



MARINA COAST WATER DISTRICT

MARINA, CA

REGIONAL URBAN WATER AUGMENTATION PROJECT

RECYCLED WATER DISTRIBUTION PIPELINES

CIP # RW-0174

BID DOCUMENTS

VOLUME 1 OF 2

SPECIFICATIONS

JANUARY 2020



CONTRACT DOCUMENTS FOR
REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES

CIP # RW-0174

Marina Coast Water District
11 Reservation Road
Marina, California 93933

Board of Directors

Dr. Thomas P. Moore, President
Jan Shriner, Vice-President
Herbert Cortez
Peter Le
Matt Zefferman

Submitted 
Jonathon P. Marshall, P.E. - Carollo Engineers



JPM 30, 2020

Approved 
Michael Wegley, P.E. - District Engineer

**MARINA COAST WATER DISTRICT
REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES**

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MARINA COAST WATER DISTRICT
MARINA, CA
CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES

INVITATION TO BIDDERS

Sealed Bids for the construction of the **Regional Urban Water Augmentation Project Recycled Water Distribution Pipelines** will be received by the Marina Coast Water District (herein after referred to as MCWD), at 11 Reservation Road, Marina, CA 93933, until **2:00 p.m. local time on Wednesday, March 25, 2020**, at which time the Bids received will be publicly opened and read. The Project consists of constructing approximately 5 miles of 8-inch diameter to 16-inch diameter ductile iron and polyvinyl chloride recycled water and potable water pipeline in paved and non-paved roadways and easements, connecting to existing pipelines, pipeline valves and appurtenances, a guided auger bore trenchless roadway crossing, five pressure reducing stations, and roadway paving for a complete in-place operational system.

Bids will be received for a single prime Contract. Bids shall be on a lump sum and unit price basis.

The Issuing Office for the Bidding Documents is: MCWD Engineering Office, 2840 4th Avenue, Marina, CA 93933, point of contact: **Don Wilcox, Ph. (831) 883-5935 or email dwilcox@mcwd.org**. The primary point of contact for all technical questions related to the project during bidding is Jonathon Marshall and secondary point of contact is Andrew Coulter. All questions must be submitted in writing to JPMarshall@carollo.com and copied to ACoulter@carollo.com. Prospective Bidders may confirm their questions are received by calling the point of contact at (925) 932-1710. Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Thursdays between the hours of 8:00 a.m. to 5:00 p.m., and may obtain copies of the Bidding Documents from the Issuing Office online at www.mcwd.org.

Bidding Documents also may be examined at the Central Coast Builder's Exchange Plan Room, 20 Quail Run Circle, Salinas, CA 93907; and online at www.mcwd.org.

Hard copies of the Bidding Documents are not available for purchase. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A **mandatory** pre-bid conference followed by a site visit to the areas of the project that are not publicly accessible will be held at **10:00 a.m. local time on Wednesday February 19, 2020** at the MCWD Administration Office, 11 Reservation Road, Marina, CA 93933. Attendance at the pre-bid conference is mandatory. Bids will not be accepted from any bidder who did not attend the Pre-Bid Conference.

The Project will be funded in whole or in part by the following funding sources in addition to District funds:

- Drinking Water State Revolving Fund (SRF) and Proposition 1 Ground Water (Prop 1)

Bids must comply with all requirements associated with these funding sources, including, but not limited to, USEPA Disadvantaged Business Enterprise compliance and American Iron and Steel. In addition, the successful Bidder will be required to comply with all requirements associated with the SRF and Prop 1 funding in carrying out the Project.

Since this Project is funded in whole or in part with SRF funds, the work must also comply with the minimum rates for wages for laborers and mechanics as determined by the Secretary of Labor in accordance with the provisions of Davis-Bacon. A copy of these wage rates is available on-line at <http://www.dir.ca.gov/oprl/DPreWageDetermination.htm>. **If there is a difference between the State and Federal rates, the higher of the two rates must be paid.** Attention is directed to the SRF Funding Requirements section of the Contract Documents.

Each bidder shall be a California licensed contractor pursuant to the Business and Professions Code and shall be licensed in the following appropriate classification(s) of contractor's license(s), for the work bid upon, and must maintain the license(s) throughout the duration of the Contract: A (General Engineering) or C-34 (Pipeline). In addition, the successful bidder will be required to self-perform at least 50% of the work.

Bid security shall be furnished in accordance with the Instructions to Bidders.

Owner: **Marina Coast Water District**

By: **Michael Wegley, PE**

Title: **District Engineer**

Pub. Date: **February 5 & 8, 2020**

+ + END OF INVITATION TO BIDDERS + +

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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

- A. *Issuing Office* – The office from which the Bidding Documents are to be issued, which is the MCWD Engineering Office, 2840 4th Avenue, Marina, CA 93933.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office on CD and on the website www.MCWD.org in the number and format stated in the advertisement or invitation to bid.

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

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

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit with its Bid (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:

- A. Evidence of Bidder's authority to do business in the state where the Project is located.
B. Bidder's state or other contractor license number, if applicable.

3.02 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit within 3 business days following the bid opening the following additional information:

- A. Disadvantaged Business Enterprise documentation not required at the time of bid opening.

3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

3.05 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of

materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

- B. See Section 01140 - Work Restrictions, for constraints on site access, sequencing and scheduling of work.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
- b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
- d. Technical Data contained in such reports and drawings.

- 2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

- 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

- 1. *Site visits are to be conducted during the pre-bid meeting and by appointment only for the following locations: MCWD Reservoir 2 (along the Beach Road*

Alignment). Contact Don Wilcox at (831) 883-5935 for arranging the visit by appointment and conditions of access.

- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and

- drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
 - F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
 - G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
 - H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
 - I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
 - J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A mandatory pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing as stated in the invitation or advertisement to bid. Questions must be received by 5:00 p.m. local time on **Tuesday, March 10, 2020**. Questions received after this date may not be answered. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda and posted by the Issuing Office online at www.mcwd.org. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 10% (ten percent) of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 calendar days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven calendar days after the Effective Date of the Contract or 90 calendar days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven calendar days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of calendar days within which, or the dates by which, the Work is to be substantially completed, and completed and ready for final payment, are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 calendar days prior to the date for receipt of Bids. Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.03 The apparent Successful Bidder, and any other Bidder so requested, shall within three business days after Bid opening, submit to Owner qualifications information for the Subcontractors or Suppliers proposed for the following portions of the Work: Paving and Guided Auger Boring.
- If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The partnership's address for receiving notices shall be shown.
- 13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.
- 13.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.
- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.
- 13.07 All names shall be printed in ink below the signatures.
- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 *Unit Price*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. Bid Alternates will not be used for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices 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.

14.02 *Allowances*

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

- B. If the Owner includes reimbursement allowances, the allowance value will be pre-entered in the Bid Form.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to Marina Coast Water District, 11 Reservation Road, Marina, CA 93933, ATTN: District Engineer.
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid 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 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
 - C. Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 10 calendar days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten calendar days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES (NOT USED)**ARTICLE 23 – RETAINAGE**

- 23.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Supplemental Conditions.

