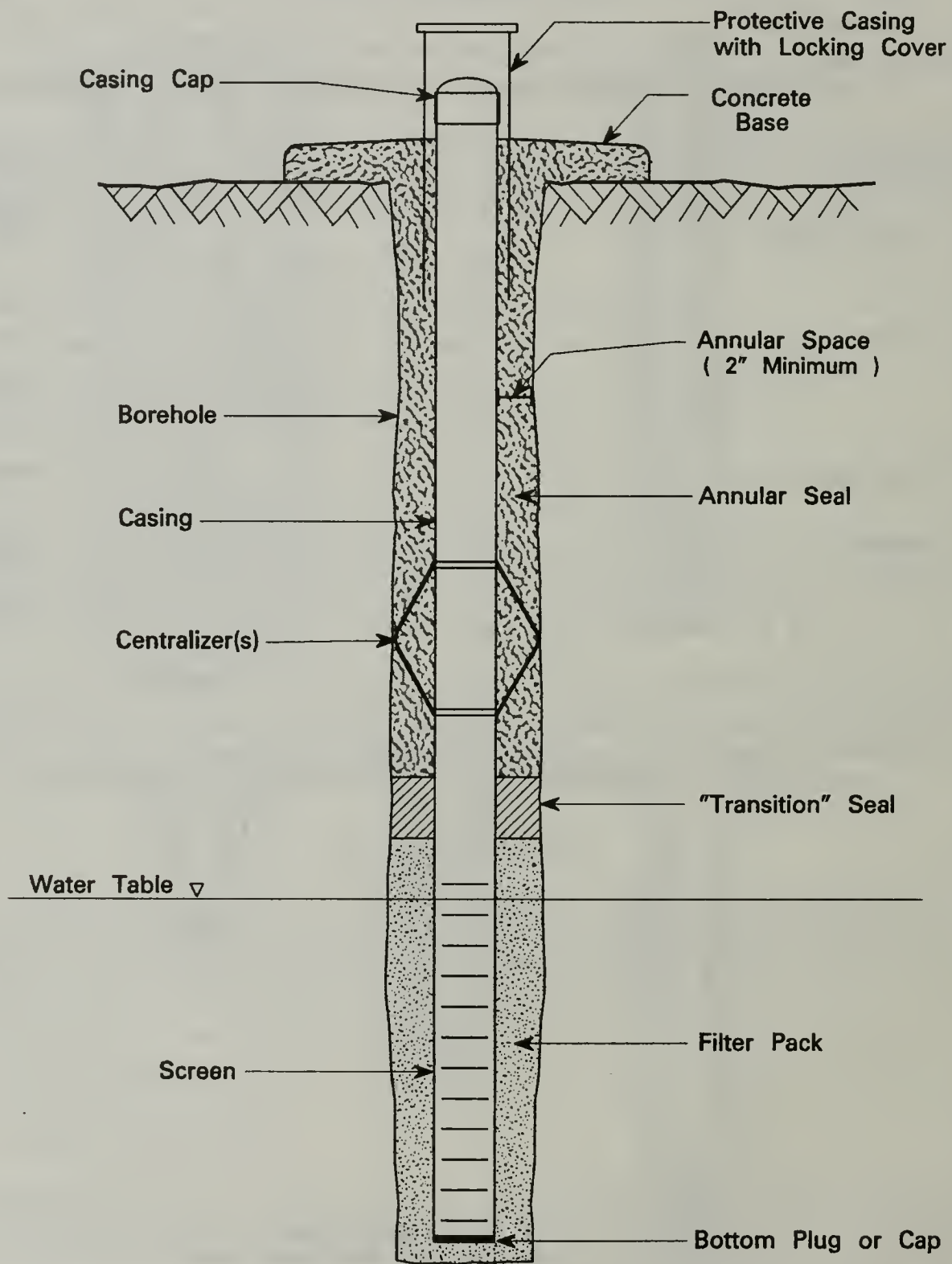


Figure 3. CROSS SECTION OF A TYPICAL MONITORING WELL

(NOTE: Schematic, not to scale)



Nested monitoring wells consist of two or more casing strings within the same borehole. Normally the screened interval of each casing string is designed to obtain water from different aquifers or water-bearing zones. The purpose of a nested monitoring well is much the same as clustered monitoring wells.

Clustered monitoring wells consist of individual monitoring wells situated close together, but not in the same borehole. The wells within a cluster are normally constructed to obtain water from different aquifers or water-bearing zones. Clustered wells are most often used for monitoring ground water conditions at various depths in roughly the same area.

A nested monitoring well can be difficult to construct because of multiple casings within the same borehole. Care is required during construction to ensure water-bearing zones for each casing string are hydraulically isolated from one another and the annular seals are effective. Some regulatory agencies may prohibit the use of nested monitoring wells for certain contamination or pollution investigations. Normally this can be due to uncertainties about whether water-bearing strata can be isolated and whether the annular seals in a nested well are always effective.

Individual casing strings for the various types of monitoring wells discussed above, are sometimes designed to obtain water from more than one aquifer or water-bearing unit. These casing strings usually have multiple intervals of openings or screen. Such well casing strings, often referred to as "multi-level monitoring wells," can sometimes serve as a preferential pathway for the movement of poor quality water, pollutants, and contaminants from one unit to another. Some regulatory agencies prohibit the use of multi-level monitoring wells for certain pollution or contamination investigations out of concern for water quality protection and data quality requirements.

Authority and Responsibilities of Other Agencies

As discussed above, Congress enacted major legislation dealing with ground water quality protection during the 1970s. Regulatory programs initiated by federal legislation, such as the Resources Conservation and Recovery Act (RCRA) and its amendments, are administered by the U. S. Environmental Protection Agency. Some administration and enforcement activities related to federal legislation have been delegated to California State agencies.

The California Legislature enacted legislation expanding efforts for ground water quality protection in California beyond federal requirements. The Legislature assigned several State agencies various responsibilities for investigation, mitigation, and control of ground water pollution and contamination.

The lead enforcement agency for most ground water quality protection issues in California is the State Water Resources Control Board (State Board) and the nine California Regional Water Quality Control Boards (Regional Boards). The State Board oversees the activities of the nine regional boards.

The Department of Health Services or, under some circumstances, the U. S. Environmental Protection Agency, is the lead enforcement agency for ground water quality issues related to hazardous wastes.

The EPA, the Department of Health Services, and the State Board have adopted regulations or standards establishing monitoring requirements for "waste facilities". These regulations or standards include requirements for design and performance of monitoring wells that are often more stringent than standards in this bulletin.

Other State government organizations concerned or directly involved with ground water quality assessment or protection in California include:

- Department of Conservation, Division of Oil and Gas,

- Department of Food and Agriculture,
- Integrated Waste Management Board, and,
- Department of Water Resources.

California cities, counties, and local water agencies are also involved with ground water quality assessment and protection.

The Division of Oil and Gas has authority and responsibility for geothermal wells and other special wells constructed in the State's Geothermal Resources Areas (pursuant to Chapter 4, Division 3, California Public Resources Code). Shallow wells drilled for geothermal observation are subject to regulations and standards established by DOG.

After July 17, 1991 the California Environmental Protection Agency will oversee the activities of the State Water Resources Control Board and the Integrated Waste Management Board. Some of the environmental protection activities of the Department of Health Services and the Department of Food and Agriculture will also come under the California Environmental Protection Agency.

Scope, Organization, and Limitations of Standards

Certain standards that apply to water wells also apply to monitoring wells. Therefore the Monitoring Well Standards refer frequently to the Water Well Standards. Standards that apply only to monitoring wells, or that require emphasis, are discussed in detail in the Monitoring Well Standards. The Monitoring Well Standards are arranged in a format similar to the Water Well Standards.

These standards are not intended as a complete manual for monitoring well construction, alteration, maintenance, and destruction. These standards serve only as minimum statewide guidelines towards ensuring that monitoring wells do not constitute a significant pathway for the movement of poor quality water, pollutants, or contaminants. These standards provide no assurance that a monitoring well will perform a desired function. In most cases ground water monitoring practices and monitoring well performance, or functional requirements, fall under the purview of the various agencies mentioned earlier. *Ultimate responsibility for the design and performance of a monitoring well rests with the well owner and/or the owner's contractor, and/or technical representative(s).*

STANDARDS

Part I. General

Section 1. Definitions¹.

- A. Monitoring Well. The term "monitoring well" is defined in Section 13712 of the California Water Code as:
- "...any artificial excavation by any method for the purpose of monitoring fluctuations in groundwater levels, quality of underground waters, or the concentration of contaminants in underground waters."
- B. Exploration Hole (or Boring). An uncased temporary excavation whose purpose is the immediate determination of hydrologic conditions at a site.
- C. Enforcing Agency. An agency designated by duly authorized local, regional, or State government to administer and enforce laws or ordinances pertaining to the construction, alteration, maintenance, and destruction of monitoring wells.

Section 2. Application to Well Type.

These standards apply to all types of monitoring wells, except as prescribed in Sections 3, 4, and 5, below. Before a change in use of a well is made, any standards for the new use must be complied with.

Section 3. Exemptions for Unusual Conditions.

Under certain circumstances the enforcing agency may waive compliance with these standards and prescribe alternate requirements. These standards may be waived where they are impractical or ineffective because of unusual conditions or would result in an unsatisfactory condition or well function. In waiving any of these standards the enforcing agency shall, if at all possible, require measures be implemented to provide the same or greater level of water-quality protection that would otherwise be provided by these standards.

Section 4. Exclusions.

Most standards in Part II, "Monitoring Well Construction," page 41, do not apply to "exploration holes." However, provisions of Section 7, "Reports," below and Part III, "Destruction of Monitoring Wells," page 50, do apply directly to exploration holes.

Exploration holes for determining suitability of on-site domestic sewage disposal that are less than 10 feet in depth are exempt from the reporting and destruction requirements of these standards.

Large volume excavations for determining the suitability of on-site domestic sewage disposal, such as backhoe trenches, that exceed ten feet in depth are exempt from the requirements of Part III of these standards. However, such excavations shall be backfilled with the excavated material or other suitable fill material and the backfill compacted in lifts to attain at least 90 percent relative compaction in order to restore physical conditions in the excavation as much as possible. If a layer or layers of material that serve to impede the

¹ Selected technical terms are defined in Appendix A, page 77.

movement of poor-quality water, pollutants and contaminants are penetrated by the excavation, they shall be reestablished to the degree possible to provide protection for underground waters, unless otherwise approved by the enforcing agency. In some cases it may be necessary to backfill all or a portion of the excavation with sealing material meeting these standards to reestablish natural barriers to the movement of poor-quality water, pollutants, and contaminants.

Section 5. Special Standards.

The enforcing agency may prescribe measures more stringent than standards presented here, where needed to protect public safety or protect water quality.

Section 6. Responsible Parties.

Pursuant to Section 13750.5 (Division 7, Chapter 10, Article 3) of the California Water Code; construction, alteration, and destruction of monitoring wells shall be performed by contractors licensed in accordance with the California Contractors' License Law (Division 3, Chapter 9, California Business and Professions Code), except where exempted by law. Construction, alteration, or destruction of monitoring wells to monitor hazardous waste facilities, other waste facilities, or underground storage tanks, shall be performed under the supervision of a California Registered Professional Engineer, California Registered Geologist, or California Certified Engineering Geologist, where specified by law.

Section 7. Reports.

Monitoring well construction, alteration, and destruction reports shall be completed on forms provided by the California Department of Water Resources. Other types of forms may be used for submission to the Department with the prior approval of the Department. The completed forms shall be submitted to the Department in accordance with relevant provisions of Sections 13750 through 13754 (Division 7, Chapter 10, Article 3) of the California Water Code. Information concerning completion and submission of well construction, alteration, and destruction reports is contained in *Guide to the Preparation of the Water Well Drillers Report*, Department of Water Resources, October 1977, or its latest revision.

Part II. Monitoring Well Construction

Section 8. Well Location With Respect to Pollutants and Contaminants, and Structures.

Monitoring wells are usually constructed to observe conditions at defined or required locations. Monitoring well locations are usually selected on the basis of known or expected hydrologic, geologic, and water quality conditions and the location of pollutant or contaminant sources. Monitoring wells frequently need to be located close to or within areas of pollution or contamination.

- A. Separation. Monitoring wells shall be located an adequate distance from known or potential sources of pollution and contamination, including those listed in Section 8 of the Water Well Standards, unless regulatory or legitimate data requirements necessitate they be located closer.
- B. Flooding and Drainage. Monitoring wells should be located in areas protected from flooding, if possible. Provisions for locating monitoring wells in areas of flooding and drainage are contained in Section 8 of the Water Well Standards.
- C. Accessibility. All monitoring wells shall be located an adequate distance from buildings and other structures to allow access for well maintenance, modification, repair, and destruction, unless otherwise approved by the enforcing agency.
- D. Disposal of Wastes When Drilling in Contaminated or Polluted Areas. Drill cuttings and wastewater from monitoring wells or exploration holes in areas of known or suspected contamination or pollution shall be disposed of in accordance with all applicable federal, State, and local requirements. The enforcing agency should be contacted to determine requirements for the proper disposal of cuttings and wastewater.

Section 9. Sealing the Upper Annular Space.

The space between the monitoring well casing and the wall of the well boring, usually referred to as the "annular space," shall be effectively sealed to prevent it from being a preferential pathway for the movement of poor quality water, pollutants, and contaminants. Since monitoring wells are often constructed to obtain water from discrete intervals, a secondary purpose of the annular seal can be to isolate the well intake section or screen to one water-bearing unit. The annular seal can also serve to protect the structural integrity of the well casing and to protect the casing from chemical attack and corrosion. Because monitoring wells are often located close to, or within areas affected by pollutants and contaminants, an effective annular seal is often critical for the protection of ground water quality.

General discussion of sealing methods and requirements for monitoring wells is contained in Section 9, Section 13, and Appendix B, of the Water Well Standards. Special requirements for monitoring wells include the following:

- A. Minimum Depth of Annular Seal.
 1. Water quality monitoring wells and monitoring wells constructed in areas of known or suspected pollution or contamination. The annular space shall be sealed from the top of the filter pack or monitoring zone to ground surface, unless otherwise approved by the enforcing agency. The top of the filter pack or monitoring zone shall not extend into another water-bearing unit above the single water-bearing unit being monitored unless otherwise approved by the enforcing agency. The filter pack or monitoring zone shall not extend into any confining layers that overlie or underlie the unit to be moni-

tored, unless otherwise approved by the enforcing agency. The annular surface seal shall be no less than 20 feet in length.

Seal lengths less than 20 feet are permissible only if shallow zones will be monitored and approval has been obtained from the enforcing agency. If possible, special protection shall be provided where a reduced-length seal is used, as described in Section 8 of the Water Well Standards.

2. Other Monitoring Wells. The upper annular seal shall extend from ground surface to a minimum depth of 20 feet. An annular seal less than 20 feet in length is permissible if provisions in Item 1, above, are followed.
3. Sealing Off Strata. Additional annular sealing material shall be placed below the minimum depth of the upper annular seal, as is needed, to prevent the movement of poor-quality water, pollutants, and contaminants through the well to zones of good-quality water. Requirements for sealing off zones are in Section 13 of the Water Well Standards.
4. Shallow Water Level Observation Wells. Water level observation wells less than 15 feet in total depth that are used to assess root zone drainage in agricultural areas are exempt from an annular surface seal requirement, unless otherwise required by the enforcing agency.
5. Areas of Freezing. The top of the annular seal may be below ground surface in areas where freezing is likely. Such areas include those listed in Section 9 of the Water Well Standards. The top of the annular seal shall not be more than 4 feet below ground surface. The remainder of the space above the seal may be made an integral part of a vault, in accordance with Section 10, Subsection E, page 45, below.
6. Vaults. At the approval of the enforcing agency, the top of the annular seal and well casing can be below ground surface where traffic or other conditions require. In no case shall the top of the annular seal be more than 4 feet below ground surface.

The top of the annular seal shall contact a suitable, watertight, structurally-sound subsurface vault, or equivalent feature, that encloses the top of the well casing in accordance with Section 10, Subsection E, page 45, below. The vault shall extend from the top of the annular seal to at least ground surface.

B. Sealing Conditions.

1. Temporary Conductor Casing. If "temporary" conductor casing is used during drilling, it shall be removed during the placement of the casing and annular seal materials, as described in Section 9 of the Water Well Standards. If the temporary conductor casing "cannot" be removed, as defined in Section 9 of the Water Well Standards, sealing material shall be placed between the conductor casing and borehole wall, and between the well casing and conductor casing, in accordance with methods described in Section 9 of the Water Well Standards. Sealing material shall extend to at least the depths specified in Subsection A of this section.
2. Permanent Conductor Casing. If a permanent conductor casing is to be installed, the monitoring well borehole diameter shall be at least 4 inches greater than the outside diameter of the conductor casing. The inner diameter of the permanent conductor

casing shall in turn be at least 4 inches greater than the outside diameter of the well casing.

Sealing material shall be placed between the permanent conductor casing and the borehole wall, and the conductor casing and the well casing. The sealing material shall extend to at least the depths specified in Subsection A of this section.

- C. Radial Thickness of Seal. A minimum of two inches of sealing material shall be maintained between all casings and the borehole wall, within the interval to be sealed, except as noted in Section 9 of the Water Well Standards. At least two inches of sealing material shall also be maintained between all "casings" in a borehole, within the interval to be sealed unless otherwise approved by the enforcing agency. Additional space shall be provided, where needed, to allow casings to be properly centralized and spaced and allow the use of a tremie pipe during well construction (if required), especially for deeper wells.
- D. Sealing Material. Sealing material shall consist of neat cement, sand-cement, or bentonite clay. Cement-based sealing material shall be used opposite fractured rock, unless otherwise approved by the enforcing agency. Concrete shall be used only with the approval of the enforcing agency.

Sealing material shall be selected based on required structural, handling, and sealing properties, and the chemical environment into which it is placed. Used drilling mud or cuttings from drilling shall not be used for any part of sealing material.

1. Water. Water used for sealing mixtures should generally be of drinking water quality, shall be compatible with the type of sealing material used, shall be free of petroleum and petroleum products, and shall be free of suspended matter. Good-quality water is necessary to ensure that sealing materials achieve proper consistency for placement and achieve adequate structural and sealing properties.

Nonpotable water can sometimes be used for preparing cement-based sealing materials. In no case shall the concentration of chloride in water used in cement-based sealing material exceed 2,000 milligrams per liter. Sulfate shall not exceed 1,500 mg/l.

Water used for sealing material shall be chemically analyzed if unknown. Only drinking-quality water of known composition should be used for preparing sealing mixtures for monitoring wells to be used for sensitive water-quality determinations.

2. Cement-Based Sealing Materials. Discussion and standards for cement-based sealing materials are contained in Section 9 of the Water Well Standards. Special considerations that apply to monitoring wells are:
 - a. Additives. Care should be exercised in the use of special additives for cement-based sealing materials, such as those used for modifying cement setting times. Some additives could interfere with sensitive water quality determinations.
 - b. Cooling Water. In the case of water quality monitoring wells, care should be exercised in the use of circulating cooling water to protect plastic casing from heat build-up during setting of cement-based sealing materials. Water introduced and/or circulated in a well for cooling could interfere with water quality determinations.
3. Bentonite-Based Sealing Materials. Discussion and standards for bentonite-based sealing materials are contained in Section 9 of the Water Well Standards.

- E. Transition Seal. A bentonite-based transition seal, up to 5 feet in length, is often placed in the annular space to separate filter pack and cement-based sealing materials. The transition seal can prevent cement-based sealing materials from infiltrating the filter pack. A short interval of fine-grain sand, usually less than 2 feet in length, is often placed between the filter pack and the bentonite transition seal to prevent bentonite from entering the filter pack. Also, fine sand is sometimes used in place of bentonite as the transition seal material.

Fine-grain forms of bentonite, such as granules and powder, are usually employed for a transition seal if a transition seal is to be placed above the water level in a well boring. Coarse forms of bentonite, such as pellets and chips, are often used where a bentonite transition seal is to be placed below the water level.

Transition seals should be installed by using a tremie pipe or equivalent. However, some forms of bentonite may tend to bridge or clog in a tremie pipe.

Bentonite can be placed in the well annulus in dry form or as slurry for transition seals. Water should be added to the bentonite transition seal prior to the placement of cement-based sealing materials where the bentonite is dry in the borehole. Care should be exercised during the addition of water to the borehole to prevent displacing the bentonite.

Water should be added to bentonite at a ratio of about 1 gallon for every 2 pounds of bentonite to allow for proper hydration. Water added to bentonite for hydration or to make a slurry shall be of suitable quality and free of pollutants and contaminants.

Sufficient time should be allowed for bentonite transition seals to properly hydrate before cement-based sealing materials are placed. Normally, 1/2 to 1 hour is required for hydration to occur. Actual time of hydration is a function of site conditions.

The top of the transition seal shall be sounded to ensure that no bridging occurred during placement.

- F. Placement of Annular Seal Material. All loose cuttings and other obstructions shall be removed from the annular space before sealing materials are placed. Sealing may be accomplished by using pressure grouting techniques, a tremie pipe, or equivalent. Sealing materials shall be installed as soon as possible during well construction operations. Sealing materials shall not be installed by "free-fall" from the surface unless the interval to be sealed is dry and less than 30 feet deep.

Casing spacers shall be used within the interval(s) to be sealed to separate individual well casing strings from one another in a borehole of a nested monitoring well. The spacers shall be placed at intervals along the casing to ensure a minimum separation of 2 inches between individual casing strings. Spacers shall be constructed of corrosion-resistant metal, plastic, or other non-degradable material. Wood shall not be used as spacer material.

Any metallic component of a spacer used with metallic casing shall consist of the same material as the casing. Metallic spacer components shall meet the same metallurgical specifications and standards as the casing to reduce the potential for galvanic corrosion of the casing.

The spacing of casing spacers is normally dictated by casing materials used, the orientation and straightness of the borehole, and the method used to install the casing. Spacers shall not be more than 12 inches in length and shall not be placed closer than 10 feet apart along a casing string within the interval to be sealed, unless otherwise approved by the enforcing agency.

Casing spacers shall be designed to allow the proper passage and distribution of sealing material around casing(s) within the interval(s) to be sealed.

Additional discussion and standards for placement of the annular seal are contained in Section 9, Section 13, and Appendix B of the Water Well Standards.

Section 10. Surface Construction Features.

Surface construction features of a monitoring well shall serve to prevent physical damage to the well; prevent entrance of surface water, pollutants, and contaminants; and prevent unauthorized access.

- A. Locking Cover. The top of a monitoring well shall be protected by a locking cover or equivalent level of protection to prevent unauthorized access.
- B. Casing Cap. The top of a monitoring well casing shall be fitted with a cap or "sanitary seal" to prevent surface water, pollutants, or contaminants from entering the well bore. Openings or passages for water level measurement, venting, pump power cables, discharge tubing, and other access shall be protected against entry of surface water, pollutants, and contaminants.
- C. Flooding. The top of the well casing shall terminate above ground surface and known levels of flooding, except where site conditions, such as vehicular traffic, will not allow.
- D. Bases. Unless otherwise approved by the enforcing agency, a concrete base or pad shall be constructed around the top of a monitoring well casing at ground surface and contact the annular seal, unless the top of the casing is below ground surface as provided by Subsection E, below. The base shall be at least 4 inches thick and shall slope to drain away from the well casing. The base shall extend at least two feet laterally in all directions from the outside of the well boring, unless otherwise approved by the enforcing agency.

The base shall be free of cracks, voids, and other significant defects likely to prevent water tightness. Contacts between the base and the annular seal, and the base and the well casing must be water tight and must not cause the failure of the well casing or annular seal.

Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the enforcing agency.

- E. Vaults. At the approval of the enforcing agency, the top of the well casing may be below ground surface because of traffic or other critical considerations. A structurally-sound watertight vault, or equivalent feature, shall be installed to house the top of a monitoring well that is below ground surface. The vault shall extend from the top of the annular seal to at least ground surface. In no case shall the top of the annular seal be more than 4 feet below ground surface.

The vault shall contact the annular seal in a manner to form a watertight and structurally sound connection. Contacts between the vault and the annular seal, and the vault and the well casing, if any, shall not fail or cause the failure of the well casing or annular seal.

Where cement-based annular seal materials are used, the vault shall be set into or contact the annular seal material before it sets, unless otherwise approved by the enforcing agency. If bentonite-based sealing material is used for the annular seal, the vault should be set into the bentonite before it is fully hydrated.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation. Bentonite-based sealing material may be used between the vault and excavation at the approval of the enforcing agency.

Sealing material surrounding a vault shall extend from the top of the annular seal to ground surface, unless precluded in areas of freezing. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the sealing material shall be placed in a "continuous pour." In other words, cement-based sealing material shall be placed between the vault and excavation and contact the cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight but shall allow the venting of gases, unless otherwise approved by the enforcing agency. The lid shall be fitted with a security device to prevent unauthorized access. The lid shall be clearly and permanently marked "MONITORING WELL." The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at or above grade so drainage is away from the vault. The top of the well casing contained within the vault shall be covered in accordance with requirements under Subsections A and B, above, so that water, contaminants, or pollutants that may enter the vault will not enter the well casing.

- F. Protection From Vehicles. Protective steel posts, or the equivalent, shall be installed around a monitoring well casing where it is terminated above ground surface in areas of vehicular traffic. The posts shall be easily seen and shall protect the well from vehicular impact.