ARTICLE 24 – PREVAILING WAGE

24.01 The Work is subject to California State prevailing wage requirements as set forth in the Supplementary Conditions, and Federal (Davis-Bacon Act) prevailing wage requirements as set forth in Section 00 73 50, State Revolving Fund and Proposition 1 Funding Requirements^{AD1}

ARTICLE 25 – DISADVANTAGED BUSINESS ENTERPRISES

25.01 Bidders must document a Good Faith Effort to hire Disadvantaged Business Enterprises (DBE) for this project, per the requirements set forth in Section 00 73 50, State Revolving Fund and Proposition 1 Funding Requirements.

25.02 A DBE minimum participation goal has not been established for this project.

ARTICLE 26 – DISQUALIFIED BUSINESSES

26.01 State and Federally Disqualified Business are prohibited from participating in this project, as set forth in Section 00 73 50, State Revolving Fund and Proposition I Funding Requirements.

END OF DOCUMENT

BID FORM

**CIP # RW-0174, REGIONAL URBAN WATER MANAGEMENT PROJECT
RECYCLED WATER DISTRIBUTION MAINS PROJECT**

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Marina Coast Water District

11 Reservation Road

Marina, CA 93933

ATTN: District Engineer

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 calendar after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
1	Mobilization and Demobilization (Shall not exceed 5% of Total of All Unit Price Bid Items)	LS	1		
2	Sheeting, shoring, and bracing, or equivalent method for the protection of life and limb in trenches and open excavation, pursuant to California Labor Code §6707 and Section 02260.	LS	1		
3	Stormwater Pollution Prevention	LS	1		
4	Traffic Management	LS	1		
5	Locating and Verifying Concealed existing Utilities per Section 01350	LS	1		
6	Blow-off Assemblies	EA	21		
7	Combination Air/Vacuum Valves	EA	19		
8	8" Isolation Valves (Gate)	EA	17		
9	12" Isolation Valves (Gate)	EA	10		
10	Beach Road: 8-inch Pipeline (Ductile Iron)	LF	164		
11	Beach Road: Pressure Reducing Station	LS	1		
12	Beach Road: 8-inch Pipeline (PVC)	LF	3,790		
13	Beach Road: Slurry Seal	SY	11,273		
14	Beach Road: Pavement Striping	LS	1		
15	Potable Water Pipeline: Beach Road from Del Monte Blvd to De Forest Rd (PVC)	LF	2,748		
16	Potable Water Pipeline: Beach Road Blow-off Assemblies	EA	4		
17	Potable Water Pipeline: Beach Road Combination Air/Vacuum Valves	EA	4		
18	Potable Water Pipeline: Beach Road 12" Isolation Valves (Gate)	EA	5		
19	Potable Water Pipeline: From Reservoir 2 to Crescent Ave (PVC)	LF	518		
20	Potable Water Pipeline: Reservoir 2 to Crescent Ave Blow-off Assemblies	EA	1		

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
21	Potable Water Pipeline: Reservoir 2 to Crescent Ave Combination Air/Vacuum Valves	EA	1		
22	Potable Water Pipeline: Reservoir 2 to Crescent Ave 12" Isolation Valves (Gate)	EA	4		
23	Carmel Avenue: 8-inch Pipeline (Ductile Iron)	LF	120		
24	Carmel Avenue: Pressure Reducing Station	LS	1		
25	Carmel Avenue: 8-inch Pipeline (PVC)	LF	2,615		
26	Carmel Avenue: Slurry Seal	SY	13,753		
27	Carmel Avenue: Pavement Striping	LS	1		
28	Marina Heights Drive: 16-inch Pipeline (Ductile Iron)	LF	240		
29	Marina Heights Drive: Pressure Reducing Station	LS	1		
30	Marina Heights Drive: Slurry Seal	SY	553		
31	Marina Heights Drive: Pavement Striping	LS	1		
32	Abrams Drive North of Imjim Parkway: 12-inch Pipeline (DIP)	LF	953		
33	Abrams Drive North of Imjim Parkway: Slurry Seal	SY	4,469		
34	Abrams Drive North of Imjim Parkway: Pavement Striping	LS	1		
35	Pressure Test and Disinfect Existing Pipeline in UCMBEST Property	LS	1		
36	Blanco Road: 12-inch Pipeline (PVC)	LF	584		
37	Allowance for sensitive plant species restoration on Blanco Road	ALW	1	\$20,000.00	\$20,000.00
38	Blanco Road: Launching Shaft for Guided Auger Boring Installation	LS	1		
39	Blanco Road: Guided Auger Boring Casing Pipeline Installation	LF	418		
40	Blanco Road: Guided Auger Boring Carrier Pipeline Installation (PVC)	LF	418		
41	Reservation Road: Receiving Shaft for Guided Auger Boring Installation	LS	1		
42	Reservation Road: 12-inch Pipeline (PVC)	LF	5,163		

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
43	Reservation Road: 2.5-inch Grind and Inlay	SY	8,402		
44	Reservation Road: Pavement Striping	LS	1		
45	9th Street: 8-inch Pipeline (Ductile Iron)	LF	78		
46	9th Street: Pressure Reducing Station	LS	1		
47	9th Street: 8-inch Pipeline (PVC)	LF	975		
48	9th Street: Slurry Seal	SY	3,136		
49	9th Street: Pavement Striping	LS	1		
50	Coe Avenue: 8-inch Pipeline (Ductile Iron)	LF	2,043		
51	Coe Avenue: Pressure Reducing Station	LS	1		
52	Coe Avenue: 8-inch Pipeline (PVC)	LF	1,127		
53	Coe Avenue: Slurry Seal	SY	12,560		
54	Coe Avenue: Pavement Striping	LS	1		
55	Reimbursement Allowance for City of Marina Encroachment Permit Fee	ALW	1	\$70,000.00	\$70,000.00
56	Reimbursement Allowance for Monterey County Encroachment Permit Fee	ALW	1	\$20,000.00	\$20,000.00
57	Reimbursement Allowance for City of Seaside Encroachment Permit Fee	ALW	1	\$15,000.00	\$15,000.00
58	Reimbursement Allowance for Business Licenses from Cities and County	ALW	1	\$25,000.00	\$25,000.00
59	Potential Installation of 1-inch Service per Detail W-1	EA	2		
60	Potential Installation of 4-inch Service	EA	2		
61	Contingency Allowance for Unknown Utility Conflicts	ALW	1	\$50,000.00	\$50,000.00
62	All work required to be completed for the project that is not included in the previous bid items	LS	1		
Total of All Unit Price Bid Items (in numbers):		\$			

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
<p>Total of All Unit Price Bid Items (in words):</p>					

ALW = Allowance, LF = Linear Feet, LS = Lump Sum, SY = Square Yards

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

5.02 Bid Alternatives

- A. Bidder offers to make, at the bid alternate prices following, the changes in the Work covered by the Unit Prices that are specified in the bid alternates priced below.
- B. It is understood that:
 - 1. All bid alternate prices must be filled in.
 - 2. The acceptance or rejection of any or all of these bid alternates is at the option of the Owner.
 - 3. Acceptance or rejection of bid alternates will not necessarily be made on the basis of price alone.
 - 4. The acceptance or rejection of one or more bid alternates will not affect the Lump Sum Bid Price, nor other conditions of this Bid, nor the price of other accepted bid alternates.
 - 5. The addition or deduction shown herein for each bid alternate is the net addition or net deduction that is to be applied to the Lump Sum Bid Price of the undersigned if the bid alternate is accepted by Owner.
 - 6. The Contract Price shall be the net amount determined by applying the bid alternate prices of all accepted bid alternates to the Total Unit Price Bid.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The items listed in Document 00 43 93, Bid Submittal checklist, are submitted with and made a condition of this Bid.