Additional requirements for surface construction features are in Section 10 of the Water Well Standards.

Section 11. Filter Pack.

Monitoring well filter pack material shall consist of nonreactive, smooth, rounded, spherical, granular material of highly uniform size and known composition. Filter pack material shall not degrade or consolidate after placement. The grain-size of the filter pack shall be matched to the slot size of the well screen so that any movement of filter pack material into the well will be limited to prevent significant voids in the filter pack that could ultimately destabilize the annular seal.

Filter pack material shall be obtained from clean sources. Filter pack material should be washed and properly packaged for handling, delivery, and storage, if used in monitoring wells constructed for sensitive water quality determinations.

Care should be exercised in the storage of filter pack materials at a drilling site to ensure the material does not come into contact with pollutants or contaminants. Care should also be exercised to prevent the introduction of foreign substances, such as clay or vegetative matter, that might interfere with the placement and function of the filter pack.

Filter pack material shall be placed in the well boring by use of a tremie pipe or equivalent. The depth of the top of the filter pack shall be carefully checked and the volume of emplaced filter pack material verified to determine that filter pack materials have not bridged during installation.

Section 12. Casing.

The term "casing" in its broadest sense includes all tubular materials that are permanent features of a well. Screens, collars, risers, liners, and blank casing in monitoring wells maintain the well bore and provide a passage for ground water level measurement and/or sample-collection devices.

Protective casing serves to prevent accidental or intentional damage to a well. Protective casing normally consists of heavy gauge metallic pipe placed over the portion of the well casing that extends above ground surface.

Conductor casing usually functions as a temporary means of shoring the walls of a well boring to allow drilling and the placement of well construction materials. If used, temporary conductor casing is usually driven into place during drilling and is withdrawn at the same time filter pack and annular seal materials are installed around the well casing. Sometimes conductor casing is left in place and is made a permanent feature of the completed well structure. Requirements for sealing permanent conductor casing in place are contained in Section 9.

For the purpose of these standards, the term "casing" applies to screens, collars, risers, and blank casing, and other specialized products used to maintain the well bore. General discussion and standards for casing materials are contained in Section 12 of the Water Well Standards. Special considerations that apply to monitoring well casing are described below:

A. Casing Material.

1. Chemical Compatibility. Special consideration shall be given to the selection of casing materials for monitoring wells installed in environments that are chemically "hostile". The selected casing shall resist chemical attack and corrosion.

Special consideration should be given to the selection of casing materials for wells to be used for sensitive water-quality determinations. Chemical interaction between casing materials and pollutants, contaminants, ground water, filter pack material, and geologic materials could bias ground-water quality determinations.

2. Used Casing. Used casing may be acceptable in certain cases, at the approval of the enforcing agency.
3. Plastic and Steel Casing. Plastic and steel well casing materials are commonly used for monitoring wells. The principal plastics used for water-quality monitoring wells are thermoplastics and fluorocarbon resins.

Standards for thermoplastic well casing are in Section 12 of the Water Well Standards. The principal thermoplastic material used for water quality monitoring wells is polyvinyl chloride (PVC).

Fluorocarbon casing materials include fluorinated ethylene propylene (FEP) and polytetrafluoroethylene (PTFE). Fluorocarbon resin casing materials are generally considered immune to chemical attack. Fluorocarbon casing materials shall meet the following specifications, including the latest revisions thereof:

- a. ASTM D3296, *Standard Specification for FEP-Fluorocarbon Tube.*
- b. ASTM D3295, *Standard Specifications for PTFE Tubing.*

Stainless steel is the most common form of metallic casing used in monitoring wells constructed for sensitive water quality determinations. Stainless steel casing shall meet the provisions of ASTM A312, *Standard Specification for Seamless and Welded Austenitic Stainless Pipe*, and shall meet general requirements for tubular steel products in Section 12 of the Water Well Standards.

- B. Multiple Screens. Monitoring well casing strings shall not have openings in multiple water-bearing units (multi-level monitoring wells), if poor-quality water, pollutants, or contaminants in units penetrated by the well could pass through the openings and move to other units penetrated by the well and degrade ground water quality, unless otherwise approved by the enforcing agency.
- C. Bottom Plugs. The bottom of a monitoring well casing shall be plugged or capped to prevent sediment or rock from entering the well.
- D. Casing Installation. Discussion and standards for the installation of casing materials are in Section 12 of the Water Well Standards. Special considerations for monitoring wells are:
 - 1. Cleanliness. Casing, couplings, centralizers, and other components of well casing shall be clean and free of pollutants and contaminants at the time of installation.
 - 2. Joining Plastic Casing. Depending on the type of material and its fabrication, plastic casing shall be joined (threaded or otherwise coupled) in a manner that ensures its water tightness. Organic solvent welding cements or glues should not be used for joining plastic casing if glues or cement compounds could interfere with water-quality determinations.
 - 3. Impact. Casing shall not be subjected to significant impact during installation that may damage or weaken the casing.

Section 13. Well Development.

Monitoring well development, redevelopment, and reconditioning shall be performed with care so as to prevent damage to the well and any strata surrounding the well that serve to restrict the movement of poor-quality water, pollutants, and contaminants. Development, redevelopment, and reconditioning operations shall be performed with special care where a well has been constructed in an area of known or suspected pollution or contamination. Such special care is necessary to prevent the spread of pollutants and contaminants in the environment and to protect public health and safety.

Water, sediment, and other waste removed from a monitoring well for "development" operations shall be disposed of in accordance with applicable federal, State, and local requirements. The enforcing agency should be contacted concerning the proper disposal of waste from development operations.

Appropriate methods of well development vary with the type and use of a monitoring well. Development methods that may be acceptable under certain circumstances include:

- A. Mechanical Surging. Plungers, bailers, surge blocks, and other surging devices shall incorporate safety valves or vents to prevent excessive pressure differentials that could damage casing or screen.

- B. Overpumping and Pump Surging. Overpumping and surging may not be suitable for development of wells producing large amounts of sediment because of the potential for clogging or jamming of pumps.
- C. Air Development. Some air development methods are not acceptable for monitoring wells to be used for sensitive water-quality determinations.
- D. Water Jetting. Water used in jetting operations shall be free of pollutants and contaminants. Water-jetting methods are not always acceptable for monitoring wells used for sensitive water-quality determinations.
- E. Chemical Development. Extreme care shall be exercised in the use of chemicals for monitoring well development. It is often unacceptable to use chemicals for developing monitoring wells to be used for water-quality determinations. Chemicals introduced for development shall be completely removed from the well, filter pack, and water-bearing strata accessed by the well immediately after development operations are completed.

The various methods described above are sometimes used in combination.

Section 14. Rehabilitation and Repair of Monitoring Wells.

For the purpose of these standards, "well rehabilitation" includes the treatment of a well to recover loss in yield caused by incrustation or clogging of the screen, filter pack, and/or water-bearing strata adjoining the well. Well rehabilitation methods that may, in certain cases, be acceptable for monitoring wells include mechanical surging, backwashing or surging by alternately starting or stopping a pump, surging with air, water jetting, sonic cleaning, chemical treatment, or combinations of these.

Rehabilitation methods shall be performed with care to prevent damage to the well and any barriers that serve to restrict the movement of poor-quality water, pollutants, or contaminants. Chemicals used for rehabilitation shall be completely removed from the well, filter pack, and water-bearing strata accessed by the well immediately after rehabilitation operations are completed. Chemicals, water, and other waste shall be disposed of in accordance with applicable federal, State, and local requirements. The enforcing agency should be contacted regarding the proper disposal of waste from rehabilitation operations.

Rehabilitation methods should be compatible with the use of the monitoring well. Special care should be given to the selection of rehabilitation methods for water-quality monitoring wells.

Materials used for repairing well casing shall meet the requirements of Section 12 of these standards.

Section 15. Temporary Cover.

The well or borehole opening and any associated excavations shall be covered at the surface to ensure public safety and to prevent the entry of foreign material, water, contaminants, and pollutants whenever work is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

Part III. Destruction of Monitoring Wells

Section 16. Purpose of Destruction.

A monitoring well or exploration hole subject to these requirements that is no longer useful, permanently inactive or "abandoned" must be properly destroyed to:

- (1) Ensure the quality of ground water is protected, and,
- (2) Eliminate a possible physical hazard to humans and animals.

Section 17. Definition of "Abandoned" Monitoring Well.

A monitoring well is considered "abandoned" or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use the well again. In some cases regulatory agencies may require that an inactive monitoring well be maintained for future use.

In accordance with Section 24400 of the California Health and Safety Code, the monitoring well owner shall properly maintain an inactive well, as evidence of intention for future use, in such a way that the following requirements are met:

- "(1) The well shall not allow impairment of the quality of water within the well and ground water encountered by the well.
- (2) The top of the well or well casing shall be provided with a cover, that is secured by a lock or by other means to prevent its removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. The cover shall be watertight where the top of the well casing or other surface openings to the well are below ground level, such as in a vault or below known levels of flooding. The cover shall be watertight if the well is inactive for more than five consecutive years. A pump motor, angle drive, or other surface feature of a well, when in compliance with the above provisions, shall suffice as a cover.
- (3) The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well.
- (4) The area surrounding the well shall be kept clear of brush, debris, and waste materials."

Section 18. General Requirements.

All permanently inactive or "abandoned" monitoring wells and exploration holes subject to these requirements shall be properly destroyed. The purposes of destruction are to eliminate the well structure and borehole as a possible means for the preferential migration of poor-quality water, pollutants, and contaminants; and, to prevent a possible hazard to humans and animals.

Section 19. Requirements for Destroying Monitoring Wells and Exploration Holes.

General requirements for destroying monitoring wells and exploration holes are contained in Section 23 of the Water Well Standards. Special considerations for monitoring wells and exploration holes are as follows.

A. Monitoring Wells. Monitoring wells shall be destroyed in accordance with the following requirements and Section 23 of the Water Well Standards, irrespective of their original date of construction.

1. Preliminary Work. A monitoring well shall be investigated before it is destroyed to determine its condition and details of its construction. The well shall be sounded immediately before it is destroyed to make sure no obstructions exist that will interfere with filling and sealing.

The well shall be cleaned before destruction as needed so that all undesirable materials, including obstructions to filling and sealing, debris, oil from oil-lubricated pumps, or pollutants and contaminants that could interfere with well destruction, are removed for disposal.

The enforcing agency shall be notified as soon as possible if pollutants or contaminants are known or suspected to be present in a well to be destroyed. Well destruction operations may then proceed only at the approval of the enforcing agency. The enforcing agency should be contacted to determine requirements for proper disposal of all materials removed from a well to be destroyed.

2. Sealing Conditions. The following minimum requirements shall be followed when various conditions are encountered.

a. The monitoring well casing, and any other significant voids within the well, shall, at a minimum, be completely filled with sealing material, if the following conditions exist:

- The monitoring well is located in an area of known or potential pollution or contamination, and,
- The well was constructed and maintained in accordance with these standards.

Sealing material may have to be placed under pressure to ensure that the monitoring well is properly filled and sealed.

b. A monitoring well shall be destroyed by removing all material within the original borehole, including the well casing, filter pack, and annular seal; and the created hole completely filled with appropriate sealing material, if the following conditions exist:

- The well is located in an area of known or potential pollution or contamination, and,
- The well's annular seal, casing, screen, filter pack, or other components were not constructed or maintained according to these standards so that well destruction by merely filling the well casing with sealing material, as in "a" above, would not prevent potential water-quality degradation from

the movement of poor-quality water, pollutants, or contaminants through the destroyed well structure.

Material to be extracted from the original borehole shall be removed by means of drilling, including overdrilling, if necessary. The enforcing agency should be contacted to determine requirements for proper disposal of removed materials.

Casing, filter pack, and annular seal materials may be left in place during sealing operations, if the enforcing agency agrees they cannot or should not be removed. In such a case, appropriate sealing material shall be placed in the well casing, filter pack, and all other significant voids within the entire well boring. Casing left in place may require perforation or puncturing to allow proper placement of sealing materials. Sealing material may have to be applied under pressure to ensure its proper distribution.

- c. **Monitoring wells shall, at a minimum, be destroyed in accordance with the requirements of Section 23 of the Water Well Standards if located in an area free of any known or potential contamination or pollution.**

- B. **Exploratory Borings.** Exploratory borings shall be completely filled with appropriate sealing material from bottom to top, if located in areas of known or suspected contamination or pollution. Borings located outside such areas shall, at a minimum, be filled with sealing material from ground surface to the minimum depths specified in Section 23 of the Water Well Standards. Additional sealing material shall be placed below the minimum surface seal where needed to prevent the interchange of poor-quality water, pollutants, or contaminants between strata penetrated by the boring.

Appropriate fill or sealing material shall be placed below and between intervals containing sealing material. Sealing material is often economical to use as fill material.

The boring shall be inspected immediately prior to filling and sealing operations. All obstructions and pollutants and contaminants that could interfere with filling and sealing operations shall be removed prior to filling and sealing. The enforcing agency shall be notified as soon as possible if pollutants or contaminants are known or suspected to be in a boring to be destroyed. Well destruction operations may then proceed only at the approval of the enforcing agency. The enforcing agency should be contacted to determine requirements for proper disposal of removed materials.

- C. **Placement of Material.** The placement of sealing material for monitoring wells and exploratory borings is generally described in Section 23 and Appendix B of the Water Well Standards. The following additional requirements shall be observed when placing sealing material for monitoring well or exploratory boring destruction.

1. **Placement Method.** The well or exploratory boring shall be filled with appropriate sealing, and fill material where allowed, using a tremie pipe or equivalent, proceeding upward from the bottom of the well or boring.

Sealing material shall be placed by methods (such as the use of a tremie pipe or equivalent) that prevent freefall, bridging, and dilution of sealing materials, and/or prevent separation of aggregate from sealants. Sealing material may be placed by

freefall only where the interval to be sealed is dry and no more than 30 feet in depth. Fill material shall be placed by methods that prevent bridging and voids.

2. Timing of Placement. Sealing material shall be placed in one continuous operation (or "pour") from the bottom to the top of the well or boring, unless conditions in the well or boring dictate that sealing operations be conducted in a staged manner, and prior approval is obtained from the enforcing agency.
 3. Ground Water Flow. Special care shall be used to restrict the flow of ground water into a well or boring while placing sealing and fill material, if subsurface pressure producing the flow is significant.
 4. Sealing Pressure. Pressure required for the placement of cement-based sealing materials shall be maintained long enough for cement-based sealing materials to properly set.
 5. Verification. It shall be verified that the volume of sealing and fill material placed during destruction operations equals or exceeds the volume to be filled and sealed. This is to help determine whether the well or boring has been properly destroyed and that no jamming or bridging of the fill or sealing material has occurred.
- D. Sealing and Fill Materials. Materials used for sealing exploratory borings and monitoring wells shall have low permeabilities so that the volume of water and possible pollutants and contaminants passing through them will be of minimal consequence. Sealing material shall be compatible with the chemical environment into which it is placed, and shall have mechanical properties consistent with present and future site uses.

Suitable sealing materials include neat cement, sand-cement, and bentonite, all of which are described in Section 9 of these standards. Bentonite shall not be used as a sealing material opposite zones of fractured rock, unless otherwise approved by the enforcing agency. Drilling mud or drill cuttings are not acceptable as any part of sealing material for well destruction. Concrete may be used as a sealing material at the approval of the enforcing agency.

Fill material, if any, shall meet the requirements of Section 23 of the Water Well Standards. Fill material shall be free of pollutants and contaminants and shall not be subject to decomposition or consolidation after placement. Drilling mud or cuttings are not acceptable as any part of fill material.

- E. Additional Requirements for Monitoring Wells and Exploratory Borings in Urban Areas. The following additional requirements shall be met for destroying monitoring wells and exploratory borings in urban areas, unless otherwise approved by the enforcing agency:
1. The upper surface of the sealing material shall end at a depth of 5 feet below ground surface; and,
 2. If the well casing was not extracted during destruction and sealing operations, a hole shall be excavated around the well casing to a depth of 5 feet below ground surface after sealing operations have been completed and the sealing material has adequately set and cured. The exposed well casing shall then be removed by cutting the casing at the bottom of the excavation. The excavation shall be backfilled with clean, native soil or other suitable material.

- F. Temporary Cover. The well or borehole opening and any associated excavations shall be covered at the surface to ensure public safety and to prevent the entry of foreign material, water, pollutants, and contaminants; whenever work is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed, except by equipment or tools.

CATHODIC PROTECTION WELLS



CATHODIC PROTECTION WELL STANDARDS

INTRODUCTION

Most wells in California are constructed to extract ground water, inject water, or monitor ground water conditions. Other, less common types of wells include cathodic protection wells. Cathodic protection wells, sometimes called "deep groundbeds," house devices to minimize electrolytic corrosion of metallic pipelines, tanks, and other facilities in contact with the ground.

Electrolytic Corrosion

For the purpose of these standards, electrolytic corrosion is defined as the deterioration of metallic objects by electrochemical reaction with the environment. The electrolytic corrosion process is illustrated in Figure 4 for a metallic pipeline in a soil-water environment. This process gradually weakens the pipeline and can cause its failure.

In Figure 4, an electric potential is induced on the surface of the pipeline as a result of variations in the concentrations of salts in the soil and water surrounding the pipeline. This potential results in an electric current in the soil-water electrolyte. Current flows from an "anode area" on the pipeline to a "cathode area" on the pipeline. Metal is removed from the anode area by the current.

Cathodic Protection

"Cathodic protection" is a term used for certain measures taken to prevent or minimize electrolytic corrosion of metallic equipment and structures. Cathodic protection devices redirect current to flow from a "sacrificial" anode to the soil-water electrolyte, instead of from an anode area on a pipeline or other metallic structure to be protected. The protective anode's role is to corrode in place of the metallic object it is designed to protect, as shown in Figure 5. The protected facility is made to be a permanent cathode by use of cathodic protection devices. Thus, the facility is said to be "cathodically protected."

Protective or sacrificial anodes can be placed close to ground surface or at significant depth. Anodes have been placed at shallow depths in horizontal and vertical arrays for many years. Shallow arrays are often not well suited for metropolitan areas because of land requirements, or suited for areas where electrical interference may be high.

Deep vertical anode installations, usually referred to as "cathodic protection wells," were first developed and used during the 1940s. They were developed in response to the constraints of shallow anode arrays.

Cathodic Protection Wells

Cathodic protection wells are widely installed to protect metallic objects in contact with the ground from electrolytic corrosion. Such objects include petroleum, natural gas, and water pipelines, and related storage facilities; power lines; telephone cables; and switchyards. Cathodic protection wells are sometimes used to control electrolytic corrosion in large water wells.

Figure 4. ELECTROLYTIC CORROSION OF A BURIED PIPELINE

(NOTE: Schematic, not to scale)

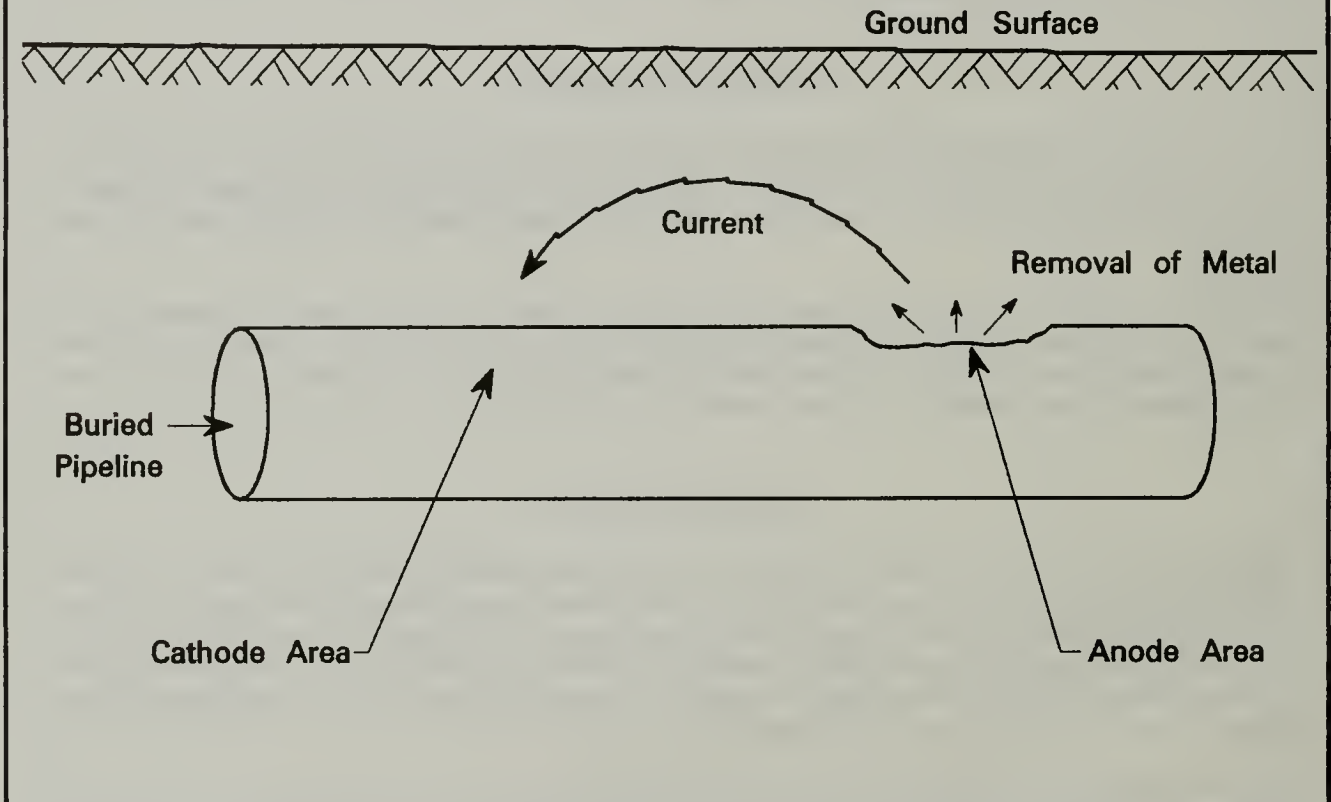
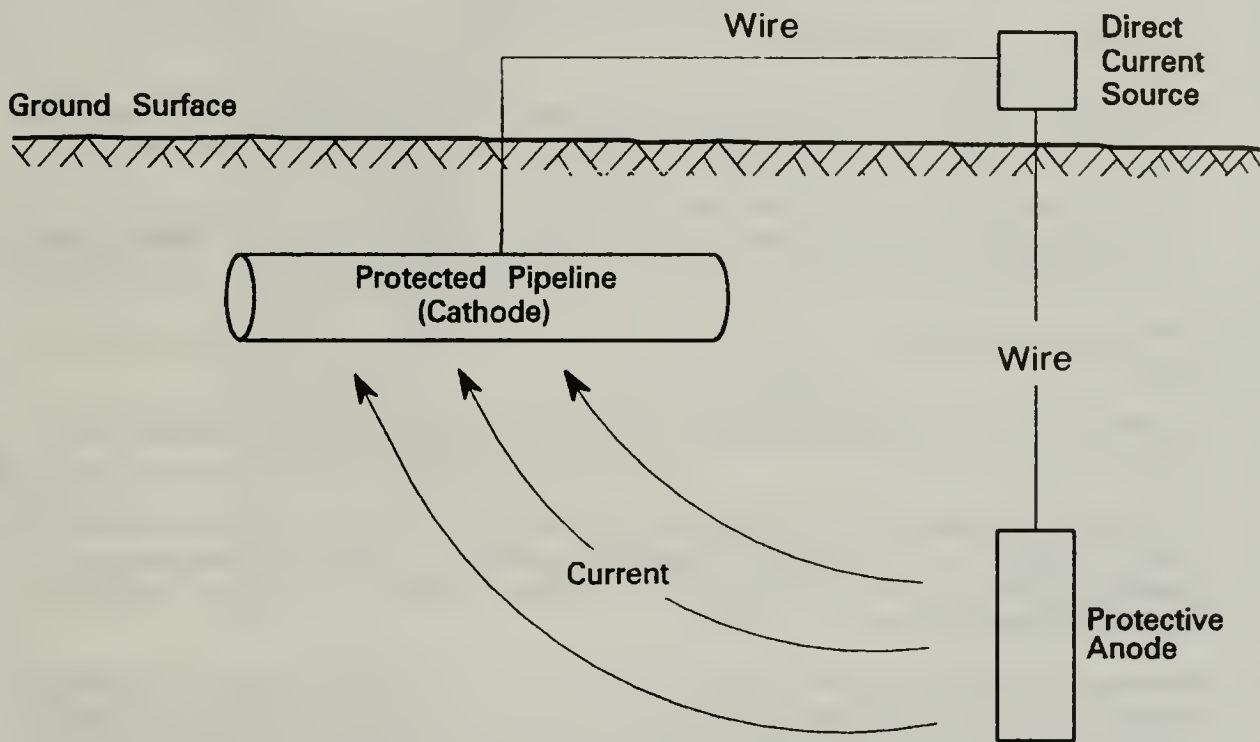


Figure 5. CATHODIC PROTECTION OF A BURIED PIPELINE

(NOTE: Schematic, not to scale)



Many cathodic protection wells have been constructed to protect pipelines that transport natural gas or other "hazardous" materials. The Natural Gas Pipeline Safety Act, Public Law 90-481 adopted by Congress in August 1968, provides requirements for cathodic protection of certain pipelines.

Most cathodic protection wells in California are located in areas where underground pipelines or "conveyance" systems are numerous and must be protected. These areas include:

- South coastal region from San Diego to Santa Barbara,
- Oil-producing areas of the southern San Joaquin Valley and the Central Coast, and,
- San Francisco Bay Area.

Few cathodic protection wells exist in California north of Sacramento.

Many cathodic protection wells, as illustrated in Figure 6, have been constructed by:

- (1) **Drilling a 6- to 12-inch diameter borehole to a desired depth.** Cathodic protection wells normally range from 100 to 500 feet in total depth. A few wells have been constructed to depths of 800 feet.

California Water Code Section 13711 defines a "cathodic protection well" as an anode installation exceeding 50 feet in depth. Installations less than 50 feet deep are "legally" considered "shallow anodes," not cathodic protection wells. Shallow anode installations are not specifically covered by these standards.

- (2) **Placing a string of anodes in the borehole within a designated interval, usually referred to as the "anode interval."**
- (3) **Backfilling the anode interval around the anodes with an electrically conductive material, such as granular coke.**
- (4) **Installing a small-diameter vent pipe that extends from the top of the anode interval to land surface, or above.** The purpose of the vent pipe is to release generated gases. Medium to large-diameter pipe or casing used in water wells to maintain the well bore and house pumping equipment is not normally used for cathodic protection wells.
- (5) **Backfilling the annulus between the vent pipe and borehole wall with an electrically non-conductive fill material to a specific height above the anode interval.** Such fill material usually consists of uniform, small-diameter gravel. Its purpose is to provide a permeable medium for migration of gases and to stabilize the walls of the borehole.

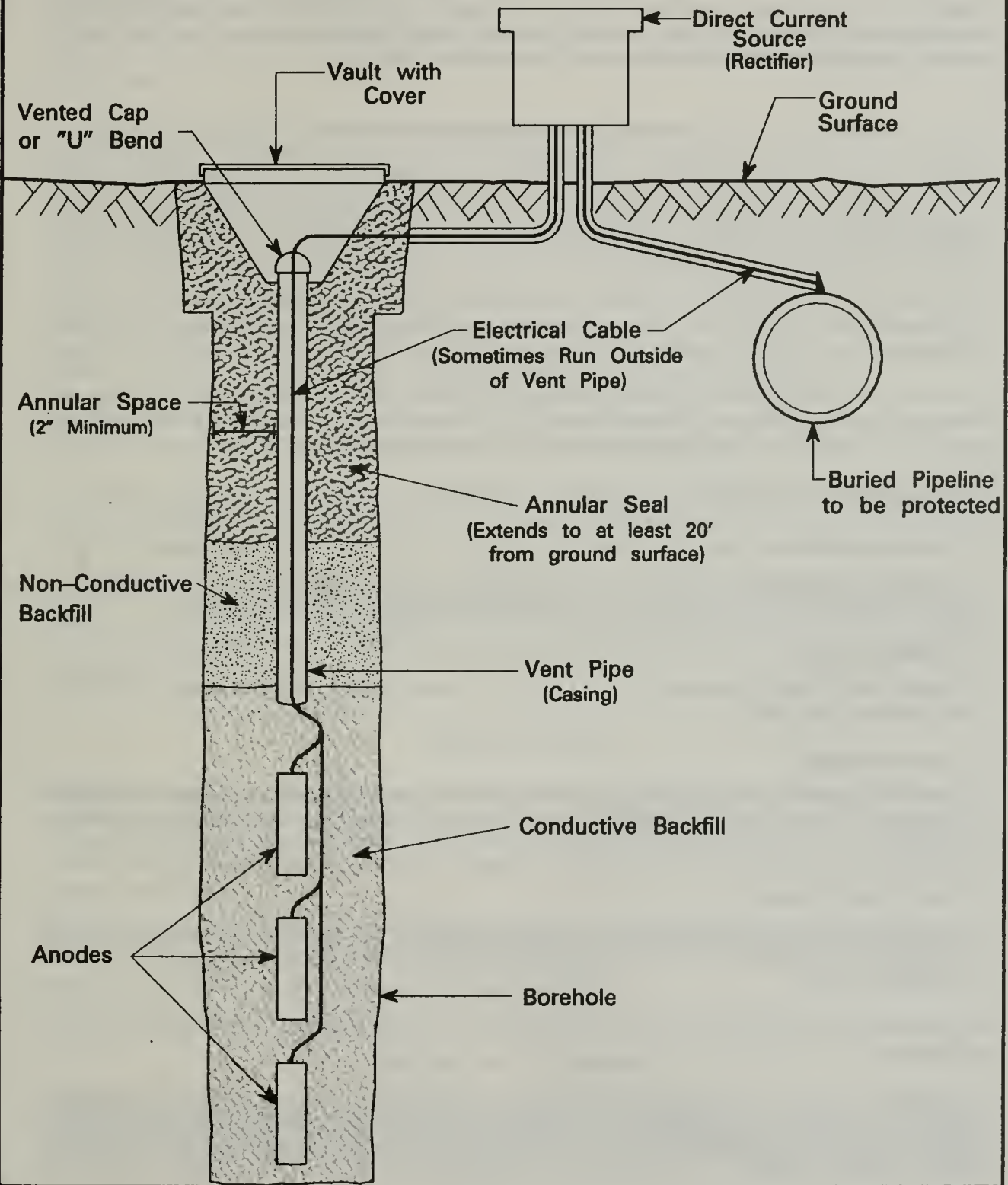
In the past this material was sometimes used to fill the annulus between the vent pipe and the borehole wall from the top of the anode interval to land surface. These standards require specific interval(s) of the upper annular space of a cathodic protection well be filled with sealing materials instead of gravel, to protect ground water quality.

- (6) **Sealing the annulus between the vent pipe and the borehole wall, from the top of the non-conductive annular fill to land surface, with sealing material.**
- (7) **Installing a permanent cover over the well at ground surface.**
- (8) **Connecting the anode leads to the facility to be protected, possibly through an electrical current source.**

Individual designs of cathodic protection wells vary.

Figure 6. CROSS SECTION OF A TYPICAL CATHODIC PROTECTION WELL

(NOTE: Schematic, not to scale)



The protective anodes of a cathodic protection well usually corrode away with time. Thus a cathodic protection well's anodes determine the well's useful life. Anodes are usually designed to last 15 to 20 years.

There has been an increasing tendency to construct cathodic protection wells with large diameter vent pipe or casing so that anodes can be replaced through the casing. Anode replacement through casing eliminates the need to drill replacement wells when anodes have been expended.

Corrosion Coordinating Committees

Serious electrical interference problems can occur where cathodic protection networks criss-cross one another or are too close to one another. Also, stray currents produced from electrical transmission lines and other equipment can sometimes interfere with the operation of cathodic protection systems. Interference problems are usually most pronounced in urban areas.

Corrosion control coordinating organizations have been formed in areas of California to overcome system interferences and other problems. Most organizations are affiliated with or are chapters of the National Association of Corrosion Engineers.

Corrosion control organizations represent the majority of utilities and other groups that install cathodic protection devices, including cathodic protection wells. Organization members coordinate the installation and operation of cathodic protection facilities with the goal of minimizing problems of electrical interference.

Four organizations that deal with Central and Southern California, are:

- **Southern California**

The Southern California Cathodic Protection Committee is a formal committee covering all of Southern California south of San Luis Obispo, Kern, and Inyo counties, except San Diego County.

- **San Diego County**

The San Diego County Underground Corrosion Control Committee is an informal organization that deals with the San Diego area.

- **Central California**

The Central California Cathodic Protection Committee is a formal committee covering all of Central California plus Sacramento Valley counties, and western Sierra Nevada mountain counties south of Plumas County.

- **San Francisco Bay Area**

The activities of the two committees that formerly covered the San Francisco Bay Area have been assumed by the San Francisco Section of the National Association of Corrosion Engineers. The committees were disbanded in 1985.

No coordinating organizations function in coastal counties north of San Francisco or in the northeastern part of the State.

Unfortunately, not all who install and operate cathodic protection facilities work with a corrosion coordinating organization. Those not associated with an organization are usually individuals or local agencies that are sometimes unaware of the existence of other installations. Non-coordinated facilities can seriously interfere with one another electrically.

Need for Cathodic Protection Well Standards

Cathodic protection wells, along with other types of wells, can allow ground water quality degradation to occur. Improperly constructed or destroyed cathodic protection wells can constitute a preferential pathway for the movement of poor-quality water, pollutants, and contaminants. Cathodic protection wells constructed with gravel backfill to land surface are particularly conducive to the movement of poor-quality water, pollutants, or contaminants.

Water and electrolytes are sometimes introduced into cathodic protection wells through vent pipes, or gravel fill in the annulus, to keep wells functional where natural electrolytes are lacking. Such a practice could be considered "waste disposal" and may be illegal if poor-quality water is used.

Permanently inactive cathodic protection wells pose a threat for the movement of poor-quality water, pollutants, and contaminants, and should be properly destroyed. Permanently inactive cathodic protection wells are a threat to ground water quality because they become dilapidated with time, are sometimes forgotten, and are sometimes used for waste disposal.

Many cathodic protection wells have small diameter vent pipes that prevent entry by persons and most animals. However, large vent pipe sizes can pose a serious safety threat if left open at land surface.

History of Cathodic Protection Well Standards

The California Legislature enacted legislation in 1949 directing the California Department of Water Resources to develop recommended water-quality protection standards for the construction and destruction of wells. The Legislature amended the Water Code in 1968 to require standards for cathodic protection wells.

Cathodic protection well standards for California were first published in 1973 as DWR Bulletin 74-1, *Cathodic Protection Well Standards: State of California*. Standards presented here replace those contained in Bulletin 74-1. Additional discussion on the history of well standards is contained in the "Introduction" section of this supplement (Bulletin 74-90) and Bulletin 74-81, *Water Well Standards: State of California*.

Scope of Standards

The following are recommended minimum standards for construction, alteration, maintenance, and destruction of cathodic protection wells in California. They only serve as minimum guidelines toward ensuring cathodic protection wells do not constitute a significant pathway for movement of poor-quality water, pollutants, and contaminants. These standards do not ensure a cathodic protection well will perform its corrosion protection function adequately.

The functional requirements of cathodic protection wells may conflict with the application of certain standards for the protection of water quality. Consequently, some compromise has been made between well function and resource protection in the development of these standards.

Organization of Standards

These standards are arranged in a format similar to the Water Well Standards. Since many of the standards that apply to water wells also apply to cathodic protection wells, many references are made in these standards to the Water Well Standards. Standards that apply only to cathodic protection wells or that require emphasis for cathodic protection wells, are discussed in detail in these standards.

STANDARDS

Part I. General

Section 1. Definitions¹.

- A. Cathodic Protection Well. A cathodic protection well is defined in Section 13711 of the California Water Code as:
- "...any artificial excavation in excess of 50 feet constructed by any method for the purpose of installing equipment or facilities for the protection electrically of metallic equipment in contact with the ground, commonly referred to as cathodic protection."
- B. Enforcing Agency. An agency designated by duly authorized local, regional, or State government to administer and enforce laws or ordinances pertaining to the construction, alteration, maintenance, and destruction of cathodic protection wells.
- C. Casing. All vent pipe, anode access tubing, electrical cable conduit, and other tubular materials that pass through the interval to be sealed.
- D. Conductor Casing. A tubular retaining structure temporarily or permanently installed in the upper portion of the well boring between the wall of the well boring and the inner well casing. Conductor casing is often installed to keep the borehole open during drilling if casing conditions are expected. Despite its title, conductor casing does not normally serve an "electrical" function for cathodic protection wells.

Section 2. Exemptions Due to Unusual Conditions.

Under certain circumstances the enforcing agency may waive compliance with these standards and prescribe alternate requirements. These standards may be waived only where they are impractical or ineffective because of unusual conditions, or would result in unsatisfactory condition or well function. In waiving any of these standards, the enforcing agency shall, if at all possible, require that measures be implemented to provide the same or greater level of water-quality protection that would otherwise be provided by these standards.

Section 3. Special Standards.

The enforcing agency may prescribe measures more stringent than standards described here, where needed to protect public safety or protect water quality.

Section 4. Responsible Parties.

Corrosion control engineers are normally responsible for the design and supervision of corrosion control facilities incorporating cathodic protection wells. Pursuant to Section 13750.5 (Division 7, Chapter 10, Article 3) of the California Water Code, construction, alteration, and destruction of cathodic protection wells shall be performed by contractors licensed in accordance with the California Contractors' License Law

¹ Technical terms are defined in Appendix A, page 77.

(Division 3, Chapter 9, California Business and Professions Code), except where exempted by law. Above-ground electrical facilities for cathodic protection wells should be installed by an appropriately licensed contractor.

Section 5. Reports.

Cathodic protection well construction, alteration, and destruction reports shall be completed on forms provided by the California Department of Water Resources. Other types of forms may be used for submission to the Department with the prior approval of the Department. The completed forms shall be submitted to the Department in accordance with relevant provisions of Sections 13750 through 13754 (Division 7, Chapter 10, Article 3) of the California Water Code. Information concerning completion and submission of well construction, alteration, and destruction reports is contained in *Guide to the Preparation of the Water Well Drillers Report*, Department of Water Resources, October, 1977, or its latest revision.

Part II. Cathodic Protection Well Construction

Section 6. Well Location With Respect to Pollutants and Contaminants, and Structures.

- A. Separation. Cathodic protection wells shall be located an adequate distance from known or potential sources of pollution or contamination, where site constraints and corrosion control considerations allow. Potential sources of pollution and contamination include those listed in Section 8 of the Water Well Standards.

As specified in Section 7 below, the length of the annular seal for a cathodic protection well shall be increased if the well is located in a congested urban area, or is located within 100 feet of any potential source of pollution or contamination.

- B. Flooding and Drainage. Cathodic protection wells should be located in areas protected from flooding, if possible. Wells located in areas of flooding shall be protected from flood waters and drainage, including protective measures outlined in Section 8, below.

Ground surface surrounding a cathodic protection well shall slope away from the well. Drainage from areas surrounding a cathodic protection well shall be directed away from the well.

- C. Accessibility. All cathodic protection wells shall be located an adequate distance from buildings and other structures to allow access for well maintenance, modification, repair, and destruction, unless otherwise approved by the enforcing agency.

Section 7. Sealing the Upper Annular Space.

The space between the cathodic protection well casing and the wall of the well boring, often referred to as the "annular space," shall be effectively sealed to prevent it from being a preferential pathway for the movement of poor-quality water, pollutants, or contaminants. In some cases, secondary purposes of the annular seal are to stabilize the borehole wall, protect casing from degradation or corrosion, and ensure the structural integrity of the casing.

General discussion of sealing requirements and methods is contained in Section 9, Section 13, and Appendix B of the Water Well Standards. Special requirements for sealing cathodic protection wells are:

A. Minimum Depth of Annular Seal.

1. Minimum Depth. The annular space shall be filled with appropriate sealing material from ground surface to a depth of at least 20 feet below land surface. The annular space shall be sealed to a depth of at least 50 feet below land surface in congested urban areas, or where a cathodic protection well is within 100 feet of any potential source of pollution or contamination. Additional annular sealing material shall be installed to greater depths where adverse conditions exist that increase the risk of pollution or contamination of ground water.
2. Fill. Any annular space existing between the base of the annular surface seal and the top of the anode and conductive fill interval shall be filled with appropriate fill or sealing material. Fill material should consist of washed granular material such as sand, pea gravel, or sealing material. Fill material shall not be subject to decomposition or

consolidation after placement and shall be free of pollutants and contaminants. Fill material shall not contain drill cuttings or drilling mud. Sealing material is often more practical and economical to use for filling the annular space than granular material.

3. Sealing-Off Strata. Additional annular sealing material shall be placed below the minimum depth of the annular surface seal, as needed, to prevent the movement of poor-quality water, pollutants, and contaminants through the well to zones of good-quality water. Requirements for sealing off zones are in Section 10, below.
- B. Sealing Conditions. Requirements for sealing the annular space under varied conditions are detailed in Section 9, Subsection B of the Water Well Standards.
- C. Radial Thickness of Seal. A minimum of 2 inches of sealing material shall be maintained between all casings and the borehole wall within the interval to be sealed, except where temporary conductor casing cannot be removed as noted in Section 9 of the Water Well Standards. At least 2 inches of sealing material shall be maintained between all casings in a borehole, within the interval to be sealed unless otherwise approved by the enforcing agency. Additional space shall be provided, where needed, to allow casings to be properly centralized and spaced and allow the use of a tremie pipe during well construction (if required), especially for deeper wells.
- D. Sealing Material. Sealing material shall consist of neat cement, sand-cement, concrete, or bentonite clay as discussed in Section 9 of the Water Well Standards. Cement-based sealing material shall be used opposite zones of fractured rock used. Concrete shall only be used at the approval of the enforcing agency. Drill cuttings and used drilling mud shall not be used as any part of sealing material.
- E. Placement of Seal. Standards for the placement of annular seals are described in Section 9 and Appendix B of the Water Well Standards.

Section 8. Surface Construction Features.

Surface construction features of a cathodic protection well shall serve to prevent physical damage to the well; prevent the entry of surface water, pollutants, and contaminants; and prevent unauthorized access.

- A. Locking Cover. The top of a cathodic protection well shall be protected by a locking cover or equivalent level of protection to prevent unauthorized access. All such covers shall allow the venting of gases.
- B. Casing Cap. The top of a cathodic protection well casing shall be fitted with a watertight cap, cover, "U" bend, or equivalent device to prevent the entry of water, pollutants, and contaminants into the well bore. All such covers shall allow venting of gases from the well.
- C. Flooding. The top of the well casing shall terminate above ground surface and known levels of flooding, except where site conditions, such as vehicular traffic, will not allow.
- D. Bases. A concrete base or pad shall be constructed around the top of a cathodic protection well casing at ground surface and contact the annular seal, unless the top of the casing is to be below ground surface as provided by Subsection E, below. The base shall be at least 4 inches thick and shall slope to drain away from the well casing. The base shall extend at least

2 feet laterally in all directions from the outside of the well boring, unless otherwise approved by the enforcing agency.

The base shall be free of cracks, voids, and other significant defects likely to prevent water tightness. Contacts between the base and the annular seal, and the base and the well casing must be water tight and must not cause the failure of the well casing or annular seal.

Where cement-based annular sealing material is used, the concrete base shall be poured before the annular seal has set, unless otherwise approved by the enforcing agency.

- E. Vaults. At the approval of the enforcing agency, the top of a cathodic protection well may be below ground surface because of traffic or other critical considerations. A watertight, structurally-sound vault, or equivalent feature, shall be installed to house the top of the well casing if it terminates below ground surface.

The vault shall extend from the top of the annular seal to at least ground surface. In no case shall the top of the annular seal be more than 4 feet below ground surface.

The vault shall contact the annular seal in a manner to form a watertight and structurally-sound connection. Contacts between the vault and the annular seal, and the vault and the well casing (if any), shall not fail, or cause the failure of the well casing or annular seal.

Where cement-based annular sealing materials are used, the vault shall be set into or contact the annular sealing material before it sets, unless otherwise approved by the enforcing agency. If bentonite-based sealing material is used for the annular seal, the vault shall be set into the bentonite before it is fully hydrated.

Cement-based sealing material shall be placed between the outer walls of the vault and the excavation into which it is placed to form a proper, structurally sound foundation for the vault, and to seal the space between the vault and excavation.

Sealing material surrounding the vault shall extend from the top of the annular seal to ground surface, unless precluded in areas of freezing. If cement-based sealing material is used for both the annular seal and the space between the excavation and vault, the sealing material shall be emplaced in a "continuous pour." In other words, cement-based sealing material shall be placed between the vault and excavation and contact a cement-based annular seal before the annular seal has set.

The vault cover or lid shall be watertight but shall allow the venting of gases. The lid shall be fitted with a security device to prevent unauthorized access and shall be clearly and permanently labeled "CATHODIC PROTECTION WELL." The vault and its lid shall be strong enough to support vehicular traffic where such traffic might occur.

The top of the vault shall be set at grade, or above, so that drainage is away from the vault. The top of the casing contained within the vault shall be capped in accordance with requirements of Subsection B, above so that water, contaminants, and pollutants that may enter the vault will not enter the well casing.

- F. Protection From Vehicles. Protective steel posts, or the equivalent, shall be installed around a cathodic protection well casing where it is terminated above ground surface in areas of vehicular traffic. The posts shall be easily seen and shall protect the well from vehicular impact.

Additional requirements for surface construction features are contained in Section 10 of the Water Well Standards.

Section 9. Casing.

Vent pipe, anode access tubing, and any other tubular materials that pass through the interval to be filled and sealed are all considered casing for the purpose of these standards. Materials used for cathodic protection well casing generally shall meet the requirements for casing materials and their installation in Section 12 of the Water Well Standards. Variance from the standards shall be at the approval of the enforcing agency. It is recommended that practices prescribed by the National Association of Corrosion Engineers also be followed in the design and installation of gas vents and electrical conduit.

Cathodic protection well casing should be at least 2 inches in internal diameter to facilitate eventual well destruction.

Section 10. Sealing-Off Strata.

If a cathodic protection well penetrates a stratum or strata below the minimum required annular surface seal depth specified in Section 7, above and that stratum contains poor-quality water, pollutants, or contaminants that could mix with and degrade water contained in other strata penetrated by the well, additional annular sealing material shall be placed below the minimum required annular surface seal to prevent mixing and water-quality degradation.

The following minimum requirements shall be observed for isolating zones containing poor-quality water, pollutants, or contaminants for various cases:

Case 1. Upper Stratum. If a stratum containing poor-quality water, pollutants, or contaminants lies above a stratum to be protected, annular seal material shall extend from the top of the stratum containing the poor-quality water, pollutants, or contaminants down to at least 10 feet into the confining layer separating the two strata, or through the entire thickness of the confining layer, whichever is least.

Case 2. Lower Stratum. If a stratum containing poor-quality water, pollutants, or contaminants lies below a stratum to be protected, the annular space opposite the stratum to be protected shall be sealed along its full length. The seal shall extend at least 10 feet into the confining layer separating the two strata, or through the entire thickness of the confining layer, whichever is least.

Case 3. Multiple Strata.

- a. Where two or more strata containing poor-quality water, pollutants, or contaminants are adjacent to one another and overlie a stratum to be protected, the annular space opposite the strata containing poor-quality water, pollutants, or contaminants and opposite all interbedded confining layers shall be sealed. The annular seal shall extend at least 10 feet down into, or completely through, whichever is least, the confining layer separating the strata containing poor-quality water, pollutants, or contaminants and the underlying stratum to be protected.
- b. Where two or more strata containing poor-quality water, pollutants, or contaminants underlie a stratum to be protected, the annular space opposite the stratum to be protected shall be sealed. The seal shall continue down at least 10 feet into, or completely through, whichever is least, the confining layer separating the stratum to be protected and the underlying strata containing poor-quality water, pollutants or contaminants.

- c. **Where two strata containing poor-quality water, pollutants, or contaminants are separated by a stratum to be protected, the annular space opposite the stratum to be protected, the confining strata underlying and overlying the stratum to be protected, and the upper stratum containing poor-quality water, pollutants, or contaminants shall be sealed off.**

The supplementary seals described in the cases above shall be extended up to and contact the base of the required minimum annular surface seal described in Section 7 above, if they are otherwise required to be within 10 feet of the surface seal. Sealing the entire annulus above the anode interval will often economically fulfill the conditions outlined above.

Requirements for sealing materials and their placement are described in Section 7, above.

Section 11. Repair of Cathodic Protection Wells.

Materials used for repairing cathodic protection well casing shall meet the requirements of Section 9, above.

Section 12. Temporary Cover.

The well or borehole opening and any associated excavations shall be covered at the surface to prevent the entry of foreign material, water, pollutants, and contaminants, and to ensure public safety whenever work is interrupted by such events as overnight shutdown, poor weather and required waiting periods to allow setting of sealing materials and the performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

Part III. Destruction of Cathodic Protection Wells

Section 13. Purpose of Destruction.

A cathodic protection well that is no longer useful, permanently inactive or "abandoned" must be properly destroyed to:

- (1) Ensure the quality of ground water is protected, and,
- (2) Eliminate a possible physical hazard to humans and animals.

Section 14. Definition of "Abandoned" Cathodic Protection Well.

A cathodic protection well is considered "abandoned" or permanently inactive when its anodes are exhausted and cannot, or will not, be replaced. A cathodic protection well is also considered "abandoned" or permanently inactive if it has not been used for one year, unless the owner demonstrates intention to use it again. To provide evidence of intention for future use of a well, the well owner, in accordance with Section 24400 of the Health and Safety Code, shall maintain the well in such a way that the following requirements are met:

- "(1) The well shall not allow impairment of the quality of water within the well and ground water encountered by the well.
- (2) The top of the well or well casing shall be provided with a cover, that is secured by a lock or by other means to prevent its removal without the use of equipment or tools, to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes in the well. The cover shall be watertight where the top of the well casing or other surface openings to the well are below ground level, such as in a vault or below known levels of flooding. The cover shall be watertight if the well is inactive for more than five consecutive years. A pump motor, angle drive, or other surface feature of a well, when in compliance with the above provisions, shall suffice as a cover.
- (3) The well shall be marked so as to be easily visible and located, and labeled so as to be easily identified as a well.
- (4) The area surrounding the well shall be kept clear of brush, debris, and waste materials."