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature] _____

[Printed name] _____

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Bidder's License No.: _____
(where applicable)

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

Marina Coast Water District
11 Reservation Road
Marina, CA 93933

BID

Bid Due Date: MARCH 25, 2020

Description: CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES
MARINA COAST WATER DISTRICT

BOND

Bond Number:

Date:

Penal sum _____ \$ _____
(10% (ten percent) of the Total Bid Value, in Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 calendar days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

BID SUBMITTAL CHECKLIST

All information required by the terms of the Bid Documents must be furnished. Important items to be submitted are including, but not limited to, those listed below:

ARTICLE 1 - SUBMIT WITH BID

	Form Number	Form Name
<input type="checkbox"/>	00 41 00	Bid Form
<input type="checkbox"/>	No form included	Certificate of Contractor's License
<input type="checkbox"/>	00 43 00	Bid Bond (or Bid Security)
<input type="checkbox"/>	00 45 12	List of Project References
<input type="checkbox"/>	00 45 14	Designation of Subcontractors
<input type="checkbox"/>	00 45 16	List of Manufacturers
<input type="checkbox"/>	00 45 18	Designation of Insurance Agent or Broker
<input type="checkbox"/>	00 45 20	Stop Notice Information
<input type="checkbox"/>	00 45 22	Non-Collusion Statement
<input type="checkbox"/>	00 45 24	Prevailing Wage Statement
<input type="checkbox"/>	00 45 26	Public Works Contractor Registration Certification
<input type="checkbox"/>	00 45 28	Local Hiring for Public Works
<input type="checkbox"/>	00 45 30	Iran Contracting Act Certification
<input type="checkbox"/>	00 45 32	American Iron and Steel Certification
<input type="checkbox"/>	00 45 34	Anti-Lobbying Certification
<input type="checkbox"/>	00 45 36	DBE Good Faith Efforts Verification - Form 4500-3 (DBE Subcontractor Performance Form). Submit form only for DBE firms that will be used.
<input type="checkbox"/>	00 45 36	DBE Good Faith Efforts Verification - Form 4500-4 (DBE Subcontractor Utilization Form). Submit form only for DBE firms that will be used.
		The rest of Section 00 45 36 shall be submitted within 3 days of bid opening.
<input type="checkbox"/>	00 45 38	Bidder's List (submit within 3 days of bid opening)

ARTICLE 2 – SUBMIT PRIOR TO OWNER'S EXECUTION OF CONTRACT (After Notice of Award)

<input type="checkbox"/>	00 52 00	Agreement
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REGIONAL URBAN WATER AUGMENTATION PROJECT

CIP #RW-0174

Document 00 43 93

Marina Coast Water District

- 00 61 00 Performance Bond
- 00 61 50 Payment Bond
- No form included Insurance Certificates
- 00 73 50 Disclosure of Lobbying Activities
Attachment SF-LLL

END OF DOCUMENT

LIST OF PROJECT REFERENCES

**CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES**

SUBMIT WITH BID

The Bidder shall provide three projects that they have successfully completed in the last ten years of like nature (each including at least 1 mile of potable or recycled water ductile iron or polyvinyl chloride pressure pipe) and each with a contract amount for the Bidder of at least \$1,000,000. The Bidder shall provide the project name, owner representative and phone number. The projects listed shall be of similar scope and type as the project identified in this document.

	Project Name	Owner Representative	Owner Phone #	Bidder Contract Amount
1				
2				
3				

END OF DOCUMENT

DESIGNATION OF SUBCONTRACTORS

REGIONAL URBAN WATER AUGMENTATION PROJECT

SUBMIT WITH BID

In compliance with the provisions of Section 4100-4113 of the Public Contract Code of the State of California, and any amendments thereof, and, if applicable, with the requirements of County relating to projects for the construction, improvement or repair of Public Works, the undersigned bidder has set forth below the name and location of the place of business of each subcontractor who will perform work or labor or render service to the undersigned in or about the construction of the work, and each subcontractor who, under subcontract, will specially fabricate and install a portion of the work or improvement according to detailed drawings contained in the plans and specifications, for such work to be performed under the Contract Documents to which the attached bid is responsive, and the portion of the work which will be done by each subcontractor and for each subcontract in excess of one half of one percent of the undersigned's total aggregate bid.

Name of SUBCONTRACTOR: _____
Division of Work: _____ Phone: _____
Location (address, city, zip): _____
Contractor License No.: _____ DIR Number: _____

Name of SUBCONTRACTOR: _____
Division of Work: _____ Phone: _____
Location (address, city, zip): _____
Contractor License No.: _____ DIR Number: _____

Name of SUBCONTRACTOR: _____
Division of Work: _____ Phone: _____
Location (address, city, zip): _____
Contractor License No.: _____ DIR Number: _____

Name of SUBCONTRACTOR: _____
Division of Work: _____ Phone: _____
Location (address, city, zip): _____
Contractor License No.: _____ DIR Number: _____

Name of SUBCONTRACTOR: _____
Division of Work: _____ Phone: _____
Location (address, city, zip): _____
Contractor License No.: _____ DIR Number: _____

Attach additional sheets, as needed.

COMPANY NAME: _____

By: _____
Print Name Signature Date

END OF DOCUMENT

LIST OF MANUFACTURERS

REGIONAL URBAN WATER AUGMENTATION PROJECT

SUBMIT WITH BID

	Manufacturer	Product
1		Ductile Iron Pipeline
2		Polyvinyl Chloride Pipeline
3		Gate Valves
4		Precast Concrete Vaults

END OF DOCUMENT

DESIGNATION OF INSURANCE AGENT OR BROKER

**CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES**

SUBMIT WITH BID

It is proposed that the following insurance agent/broker and insurance company will provide policies of insurance or insurance certificates as required by the bid documents.

Insurance Agent or Broker: _____

Street: _____

City, State and Zip: _____

Telephone: _____

Name of Insurance Company
Providing Coverage _____

Best's Key Rating Guide of at least A VII? Yes _____ No _____

It is proposed that the following bonding agent or surety will provide payment and performance bonds as required by the bid documents.