Section 15. General Requirements.

All permanently inactive or "abandoned" cathodic protection wells shall be properly destroyed. The purpose of destruction is to prevent a possible safety hazard to humans and animals and to eliminate the well structure as a possible means for the preferential migration of poor-quality water, pollutants, and contaminants.

Section 16. Requirements for Destroying Cathodic Protection Wells.

General requirements for well destruction are contained in Section 23 of the Water Well Standards. Special considerations for cathodic protection wells are as follows:

- A. Preliminary Work. A cathodic protection well shall be investigated before it is destroyed to determine its condition, details of its construction and whether conditions exist that will interfere with filling and sealing.

The well shall be sounded immediately before it is destroyed to make sure that no obstructions exist that will interfere with filling and sealing. The well shall be cleaned before destruction, as needed, to ensure that all undesirable materials, including obstructions to filling and sealing, debris, and pollutants and contaminants that could interfere with well destruction are removed for disposal. The enforcing agency shall be notified as soon as possible if pollutants and contaminants are known or suspected to be in a well to be destroyed. Well destruction operations may then proceed only at the approval of the enforcing agency. The enforcing agency should be contacted to determine requirements for proper disposal of materials removed from a well to be destroyed.

B. Filling and Sealing Conditions. The following minimum requirements shall be followed when various conditions are encountered.

1. Wells that only penetrate unconsolidated material and a single "zone" of ground water. At a minimum, the upper 20 feet of the well casing and the annulus between the well casing and borehole wall (if not already sealed) shall be completely sealed with suitable material. Sealing material shall extend to a minimum depth of 50 feet below land surface if the well to be destroyed is located in an urban area, or is within 100 feet of any potential source of pollution or contamination. Additional sealing material may be needed if adverse conditions exist. The remainder of the well below the minimum surface seal shall be filled with suitable granular fill material, such as clean sand or pea gravel, or with sealing material.
2. Wells that penetrate several water-bearing strata. The upper portion of the well casing and annular space shall be filled with sealing material as described in Item 1, above. Strata encountered below the surface seal that contain poor-quality water, pollutants, or contaminants that could mix with and degrade water in other strata penetrated by the well, shall be effectively isolated by sealing the well bore and annulus within intervals specified in Section 10, above. The remainder of the well shall be filled with suitable granular fill or sealing material.
3. Wells penetrating fractured rock. Sealing material shall be installed as outlined in Items 1 and 2, above. Cement-based sealing material shall be used opposite fractured rock. The remainder of the well shall be filled with fill or sealing material, as appropriate.
4. Wells in nonfractured consolidated strata. Sealing material shall be installed as outlined in Items 1 and 2, above. The remainder of the well shall be filled with fill or sealing material, as appropriate.
5. Wells penetrating water-bearing zones or aquifers of special significance. The enforcing agency may require that specific water-bearing zones be sealed off for well destruction.

C. Placement of Material. The placement of sealing materials for cathodic protection well destruction is generally described in Section 23 and Appendix B of the Water Well Standards. The following additional requirements shall be observed in destroying cathodic protection wells.

Casing, cables, anodes, granular backfill, conductive backfill, and sealing material shall be removed as needed, by redrilling, if necessary, to the point needed to allow proper placement of sealing materials within required sealing intervals. Removal of some or all well materials will likely be required for cathodic protection wells that were not constructed in accordance with

these standards, or standards adopted by the Southern California Cathodic Protection Committee in December 1969.

Casing that cannot be removed shall be adequately perforated or punctured at specific intervals to allow pressure injection of sealing materials into granular backfill and all other voids that require sealing.

The following requirements shall be observed in placing fill and sealing material in cathodic protection wells to be destroyed.

1. Placement Method. The well shall be filled and sealed with appropriate material upward from the bottom of the well using a tremie pipe or equivalent.
Sealing material shall be placed by methods (such as by the use of a tremie pipe or equivalent) that prevent freefall, bridging, or dilution of the sealing materials, or separation of aggregates from sealants. Sealing materials shall not be installed by freefall unless the interval to be sealed is dry and no deeper than 30 feet below ground surface.
2. Timing of Placement. Sealing material shall be placed in one continuous operation (or "pour") from the bottom to the top of the well unless conditions in the well dictate that sealing operations be conducted in a staged manner and prior approval is obtained from the enforcing agency.
3. Ground Water Flow. Special care shall be used to restrict the flow of ground water into a well while fill and sealing material is being placed, if subsurface pressure causing the flow of water is significant.
4. Sealing Pressure. Pressure required for placement of cement-based sealing material shall be maintained long enough for the cement-based sealing material to set.
5. Verification. Verification shall be made that the volume of sealing and fill material placed in a well during destruction operations equals or exceeds the volume to be filled and sealed. This is to help determine that the well has been properly destroyed and that no jamming or bridging of the fill or sealing material has occurred.

- D. Sealing Materials. Materials used for sealing cathodic protection wells for destruction shall have low permeabilities so that the volume of water and possible pollutants and contaminants passing through them will be of minimal consequence. Sealing material shall be compatible with the chemical environment into which it is placed and shall have mechanical properties compatible with present and future site uses.

Suitable sealing materials include neat cement, sand-cement, concrete, and bentonite, as described in Section 9 of the Water Well Standards. Sealing materials used for isolating zones of fractured rock shall be cement-based, as described in Subsection B, above. Drilling mud or drill cuttings shall not be used as any part of a sealing material for well destruction. Concrete may be used as a sealing material at the approval of the enforcing agency.

- E. Fill Material. Many fill materials are suitable for destruction of cathodic protection wells. These include clean, washed sand or gravel or sealing material. Fill material shall be free of pollutants and contaminants and shall not be subject to decomposition or consolidation after placement. Fill material shall not contain drilling mud or cuttings.

- F. Additional Requirements for Destruction of Cathodic Protection Wells in Urban Areas. The following additional requirements shall be met at each well site in urban areas, unless otherwise approved by the enforcing agency:
- (1) The upper surface of the sealing material shall end at a depth of 5 feet below ground surface, and,
 - (2) If the casing was not extracted during destruction and sealing operations, a hole shall be excavated around the well casing to a depth of 5 feet below ground surface after sealing operations have been completed and sealing materials have adequately set and cured. The exposed well casing shall then be removed by cutting the casing at the bottom of the excavation. The excavation shall then be backfilled with clean, native soil or other suitable material.
- G. Temporary Cover. The well borehole and any associated excavations shall be covered at the surface to prevent the entry of foreign material, water, pollutants, and contaminants and to ensure public safety whenever work on the well is interrupted by such events as overnight shutdown, poor weather, and required waiting periods to allow setting of sealing materials and performance of tests. The cover shall be held in place or weighted down in such a manner that it cannot be removed except by equipment or tools.

APPENDICES



APPENDIX A

Definition of Terms

Protective Anode - A metallic object designed to corrode in place of the object it is designed to protect.

Cathodic Protection¹ - A technique to prevent the corrosion of a metal surface by making that surface the cathode of an electrochemical cell.

Cement, Portland Cement - A cement that contains oxides of calcium, aluminum, iron, and silicon made by heating a mixture of limestone and clay in a kiln and pulverizing the resultant clinker, as defined in ASTM C150. Portland cement is also considered a hydraulic cement, because it must be mixed with water to form a cement-water paste with the ability to develop strength and harden, even under water.

Centralizer - A device that assists in centering tubular materials in a borehole.

Conductance, Specific - A measure of the ability of water to conduct electric current at 77 degrees Fahrenheit. It is related to the total concentration of ions in the water.

Corrosion¹ - The deterioration of a material, usually a metal, because of a reaction with its environment.

Drilling Fluid - A fluid (liquid or gas) used in drilling operations to remove cuttings from a borehole, to clean and cool the drilling bit, to reduce friction between the drill stem and the borehole wall, and, in some cases, to prevent caving or sloughing of the borehole.

Electrolyte¹ - A chemical substance or mixture, usually liquid, containing ions that migrate in an electric field. The term electrolyte refers to the soil or liquid adjacent to, and in contact with a buried or submerged metallic structure including the moisture and other chemicals contained therein.

Interference¹ - The situation that arises when a foreign substructure is affected in any way by a direct current source.

Rectifier¹ - An electronic device that changes alternating current to direct current.

¹ Definition from National Association of Corrosion Engineers Standard RP-01-69 or RP-05-72.

APPENDIX B

REFERENCES

Since Bulletin 74-81 was published in mid-1981 several new or revised publications have been issued that address ground water or well construction. This appendix lists publications issued or revised since 1981 and selected other publications that were reviewed during the preparation of this supplement. Publications that were used for Bulletin 74-81 that have since been revised are identified by a number in parentheses. These numbers refer to the publication's original position in the bibliography of Bulletin 74-81 (Appendix E, page 83).

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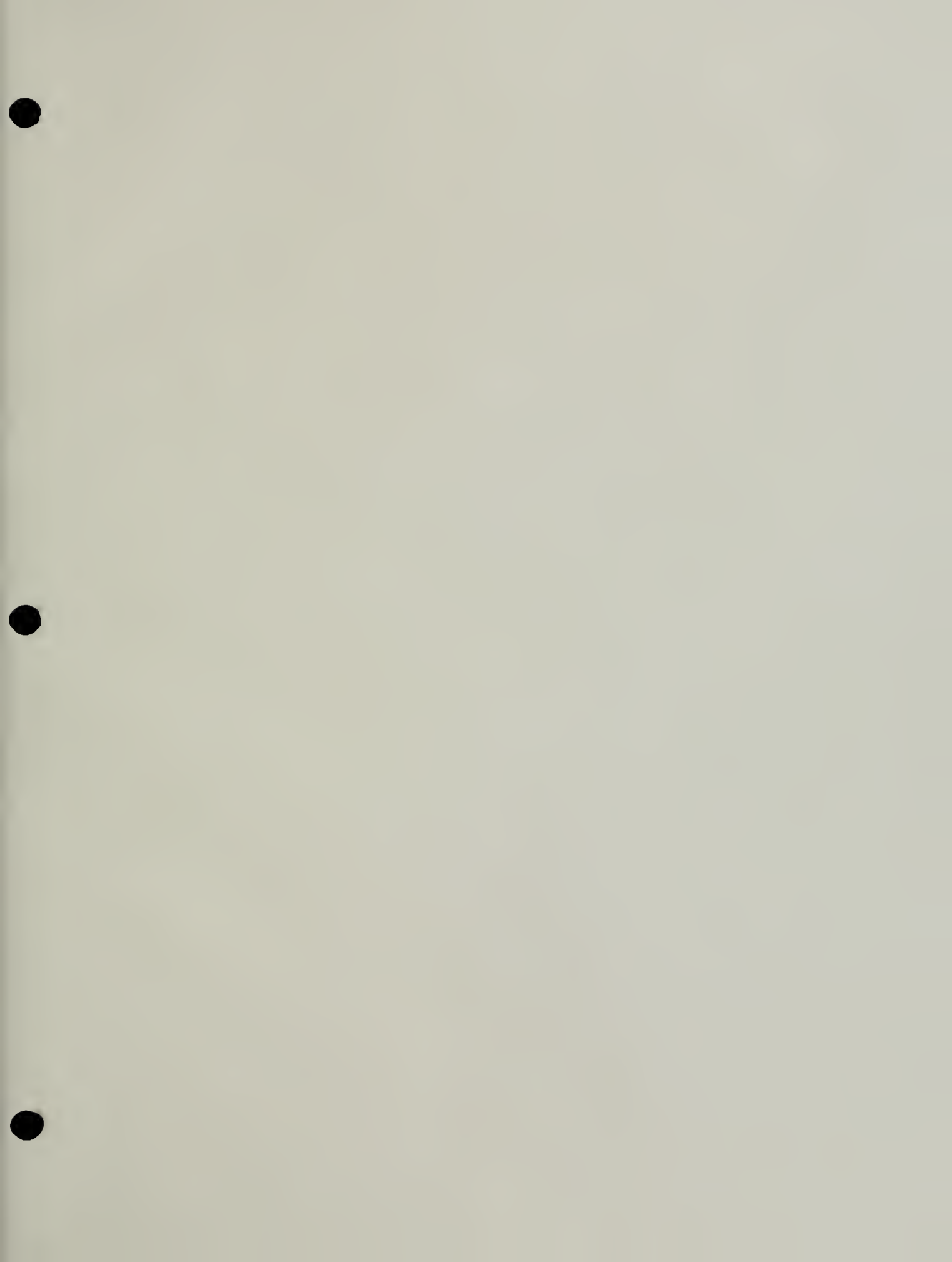
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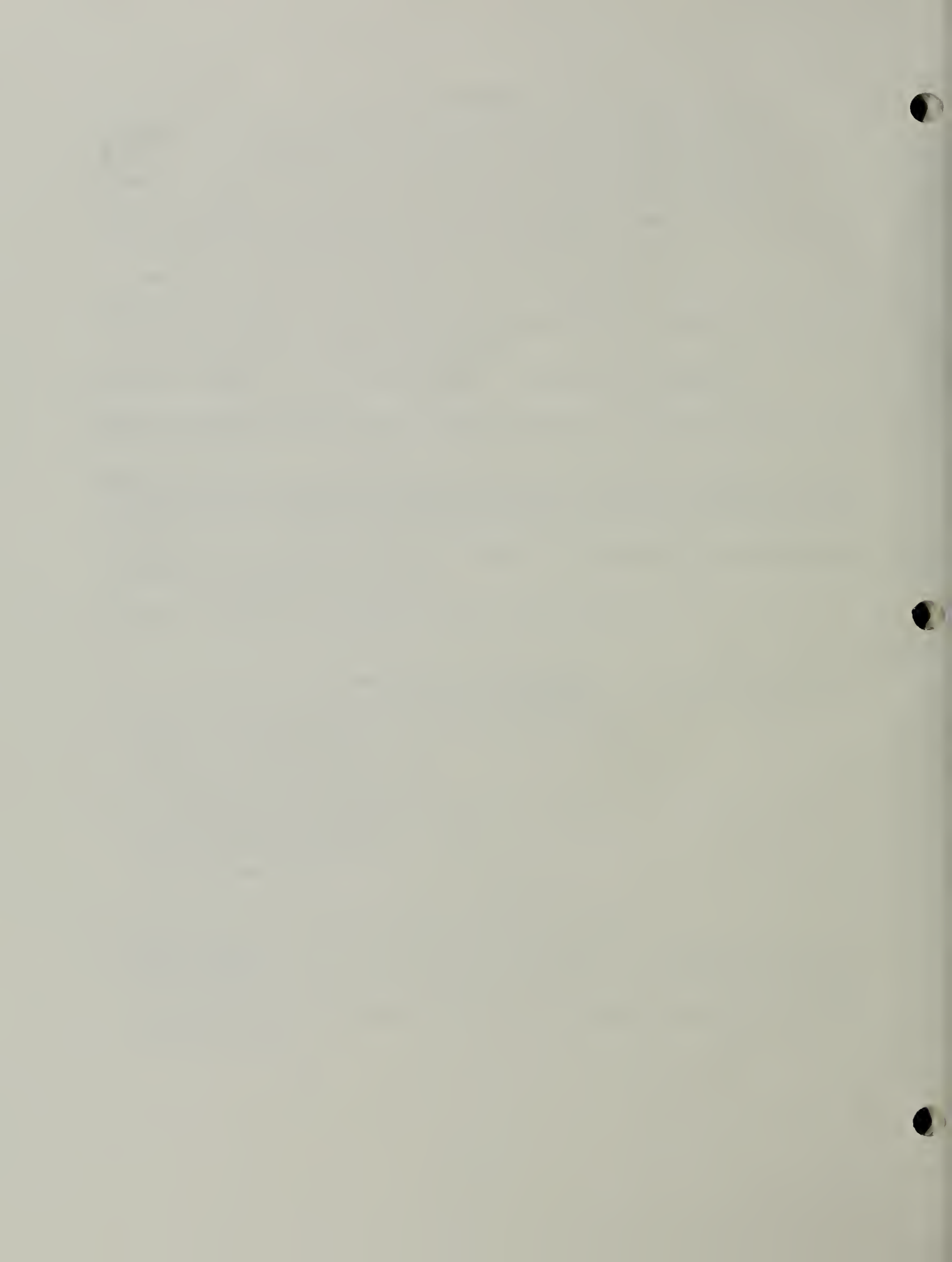
Water Well Journal. Water Well Journal Publishing Company in cooperation with the National Water Well Association. Published monthly since 1948.

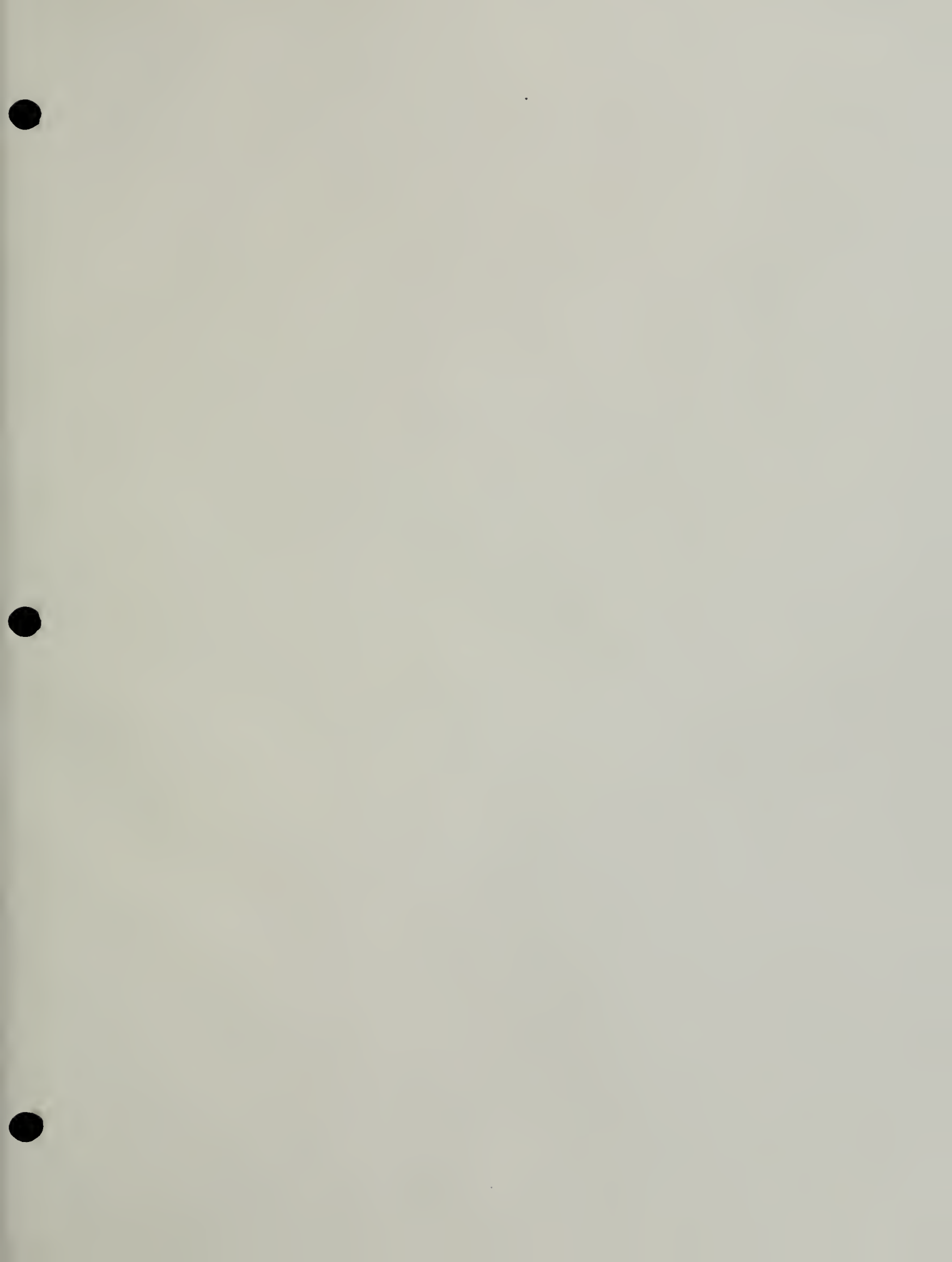
Western Water. Water Education Foundation. Published monthly since 1949.

Laws, Rules and Regulations

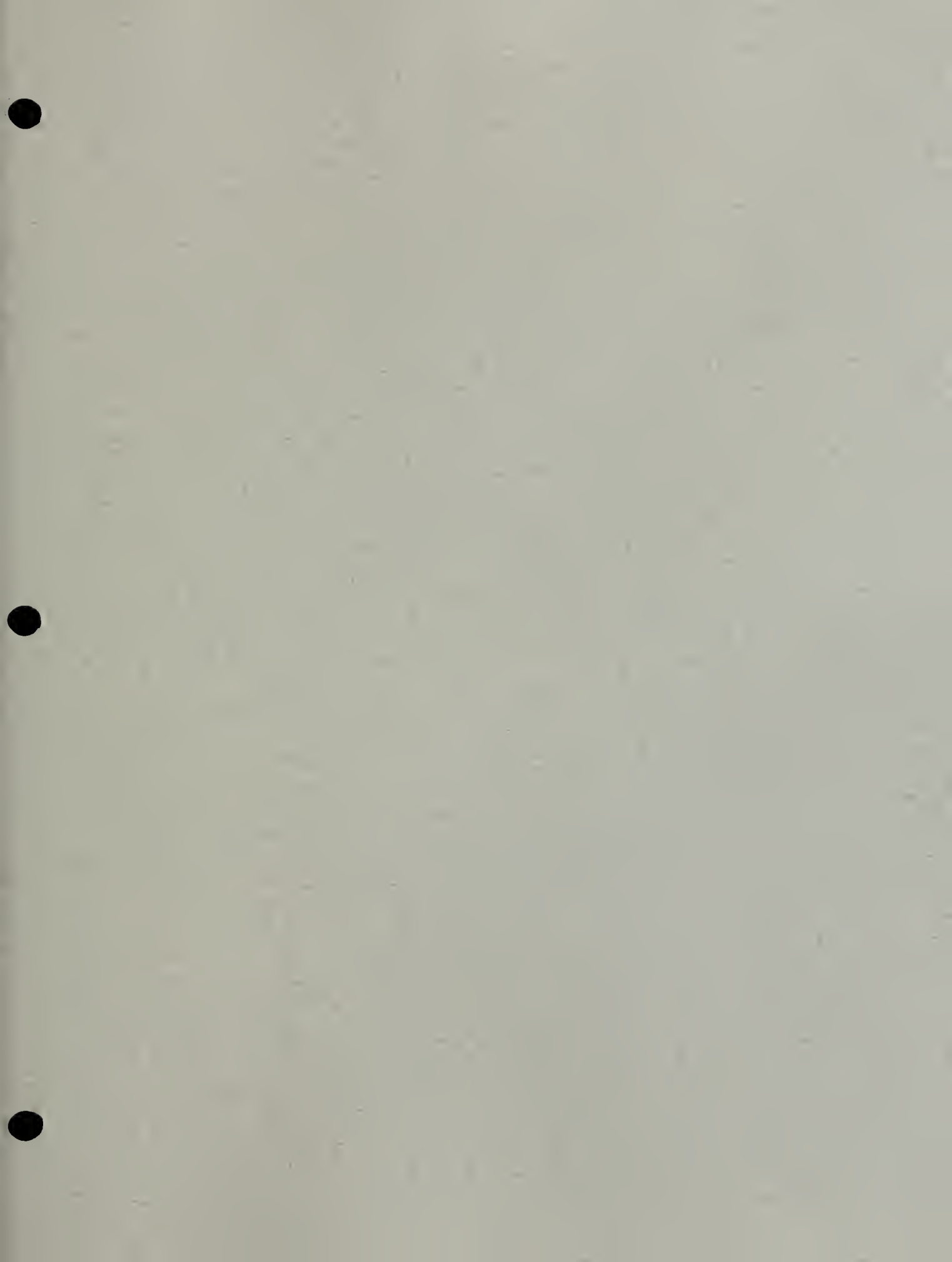
- A. Pertinent laws and regulations of the State of California as contained in:
 - California Code of Regulations
 - California Business and Professions Code
 - California Health and Safety Code
 - California Public Resources Code
 - California Water Code
- B. The State Water Resources Control Board Model Water Well Ordinance.
- C. Existing ordinances of the counties of California pertaining to the construction, alteration, and destruction of wells.
- D. Laws, regulations, and recommendations of the various states pertaining to the construction, alteration, or destruction of wells.











**THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW**

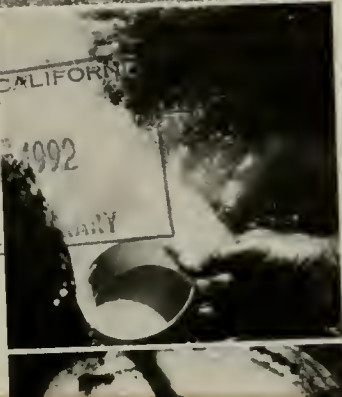
**BOOKS REQUESTED BY ANOTHER BORROWER
ARE SUBJECT TO RECALL AFTER ONE WEEK.
RENEWED BOOKS ARE SUBJECT TO
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ATTACHMENT 3

GEOTECHNICAL REPORT #306405-001

DATED FEBRUARY 2, 2024



February 2, 2024

File No.: 306405-001

Ms. Kari Wagner, P.E.
Wallace Group
612 Clarion Court
San Luis Obispo, California 93401

PROJECT: SUNNYSLOPE WATER DISTRICT (BEST ROADS MUTUAL WATER COMPANY IMPROVEMENTS)
JOHN SMITH ROAD
HOLLISTER, CALIFORNIA

SUBJECT: Limited Geotechnical Engineering Study Report

REF.: Proposal for a Limited Geotechnical Engineering Report, Phase I, Best Roads Mutual Water Company, John Smith Road, San Benito County, California, by Earth Systems Pacific, dated October 25, 2023

Dear Ms. Wagner:

Per your authorization of the above referenced proposal, Earth Systems Pacific (Earth Systems) has prepared this limited geotechnical report for the proposed installation of an 8-inch water main along John Smith Road to connect Best Road Mutual Water Company (BRMWC) to the Sunnyslope County Water District (SSCWD) existing water distribution system. The project will consist of the installation of approximately 3,800 linear feet of new 8-inch diameter water line beginning at the intersection of John Smith Road and Fairview Road. It is our understanding that the depth of the proposed waterline will be less than 5 feet below ground surface (bgs).

Scope of Services

The purpose of our study was to identify and evaluate the soil conditions and verify the thickness of the existing asphalt concrete pavement sections and perform laboratory tests on selected soil samples to obtain data for engineering analysis. The scope of our evaluation included: 1) a site reconnaissance by a staff engineer; 2) marking of locations for subsurface exploration; 3) contacting Underground Service Alert to get the known utility lines marked at the site; 4) the drilling of six shallow test borings to measure the asphalt and aggregate base thicknesses and to collect soil samples for laboratory testing; 5) laboratory testing of the collected samples; 6) engineering analysis of the collected data; and 7) preparation of this report. It is our intent that this report be used by the client to form the geotechnical basis for the preparation of plans and specifications.



Site Description

The subject site is a two-lane road located in a rural area of San Benito County. John Smith Road is bordered by Fairview Road on the west, agricultural fields on the north and south sides, two driveways for single-family residences in both the north and south directions and Heatherwood Lane on the east end. The general location of the subject sites is shown in the Site Vicinity Map, Figure 1.

Field Exploration Program

Six shallow test borings were drilled at the approximate locations shown on the Site Plan, using a B-24 truck-mounted drill rig equipped with a 6-inch diameter, solid stem auger. Once reaching the desired depth, a standard sampler was lowered into the hole. The sampler was driven into the undisturbed ground with a 140-pound, safety hammer falling about 30 inches per drop. The sampler was driven up to 18 inches and the hammer blows required to drive every six inches of the sampler were recorded and are presented on the boring logs. The number of blows required to drive the final 12 inches of the sampler into the undisturbed ground was used as Penetration Resistance and this was used to interpret soil consistency/density. Our staff engineer supervised the drilling program, described the soil conditions revealed by the boring to create a continuous log, and collected representative samples for laboratory testing. The boring logs show soil descriptions including: color, major and minor components, USCS classification, changes in soil conditions with depth, moisture content, consistency/density, plasticity, sampler type, and sampling depths, and laboratory test results.

Two composite bulk samples were collected for laboratory testing. The thickness of the asphalt concrete pavement and aggregate base were measured at each boring location. At the completion of the boring operation, the boreholes were backfilled with soil cuttings and capped with cut-back asphalt patch material.

The following table summarizes the measured pavement sections, and surficial subgrade soils logged at the boring locations.



Pavement Sections

Boring No.	AC Thickness	AB Thickness	Subgrade Soil Type
B-1	4"	6"	Clayey Sand (SC)
B-2	2"	7"	Sandy Lean Clay (CL)
B-3	3"	7"	Sandy Lean Clay (CL)
B-4	5"	6"	Sandy Lean Clay (CL)
B-5	7" (2"/ 5")*	7"	Sandy Lean Clay (CL)
B-6	4" (2"/ 2")**	4"	Sandy Lean Clay (CL)

*AC encountered in two layers: 2 inches over 5 inches for a total of 7 inches

** AC encountered in two layers, both 2 inches thick for a total of 4 inches

Laboratory Test Program

Eighteen samples were tested in the laboratory to determine the in-place dry density and moisture content (ASTM D2937-17); one surface sample was tested to determine their Atterberg Limits (ASTM D4318-17); and two bulk samples were tested for R-Value (ASTM D2844/D2844M-18).

Summary of Collected Data

The near surface soils encountered at the site were logged as clayey sands to clayey and lean to fat clays extending to the bottom of borings, up to 10 feet below ground surface. An Atterberg Limits test performed on a sample collected from Boring 2 at 1.5 to 2.0 feet in depth, indicated a liquid limit of 35 and plasticity index of 21. Based on the review of the test results the near surface soil is judged to have a moderate shrinkage/swelling potential. Two R-value tests were conducted. An R-Value of 21 was obtained from the composite bulk sample for the western half of John Smith Road and an R-Value of 14 was obtained from the composite bulk sample for the eastern half of John Smith Road.



Recommendations

Utility Trenches Backfilling

1. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utility pipes. The site soils may be used for trench backfill above the shading layer. However, if obtaining compaction is difficult with the site soils for various reasons, use of a more easily compacted sand may be desirable. The upper foot of backfill in unimproved areas should consist of native material to reduce the potential for seepage of water into the backfill.
2. Trench backfill in the upper 8 inches of subgrade beneath pavement areas should be compacted to a minimum of 95 percent of maximum dry density for sandy soils and 92 percent of maximum dry density for clayey soils at a moisture content at least 3 percentage points above optimum moisture content. The aggregate base courses should be compacted to a minimum 95 percent of maximum dry density at a moisture content above optimum. Trench backfill in other areas should be compacted to a minimum of 90 percent of maximum dry density at a moisture content at least 2 percentage points above optimum moisture content. Jetting of utility trench backfill should not be allowed. For public utilities, the trench backfill and compaction requirements should be in accordance with the requirements of the County of San Benito.
3. Long-term settlement of properly compacted imported granular backfill material should be assumed to be about 0.25 to 0.5 percent of the depth of the backfill. Where trenches are backfilled with site soils, the anticipated settlement would be about twice that of granular backfill. Improvements that are constructed over or near trenches should be designed to accommodate the potential for settlement.
4. The recommendations of this section are minimums only and may be superseded by the specifications of the architect/engineer based upon soil corrosivity or the requirements of pipe manufacturers, utility companies or the governing jurisdiction.



Asphalt Pavement Design Sections

Asphalt pavement sections were developed using the State of California Highway Design Manual, Chapter 630-Flexible Pavement. The R-Value of 14 was used for the pavement design calculations as the sample was the most representative sample of the native soil materials. Determination of the appropriate Traffic Index (TI) for the area to be paved is the province of the design engineer. The calculated Asphalt Concrete (AC) and aggregate base (AB) thicknesses are for compacted subgrade material. Normal Caltrans construction tolerances should apply. The aggregate base should conform to Caltrans Class 2.

R-Value = 14

Traffic Index	AC Thickness	AB Thickness
4	2.5"	6.5"
4.5	2.5"	8.0"
5	3"	8.5"
5.5	3"	10.0"
6	3.5"	11.0"
6.5	4"	11.5"
7	4"	13.5"

Closure

We trust this letter provides the requested information. If you have any questions or need any additional information, please contact our office.

Sincerely,
Earth Systems Pacific


Ajay Singh, GE 3057
Principal Engineer




Michelle Garcia, CEG
Senior Engineering Geologist

- Attachments:
- Site Vicinity Map
 - Boring Location Map
 - Boring Logs
 - Laboratory Test Results

Figure 1

TN
MN
13.5



1,200 0 1,200 2,400



Approximate Scale in Feet

Base: Google Earth (2024)



EARTH SYSTEMS

Sunnyslope Water District Improvements
John Smith Road
San Benito County, California

Site Vicinity Map

File No.: 306405-001

Figure 2



B-6

Approximate Boring Location (2023)



Approximate Scale in Feet

Base: Google Earth (2023)



Earth Systems Pacific

**Sunnyslope Water District Improvements
John Smith Road
San Benito County, California**

Site Plan

File No.: 306405-001



LOGGED BY: M. Arias
 RIG TYPE: Cenozoic Exploration B-24
 AUGER TYPE: 6" Solid Stem Auger

PAGE 1 OF 1
 FILE NO.: 306405-001
 DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA						
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
SOIL DESCRIPTION										
0	Af	■	4" AC / 6" AB							
1	SC	▨	CLAYEY SAND; strong brown, moist, medium dense, fine grained sand, little fine gravel	1.5 - 2.0	1-1	■	125.7	12.6	7	
2	CL	▨	SANDY LEAN CLAY; strong brown, moist, stiff, fine grained sand, some fine gravel, coarse gravel fragment	2.0 - 2.5	1-2	■	114.9	8.3	9	
3				2.0 - 3.5	Bag C	○			8	
4	CL	▨	SANDY LEAN CLAY; light brown, moist, stiff, fine grained sand	4.0 - 4.5	1-3	■	105.5	17.3	13	4.0
5									5	
6				6.0 - 6.5	1-4	●			4	
7									6	
8	CH	▨	SANDY FAT CLAY; light brown to gray, moist, stiff, fine grained sand, mottling							
9									5	
10				9.5 - 10.0	1-5	●			6	
11			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.							
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample □ Shelby ● SPT ○ Bulk Sample ▨ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



LOGGED BY: M. Arias
 RIG TYPE: Cenozoic Exploration B-24
 AUGER TYPE: 6" Solid Stem Auger

PAGE 1 OF 1
 FILE NO.: 306405-001
 DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA					
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
			SOIL DESCRIPTION						
0	Af		2" AC / 7" AB						
1	CL		SANDY LEAN CLAY; dark brown, moist, stiff, fine grained sand, yellow brown to grayish brown mottling, 1/2" diameter gravel completely weathered [LL=35, PI=21]	1.5 - 2.0	2-1				5
2				2.0 - 2.5	2-2		119.3	13.3	9
3	CL		SANDY LEAN CLAY; dark brown, moist, very stiff, fine grained sand, little fine gravels	2.5 - 4.0	Bag C				13
4			- decrease in gravel content from top to bottom of sample	4.0 - 4.5	2-3		129.8	11.0	12
5									14
6			- dark to light brown, little multi-colored gravels	6.0 - 6.5	2-4		117.3	15.7	14
7									5
8	SC		CLAYEY SAND; olive brown, moist, medium dense, fine grained sand, trace fine gravel						9
9									8
10				9.5 - 10.0	2-5				5
11			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.						
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									

LEGEND: 2.5" Mod Cal Sample Shelby SPT Bulk Sample Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



LOGGED BY: M. Arias
 RIG TYPE: Cenozoic Exploration B-24
 AUGER TYPE: 6" Solid Stem Auger

PAGE 1 OF 1
 FILE NO.: 306405-001
 DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA						
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
SOIL DESCRIPTION										
0	Af	■	3" AC / 7" AB							
1	CL	▨	SANDY LEAN CLAY; dark brown, moist, stiff, fine grained sand	1.5 - 3.0	Bag B	○			9	
2				2.0 - 2.5	3-1	■	112.4	15.2	8	3.0
3										
4			- strong brown to light brown	3.5 - 4.0	3-2	■	112.9	18.2	4	4.0
5				4.0 - 4.5	3-3	■			8	>4.5
6			- very stiff	6.0 - 6.5	3-4	■	116.0	15.9	16	
7									19	
8										
9									8	
10			- increase in sand content	9.5 - 10.0	3-5	■			12	>4.5
11			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.						15	
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample □ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



LOGGED BY: M. Arias
 RIG TYPE: Cenozoic Exploration B-24
 AUGER TYPE: 6" Solid Stem Auger

PAGE 1 OF 1
 FILE NO.: 306405-001
 DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA						
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
SOIL DESCRIPTION										
0	Af	■	5" AC / 6" AB							
1	CL	▨	SANDY LEAN CLAY; dark brown, moist, medium stiff, fine grained sand - 2" rock found in sampler	1.5 - 3.0	Bag B	○			14	
2				2.0 - 2.5	4-1	■	117.3	15.1	6	3.5
3				4.0 - 4.5	4-2	■	105.8	15.9	3	
4									3	4
5			- cobble encountered in cuttings							
6	CL	▨	SANDY LEAN CLAY; olive brown to grayish brown, moist, medium stiff, fine grained sand, weathered gravels [Passing #4: 83%, Passing #200: 52%] [Passing 8-µm: 26%]	5.5 - 6.0	4-3	■			3	
7				6.0 - 6.5	4-4	■	102.7	15.3	8	
8				9.5 - 10.0	4-5	■			8	
9									12	15
10			- ½" diameter white weathered gravel - increase in clay content							
11			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.							
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample □ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



LOGGED BY: M. Arias
 RIG TYPE: Cenozoic Exploration B-24
 AUGER TYPE: 6" Solid Stem Auger

PAGE 1 OF 1
 FILE NO.: 306405-001
 DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA								
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)		
SOIL DESCRIPTION												
0	Af		2" AC over 5" AC / 7" AB									
1	CL		SANDY LEAN CLAY; dark brown, moist, stiff, trace fine grained sand	1.5 - 2.0	5-1		107.9	18.5	10	4.0		
2				2.0 - 2.5	5-2				8			
3				1.5 - 3.0	Bag B		11	3.5				
4	CL		SANDY LEAN CLAY; light brown, moist, very stiff, fine grained sand	4.0 - 4.5	5-3		112.1	16.0	8	> 4.5		
5				6.0 - 6.5	5-4				15			
6				-	stiff	6.0 - 6.5	5-4		110.0	16.3	15	> 4.5
7											6	
8											10	
9								14				
10				9.5 - 10.0	5-5				7			
11			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.									
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												

LEGEND: 2.5" Mod Cal Sample Shelby SPT Bulk Sample Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



LOGGED BY: M. Arias

RIG TYPE: B-24

FILE NO.: 306405-001

AUGER TYPE: 4" Solid Stem Auger

DATE: 11/30/2023

DEPTH (feet)	USCS CLASS	SYMBOL	Sunnyslope County Water District Improvements John Smith Road Hollister, California	SAMPLE DATA						
				INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
			SOIL DESCRIPTION							
0	Af	■	2" AC over 2" AC / 4" AB							
1	CL	▨	SANDY LEAN CLAY; orange brown, moist, stiff, fine grained sand	1.5 - 2.0	6-1	■	114.7	15.9	5	
2				2.0 - 2.5	6-2	■			7	> 4.5
3				2.0 - 3.0	6-3	○			10	> 4.5
4	CL	▨	SANDY LEAN CLAY; olive brown, moist, stiff, fine grained sand	4.0 - 4.5	6-3	■	105.5	20.9	6	
5									7	
6									10	3.0
7									11	
8			- very stiff	6.0 - 6.5	6-4	■	113.6	15.8	16	> 4.5
9										6
10				9.0 - 9.5	6-5	■			9	
11				9.5 - 10.0	6-6	■			12	4.0
12									20	4.5
13			Boring terminated at 10 feet below ground surface. Groundwater was not encountered to the maximum depth of drilling.							
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample □ Shelby ● SPT ○ Bulk Sample ▽ Groundwater

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.



Earth Systems Pacific

BORING LOG LEGEND

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

SAMPLE / SUBSURFACE WATER SYMBOLS		GRAPH. SYMBOL	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)			
			MAJOR DIVISIONS	GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
CALIFORNIA MODIFIED STANDARD PENETRATION TEST (SPT) SHELBY TUBE BULK SUBSURFACE WATER DURING DRILLING SUBSURFACE WATER AFTER DRILLING			COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
				GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
				GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
				SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
				SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
				SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
			FINE GRAINED SOILS HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS					

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)
-----	----------------	-------	------------	-----------------

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING			
# 200	# 40	# 10	# 4	3/4"	3"	12"	
SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES; SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY



RESISTANCE 'R' VALUE AND EXPANSION PRESSURE

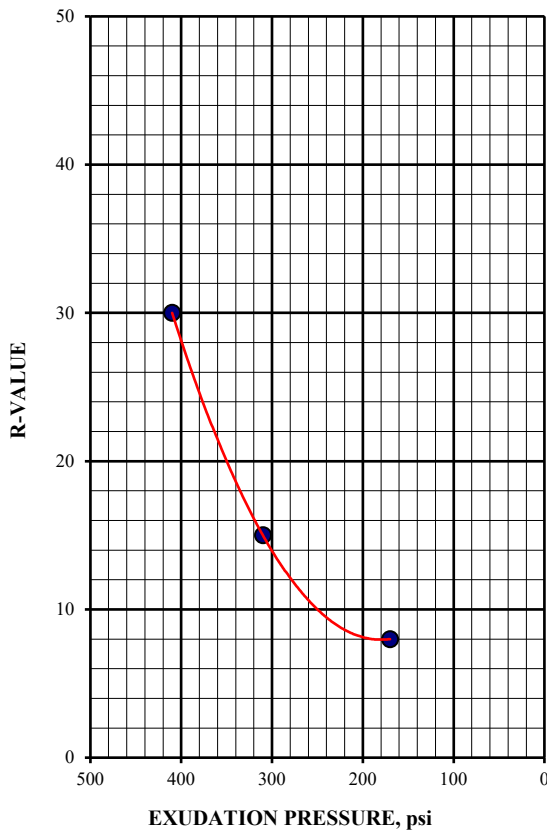
ASTM D 2844/D2844M-18

December 28, 2023

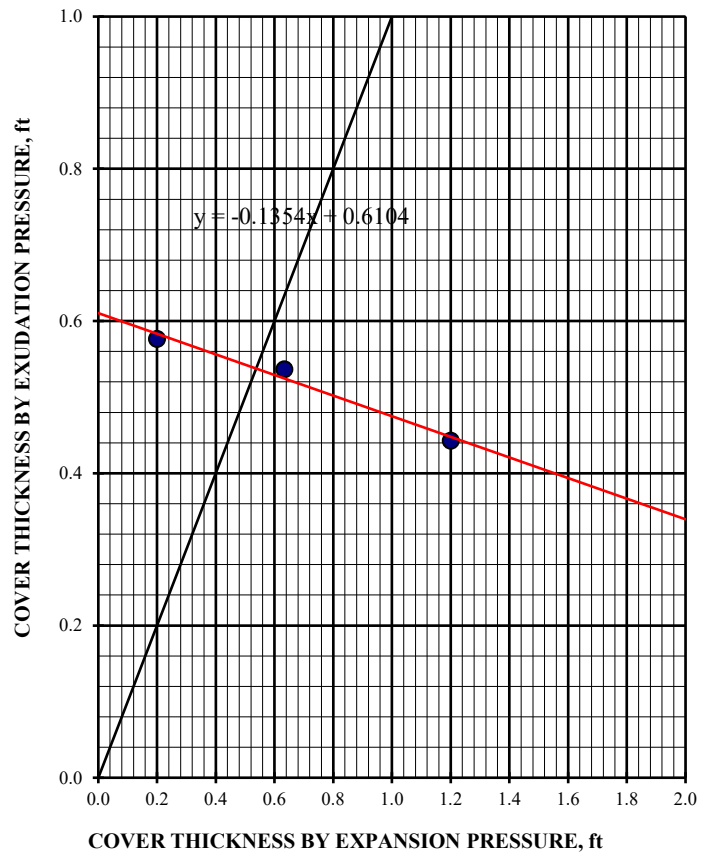
Bag B - Boring 3+4+5+Bag 1 Composite
Brown Sandy Lean Clay (CL)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 123.5-pcf
% Moisture @ 300 psi Exudation Pressure: 15.5%
R-Value - Exudation Pressure: 14
R-Value - Expansion Pressure: 15
R-Value @ Equilibrium: 14

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART





RESISTANCE 'R' VALUE AND EXPANSION PRESSURE

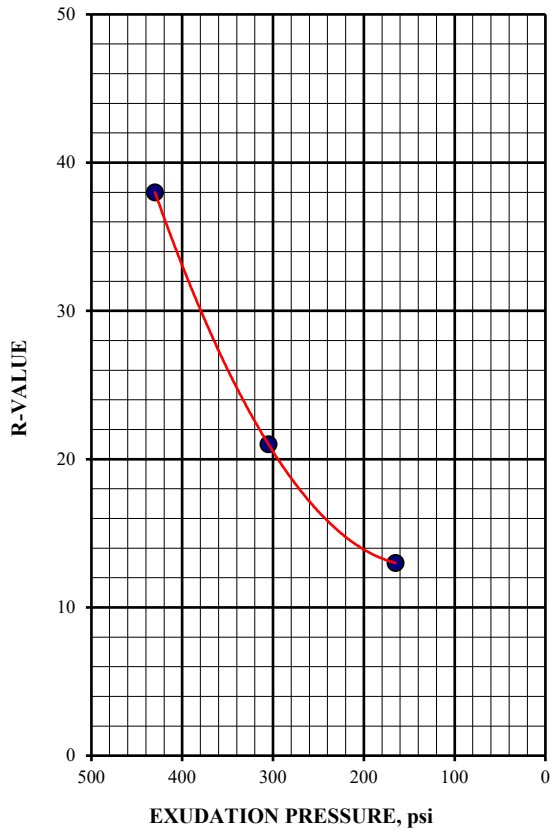
ASTM D 2844/D2844M-18

December 28, 2023

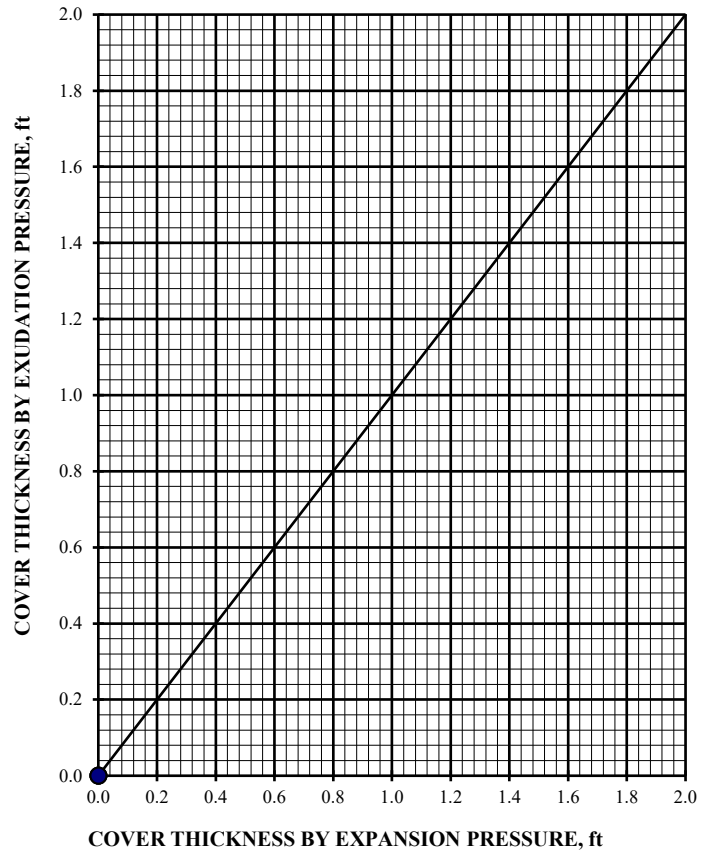
Bag C - Boring 1+2 Composite
Brown Sandy Lean Clay (CL)

Dry Density @ 300 psi Exudation Pressure: 124.4-pcf
% Moisture @ 300 psi Exudation Pressure: 14.0%
R-Value - Exudation Pressure: 21
R-Value - Expansion Pressure: N/A
R-Value @ Equilibrium: 21

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART





SSCWD, John Smith Road

306405-001

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

December 14, 2023

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
B1-1	1.5 - 2.0	12.6	141.5	125.7
B1-2	2.0 - 2.5	8.3	124.5	114.9
B1-3	4.0 - 4.5	17.3	123.8	105.5
B2-2	2.0 - 2.5	13.3	135.2	119.3
B2-3	4.0 - 4.5	11.0	144.1	129.8
B2-4	6.0 - 6.5	15.7	135.7	117.3
B3-1	2.0 - 2.5	15.2	129.5	112.4
B3-2	3.5 - 4.0	18.2	133.4	112.9
B3-4	6.0 - 6.5	15.9	134.4	116.0
B4-1	2.0 - 2.5	15.1	134.9	117.3
B4-2	4.0 - 4.5	15.9	122.6	105.8
B4-4	6.0 - 6.5	15.3	118.4	102.7
B5-2	2.0 - 2.5	18.5	127.8	107.9
B5-3	4.0 - 4.5	16.0	130.1	112.1
B5-4	6.0 - 6.5	16.3	128.0	110.0
B6-1	1.5 - 2.0	15.9	133.0	114.7
B6-3	4.0 - 4.5	20.9	127.5	105.5
B6-4	6.0 - 6.5	15.8	131.5	113.6



SSCWD, John Smith Road

306405-001

PARTICLE SIZE ANALYSIS

ASTM D 7928-16

Boring #4 @ 5.5 - 6.0'

December 14, 2023

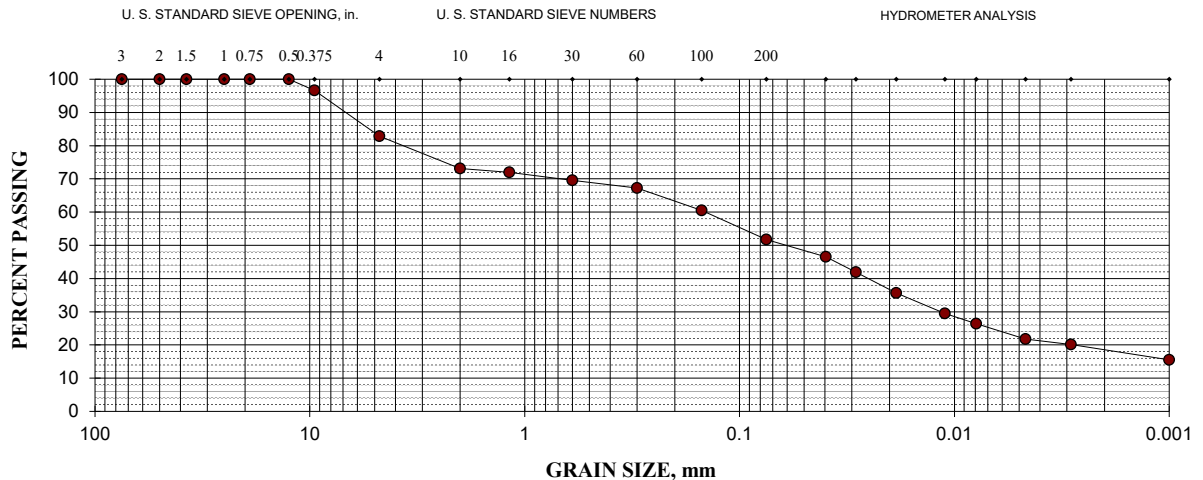
Sandy Lean Clay with gravel (CL)

Specific Gravity = 2.65 (assumed)
Gravel = 17%; Sand = 31%; Silt = 30%; Clay = 22%

Sieve size	% Retained	% Passing
3" (75.0-mm)	0	100
2" (50.0-mm)	0	100
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	3	97
#4 (4.75-mm)	17	83
#10 (2.00-mm)	27	73
#16 (1.18-mm)	28	72
#30 (600- μ m)	30	70
#50 (300- μ m)	33	67
#100 (150- μ m)	39	61
#200 (75- μ m)	48	52

Hydrometer Analysis

40- μ m	47
29- μ m	42
19- μ m	36
11- μ m	29
8- μ m	26
4.7- μ m	22
2.9- μ m	20
Colloids	16





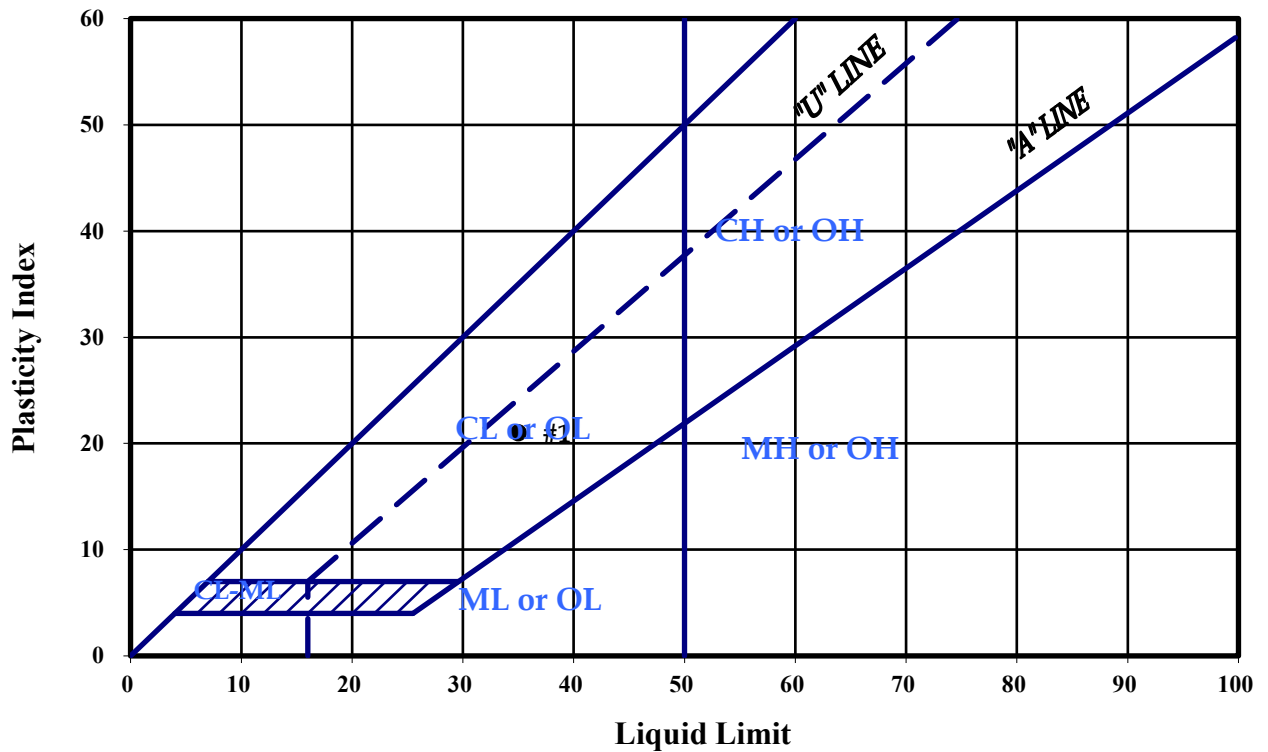
PLASTICITY INDEX

ASTM D 4318-17

December 14, 2023

Test No.:	1	2	3	4	5
Boring No.:	2-1				
Sample Depth:	1.5 - 2.0'				
Liquid Limit:	35				
Plastic Limit:	14				
Plasticity Index:	21				

Plasticity Chart



ATTACHMENT 4

EXECUTED GRANT AGREEMENT #4600015596

DATED NOVEMBER 21, 2023

For Review and Initial before approval.

DAL

11/21/2023

Drew Landler

Date

drew@sunnysloewater.org

**STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES**

AGREEMENT NUMBER: 4600015596

**FUNDING AGREEMENT BETWEEN THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
AND
SUNNYSLOPE COUNTY WATER DISTRICT**

**FOR THE
BEST ROAD MUTUAL WATER COMPANY WATER SYSTEM CONSOLIDATION PROJECT**

A PART OF THE SMALL COMMUNITY DROUGHT RELIEF PROGRAM

FUNDED BY

**THE BUDGET ACT OF 2021 AS AMENDED
(STATS. 2022, ch. 44, § 25)**

**FUNDING AGREEMENT BETWEEN
THE STATE OF CALIFORNIA (DEPARTMENT OF WATER RESOURCES) AND
SUNNYSLOPE COUNTY WATER DISTRICT
4600015596
SMALL COMMUNITY DROUGHT RELIEF PROGRAM**

THIS FUNDING AGREEMENT is entered into by and between the Department of Water Resources of the State of California, herein referred to as the "State" and the Sunnyslope County Water District, a public agency in the State of California, duly organized, existing, and acting pursuant to the laws thereof, herein referred to as the "Grantee," which parties do hereby agree as follows:

1. **PURPOSE.** State shall provide funding pursuant to the Budget Act of 2021, as amended (Stats. 2022, ch. 44, § 25), to the Grantee to assist in financing the Best Road Mutual Water Company Water System Consolidation Project (Project). By executing this Agreement, the Grantee certifies that the purpose of the Project is in response to a drought scenario, as defined by Water Code section 13198(a) and is intended to: (1) address immediate impacts on human health and safety; (2) address immediate impacts on fish and wildlife resources; or, (3) provide water to persons or communities that lose or are threatened with the loss or contamination of water supplies.
2. **TERM OF FUNDING AGREEMENT.** The term of this Funding Agreement begins on the date this Funding Agreement is initially executed by State, through final payment plus three (3) years unless otherwise terminated or amended as provided in this Agreement. However, all work shall be completed by June 30, 2025, and no funds may be requested after September 30, 2025.
3. **PROJECT COST.** The reasonable cost of the Project is estimated to be \$3,440,000.
4. **FUNDING AMOUNT.** The maximum amount payable by the State under this Agreement shall not exceed \$2,253,000.
5. **GRANTEE REQUIRED COST SHARE.** Grantee agrees to fund the difference between the actual Project Cost in Paragraph 3 and the amount specified in Paragraph 4, if any.
6. **BASIC CONDITIONS.** State shall have no obligation to disburse money for the Project under this Funding Agreement until Grantee has satisfied the following conditions:
 - A. For the term of this Funding Agreement, Grantee submits timely Quarterly Progress Reports as required by Paragraph 13, "Submission of Reports."
 - B. Grantee submits all deliverables as specified in Paragraph 13 of this Funding Agreement and in Exhibit A.
 - C. Prior to the commencement of construction or implementation activities, Grantee shall submit the following to the State:
 - i. Final plans and specifications certified by a California Registered Civil Engineer as to compliance for the Project as listed in Exhibit A of this Funding Agreement.
 - ii. Work that is subject to the California Environmental Quality Act (CEQA) and or environmental permitting shall not proceed under this Funding Agreement until the following actions are performed:
 - a. Grantee submits to the State all applicable environmental permits as indicated on the Environmental Information Form to the State, and

- b. Documents that satisfy the CEQA process are received by the State, and
- c. Grantee receives written concurrence from the State of the Lead Agency's CEQA document(s) and State notice of verification of environmental permit submittal.

State's concurrence of Lead Agency's CEQA documents is fully discretionary and shall constitute a condition precedent to any work (i.e., construction or implementation activities) for which it is required. Once CEQA documentation has been completed, State will consider the environmental documents and decide whether to continue to fund the Project or to require changes, alterations, or other mitigation. Grantee must also demonstrate that it has complied with all applicable requirements of the National Environmental Policy Act (NEPA) by submitting copies of any environmental documents, including environmental impact statements, Finding of No Significant Impact, mitigation monitoring programs, and environmental permits as may be required prior to beginning construction/implementation.

7. DISBURSEMENT OF FUNDS. State will disburse to Grantee the amount approved, subject to the availability of funds through normal State processes. Notwithstanding any other provision of this Funding Agreement, no disbursement shall be required at any time or in any manner which is in violation of, or in conflict with, federal or state laws, rules, or regulations pursuant to any federal statute or regulation. Any and all money disbursed to Grantee under this Funding Agreement shall be deposited in a separate account and shall be used solely to pay Eligible Project Costs.
8. ELIGIBLE PROJECT COST. Grantee shall apply State funds received only to Eligible Project Costs in accordance with applicable provisions of the law and Exhibit B. Eligible Project Costs include the reasonable costs of studies, engineering, design, land and easement acquisition, legal fees, preparation of environmental documentation, environmental mitigations, monitoring, and project construction. Reimbursable administrative expenses are the necessary costs incidental but directly related to the Project included in this Agreement. Work performed on the Project after November 21, 2022, shall be eligible for reimbursement.

Costs that are not eligible for reimbursement include, but are not limited to the following items:

- A. Costs incurred prior to November 21, 2022.
- B. Operation and maintenance costs, including post-construction performance and monitoring costs.
- C. Purchase of equipment not an integral part of the Project.
- D. Establishing a reserve fund.
- E. Monitoring and assessment costs for efforts required after Project construction is complete.
- F. Replacement of existing funding sources for ongoing programs.
- G. Payment of federal or state taxes.
- H. Costs incurred as part of any necessary response and cleanup activities required under the Comprehensive Environmental Response, Compensation, and Liability Act; Resource Conservation and Recovery Act; Hazardous Substances Account Act; or other applicable law.
- I. Support of existing agency requirements and mandates (e.g., punitive regulatory agency requirement).
- J. Purchase of land in excess of the minimum required acreage necessary to operate as an integral part of a project, as set forth and detailed by engineering and feasibility studies, or land purchased prior to November 21, 2022.

K. Overhead and indirect costs. "Indirect Costs" means those costs that are incurred for a common or joint purpose benefiting more than one cost objective and are not readily assignable to the funded project (i.e., costs that are not directly related to the funded project). Examples of Indirect Costs include but are not limited to: central service costs; general administration of the Grantee; non-project-specific accounting and personnel services performed within the Grantee's organization; depreciation or use allowances on buildings and equipment; the costs of operating and maintaining non-project-specific facilities; tuition; conference fees; and, generic overhead or markup. This prohibition applies to the Grantee and any subcontract or sub-agreement for work on the Project that will be reimbursed pursuant to this Agreement.

9. METHOD OF PAYMENT. After the disbursement requirements in Paragraph 6 "Basic Conditions" are met, State will disburse the whole or portions of State funding to Grantee, following receipt from Grantee via US mail or Express mail delivery of a "wet signature" invoice, or an electronic invoice certified and transmitted via DocuSign for costs incurred, including Cost Share, and timely Quarterly Progress Reports as required by Paragraph 13, "Submission of Reports." Payment will be made no more frequently than monthly, in arrears, upon receipt of an invoice bearing the Funding Agreement number. State will notify Grantee, in a timely manner, whenever, upon review of an Invoice, State determines that any portion or portions of the costs claimed are not eligible costs or is not supported by documentation or receipts acceptable to State. Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to State to cure such deficiency(ies). If Grantee fails to submit adequate documentation curing the deficiency(ies), State will adjust the pending invoice by the amount of ineligible or unapproved costs.

Invoices submitted by Grantee shall include the following information:

- A. Costs incurred for work performed in implementing the Project during the period identified in the particular invoice.
- B. Costs incurred for any interests in real property (land or easements) that have been necessarily acquired for the Project during the period identified in the particular invoice for the implementation of the Project.
- C. Invoices shall be submitted on forms provided by State and shall meet the following format requirements:
 - i. Invoices must contain the date of the invoice, the time period covered by the invoice, and the total amount due.
 - ii. Invoices must be itemized based on the categories (i.e., tasks) specified in Exhibit B. The amount claimed for salaries/wages/consultant fees must include a calculation formula (i.e., hours or days worked times the hourly or daily rate = the total amount claimed).
 - iii. One set of sufficient evidence (i.e., receipts, copies of checks, timesheets) must be provided for all costs included in the invoice.
 - iv. Each invoice shall clearly delineate those costs claimed for reimbursement from the State's funding amount, as depicted in Paragraph 4, "Funding Amount" and those costs that represent Grantee's costs, as applicable, in Paragraph 5, "Grantee Required Cost Share."
 - v. Invoices can be submitted by one of the following methods.
 - a. Via email to the State's Project Manager at denise.soria@water.ca.gov.

- b. Mail the invoice with the original "wet signature" to the following address:
Denise Soria, Department of Water Resources, South Central Region Office,
691 N. Laverne Avenue, Suite 104, Fresno, CA 93727

All invoices submitted shall be accurate and signed under penalty of law. Any and all costs submitted pursuant to this Agreement shall only be for the tasks set forth herein. The Grantee shall not submit any invoice containing costs that are ineligible or have been reimbursed from other funding sources unless required and specifically noted as such (i.e., match costs/cost share). Any eligible costs for which the Grantee is seeking reimbursement shall not be reimbursed from any other source. Double or multiple billing for time, services, or any other eligible cost is illegal and constitutes fraud. Any suspected occurrences of fraud, forgery, embezzlement, theft, or any other misuse of public funds may result in suspension of disbursements of grant funds and/or termination of this Agreement requiring the repayment of all funds disbursed hereunder plus interest. Additionally, the State may request an audit pursuant to Paragraph D.5 and refer the matter to the Attorney General's Office or the appropriate district attorney's office for criminal prosecution or the imposition of civil liability. (Civ. Code, §§ 1572-1573; Pen. Code, §§ 115, 470, 487-489.)

10. WITHHOLDING OF DISBURSEMENTS BY STATE. If State determines that the Project is not being implemented in accordance with the provisions of this Funding Agreement, or that Grantee has failed in any other respect to comply with the provisions of this Funding Agreement, and if Grantee does not remedy any such failure to State's satisfaction, State may withhold from Grantee all or any portion of the State funding and take any other action that it deems necessary to protect its interests. Where a portion of the State funding has been disbursed to the Grantee and State notifies Grantee of its decision not to release funds that have been withheld pursuant to Paragraph 11, the portion that has been disbursed shall thereafter be repaid immediately as directed by State. State may consider Grantee's refusal to repay the requested disbursed amount a contract breach subject to the default provisions in Paragraph 11, "Default Provisions." If State notifies Grantee of its decision to withhold the entire funding amount from Grantee pursuant to this Paragraph, this Funding Agreement shall terminate upon receipt of such notice by Grantee and the State shall no longer be required to provide funds under this Funding Agreement and the Funding Agreement shall no longer be binding on either party.
11. DEFAULT PROVISIONS. Grantee will be in default under this Funding Agreement if any of the following occur:
- A. Substantial breaches of this Funding Agreement, or any supplement or amendment to it, or any other agreement between Grantee and State evidencing or securing Grantee's obligations.
 - B. Making any false warranty, representation, or statement with respect to this Funding Agreement, the application, or any documents filed to obtain grant funding.
 - C. Failure to operate or maintain the Project in accordance with this Funding Agreement.
 - D. Failure to make any remittance required by this Funding Agreement, including any remittance recommended as the result of an audit conducted pursuant to Paragraph D.5.
 - E. Failure to submit timely progress reports.
 - F. Failure to routinely invoice State.
 - G. Failure to meet any of the requirements set forth in Paragraph 12, "Continuing Eligibility."
- Should an event of default occur, State shall provide a notice of default to the Grantee and shall give Grantee at least ten (10) calendar days to cure the default from the date the notice is sent via

first-class mail to the Grantee. If the Grantee fails to cure the default within the time prescribed by the State, State may do any of the following:

- A. Declare the funding disbursed be immediately repaid.
- B. Terminate any obligation to make future payments to Grantee.
- C. Terminate the Funding Agreement.
- D. Take any other action that it deems necessary to protect its interests.

In the event State finds it necessary to enforce this provision of this Funding Agreement in the manner provided by law, Grantee agrees to pay all costs incurred by State including, but not limited to, reasonable attorneys' fees, legal expenses, and costs.

12. CONTINUING ELIGIBILITY. Grantee must meet the following ongoing requirement(s) to remain eligible to receive State funds:
- A. Grantee must adhere to the protocols developed pursuant to The Open and Transparent Water Data Act (Wat. Code, § 12406) for data sharing, transparency, documentation, and quality control.
 - B. If the Grantee diverting surface water, the Grantee must maintain compliance with diversion reporting requirements as outlined in Water Code section 5100 et seq.
 - C. If applicable, maintain compliance with the Urban Water Management Planning Act (Wat. Code, § 10610 et seq.).
 - D. If applicable, maintain compliance with Sustainable Water Use and Demand Reduction requirements outlined in Water Code Section 10608, et seq.
 - E. On March 4, 2022, the Governor issued Executive Order N-6-22 (the EO) regarding Economic Sanctions against Russia and Russian entities and individuals. The EO may be found at: <https://www.gov.ca.gov/wp-content/uploads/2022/03/3.4.22-Russia-Ukraine-Executive-Order.pdf>. "Economic Sanctions" refers to sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as any sanctions imposed under State law. The EO directs DWR to terminate funding agreements with, and to refrain from entering any new agreements with, individuals or entities that are determined to be a target of Economic Sanctions. Accordingly, should the State determine that the Grantee is a target of Economic Sanctions or is conducting prohibited transactions with sanctioned individuals or entities, that shall be grounds for termination of this Agreement. The State shall provide the Grantee advance written notice of such termination, allowing the Grantee at least 30 calendar days to provide a written response. Termination shall be at the sole discretion of the State.
13. SUBMISSION OF REPORTS. The submittal and approval of all reports is a requirement for the successful completion of this Funding Agreement. Reports shall meet generally accepted professional standards for technical reporting and shall be proofread for content, numerical accuracy, spelling, and grammar prior to submittal to State. All reports shall be submitted to the State's Project Manager and shall be submitted via email or DWR's "Grant Review and Tracking System" (GRanTS). If requested, Grantee shall promptly provide any additional information deemed necessary by State for the approval of reports. Reports shall be presented in the formats described in the applicable portion of Exhibit F. The timely submittal of reports is a requirement for initial and continued disbursement of State funds. Submittal and subsequent approval by the State, of a Project Completion Report is a requirement for the release of any funds retained for such project.

- A. Quarterly Progress Reports: Grantee shall submit Quarterly Progress Reports to meet the State's requirement for disbursement of funds. Quarterly Progress Reports shall be sent directly to the Project Manager via email or uploaded via GRanTS, and the State's Project Manager notified of upload. Quarterly Progress Reports shall, in part, provide a brief description of the work performed, Grantee's activities, milestones achieved, any accomplishments and any problems encountered in the performance of the work under this Funding Agreement during the reporting period. The first Quarterly Progress Report should be submitted to the State no later than three months after the execution of the agreement with future reports then due on successive three-month increments based on the invoicing schedule and this date.
- B. Project Completion Report: Grantee shall prepare and submit to State a Project Completion Report for the Project. Grantee shall submit the Project Completion Report within ninety (90) calendar days of project completion. The Project Completion Report shall include, in part, a description of actual work done, any changes or amendments to the Project, and a final schedule showing actual progress versus planned progress, copies of any final documents or reports generated or utilized during the Project. The Project Completion Report shall also include, if applicable, certification of final project by a registered civil engineer, consistent with Standard Condition D.17, "Final Inspections and Certification of Registered Civil Engineer". A DWR "Certification of Project Completion" form will be provided by the State.
14. OPERATION AND MAINTENANCE OF PROJECT. For the useful life of construction and implementation projects and in consideration of the funding made by State, Grantee agrees to ensure or cause to be performed the commencement and continued operation of the Project, and shall ensure or cause the Project to be operated in an efficient and economical manner; shall ensure all repairs, renewals, and replacements necessary to the efficient operation of the same are provided; and shall ensure or cause the same to be maintained in as good and efficient condition as upon its construction, ordinary and reasonable wear and depreciation excepted. The State shall not be liable for any cost of such maintenance, management, or operation. Grantee or their successors may, with the written approval of State, transfer this responsibility to use, manage, and maintain the property. For purposes of this Funding Agreement, "useful life" means period during which an asset, property, or activity is expected to be usable for the purpose it was acquired or implemented; "operation costs" include direct costs incurred for material and labor needed for operations, utilities, insurance, and similar expenses, and "maintenance costs" include ordinary repairs and replacements of a recurring nature necessary for capital assets and basic structures and the expenditure of funds necessary to replace or reconstruct capital assets or basic structures. Refusal of Grantee to ensure operation and maintenance of the Project in accordance with this provision may, at the option of State, be considered a breach of this Funding Agreement and may be treated as default under Paragraph 11, "Default Provisions."
15. NOTIFICATION OF STATE. Grantee shall promptly notify State, in writing, of the following items:
- A. Events or proposed changes that could affect the scope, budget, or work performed under this Funding Agreement. Grantee agrees that no substantial change in the scope of the Project will be undertaken until written notice of the proposed change has been provided to State and State has given written approval for such change. Substantial changes generally include changes to the scope of work, schedule or term, and budget.
- B. Any public or media event publicizing the accomplishments and/or results of this Funding Agreement and provide the opportunity for attendance and participation by State's representatives. Grantee shall make such notification at least 14 calendar days prior to the event.

- C. Discovery of any potential archaeological or historical resource. Should a potential archaeological or historical resource be discovered during construction, the Grantee agrees that all work in the area of the find will cease until a qualified archaeologist has evaluated the situation and made recommendations regarding preservation of the resource, and the State has determined what actions should be taken to protect and preserve the resource. The Grantee agrees to implement appropriate actions as directed by the State.
 - D. The initiation of any litigation or the threat of litigation against the Grantee regarding the Project or that may affect the Project in any way.
 - E. Final inspection of the completed work on a project by a Registered Civil Engineer, in accordance with Standard Condition D.17, "Final Inspections and Certification of Registered Civil Engineer." Grantee shall notify the State's Project Manager of the inspection date at least 14 calendar days prior to the inspection in order to provide State the opportunity to participate in the inspection.
16. NOTICES. Any notice, demand, request, consent, or approval that either party desires or is required to give to the other party under this Funding Agreement shall be in writing. Notices may be transmitted by any of the following means:
- A. By delivery in person.
 - B. By certified U.S. mail, return receipt requested, postage prepaid.
 - C. By "overnight" delivery service, provided that next-business-day delivery is requested by the sender.
 - D. By electronic means.
 - E. Notices delivered in person will be deemed effective immediately on receipt (or refusal of delivery or receipt). Notices sent by certified mail will be deemed effective given ten (10) calendar days after the date deposited with the U. S. Postal Service. Notices sent by overnight delivery service will be deemed effective one business day after the date deposited with the delivery service. Notices sent electronically will be effective on the date of transmission, which is documented in writing. Notices shall be sent to the below addresses. Either party may, by written notice to the other, designate a different address that shall be substituted for the one below.
17. PERFORMANCE EVALUATION. Upon completion of this Funding Agreement, Grantee's performance will be evaluated by the State and a copy of the evaluation will be placed in the State file and a copy sent to the Grantee.