Bonding Agent or Broker: _____

Street: _____

City, State and Zip: _____

Telephone: _____

Name of Surety Company
Providing Bonds: _____

- 1. Admitted in California? Yes _____ NO _____

OR

Current Treasury Listed Surety (Federal Register)? Yes _____ NO _____

AND

Current A.M. Best BB or better rating? Yes _____ NO _____

OR

Current Standard and Poor's Rating of BBB or better? Yes _____ NO _____

2. (in lieu of 1)

An admitted surety insurer which complies with the provisions of the code of Civil Procedure, Section 995.660*.

California Code of Civil Procedure Section 995.660 in summary, states that an admitted surety must provide 1) the original, or a certified copy of instrument authorizing the person who executed the bond to do so; 2) a certified copy of the Certificate of Authority issued by the Insurance Commissioner, 3) a certificate from county Clerk of Monterey County that Certificate of Authority has not been surrendered, revoked, canceled, annulled or suspended; 4) a financial statement showing the assets and liabilities of the insurer at the end of the quarter calendar year, prior to 30 days next preceding the date of the execution of the bond.

OR

3. In lieu of 1 and 2, a company of equal financial size and stability that is approved by the MCWD Insurance/Risk Manager.

By signing below, the bidder certifies that:

The above comply with the MCWD standards for liability insurers and sureties pursuant to Article 6 of the General and Supplementary Conditions: Yes _____ NO _____. If "No", your bid is subject to rejection.

COMPANY NAME: _____

BY: _____
(Bidder's signature)

DATE: _____

END OF DOCUMENT

STOP NOTICE INFORMATION

SUBMIT WITH BID

PROJECT NAME: CIP # RW-0174, REGIONAL URBAN WATER MANAGEMENT PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES

CONTRACTOR'S NAME AND ADDRESS: _____

Reference: California Civil Code, Division 3, Part 4, Title 15, Chapter 4

The following is provided for the information of contractors, subcontractors and suppliers of labor, materials, equipment, and services under MCWD contracts, and is not intended as legal advice. Advice of legal counsel should be obtained to ensure compliance with legal requirements relating to public works stop notices.

WHERE TO FILE: All original stop notices and preliminary-20 day notices (if required by California Civil Code 53098) must be filed with the Marina Coast Water District, 11 Reservation Road, Marina, CA 93933.

STOP NOTICE CONTENTS: See California Civil Code 3103. written notice, signed and verified by the claimant and including information such as the kind of labor, equipment, materials or service furnished or agreed to be furnished by the claimant; the name of the person/entity to or for whom the same was done or furnished; the amount in value of that already done or furnished and/or agreed to be done or furnished. Blank stop Notice forms are commercially available.

WHO MAY SERVE STOP NOTICE: See California Code 53181. All persons furnishing labor, materials, equipment or services to the job (except the original contractor) and persons furnishing provisions, provender or other supplies.

HOW THE STOP NOTICE IS SERVED: See California Code S3103. Served by personal service, registered mail, or certified mail.

TIME FOR SERVICE: See California Civil Code 3184. Stop notices must be served before the expiration of 30 days after the recording of a Notice of Completion (sometimes referred to as a Notice of Acceptance) or Notice of Cessation, if such notice is recorded or if no Notice of Completion or Notice of Cessation is recorded, 90 days after actual completion or cessation.

NOTICE OF PUBLIC ENTITY (OWNER): See California Civil Code 3185. Provided that a stop notice claimant has paid to the Clerk of the Board of Supervisors the sum of \$2.00 at the time of filing a stop notice, the Clerk shall provide each stop notice claimant with notice of filing of a Notice of

Completion or after the cessation of labor has been deemed a completion of a public work or after the acceptance of completion, whichever is later, to each stop notice claimant, by personal service or registered or certified mail.

RELEASE OF STOP NOTICE: See California Civil Code 3196 and following. A stop notice can be released if the original contractor files a corporate surety bond with the Clerk of the Board of Supervisors, in the amount of 125% of the stop notice claim. Alternatively, the original contractor may file an affidavit pursuant to California Civil Code S3198, stating objections to the validity of the stop notice. A counter affidavit may be filed by the claimant pursuant to 53200 and a summary legal proceeding may be held pursuant to 3201 and following, to determine the validity of the stop notice. If no counter affidavit is filed, the stop notice funds shall be released. Alternatively, the Stop Notice claimant may file a Release in a form which substantially complies with California Civil Code 3262.

STOP NOTICE LAWSUIT: See California Civil Code 53210 through 3214. These sections provide that a stop notice is perfected only by the filing of a lawsuit. A lawsuit must be filed no sooner than 10 days after service of a stop notice and no later than 90 days after the expiration of the time for filing stop notices. Notice of suit must be given to the Clerk of the Board within 5 days after commencement. The Court has the discretionary right to dismiss the lawsuit if it is not brought to trail within two years.

I HEREBY ACKNOWLEDGE THAT I RECEIVED AND READ THE ABOVE STOP NOTICE INFORMATION AND IF I AM AWARDED THIS CONTRACT, I AGREE TO INCLUDE A COPY OF THIS PAGE IN ALL SUBCONTRACTS AND CONTRACTS FOR LABOR, MATERIALS, EQUIPMENT, AND SERVICES THAT I ENTER INTO FOR THIS PROJECT:

Bidder's Signature: _____

Bidder's Name and Title (Print): _____

Date: _____

END OF DOCUMENT

NON-COLLUSION DECLARATION TO BE EXECUTED BY BIDDER

**CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES**

SUBMIT WITH BID

I, _____, am the
(name)
_____ of _____,
(Position Title) (Company)

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 to 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 of 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.

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

Signature

Date

END OF DOCUMENT

PREVAILING WAGE STATEMENT

SUBMIT WITH BID

If awarded the contract, we and our subcontractors shall pay all the workers we assign to the project not less than the higher of the Davis Bacon provisions as part of the SRF requirements or prevailing wage as determined by the state of California, Director of Industrial Relations in compliance with Article 7 of the Supplementary Conditions. We are aware that the contractor shall be penalized for non-compliance by either the contractor or his subcontractor(s).

In addition, we are informed of the following:

Copies of the prevailing wage rates are on file at:

Marina Coast Water District
11 Reservation Road
Marina, CA 93933

or

State of California Department of Industrial Relations
Division of Labor Statistics and Research
455 Golden Gate Avenue, 10th Floor
San Francisco, CA 94104
(415) 703-4774

On-line at <https://www.dir.ca.gov/oprl/DPreWageDetermination.htm>

The successful bidder shall be required to post the prevailing wage determinations at each job site.

Each contractor and subcontractor shall keep accurate payroll records showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per them wages paid to each journeyman, apprentice, worker or other employee employed by him or her in connection the public work.

Certified copies of such payroll records must be furnished to the State or Marina Coast Water District upon request.

By signing below, the bidder certifies that he shall comply with the prevailing wage laws.

Company Name: _____

Bidder's Signature: _____

Date: _____

END OF DOCUMENT

PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION

REGIONAL URBAN WATER AUGMENTATION PROJECT

SUBMIT WITH BID

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. See <http://www.dir.ca.gov/Public-Works/PublicWorks.html> for additional information.

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.

Bidder hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and the bidder and all bidder's subcontractors are currently registered as a contractor with the Department of Industrial Relations.

Name of Bidder: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Name of Subcontractor: _____

DIR Registration Number: _____

Bidder further acknowledges:

1. Bidder shall maintain a current DIR registration for the duration of the project.
2. Bidder shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its contract with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain registration status for the duration of the project.
3. Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Bidder's Signature: _____

Bidder's Name and Title: _____

Firm: _____

Date: _____

END OF DOCUMENT

LOCAL HIRING FOR PUBLIC WORKS

**REGIONAL URBAN WATER AUGMENTATION PROJECT
 RECYCLED WATER DISTRIBUTION PIPELINES
 CIP # RW-0174**

SUBMIT WITH BID

This contract is for a Marina Coast Water District public works project. All Contractors and Subcontractors are required to comply with all of the provisions of Ordinance 53 Local Hiring (Chapter 2.10 of the MCWD Code). Failure to comply with the local hiring ordinance may subject the Contractor herein with disqualification from any future Marina Coast Water District public works contracts. This ordinance applies for hiring throughout the duration of the project.

The Bidder hereby certifies that (initial as applicable):

_____ Bidder has read Ordinance 53, Local Hiring for District Public Works, and

_____ Bidder can meet the local hiring requirements of Ordinance 53, or

_____ Bidder has made a good faith effort to meet the requirements of Ordinance 53 as documented on the attached pages, or

_____ Bidder requires an exception because a suitable pool of persons does not exist locally for the specialized skills listed below.

Specialized Skill	No. of Workers	County of Residence

Company Name: _____

Contractor's Signature: _____

Date: _____

CIP # RW-0174

Efforts to Hire Employees (submit only if needed)

Classification	Agency Contacted	Date	Results

Efforts to Hire Subcontractors (submit only if needed)

Work Item	Company Contacted	Date	Results*

* Standard codes: DNR-did not respond, NA-not available for job, NB-not bidding, USED-included in bid, HIGH-selected lower cost bid

END OF DOCUMENT

IRAN CONTRACTING ACT CERTIFICATION

SUBMIT WITH BID

Reference: 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:

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.

MCWD has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, MCWD will be unable to obtain the goods and/or services to be provided pursuant to the Contract.

The amount of the Contract payable to the Contractor for the Project does not exceed \$1,000,000.

Bidder's Signature: _____

Bidder's Name and Title: _____

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 DOCUMENT

AMERICAN IRON AND STEEL CERTIFICATION

SUBMIT WITH BID

1. Identification of American-made Iron and Steel Products: The Bidder certifies that this bid effects the Bidder's best, good faith effort to identify domestic sources of iron and steel products for every component contained in the bid solicitation where such American-made components are required. The term "iron and steel products" means the following products made primarily of iron or steel - lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

2. Verification of U.S. Production: If this bid is accepted, the Bidder agrees that it will provide, to the Owner, reasonable, sufficient, and timely verification of the U.S. production of each Iron and Steel Product incorporated into the Project.

3. Documentation Regarding Non-American-made Iron and Steel: The Bidder certifies that for any Iron or Steel Product that is not American-made but was incorporated in the development of this bid, is allowed by waiver of the U.S. Environmental Protection Agency and such waiver is attached to this certification.

4. Warranty of Bidder: The Bidder hereby represents and warrants to and for the benefit of Owner that (a) Bidder has reviewed and understands the American Iron and Steel Requirement, and (b) if the bid is selected, all of the iron and steel products used in the project will be produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is attached to this certification.

Bidder's Signature: _____

Bidder's Name and Title: _____

Firm: _____

Date: _____

Q & A's, Waiver request instructions, and a list of approved waivers can be found at http://water.epa.gov/grants_funding/aisrequirement.cfm

END OF DOCUMENT

ANTI-LOBBYING CERTIFICATION

SUBMIT WITH BID

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form LLL, "Disclosure of Lobbying Activities," in accordance with its instructions. A copy of this form is included as part of the SRF Funding Requirements section of the Contract Documents.

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Typed Name & Title of Authorized Representative

Signature and Date of Authorized Representative

END OF DOCUMENT

DBE GOOD FAITH EFFORT VERIFICATION

SUBMIT ATTACHED FORM 4500-3 AND FORM 4500-4 WITH BID

SUBMIT THIS DOCUMENT 00 45 36 WITHIN 3 DAYS OF BID OPENING.

Project: _____ Bid Opening Date: _____
 Bidder Name: _____ Bidder Phone Number: _____
 Bidder Address: _____

Owner, in accordance with 40 CFR part 33, requires bidders to provide information pertaining to the use of minority businesses, women's business enterprises, and labor surplus area firms (referred to herein as "DBEs").

Please provide the following information, using additional sheets of paper if necessary, and submit this form with your bid. Bidder should also submit mail logs, phone logs, electronic searches and communication, newspaper clippings or similar records documenting efforts to meet the Good Faith Effort requirements.

1. Solicitation Lists/Publications. The names and dates of each publication in which a request for DBE participation for this project was placed by the bidder (please attach copies of advertisements or proofs of publication), or information related to solicitation lists on which DBEs were included. Postings/publications should be at least 30 days before the date Bids are publicly opened and read (Bid Opening) per Document 00 11 00.

Publications/Solicitation Lists	Date of Advertisement

2. Soliciting DBEs as Potential Sources. The names and dates of written notices sent to certified DBEs soliciting bids for this project and the dates and methods used for following up initial solicitations to determine with certainty whether the DBEs were interested (please attach copies of solicitations, telephone records, fax confirmations, etc.):

Name of DBEs Solicited	Date of Initial Solicitation	Follow-up Methods and Dates

3. Division of Requirements. The items of work which the bidder made available to DBE firms including, where appropriate, any breaking down of the contract work items (including those items normally performed by the bidder with its own forces) into economically feasible units to facilitate DBE participation. It is the bidder's responsibility to demonstrate that sufficient work to facilitate DBE participation was made available to DBE firms.

Items of Work	Bidder Normally Performs Them? (Yes/No)	Breakdown of Items	Amount (\$)	Percentage of Contract (%)

--	--	--	--	--

4. Delivery Schedules. Efforts made to establish delivery schedules or break down work items, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises:

5. Services of Other Agencies. The names of agencies, organizations or groups contacted to provide assistance in contacting, recruiting and using DBE firms, such as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce (please attach copies of requests to agencies and any responses received, i.e., lists, Internet page download, etc.):

Name of Agency/Organization	Method/Date of Contact	Results

6. DBE Forms. Complete the attached State Water Resources Control Board forms **4500-3** (DBE Subcontractor Performance Form) and **4500-4** (DBE Subcontractor Utilization Form) and submit with the bid.