18. PROJECT REPRESENTATIVES. The Project Representatives during the term of this Funding Agreement are as follows:

Department of Water Resources
Arthur Hinojosa
Manager, Division of Regional Assistance
P.O. Box 942836
Sacramento, CA 94236
Phone: (916) 902-6713
Email: Arthur.Hinojosa@water.ca.gov

Sunnyslope County Water District
Dorothy (Dee) Brown
President, Sunnyslope Board of Directors
3570 Airline Hwy,
Hollister, CA 95023
Phone: (831) 637-4670
Email: dee@sunnyslopewater.org

Direct all inquiries to the Project Manager:

Department of Water Resources
Denise Soria
Water Resources Engineer
South Central Region Office
691 N. Laverne Ave, Suite104
Phone: (559) 593-3340
Email: denise.soria@water.ca.gov

Sunnyslope County Water District
Drew A. Lander
General Manager
3570 Airline Hwy,
Hollister, CA 95023
Phone: (831) 637-4670
Email: drew@sunnyslopewater.org

Either party may change its Project Representative or Project Manager upon written notice to the other party.

19. STANDARD PROVISIONS AND INTEGRATION. This Funding Agreement is complete and is the final Agreement between the parties. The following Exhibits are attached and made a part of this Funding Agreement by this reference:

- Exhibit A – WORK PLAN
- Exhibit B – BUDGET
- Exhibit C – SCHEDULE
- Exhibit D – STANDARD CONDITIONS
- Exhibit E – GRANTEE’S AUTHORIZING RESOLUTION

Exhibit F – REPORT FORMATS AND REQUIREMENTS

Exhibit G – STATE AUDIT DOCUMENT REQUIREMENTS

Exhibit H – INFORMATION NEEDED FOR ESCROW PROCESSING AND CLOSURE

Exhibit I – APPRAISAL SPECIFICATIONS

Exhibit J – ADVANCE PAYMENT

IN WITNESS WHEREOF, the parties hereto have executed this Funding Agreement.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

SUNNYSLOPE COUNTY WATER DISTRICT

Mathew Bates For
Arthur Hinojosa, Manager
Division of Regional Assistance

Dorothy (Dee) Brown
Dorothy (Dee) Brown, President
Sunnyslope Board of Directors

Date 11/22/2023

Date 11/21/2023

Approved as to Legal Form and Sufficiency

James Herink For
Robin Brewer, Assistant General Counsel
Office of General Counsel

Date 11/21/2023

Exhibit A

WORK PLAN

Project Title: Best Road Mutual Water Company Water System Consolidation Project

Grantee: Sunnyslope County Water District

Project Description: The Project includes consolidating the Best Road Mutual Water Company (Best Road) water system with the Grantee's water system by installing approximately 4,500 feet of an 8-inch water main and a new hydropneumatic tank, upgrading the Grantee's existing Supervisory Control and Data Acquisition (SCADA) system, and disconnecting the existing Best Road wells.

The Best Roads community relies on a single groundwater well that has historically had elevated levels of arsenic. In addition, the well has declining water production rates due to the current drought. The State Water Resources Control Board recently issued a "do not drink order" and the community is currently relying on bottled water.

Task 1 – Project Administration

This task includes project administration, invoicing, and reporting.

Project administration includes working with DWR to develop and execute the Grant Agreement, administration of the Project including overseeing the budget and schedule, making payments to engineers and contractors after inspections and/or approval of work, and other activities related to the completion of the Project. Includes attending weekly/monthly meetings (as needed) with the DWR Project Manager.

Invoicing includes preparing and submitting invoices and appropriate backup documentation to the DWR Project Manager describing the work completed and listing the costs incurred during the billing cycle.

Reporting includes preparing and submitting progress reports. Prepare quarterly reports and submit them to DWR. Prepare the draft Grant Completion Report and submit it for DWR comments. Prepare the final Grant Completion Report incorporating DWR comments. All reports should be prepared as specified in Exhibit F of this Agreement.

Deliverables:

- Invoices and supporting documents
- Quarterly progress reports
- Draft Grant completion report
- Final Grant completion report

Task 2 – Permitting, Easements, and CEQA Documentation

Task 2a – Permitting

This task includes obtaining all the required permits and agreements to complete the Project.

Deliverables:

- Copy of all permits

Task 2b – Easements

This task includes negotiating and acquiring easements required for construction. The easement acquisition shall be performed as per Exhibits H and I.

Deliverables:

- Appraisal Report
- Easement agreements

Task 2c – CEQA Documentation

This task includes filling out the Environmental Information Form (EIF) and preparing CEQA documentation for the Project. The EIF and CEQA documentation need to be submitted to the DWR's Project Manager for review and concurrence prior to beginning construction.

Deliverables:

- Environmental Information Form
- Final CEQA documentation

Task 3 – Design and Contracting

This task includes preparing 30%, 90%, and final (100%) engineering design plans, technical specifications, and cost estimates for the installation of approximately 4,500 feet of an 8-inch water main and a new hydropneumatic tank, and upgrading the Grantee's existing SCADA system. The size of the hydropneumatic tank will be determined during the design process. The engineering design shall be detailed enough for construction such that requests for information from contractors are minimized during the construction.

This task also includes preparing bid documents, advertising the construction of the Project, and awarding the contracts.

Deliverables:

- All design documents
- 30%, 90%, and 100% design plans, specifications, and cost estimates
- Copy of bid documents
- Proof of advertisement
- Bid Summary
- Copy of awarded contracts
- Copy of notice to proceed

Task 4 – Construction

This task includes the construction of the Project as specified in the final design plans and technical specifications. This task includes the following construction activities:

- Installing approximately 4,500 feet of an 8-inch water main along John Smith Road
- Installing a new hydropneumatic tank
- Upgrade the Grantee's existing SCADA system

- Disconnect the existing Best Road's wells

Deliverables:

- Construction pictures

Task 5 – Construction Management

This task includes construction staking and performing construction inspection, labor compliance, engineering support during construction including reviewing submittals and responding to contractor requests for information, construction management, and Project closeout.

Deliverables:

- Construction schedules
- Final construction report
- Change orders if any
- Final as-built drawings

Exhibit B
BUDGET

All work associated with the Project must be completed prior to payment of retention. Backup documentation for cost share will not be reviewed for the purposes of invoicing. The Grantee is required to maintain all financial documents related to the Project in accordance with Exhibit G (State Audit Document Requirements for Grantees).

Task	Funding Amount	Cost Share: Non-State Fund Source	Total Cost
Task 1 – Project Administration	\$244,000	\$0	\$244,000
Task 2 – Permitting, Easement, and CEQA Documentation	\$65,000	\$0	\$65,000
Task 3 – Design and Contracting	\$251,000	\$65,000	\$316,000
Task 4 – Construction	\$1,540,000	\$1,020,000	\$2,560,000
Task 5 – Construction Management	\$153,000	\$102,000	\$255,000
Grand Total	\$2,253,000	\$1,187,000	\$3,440,000

Exhibit C
SCHEDULE

Task	Start Date	End Date
Task 1 – Project Administration	11/21/2022	06/30/2025
Task 2 – Permitting, Easement, and CEQA Documentation	11/21/2022	12/31/2024
Task 3 – Design and Contracting	11/21/2022	06/30/2025
Task 4 – Construction	11/21/2022	06/30/2025
Task 5 – Construction Management	11/21/2022	06/30/2025

Exhibit D**STANDARD CONDITIONS****D.1. ACCOUNTING AND DEPOSIT OF FUNDING DISBURSEMENT:**

- A. **Separate Accounting of Funding Disbursements:** Grantee shall account for the money disbursed pursuant to this Funding Agreement separately from all other Grantee funds. Grantee shall maintain audit and accounting procedures that are in accordance with generally accepted accounting principles and practices, consistently applied. Grantee shall keep complete and accurate records of all receipts and disbursements on expenditures of such funds. Grantee shall require its contractors or subcontractors to maintain books, records, and other documents pertinent to their work in accordance with generally accepted accounting principles and practices. Records are subject to inspection by State at any and all reasonable times.
- B. **Disposition of Money Disbursed:** All money disbursed pursuant to this Funding Agreement shall be deposited in a separate account, administered, and accounted for pursuant to the provisions of applicable law.
- C. **Remittance of Unexpended Funds:** Grantee shall remit to State any unexpended funds that were disbursed to Grantee under this Funding Agreement and were not used to pay Eligible Project Costs within a period of sixty (60) calendar days from the final disbursement from State to Grantee of funds or, within thirty (30) calendar days of the expiration of the Funding Agreement, whichever comes first.

D.2. ACKNOWLEDGEMENT OF CREDIT AND SIGNAGE: Grantee shall include appropriate acknowledgement of credit to the State for its support when promoting the Project or using any data and/or information developed under this Funding Agreement. Signage shall be posted in a prominent location at Project site(s) (if applicable) or at the Grantee's headquarters and shall include the Department of Water Resources color logo and the following disclosure statement: "Funding for this project has been provided in full or in part from the State Department of Water Resources." The Grantee shall also include in each of its contracts for work under this Agreement a provision that incorporates the requirements stated within this Paragraph.

D.3. AMENDMENT: This Funding Agreement may be amended at any time by mutual agreement of the Parties, except insofar as any proposed amendments are in any way contrary to applicable law. Requests by the Grantee for amendments must be in writing stating the amendment request and the reason for the request. Requests solely for a time extension must be submitted at least 90 days prior to the work completion date set forth in Paragraph 2. Any other request for an amendment must be submitted at least 180 days prior to the work completion date set forth in Paragraph 2. State shall have no obligation to agree to an amendment.

D.4. AMERICANS WITH DISABILITIES ACT: By signing this Funding Agreement, Grantee assures State that it complies with the Americans with Disabilities Act (ADA) of 1990, (42 U.S.C. § 12101 et seq.), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

D.5. AUDITS: State reserves the right to conduct an audit at any time between the execution of this Funding Agreement and the completion of the Project, with the costs of such audit borne by State. After completion of the Project, State may require Grantee to conduct a final audit to State's specifications, at Grantee's expense, such audit to be conducted by and a report prepared by an independent Certified Public Accountant. Failure or refusal by Grantee to comply with this provision shall be considered a breach of this Funding Agreement, and State

may elect to pursue any remedies provided in Paragraph 11 or take any other action it deems necessary to protect its interests. The Grantee agrees it shall return any audit disallowances to the State.

Pursuant to Government Code section 8546.7, the Grantee shall be subject to the examination and audit by the State for a period of three (3) years after final payment under this Funding Agreement with respect of all matters connected with this Funding Agreement, including but not limited to, the cost of administering this Funding Agreement. All records of Grantee or its contractor or subcontractors shall be preserved for this purpose for at least three (3) years after receipt of the final disbursement under this Agreement.

- D.6. **BUDGET CONTINGENCY:** If the Budget Act of the current year covered under this Funding Agreement does not appropriate sufficient funds for this program, this Funding Agreement shall be of no force and effect. This provision shall be construed as a condition precedent to the obligation of State to make any payments under this Funding Agreement. In this event, State shall have no liability to pay any funds whatsoever to Grantee or to furnish any other considerations under this Funding Agreement and Grantee shall not be obligated to perform any provisions of this Funding Agreement. Nothing in this Funding Agreement shall be construed to provide Grantee with a right of priority for payment over any other Grantee. If funding for any fiscal year after the current year covered by this Funding Agreement is reduced or deleted by the Budget Act, by Executive Order, or by order of the Department of Finance, the State shall have the option to either cancel this Funding Agreement with no liability occurring to State or offer a Funding Agreement amendment to Grantee to reflect the reduced amount.
- D.7. **CEQA:** Activities funded under this Funding Agreement, regardless of funding source, must be in compliance with the California Environmental Quality Act (CEQA). (Pub. Resources Code, § 21000 et seq.) Any work that is subject to CEQA and funded under this Agreement shall not proceed until documents that satisfy the CEQA process are received by the State's Project Manager and the State has completed its CEQA compliance. Work funded under this Agreement that is subject to a CEQA document shall not proceed until and unless approved by the Department of Water Resources. Such approval is fully discretionary and shall constitute a condition precedent to any work for which it is required. If CEQA compliance by the Grantee is not complete at the time the State signs this Agreement, once State has considered the environmental documents, it may decide to require changes, alterations, or other mitigation to the Project; or to not fund the Project. Should the State decide to not fund the Project, this Agreement shall be terminated in accordance with Paragraph 11.
- D.8. **CHILD SUPPORT COMPLIANCE ACT:** The Grantee acknowledges in accordance with Public Contract Code section 7110, that:
- A. The Grantee recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Family Code section 5200 et seq.; and
 - B. The Grantee, to the best of its knowledge, is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.
- D.9. **CLAIMS DISPUTE:** Any claim that the Grantee may have regarding performance of this Agreement including, but not limited to, claims for additional compensation or extension of time, shall be submitted to the DWR Project Representative, within thirty (30) days of the Grantee's knowledge of the claim. State and Grantee shall then attempt to negotiate a

resolution of such claim and process an amendment to this Agreement to implement the terms of any such resolution.

- D.10. **COMPETITIVE BIDDING AND PROCUREMENTS:** Grantee's contracts with other entities for the acquisition of goods and services and construction of public works with funds provided by State under this Funding Agreement must be in writing and shall comply with all applicable laws and regulations regarding the securing of competitive bids and undertaking competitive negotiations. If the Grantee does not have a written policy to award contracts through a competitive bidding or sole source process, the Department of General Services' *State Contracting Manual* rules must be followed and are available at: <https://www.dgs.ca.gov/OLS/Resources/Page-Content/Office-of-Legal-Services-Resources-List-Folder/State-Contracting>.
- D.11. **COMPUTER SOFTWARE:** Grantee certifies that it has appropriate systems and controls in place to ensure that state funds will not be used in the performance of this Funding Agreement for the acquisition, operation, or maintenance of computer software in violation of copyright laws.
- D.12. **CONFLICT OF INTEREST:** All participants are subject to State and Federal conflict of interest laws. Failure to comply with these laws, including business and financial disclosure provisions, will result in the application being rejected and any subsequent contract being declared void. Other legal action may also be taken. Applicable statutes include, but are not limited to, Government Code section 1090 and Public Contract Code sections 10410 and 10411, for State conflict of interest requirements.
- A. **Current State Employees:** No State officer or employee shall engage in any employment, activity, or enterprise from which the officer or employee receives compensation or has a financial interest, and which is sponsored or funded by any State agency, unless the employment, activity, or enterprise is required as a condition of regular State employment. No State officer or employee shall contract on his or her own behalf as an independent contractor with any State agency to provide goods or services.
 - B. **Former State Employees:** For the two-year period from the date, he or she left State employment, no former State officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements, or any part of the decision-making process relevant to the contract while employed in any capacity by any State agency. For the twelve-month period from the date, he or she left State employment, no former State officer or employee may enter into a contract with any State agency if he or she was employed by that State agency in a policy-making position in the same general subject area as the proposed contract within the twelve-month period prior to his or her leaving State service.
 - C. **Employees of the Grantee:** Employees of the Grantee shall comply with all applicable provisions of law pertaining to conflicts of interest, including but not limited to any applicable conflict of interest provisions of the California Political Reform Act. (Gov. Code, § 87100 et seq.)
 - D. **Employees and Consultants to the Grantee:** Individuals working on behalf of the Grantee may be required by the Department to file a Statement of Economic Interests (Fair Political Practices Commission Form 700) if it is determined that an individual is a consultant for Political Reform Act purposes.

- D.13. DELIVERY OF INFORMATION, REPORTS, AND DATA: Grantee agrees to expeditiously provide throughout the term of this Funding Agreement, such reports, data, information, and certifications as may be reasonably required by State.
- D.14. DISPOSITION OF EQUIPMENT: Grantee shall provide to State, not less than 30 calendar days prior to submission of the final invoice, an itemized inventory of equipment purchased with funds provided by State. The inventory shall include all items with a current estimated fair market value of more than \$5,000.00 per item. Within 60 calendar days of receipt of such inventory, State shall provide Grantee with a list of the items on the inventory that State will take title to. All other items shall become the property of Grantee. State shall arrange for delivery from Grantee of items that it takes title to. Cost of transportation, if any, shall be borne by State.
- D.15. DRUG-FREE WORKPLACE CERTIFICATION: Certification of Compliance: By signing this Funding Agreement, Grantee, its contractors or subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code, § 8350 et seq.) and have or will provide a drug-free workplace by taking the following actions:
- A. Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by the Government Code section 8355.
 - B. Establish a Drug-Free Awareness Program, as required by Government Code section 8355 to inform employees, contractors, or subcontractors about all of the following:
 - i. The dangers of drug abuse in the workplace,
 - ii. Grantee's policy of maintaining a drug-free workplace,
 - iii. Any available counseling, rehabilitation, and employee assistance programs, and
 - iv. Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.
 - C. Provide, as required by Government Code section 8355, that every employee, contractor, and/or subcontractor who works under this Funding Agreement:
 - i. Will receive a copy of Grantee's drug-free policy statement, and
 - ii. Will agree to abide by terms of Grantee's condition of employment, contract, or subcontract.
- D.16. EASEMENTS: Where the Grantee acquires property in fee title or funds improvements to real property already owned in fee by the Grantee using State funds provided through this Funding Agreement, an appropriate easement or other title restriction providing for floodplain preservation and agricultural and/or wildlife habitat conservation for the subject property in perpetuity, approved by the State, shall be conveyed to a regulatory or trustee agency or conservation group acceptable to the State. The easement or other title restriction must be in the first position ahead of any recorded mortgage or lien on the property unless this requirement is waived by the State.

Where the Grantee acquires an easement under this Agreement, the Grantee agrees to monitor and enforce the terms of the easement, unless the easement is subsequently transferred to another land management or conservation organization or entity with State

permission, at which time monitoring and enforcement responsibilities will transfer to the new easement owner.

Failure to provide an easement acceptable to the State may result in termination of this Agreement.

- D.17. FINAL INSPECTIONS AND CERTIFICATION OF REGISTERED CIVIL ENGINEER: Upon completion of the Project, Grantee shall provide for a final inspection and certification by a California Registered Civil Engineer that the Project has been completed in accordance with submitted final plans and specifications and any modifications thereto and in accordance with this Funding Agreement.
- D.18. GOVERNING LAW: This Funding Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.
- D.19. GRANTEE'S RESPONSIBILITIES: Grantee and its representatives shall:
- A. Faithfully and expeditiously perform or cause to be performed all project work as described in Exhibit A (Work Plan) and in accordance with Project Exhibit B (Budget) and Exhibit C (Schedule).
 - B. Accept and agree to comply with all terms, provisions, conditions, and written commitments of this Funding Agreement, including all incorporated documents, and to fulfill all assurances, declarations, representations, and statements made by Grantee in the application, documents, amendments, and communications filed in support of its request for funding.
 - C. Comply with all applicable California, federal, and local laws and regulations.
 - D. Implement the Project in accordance with applicable provisions of the law.
 - E. Fulfill its obligations under the Funding Agreement and be responsible for the performance of the Project.
 - F. Obtain any and all permits, licenses, and approvals required for performing any work under this Funding Agreement, including those necessary to perform design, construction, or operation and maintenance of the Project. Grantee shall provide copies of permits and approvals to State.
 - G. Be solely responsible for design, construction, and operation, and maintenance of the Project. Review or approval of plans, specifications, bid documents, or other construction documents by State is solely for the purpose of proper administration of funds by State and shall not be deemed to relieve or restrict responsibilities of Grantee under this Agreement.
 - H. Be solely responsible for all work and for persons or entities engaged in work performed pursuant to this Agreement, including, but not limited to, contractors, subcontractors, suppliers, and providers of services. The Grantee shall be responsible for any and all disputes arising out of its contracts for work on the Project, including but not limited to payment disputes with contractors and subcontractors. The State will not mediate disputes between the Grantee and any other entity concerning responsibility for performance of work.
- D.20. INDEMNIFICATION: Grantee shall indemnify and hold and save the State, its officers, agents, and employees, free and harmless from any and all liabilities for any claims and damages (including inverse condemnation) that may arise out of the Project and this Agreement, including any breach of this Agreement. Grantee shall require its contractors or subcontractors

to name the State, its officers, agents and employees as additional insureds on their liability insurance for activities undertaken pursuant to this Agreement.

- D.21. INDEPENDENT CAPACITY: Grantee, and the agents and employees of the Grantee, in the performance of the Funding Agreement, shall act in an independent capacity and not as officers, employees, or agents of the State.
- D.22. INSPECTION OF BOOKS, RECORDS, AND REPORTS: During regular office hours, each of the parties hereto and their duly authorized representatives shall have the right to inspect and to make copies of any books, records, or reports of either party pertaining to this Funding Agreement or matters related hereto. Each of the parties hereto shall maintain and shall make available at all times for such inspection accurate records of all its costs, disbursements, and receipts with respect to its activities under this Funding Agreement. Failure or refusal by Grantee to comply with this provision shall be considered a breach of this Funding Agreement, and State may withhold disbursements to Grantee or take any other action it deems necessary to protect its interests.
- D.23. INSPECTIONS OF PROJECT BY STATE: State shall have the right to inspect the work being performed at any and all reasonable times during the term of the Grant. This right shall extend to any subcontracts, and Grantee shall include provisions ensuring such access in all its contracts or subcontracts entered into pursuant to its Funding Agreement with State.
- D.24. LABOR CODE COMPLIANCE: The Grantee agrees to be bound by all the provisions of the Labor Code regarding prevailing wages and shall monitor all contracts subject to reimbursement from this Agreement to assure that the prevailing wage provisions of the Labor Code are being met. Current Department of Industrial Relations (DIR) requirements may be found at: <http://www.dir.ca.gov/lcp.asp>. For more information, please refer to DIR's *Public Works Manual* at: <http://www.dir.ca.gov/dlse/PWManualCombined.pdf>. The Grantee affirms that it is aware of the provisions of section 3700 of the Labor Code, which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance, and the Grantee affirms that it will comply with such provisions before commencing the performance of the work under this Agreement and will make its contractors and subcontractors aware of this provision.
- D.25. MODIFICATION OF OVERALL WORK PLAN: At the request of the Grantee, the State may at its sole discretion approve non-material changes to the portions of Exhibits A, B, and C that concern the budget and schedule without formally amending this Funding Agreement. Non-material changes with respect to the budget are changes that only result in reallocation of the budget and will not result in an increase in the amount of the State Funding Agreement. Non-material changes with respect to the Project schedule are changes that will not extend the term of this Funding Agreement. Requests for non-material changes to the budget and schedule must be submitted by the Grantee to the State in writing and are not effective unless and until specifically approved by the State's Program Manager in writing.
- D.26. NONDISCRIMINATION: During the performance of this Funding Agreement, Grantee and its contractors or subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex (gender), sexual orientation, race, color, ancestry, religion, creed, national origin (including language use restriction), pregnancy, physical disability (including HIV and AIDS), mental disability, medical condition (cancer/genetic characteristics), age (over 40), marital/domestic partner status, gender identity, and denial of medical and family care leave or pregnancy disability leave. Grantee and its contractors or subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and

harassment. Grantee and its contractors or subcontractors shall comply with the provisions of the California Fair Employment and Housing Act (Gov. Code, § 12990.) and the applicable regulations promulgated thereunder (Cal. Code Regs., tit. 2, § 11000 et seq.). The applicable regulations of the Fair Employment and Housing Commission are incorporated into this Agreement by reference. Grantee and its contractors or subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

Grantee shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the Funding Agreement.

- D.27. OPINIONS AND DETERMINATIONS: Where the terms of this Funding Agreement provide for action to be based upon, judgment, approval, review, or determination of either party hereto, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable.
- D.28. PERFORMANCE BOND: Where contractors are used, the Grantee shall not authorize construction to begin until each contractor has furnished a performance bond in favor of the Grantee in the following amounts: faithful performance (100%) of contract value, and labor and materials (100%) of contract value. This requirement shall not apply to any contract for less than \$25,000.00. Any bond issued pursuant to this paragraph must be issued by a California-admitted surety. (Pub. Contract Code, § 7103; Code Civ. Proc., § 995.311.)
- D.29. PRIORITY HIRING CONSIDERATIONS: If this Funding Agreement includes services in excess of \$200,000, the Grantee shall give priority consideration in filling vacancies in positions funded by the Funding Agreement to qualified recipients of aid under Welfare and Institutions Code section 11200 in accordance with Public Contract Code section 10353.
- D.30. PROHIBITION AGAINST DISPOSAL OF PROJECT WITHOUT STATE PERMISSION: The Grantee shall not sell, abandon, lease, transfer, exchange, mortgage, hypothecate, or encumber in any manner whatsoever all or any portion of any real or other property necessarily connected or used in conjunction with the Project, or with Grantee's service of water, without prior permission of State. Grantee shall not take any action, including but not limited to actions relating to user fees, charges, and assessments that could adversely affect the ability of Grantee to meet its obligations under this Funding Agreement, without prior written permission of State. State may require that the proceeds from the disposition of any real or personal property be remitted to State.
- D.31. PROJECT ACCESS: The Grantee shall ensure that the State, the Governor of the State, or any authorized representatives of the foregoing, will have safe and suitable access to the Project site at all reasonable times during Project construction and thereafter for the term of this Agreement.
- D.32. REMAINING BALANCE: In the event the Grantee does not submit invoices requesting all of the funds encumbered under this Funding Agreement, any remaining funds revert to the State. The State will notify the Grantee stating that the Project file is closed, and any remaining balance will be disencumbered and unavailable for further use under this Funding Agreement.
- D.33. REMEDIES NOT EXCLUSIVE: The use by either party of any remedy specified herein for the enforcement of this Funding Agreement is not exclusive and shall not deprive the party using such remedy of, or limit the application of, any other remedy provided by law.
- D.34. RETENTION: The State shall withhold ten percent (10%) of the funds requested by the Grantee for reimbursement of Eligible Project Costs until the Project is completed and Final

Report is approved. Any retained amounts due to the Grantee will be promptly disbursed to the Grantee, without interest, upon completion of the Project.