7. Additional Data. Provide any additional data to support a demonstration of good faith efforts (use additional sheets if necessary):

END OF DOCUMENT



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	

Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.
² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)



Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractor's² and the estimated dollar amount of each subcontract. A Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity			

I have identified potential DBE certified subcontractors. ___ YES ___ NO If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address / Phone / Email	Estimated Dollar Amount	Currently DBE Certified?

--Continue on back if needed--

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-4 (DBE Subcontractor Utilization Form)

BIDDER'S LIST

SUBMIT WITHIN 3 DAYS OF BID OPENING

Bidder is required to provide the following information for all DBE and non-DBE subcontractors who provided a proposal, bid or quote to the Prime Contractor. Provide this form to all subcontractors and have them complete and return it with their proposal, bid or quote. This information must be submitted with the bid.

Prime Contractor: _____

Project: CIP # RW-0174, REGIONAL URBAN WATER MANAGEMENT PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES

<p>Firm Name: _____</p> <p>Business Address: _____</p> <p>Phone: _____ Fax: _____</p> <p>Contact Person: _____</p> <p>E-mail: _____</p> <p>Is the firm currently certified as a DBE? <input type="checkbox"/> No <input type="checkbox"/> Yes Cert. Number: _____</p> <p>Type of work/services/materials proposed by bidder:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Amount of Bid/Quote: \$ _____</p> <p>Date of Bid/Quote: _____</p>
--

END OF DOCUMENT

AGREEMENT
BETWEEN MARINA COAST WATER DISTRICT
AND _____
FOR THE
REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER DISTRIBUTION PIPELINES
CIP# RW-0174

THIS AGREEMENT is by and between Marina Coast Water District (“Owner”) and _____ (“Contractor”).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The Project consists of constructing approximately 5 miles of 8-inch diameter to 16-inch diameter ductile iron and polyvinyl chloride recycled water and potable water pipeline in paved and non-paved roadways and easements, connecting to existing pipelines, pipeline valves and appurtenances, a guided auger bore trenchless roadway crossing, five pressure reducing stations, and roadway paving for a complete in-place operational system.

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: CIP # RW-0174, REGIONAL URBAN WATER AUGMENTATION PROJECT RECYCLED WATER DISTRIBUTION PIPELINES.

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by Carollo Engineers, Inc., 2795 Mitchell Drive, Walnut Creek, CA 94598.

3.02 The Owner has retained Carollo Engineers (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Contract Times: Days

- A. The Work will be substantially completed within 270 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 305 calendar days after the date when the Contract Times commence to run.

4.03 Liquidated Damages

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. Abrams Drive: Contractor shall pay Owner \$1,500 for each calendar day (or partial calendar day) after the required completion date in Section 01140 until the Work along Abrams Drive is substantially complete.
 2. Marina Heights Drive: Contractor shall pay Owner \$1,500 for each calendar day (or partial calendar day) after the required completion date in Section 01140 until the Work in the road of Marina Heights Drive is substantially complete. Work outside the road (such as the pressure reducing station beyond the road curb) is not subject to this liquidated damage.
 3. Beach Road, Carmel Avenue and Coe Avenue: Contractor shall pay Owner \$1,500 for each calendar day (or partial calendar day) Work is done in Beach Road, Carmel Avenue and Coe Avenue on days before or after the schools summer break period defined in Section 01140.
 4. Blanco Road and Reservation Road Intersection Receiving Shaft: Contractor shall pay Owner \$500 for each calendar day (or partial calendar day) the receiving shaft is not restored and temporary paved beyond the allowable duration specified in Section 02261.
 5. Trench Plates: Contractor shall pay Owner \$500 per 20 linear feet of steel plating for each night that steel plating, in excess of 20 linear feet, is left in the public right-of-way.
 6. Substantial Completion: Contractor shall pay Owner \$5,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
 7. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$5,000 for each day that expires after such time until the Work is completed and ready for final payment.

8. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price (adjusted for any math errors in the submitted bid form) times the actual quantity of that item):

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
1	Mobilization and Demobilization (Shall not exceed 5% of Total of All Unit Price Bid Items)	LS	1		
2	Sheeting, shoring, and bracing, or equivalent method for the protection of life and limb in trenches and open excavation, pursuant to California Labor Code §6707 and Section 02260.	LS	1		
3	Stormwater Pollution Prevention	LS	1		
4	Traffic Management	LS	1		
5	Locating and Verifying Concealed existing Utilities per Section 01350	LS	1		
6	Blow-off Assemblies	EA	21		
7	Combination Air/Vacuum Valves	EA	19		
8	8" Isolation Valves (Gate)	EA	17		
9	12" Isolation Valves (Gate)	EA	10		
10	Beach Road: 8-inch Pipeline (Ductile Iron)	LF	164		
11	Beach Road: Pressure Reducing Station	LS	1		
12	Beach Road: 8-inch Pipeline (PVC)	LF	3,790		
13	Beach Road: Slurry Seal	SY	11,273		
14	Beach Road: Pavement Striping	LS	1		
15	Potable Water Pipeline: Beach Road from Del Monte Blvd to De Forest Rd (PVC)	LF	2,748		
16	Potable Water Pipeline: Beach Road Blow-off Assemblies	EA	4		
17	Potable Water Pipeline: Beach Road Combination Air/Vacuum Valves	EA	4		

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
18	Potable Water Pipeline: Beach Road 12" Isolation Valves (Gate)	EA	5		
19	Potable Water Pipeline: From Reservoir 2 to Crescent Ave (PVC)	LF	518		
20	Potable Water Pipeline: Reservoir 2 to Crescent Ave Blow-off Assemblies	EA	1		
21	Potable Water Pipeline: Reservoir 2 to Crescent Ave Combination Air/Vacuum Valves	EA	1		
22	Potable Water Pipeline: Reservoir 2 to Crescent Ave 12" Isolation Valves (Gate)	EA	4		
23	Carmel Avenue: 8-inch Pipeline (Ductile Iron)	LF	120		
24	Carmel Avenue: Pressure Reducing Station	LS	1		
25	Carmel Avenue: 8-inch Pipeline (PVC)	LF	2,615		
26	Carmel Avenue: Slurry Seal	SY	13,753		
27	Carmel Avenue: Pavement Striping	LS	1		
28	Marina Heights Drive: 16-inch Pipeline (Ductile Iron)	LF	240		
29	Marina Heights Drive: Pressure Reducing Station	LS	1		
30	Marina Heights Drive: Slurry Seal	SY	553		
31	Marina Heights Drive: Pavement Striping	LS	1		
32	Abrams Drive North of Imjim Parkway: 12-inch Pipeline (DIP)	LF	953		
33	Abrams Drive North of Imjim Parkway: Slurry Seal	SY	4,469		
34	Abrams Drive North of Imjim Parkway: Pavement Striping	LS	1		
35	Pressure Test and Disinfect Existing Pipeline in UCMBEST Property	LS	1		
36	Blanco Road: 12-inch Pipeline (PVC)	LF	584		
37	Allowance for sensitive plant species restoration on Blanco Road	ALW	1	\$20,000.00	\$20,000.00
38	Blanco Road: Launching Shaft for Guided Auger Boring Installation	LS	1		
39	Blanco Road: Guided Auger Boring Casing Pipeline Installation	LF	418		
40	Blanco Road: Guided Auger Boring Carrier Pipeline Installation (PVC)	LF	418		

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
41	Reservation Road: Receiving Shaft for Guided Auger Boring Installation	LS	1		
42	Reservation Road: 12-inch Pipeline (PVC)	LF	5,163		
43	Reservation Road: 2.5-inch Grind and Inlay	SY	8,402		
44	Reservation Road: Pavement Striping	LS	1		
45	9th Street: 8-inch Pipeline (Ductile Iron)	LF	78		
46	9th Street: Pressure Reducing Station	LS	1		
47	9th Street: 8-inch Pipeline (PVC)	LF	975		
48	9th Street: Slurry Seal	SY	3,136		
49	9th Street: Pavement Striping	LS	1		
50	Coe Avenue: 8-inch Pipeline (Ductile Iron)	LF	2,043		
51	Coe Avenue: Pressure Reducing Station	LS	1		
52	Coe Avenue: 8-inch Pipeline (PVC)	LF	1,127		
53	Coe Avenue: Slurry Seal	SY	12,560		
54	Coe Avenue: Pavement Striping	LS	1		
55	Reimbursement Allowance for City of Marina Encroachment Permit Fee	ALW	1	\$70,000.00	\$70,000.00
56	Reimbursement Allowance for Monterey County Encroachment Permit Fee	ALW	1	\$20,000.00	\$20,000.00
57	Reimbursement Allowance for City of Seaside Encroachment Permit Fee	ALW	1	\$15,000.00	\$15,000.00
58	Reimbursement Allowance for Business Licenses from Cities and County	ALW	1	\$25,000.00	\$25,000.00
59	Potential Installation of 1-inch Service per Detail W-1	EA	2		
60	Potential Installation of 4-inch Service	EA	2		
61	Contingency Allowance for Unknown Utility Conflicts	ALW	1	\$50,000.00	\$50,000.00
62	All work required to be completed for the project that is not included in the previous bid items	LS	1		
Total of All Unit Price Bid Items (in numbers): \$					

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
<p>Total of All Unit Price Bid Items (in words):</p>					

ALW = Allowance, LF = Linear Feet, LS = Lump Sum, SY = Square Yards, EA = Each

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

5.02 Bid Alternatives

- A. Bidder offers to make, at the bid alternate prices following, the changes in the Work covered by the Unit Prices that are specified in the bid alternates priced below.
- B. It is understood that:
 - 1. All bid alternate prices must be filled in.
 - 2. The acceptance or rejection of any or all of these bid alternates is at the option of the Owner.
 - 3. Acceptance or rejection of bid alternates will not necessarily be made on the basis of price alone.
 - 4. The acceptance or rejection of one or more bid alternates will not affect the Lump Sum Bid Price, nor other conditions of this Bid, nor the price of other accepted bid alternates.
 - 5. The addition or deduction shown herein for each bid alternate is the net addition or net deduction that is to be applied to the Lump Sum Bid Price of the undersigned if the bid alternate is accepted by Owner.
 - 6. The Contract Price shall be the net amount determined by applying the bid alternate prices of all accepted bid alternates to the Total Unit Price Bid.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor’s Applications for Payment on or about the 30th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of

Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. 95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. 0 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the legal rate unless otherwise specified according to California law.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and

- drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
 - F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 - G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
 - H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. This Agreement.
 - 2. Performance bond.
 - 3. Payment bond.
 - 4. General Conditions.
 - 5. Supplementary Conditions.
 - 6. Specifications as listed in the table of contents of the Project Manual.
 - 7. Drawings (not attached but incorporated by reference) consisting of 58 sheets with each sheet bearing the following general title: Regional Urban Water Augmentation Project Recycled Water Distribution Mains, Capital Improvement Program Potable Water Mains Beach Road, and Capital Improvement Program Potable Water Mains Reservoir 2 to Crescent Ave.
 - 8. Typical Details listed or incorporated into the Project Manual.

-
9. Addenda (numbers 1 to X, inclusive).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. List of Project References (00 45 12)
 - b. Designation of Subcontractors (00 45 14)
 - c. List of Manufacturers (0045 16)
 - d. Designation of Insurance Agent or Broker (00 45 18)
 - e. Stop Notice Information (00 45 20)
 - f. Non-Collusion Declaration (00 45 22)
 - g. Prevailing Wage (00 45 24)
 - h. Public Works Contractor Registration Certification (00 45 26)
 - i. Local Hiring for Public Works (00 45 28)^{AD1}
 - j. Iran Contracting Act Certification (00 45 30)
 - k. American Iron and Steel Certification (00 45 32)
 - l. Anti-Lobbying Certification (00 45 34)
 - m. DBE Good Faith Efforts Verification (00 45 36)
 - n. Bidder's List (00 45 38)
 - o. State Revolving Fund and Proposition 1 Funding Requirements (00 73 50).
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 12. The standard Plans and Specifications of the Marina Coast Water District, dated November 2007 (not attached but incorporated by reference).
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto 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 Documents.

10.03 *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.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall 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.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

- 10.06 In accordance with Section 1775, California Labor Code, Contractor shall forfeit to Owner, as a penalty, not more than \$50 for each calendar day, or portion thereof, for each worker paid, either by Contractor or any subcontractor, less than the prevailing rates as determined by the Director of California Department of Industrial Relations for the Work.

- 10.07 In the performance of the Work, a day's work shall be 8 hours of labor in any workday and 40 hours in any work week and any other work as required by Section 510, California Labor Code, and Contractor shall further conform to the requirements of Section 1813, California Labor Code, or forfeit to Owner, as a penalty, the sum of \$25 for each worker employed in the execution of the Work by Contractor or any subcontractor, for each day during which any worker is required or permitted to labor more than 8 hours in any workday or more than 40 hours in any 1 calendar week in violation of Section 510.
- 10.08 Contractor shall carry workers' compensation insurance and require subcontractors to carry workers' compensation insurance as required by Section 3700, California Labor Code.
- 10.09 Pursuant to California Labor Code Section 6705, excavation of any trench or trenches 5 feet or more in depth, involving estimated expenditures in excess of \$25,000 shall require, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection prepared by a registered civil or structural engineer.
- 10.10 *Contractor registration:*
- A. Project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations (DIR).
- 10.11 Pursuant to Section 1770 et seq., California Labor Code, the successful Bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of California Department of Industrial Relations. A copy of such prevailing rate is on file at the offices of the Owner, which copy will be made available for examination during business hours to any party on request.
- 10.12 Contractor, by signing this Agreement, certifies the following: "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation 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."
- 10.13 Nothing in this Agreement shall prevent Contractor or any Subcontractor from employing properly registered apprentices in the execution of the Agreement. Contractor shall have responsibility for compliance with California Labor Code Section 1777.5 for all apprenticeable occupations.
- 10.14 *Other Provisions*
- A. Owner stipulates that the General Conditions that are made a part of this Contract are the EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, with modifications made solely in the Supplementary Conditions.
- B. Since this Project is funded in whole or in part with SRF funds, the work must also comply with the minimum rates for wages for laborers and mechanics as determined by the Secretary of Labor in accordance with the provisions of Davis-Bacon. As between the State and Federal rates, the higher of the two rates must be paid. Attention is directed to the SRF Funding Requirements section of the Contract Documents.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on [redacted] (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