- D.35. RIGHTS IN DATA: Grantee agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work produced in the performance of this Funding Agreement shall be made available to the State and shall be in the public domain to the extent to which release of such materials is required under the California Public Records Act. (Gov. Code, § 6250 et seq.) Grantee may disclose, disseminate and use in whole or in part, any final form data and information received, collected, and developed under this Funding Agreement, subject to appropriate acknowledgement of credit to State for financial support. Grantee shall not utilize the materials for any profit-making venture or sell or grant rights to a third party who intends to do so. The State shall have the right to use any data described in this Paragraph for any public purpose.
- D.36. SEVERABILITY: Should any portion of this Funding Agreement be determined to be void or unenforceable, such shall be severed from the whole and the Funding Agreement shall continue as modified.
- D.37. SUSPENSION OF PAYMENTS: This Funding Agreement may be subject to suspension of payments or termination, or both if the State determines that:
- A. Grantee, its contractors, or subcontractors have made a false certification, or
 - B. Grantee, its contractors, or subcontractors violates the certification by failing to carry out the requirements noted in this Funding Agreement.
- D.38. SUCCESSORS AND ASSIGNS: This Funding Agreement and all of its provisions shall apply to and bind the successors and assigns of the parties. No assignment or transfer of this Funding Agreement or any part thereof, rights hereunder, or interest herein by the Grantee shall be valid unless and until it is approved by State and made subject to such reasonable terms and conditions as State may impose.
- D.39. TERMINATION BY GRANTEE: Subject to State approval which may be reasonably withheld, Grantee may terminate this Agreement and be relieved of contractual obligations. In doing so, Grantee must provide a reason(s) for termination. Grantee must submit all progress reports summarizing accomplishments up until termination date.
- D.40. TERMINATION FOR CAUSE: Subject to the right to cure under Paragraph 11, the State may terminate this Funding Agreement and be relieved of any payments should Grantee fail to perform the requirements of this Funding Agreement at the time and in the manner herein, provided including but not limited to reasons of default under Paragraph 11.
- D.41. TERMINATION WITHOUT CAUSE: The State may terminate this Agreement without cause on 30 days' advance written notice. The Grantee shall be reimbursed for all reasonable expenses incurred up to the date of termination.
- D.42. THIRD PARTY BENEFICIARIES: The parties to this Agreement do not intend to create rights in, or grant remedies to, any third party as a beneficiary of this Agreement, or any duty, covenant, obligation or understanding established herein.
- D.43. TIMELINESS: Time is of the essence in this Funding Agreement.
- D.44. TRAVEL: Travel includes the reasonable and necessary costs of transportation, subsistence, and other associated costs incurred by personnel during the term of this Funding Agreement. Any reimbursement for necessary travel and per diem shall be at rates not to exceed those set by the California Department of Human Resources for excluded employees. These rates may

be found at: <http://www.calhr.ca.gov/employees/Pages/travel-reimbursements.aspx>.

Reimbursement will be at the State travel and per diem amounts that are current as of the date costs are incurred. No travel outside the State of California shall be reimbursed unless prior written authorization is obtained from the State.

- D.45. **UNION ORGANIZING:** Grantee, by signing this Funding Agreement, hereby acknowledges the applicability of Government Code sections 16645 through 16649 to this Funding Agreement. Furthermore, Grantee, by signing this Funding Agreement, hereby certifies that:
- A. No State funds disbursed by this Funding Agreement will be used to assist, promote, or deter union organizing.
 - B. Grantee shall account for State funds disbursed for a specific expenditure by this Funding Agreement to show those funds were allocated to that expenditure.
 - C. Grantee shall, where State funds are not designated as described in (b) above, allocate, on a pro rata basis, all disbursements that support the program.
 - D. If Grantee makes expenditures to assist, promote, or deter union organizing, Grantee will maintain records sufficient to show that no State funds were used for those expenditures and that Grantee shall provide those records to the Attorney General upon request.
- D.46. **VENUE:** The State and the Grantee hereby agree that any action arising out of this Agreement shall be filed and maintained in the Superior Court in and for the County of Sacramento, California, or in the United States District Court in and for the Eastern District of California. The Grantee hereby waives any existing sovereign immunity for the purposes of this Agreement.
- D.47. **WAIVER OF RIGHTS:** None of the provisions of this Funding Agreement shall be deemed waived unless expressly waived in writing. It is the intention of the parties here to that from time to time either party may waive any of its rights under this Funding Agreement unless contrary to law. Any waiver by either party of rights arising in connection with the Funding Agreement shall not be deemed to be a waiver with respect to any other rights or matters, and such provisions shall continue in full force and effect.

Exhibit E
GRANTEE'S AUTHORIZING RESOLUTION

RESOLUTION NO. 956

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SUNNYSLOPE COUNTY WATER DISTRICT

AUTHORIZING THE GRANT APPLICATION, ACCEPTANCE, AND EXECUTION FOR THE BEST ROAD MUTUAL WATER COMPANY WATER SYSTEM CONSOLIDATION PROJECT

WHEREAS, Sunnyslope County Water District (SSCWD) proposes to implement The Best Road Mutual Water Company Water System Consolidation Project;

WHEREAS, The Best Road Mutual Water Company Water System Consolidation Project is being implemented in response to a drought scenario, as defined by Water Code section 13198(a) and is intended to: (1) address immediate impacts on human health and safety; (2) address immediate impacts on fish and wildlife resources; or, (3) provide water to persons or communities that lose or are threatened with the loss or contamination of water supplies;

WHEREAS, SSCWD has the legal authority and is authorized to enter into a funding agreement with the State of California; and


WHEREAS, SSCWD intends to apply for grant funding from the California Department of Water Resources for the The Best Road Mutual Water Company Water System Consolidation Project;

THEREFORE, BE IT RESOLVED by the Board of Directors of the SSCWD as follows:

1. That pursuant and subject to all of the terms and provisions of Budget Act of 2021, as amended (Stats. 2022, ch. 44, § 25), the SSCWD President of the Board, or designee is hereby authorized and directed to prepare and file an application for funding with the Department of Water Resources, and take such other actions as necessary or appropriate to obtain grant funding.
2. The SSCWD President of the Board, or designee is hereby authorized and directed to execute the funding agreement with the Department of Water Resources and any amendments thereto.
3. The SSCWD President of the Board, or designee is hereby authorized and directed to submit any required documents, invoices, and reports required to obtain grant funding.

CERTIFICATION I hereby certify that the foregoing Resolution was duly and regularly adopted by the Board of Directors of the SSCWD at the meeting held on October 17, 2023, motion by Director Parker and seconded by Director Alcorn, motion passed by the following vote:

AYES:
NOES:
ABSTAIN:
ABSENT:


Dorothy (Dee) Brown
President, Sunnyslope Board of Directors

Attest:

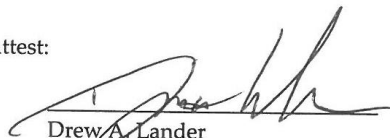

Drew A. Lander
Secretary to the Board of Directors

Exhibit F**REPORT FORMATS AND REQUIREMENTS**

The following reporting formats should be utilized. Please obtain State approval prior to submitting a report in an alternative format.

1. PROGRESS REPORTS

Progress reports shall generally use the following format. This format may be modified as necessary to effectively communicate information.

PROJECT STATUS

Describe the work performed during the time period covered by the report including but not limited to:

PROJECT INFORMATION

- Legal matters
- Engineering Evaluations
- Environmental matters
- Status of permits, easements, rights-of-way, rights of entry, and approvals as may be required by other State, federal, and/or local agencies
- Major accomplishments during the quarter (i.e., tasks completed, milestones met, meetings held or attended, press releases, etc.)
- Issues/concerns that have, will, or could affect the schedule or budget, with a recommendation on how to correct the matter
- Describe differences between the work performed and the work outlined in the Overall Work Plan, including change orders
- Demonstrate financial ability to pay local cost share of Eligible Project Costs required to complete the Project
- Estimate the percentage completion of the overall project
- Identify key issues that need to be resolved
- Photos documenting progress

COST INFORMATION

- Provide a list showing all project costs incurred during the time period covered by the report by the Grantee and each contractor working on the Project and which of these costs are Eligible Project Costs
- A discussion on how the actual budget is progressing in comparison to the project budget included in the Overall Work Plan
- A list of any changes approved to the budget in accordance with Funding Agreement and a revised budget, by task, if changed from latest budget in the Overall Work Plan
- A discussion of whether there have been any changes to the Grantee's finance plan for payment of the Grantee's share of Eligible Project Costs

SCHEDULE INFORMATION

- A schedule showing actual progress versus planned progress
- A discussion on how the actual schedule is progressing in comparison to the original or last reported schedule
- A list of any changes approved to the Schedule in accordance with Funding Agreement and a revised schedule, by task, if changed from latest reported schedule

2. PROJECT COMPLETION REPORT

Project Completion Reports shall generally use the following format.

EXECUTIVE SUMMARY – Should include a brief summary of project information and include the following items:

- Brief description of work proposed to be done in the original application
- Description of actual work completed and any deviations from the work plan identified in the Funding Agreement

REPORTS AND/OR PRODUCTS – The following items should be provided

- Final Evaluation report
- Electronic copies of any data collected, not previously submitted
- As-built drawings
- Final geodetic survey information
- Self-Certification that the Project meets the stated goal of the funding agreement (e.g. 100-year level of flood protection, HMP standard, PL-84-99, etc.)
- Project photos
- Discussion of problems that occurred during the work and how those problems were resolved
- A final project schedule showing actual progress versus planned progress

COSTS AND DISPOSITION OF FUNDS – A list showing:

- The date each invoice was submitted to State
- The amount of the invoice
- The date the check was received
- The amount of the check (If a check has not been received for the final invoice, then state this in this section.)
- A summary of the payments made by the Grantee for meeting its cost sharing obligations under this Funding Agreement.
- A summary of final funds disbursement including:
 - Labor cost of personnel of agency/ major consultant /sub-consultants. Indicate personnel, hours, rates, type of profession, and reason for consultant, i.e., design, CEQA work, etc.

- Evaluation cost information, shown by material, equipment, labor costs, and any change orders
- Any other incurred cost detail
- A statement verifying separate accounting of funding disbursements
- Summary of project cost including the following items:
 - Accounting of the cost of project expenditure;
 - Include all internal and external costs not previously disclosed; and
 - A discussion of factors that positively or negatively affected the project cost and any deviation from the original project cost estimate.

ADDITIONAL INFORMATION – Any relevant additional Information should be included.

Exhibit G**STATE AUDIT DOCUMENT REQUIREMENTS**

The following provides a list of documents typically required by State Auditors and general guidelines for Grantees. List of documents pertains to both State funding and Grantee's Cost Share, if any, and details the documents/records that State Auditors would need to review in the event of this Funding Agreement is audited. Grantees should ensure that such records are maintained for three (3) years after final disbursement pursuant to this Agreement.

State Audit Document RequirementsInternal Controls

1. Organization chart (e.g., Agency's overall organization chart and organization chart for the State funded Program/Project).
2. Written internal procedures and flowcharts for the following:
 - a) Receipts and deposits
 - b) Disbursements
 - c) State reimbursement requests
 - d) Expenditure tracking of State funds
 - e) Guidelines, policy, and procedures on State-funded Program/Project
3. Audit reports of the Agency internal control structure and/or financial statements within the last two years.
4. Prior audit reports on the State funded Program/Project.

State Funding:

1. Original Funding Agreement, any amendment(s), and budget modification documents.
2. A listing of all grants, loans, or subventions received from the State.
3. A listing of all other funding sources for the Program/Project.

Contracts:

1. All subcontractor and consultant contracts and related or partners' documents, if applicable.
2. Contracts between the Agency and member agencies as related to the State-funded Program/Project.

Invoices:

1. Invoices from vendors and subcontractors for expenditures submitted to the State for payments under the Funding Agreement.
2. Documentation linking subcontractor invoices to State reimbursement, requests, and related Funding Agreement budget line items.
3. Reimbursement requests submitted to the State for the Funding Agreement.

Cash Documents:

1. Receipts (copies of warrants) showing payments received from the State.
2. Deposit slips (or bank statements) showing deposits of the payments received from the State.

3. Cancelled checks or disbursement documents showing payments made to vendors, subcontractors, consultants, and/or agents under the grants or loans.
4. Bank statements showing the deposit of the receipts.

Accounting Records:

1. Ledgers showing entries for funding receipts and cash disbursements.
2. Ledgers showing receipts and cash disbursement entries of other funding sources.
3. Bridging documents that tie the general ledger to requests for Funding Agreement reimbursement.

Administration Costs:

1. Supporting documents showing the calculation of administration costs.

Personnel:

1. List of all contractors and Agency staff that worked on the State funded Program/Project.
2. Payroll records including timesheets for contractor staff and the Agency personnel who provided services charged to the program

Project Files:

1. All supporting documentation maintained in the project files.
2. All Funding Agreement related correspondence.

Exhibit H**INFORMATION NEEDED FOR ESCROW PROCESSING AND CLOSURE**

The Grantee must provide the following documents to the State Project Representative during the escrow process. Property acquisition escrow documents must be submitted within the term of this Funding Agreement and after a qualified appraisal has been approved.

- Name and Address of Title Company Handling the Escrow
- Escrow Number
- Name of Escrow Officer
- Escrow Officer's Phone Number
- Dollar Amount Needed to Close Escrow
- Legal Description of Property Being Acquired
- Assessor's Parcel Number(s) of Property Being Acquired
- Copy of Title Insurance Report
- Entity Taking Title as Named Insured on Title Insurance Policy
- Copy of Escrow Instructions in Draft Form Prior to Recording for Review Purposes
- Copy of Final Escrow Instructions
- Verification that all Encumbrances (Liens, Back Taxes, and Similar Obligations) have been Cleared Prior to Recording the Deed to Transfer Title
- Copy of Deed for Review Purposes Prior to Recording
- Copy of Deed as Recorded in County Recorder's Office
- Copy of Escrow Closure Notice

Exhibit I**APPRAISAL SPECIFICATIONS**

For property acquisitions funded this Funding Agreement, the Grantee must submit an appraisal for review and approval by the Department of General Services or DWR's Real Estate Branch prior to reimbursement or depositing State funds into an escrow account. All appraisal reports, regardless of report format, must include all applicable Appraisal Specifications below. Appraisals for a total compensation of \$150,000 or more shall be reported as a Self-Contained Appraisal Report. Appraisals for a total compensation of less than \$150,000 may be reported as a Summary Appraisal Report, which includes all information necessary to arrive at the appraiser's conclusion. Appraisal Specifications 14, 16, 21, 23-25, and 28 shall be narrative analysis regardless of the reporting format.

1. Title page with sufficient identification of appraisal assignment.
2. Letter of transmittal summarizing important assumptions and conclusions, value estimate, date of value and date of report.
3. Table of contents.
4. Assumptions and Limiting Conditions, Extraordinary Assumptions, and Hypothetical Conditions as needed.
5. Description of the scope of work, including the extent of data collection and limitations, if any, in obtaining relevant data.
6. Definition of Fair Market Value, as defined by Code of Civil Procedure, section 1263.320.
7. Photographs of subject property and comparable data, including significant physical features and the interior of structural improvements, if applicable.
8. Copies of Tax Assessor's plat map with the subject marked along with all contiguous assessor's parcels that depict the ownership.
9. A legal description of the subject property, if available.
10. For large, remote or inaccessible parcels, provide aerial photographs or topographical maps depicting the subject boundaries.
11. Three-year subject property history, including sales, listings, leases, options, zoning, applications for permits, or other documents or facts that might indicate or affect use or value.
12. Discussion of any current Agreement of Sale, option, or listing of subject property. This issue required increased diligence since state agencies often utilize non-profit organizations to quickly acquire sensitive-habitat parcels using Option Agreements. However, due to confidentiality clauses, the terms of the Option are often not disclosed to the state. If the appraiser discovers evidence of an Option or the possible existence of an Option, and the terms cannot be disclosed due to a confidentiality clause, then the appraiser is to cease work and contact the client.
13. Regional, area, and neighborhood analyses. This information may be presented in a summary format.
14. Market conditions and trends including identification of the relevant market area, a discussion of supply and demand within the relevant market area, and a discussion of the relevant market factors impacting demand for site acquisition and leasing within the relevant market area. This information may be presented in a summary format.
15. Discussion of subject land/site characteristics (size, topography, current use, elevations, zoning and land use issues, development entitlements, General Plan designation, utilities, offsite

improvements, access, land features such as levees and creeks, offsite improvements, easements and encumbrances, covenants, conditions and restrictions, flood and earthquake information, toxic hazards, water rights, mineral rights, toxic hazards, taxes and assessments, etc.).

16. Description of subject improvements including all structures, square footage, physical age, type of construction, quality of construction, condition of improvements and/or identification of any permanent plantings. Discussion of construction cost methodology, costs included and excluded, accrued depreciation from all causes, remaining economic life, items of deferred maintenance and cost to cure, and incurable items. Construction cost data must include cost data source, date of estimate or date of publication of cost manual, section and page reference of cost manual, copies of cost estimate if provided from another source, replacement or reproduction cost method used, and supporting calculations including worksheets or spreadsheets.
17. Subject property leasing and operating cost history, including all items of income and expense.
18. Analysis and conclusion of the larger parcel for partial taking appraisals. For partial taking appraisals, Appraisal Specifications generally apply to the larger parcel rather than an ownership where the larger parcel is not the entire ownership.
19. Include a copy of a recent preliminary title report (within the past year) as an appraisal exhibit. Discuss the title exceptions and analyze the effect of title exceptions on fair market value.
20. For appraisals of partial takings or easements, a detailed description of the taking or easement area including surface features and topography, easements, encumbrances or improvements including levees within the subject partial take or easement, and whether the take area is characteristic of the larger parcel. Any characteristics of the taking area, including existing pre-project levees that render the take area different from the larger parcel must be addressed in the valuation.
21. Opinion of highest and best use for the subject property, based on an in depth analysis supporting the concluded use which includes the detail required by the complexity of the analysis. Such support typically requires a discussion of the four criteria of tests utilized to determine the highest and best use of a property. If alternative feasible uses exist, explain and support market, development, cash flow, and risk factors leading to an ultimate highest and best use decision.
22. All approaches to market value applicable to the property type and in the subject market. Explain and support the exclusion of any usual approaches to value.
23. Map(s) showing all comparable properties in relation to the subject property.
24. Photographs and plat maps of comparable properties.
25. In depth discussion of comparable properties, similarities and differences compared to the subject, adjustments to the comparable data, and discussion of the reliability and credibility of the data as it relates to the indicated subject property value. Improved comparable sales which are used to compare to vacant land subject properties must include an allocation between land and improvements, using methodology similar to methodology used in item 16 above to estimate improvement value when possible, with an explanation of the methodology used.
26. Comparable data sheets.
 - a) For sales, include information on grantor/grantee, sale/recordation dates, listed or asking price as of the date of sale, highest and best use, financing, conditions of sale, buyer motivation, sufficient location information (street address, post mile, and/or distance from local landmarks

- such as bridges, road intersections, structures, etc.), land/site characteristics, improvements, source of any allocation of sale price between land and improvements, and confirming source.
- b) For listings, also include marketing time from list date to effective date of the appraisal, original list price, changes in list price, broker feedback, if available.
 - c) For leases, include significant information such as lessor/lessee, lease date and term, type of lease, rent and escalation, expenses, size of space leased, tenant improvement allowance, concessions, use restrictions, options, and confirming source. When comparing improved sales to a vacant land subject, the contributory value of the improvements must be segregated from the land value.
27. For appraisals of easements, a before and after analysis of the burden of the easement on the fee, with attention to how the easement affects highest and best use in the after condition. An Easement Valuation Matrix or generalized easement valuation references may be used ONLY as a reference for a secondary basis of value.
28. For partial taking and easement appraisals, valuation of the remainder in the after condition and analysis and identification of any change in highest and best use or other characteristics in the after condition, to establish severance damages to the remainder in the after condition, and a discussion of special and general benefits, and cost to cure damages or construction contract work.
29. There are occasions where properties involve water rights, minerals, or salable timber that require separate valuations. If an appraisal assignment includes water rights, minerals, or merchantable timber that requires separate valuation, the valuation of the water rights, minerals, or merchantable timber must be completed by a credentialed subject matter specialist.
30. For partial taking and easement appraisals, presentation of the valuation in California partial taking acquisition required format.
31. Implied dedication statement.
32. Reconciliation and final value estimate. Include analysis and comparison of the comparable sales to the subject, and explain and support conclusions reached.
33. Discussion of any departures taken in the development of the appraisal.
34. Signed Certification consistent with the language found in Uniform Standards of Professional Appraisal Practice.
35. If applicable, in addition to the above, appraisals of telecommunication sites must also provide:
- a) A discussion of market conditions and trends including identification of the relevant market, a discussion of supply and demand within the relevant market area and a discussion of the relevant market factors impacting demand for site acquisition and leasing within the relevant market area.
 - b) An analysis of other (ground and vault) leases comparable to subject property. Factors to be discussed in the analysis include the latitude, longitude, type of tower, tower height, number of rack spaces, number of racks occupied, placement of racks, power source and adequacy, back-up power, vault and site improvements description and location on site, other utilities; access, and road maintenance costs.

Exhibit J

ADVANCE PAYMENT

Water Code section 13198.4(c) authorizes advanced payment by the State for grantees that demonstrate cash flow issues. A project may receive an advanced payment of twenty-five (25) percent of its grant award; the remaining seventy-five (75) percent of the grant award will be reimbursed in arrears after the advanced funds have been fully expended. Within ninety (90) calendar days of execution of the Grant Agreement, the Grantee may provide the State an Advanced Payment Request. Advanced Payment Requests received ninety-one (91) calendar days after the execution of this Agreement will not be eligible to receive an advanced payment. The Advanced Payment Request shall contain the following:

- A. If the Grantee is requesting the advanced payment, the request(s) shall include:
 1. Descriptive information of each project with an update on project status
 2. Description and documentation of the cash flow issues the Grantee has that requires funds to be advanced
 3. The names of the entities that will receive the funding for each project
 4. A detailed Funding Plan which includes how the advanced payment will be expended (in terms of workplan, budget, and schedule) within the timeframe agreed upon by DWR and the Grantee. The Funding Plan must clearly identify the total budget (at Budget Category Level) for each project clearly showing the portion of advanced payment and reimbursement funds.
 5. Any other information that DWR may deem necessary
- B. Upon review and approval of the Advanced Payment Request, DWR may authorize payment of the requested amount or a lesser amount for those entities that have requested advanced funds. Based on the project's Funding Plan and other considerations, DWR may develop a "Disbursement Schedule," to disburse funds in installments. This Disbursement Schedule may change based on the project's ongoing compliance with the Advanced Payment requirements and the project's cash flow needs.
- C. Once DWR authorizes the Advanced Payment Request, the Grantee shall submit Advanced Payment Invoice(s) for the initial amount based on the "Disbursement Schedule" containing the request for each project requesting advanced funds, to the State with signature and date of the Grantee's Project Representative, as indicated in Paragraph 18, "Project Representative." The Grantee shall be responsible for the timely distribution of the advanced funds. The Advanced Payment Invoice(s) shall be submitted on forms provided by the State and shall meet the following format requirements:
 1. Invoice shall contain the date of the invoice, the time period covered by the invoice, and the total amount due.
 2. Invoice shall be itemized based on the budget categories specified in Exhibit B, "Budget."
 3. The State Project Manager will notify the Grantee, in a timely manner, when, upon review of an Advance Payment Invoice, the State determines that any portion or portions of the costs claimed are not eligible costs. The Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to cure such deficiency(ies). The Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to cure such deficiency(ies). If costs are not consistent with the

tasks in Exhibit A, the State will reject the claim and remove them from the Accountability Report.

4. On a quarterly basis, the Grantee will submit an Accountability Report to the State that demonstrates how actual expenditures compare with the scheduled budget. The Accountability Report shall include the following information:
 - i. An itemization of how advanced funds have been spent to-date (Expenditure Report), including documentation that supports the disbursements (e.g., contractor invoices, receipts, personnel hours, etc.). Accountability Reports shall be itemized based on the budget categories (i.e., tasks) specified in Exhibit B.
 - ii. An updated Accountability Report including an updated Funding Plan that depicts how the remaining advanced funds will be expended and the activities and deliverables associated with the advanced funds within the timeframe agreed upon by DWR and the Grantee when the advanced payment request was approved.
 - iii. Documentation that the funds were placed in a non-interest bearing account, including the dates of deposits and withdrawals from that account.
 - iv. Proof of distribution of advanced funds, if applicable.
- D. Once the Grantee has spent all advanced funds in a budget category, then the method of payment will revert to the reimbursement process for that budget category specified in Paragraph 9, "Method of Payment."