By: _____

By: _____

Title: General Manager

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

Marina Coast Water District

11 Reservation Road

Marina, CA 93933

License No.: _____

(where applicable)

PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

Marina Coast Water District
11 Reservation Road, Marina, CA 93933

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the

Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than

the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including

allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

Marina Coast Water District
11 Reservation Road, Marina, CA 93933

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location):*

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*
Amount:
Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant

under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: Marina Coast Water District
Contractor:
Engineer:
Project:

Owner's Contract No.:
Contractor's Project No.:
Engineer's Project No.:
Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

- All Work
- The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: None As follows

Amendments to Contractor's responsibilities: None As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

**DOCUMENT 00 72 00
STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT**

Prepared by



Issued and Published Jointly 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
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

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**STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT**

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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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting 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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree 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 the 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. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *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.
37. *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 furnished by Owner which are designated for the use of Contractor.

38. *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.
39. *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.
40. *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 thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, 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.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.

-
48. *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 the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. 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:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. 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 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean 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, shall mean 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, shall mean 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. 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 Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), 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 executed 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 specifically 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 *Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items

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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one 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 or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, 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, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Documents 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 Documents 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 shall 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 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 thereunder.
- 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 give written notice to

Owner and Contractor 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 editions, 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. 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.
- E. Paragraph 8.03 governs 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.

- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times 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.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor 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; 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 7.12, 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 at law; 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 shall 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 known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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 upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 - 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.

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 either:
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; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not

shown or indicated 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), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; 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 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 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

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- 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, 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.
- 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 or 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 shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall 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 Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the

policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. 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, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to

industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

- F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed 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.

- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *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 full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed 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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an

employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers 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. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend 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. 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:
1. loss 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 perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES**7.01** *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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *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 at all times maintain good discipline and order at the Site.
- B. 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 shall 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.

7.03 *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 shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall 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 shall 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.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, 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 material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it 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) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it 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 shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities 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, Supplier, or other

- individual or entity 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 five days.
 - E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
 - F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
 - J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
 - K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
 - L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
 - M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to

the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create 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.

7.07 *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 a particular 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 shall be disclosed by Owner 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. 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

7.09 *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.

7.10 *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. Except where otherwise expressly required by applicable Laws and Regulations, 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *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.

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.
- B. 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. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when 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.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. 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.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.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).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall 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.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of 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 threatened 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 thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified 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
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall 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 submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will 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.D.

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.D.
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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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, conform to the information given in 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 shall 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.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.

E. *Resubmittal Procedures:*

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 submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper 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.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 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. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. 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 shall 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 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 performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury 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 shall 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.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations,

specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible 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, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.

- D. 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 shall 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 Documents (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 10.08. 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 *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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

10.08 *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, shall 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 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* 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 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any

Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate 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.

11.03 *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.

11.04 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or
 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 11.04.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 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall 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 shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five 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 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. 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. The supporting data shall 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. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 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 shall be submitted 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; and
 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, 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, shall 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 shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall 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, who 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 shall 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 for services specifically related to the Work.
5. Supplemental costs including 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, and hand tools not owned by the workers, 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.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the 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 property insurance established in accordance with Paragraph 6.05), 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 shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall 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 shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. 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.
5. 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:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

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.

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- 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 on account of any of the foregoing will be valid.
 - C. *Contingency Allowance*: Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall 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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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 will 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 therewith 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 shall 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 shall 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 shall 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 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 shall 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.

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- 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, or both, 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 shall 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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven 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 on account of 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. 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 shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and 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.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. 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;

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- 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, 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

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- 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;
 - l. there are other items entitling 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 shall 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 shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall 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 seven 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*

1. 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 ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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. *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.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including

but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- 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 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then 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 other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, 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 therefrom.
- B. If 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 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 correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. 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.
- D. 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.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall 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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven 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 on account of loss of anticipated overhead, profits, or revenue, 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 seven 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, seven 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; and
 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising 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; or
 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 Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

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 shall not constitute a waiver of that provision, nor shall 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 or completion of the Contract or termination 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 *Headings*

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

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I. General

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, Document 00 72 00 (EJCDC® C-700, 2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

II. Specific Items**ARTICLE 1 – DEFINITIONS AND TERMINOLOGY***SC-1.01 Defined Terms*

SC-1.01.A.28 Add the following sentence to the end of Paragraph 1.01.A.29: The Terms "Owner", "District" and "MCWD" shall be used interchangeably and shall have the same meaning.

ARTICLE 2 – PRELIMINARY MATTERS*SC-2.02 Copies of Documents*

SC-2.02.A. Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor 5 copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE*SC-3.01 Intent*

SC-3.01.F Add the following new paragraphs immediately after Paragraph 3.01.E:

- F. In case of conflicts between the Contract Documents, the order of precedence shall be as follows:
 1. Change Orders, Field Orders or Work Change Directives
 2. Permits from Agencies having jurisdiction
 3. Addenda
 4. SRF and Proposition 1 Funding Requirements (Document 00 73 50)
 5. Supplementary Conditions (Document 00 73 00)

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6. Technical Specifications (Divisions 01 to 17)
 7. Drawings
 8. Agreement (Document 00 52 00)
 9. General Conditions (Document 00 72 00)
 11. Contractor's Bid Forms (Documents 00 41 00 to 00 45 38)
 12. Standard Specifications
 13. Standard Plans (Drawings)
 14. Reference Documents
- G. With respect to the Drawings, the order of precedence shall be as follows:
1. Figures govern over scaled dimensions
 2. Detail drawings govern over general drawings
 3. Addenda, Change Orders, Field Orders or Work Change Directives govern over Contract Drawings, with the most recent governing over earlier changes
 4. Contract Drawings govern over Standard Drawings
 5. Contract Drawings govern over Shop Drawings

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.02 Use of Site and Other Areas

SC-5.02 Add the following new paragraphs immediately after Paragraph 5.02.D

- D. Contractor shall submit copies of all agreements made with property owners for property use related to this project such as material and/or equipment storage, material disposal, etc.

SC-5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

- C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:
1. Report dated August 7, 2007, prepared by ENGEO Inc, Consulting Engineers, San Ramon, Ca., entitled: "Geotechnical Exploration, Marina Coast Water District, Regional Urban Water Augmentation Project, Marina, Ca."
 2. Report dated October 23, 2006, prepared by ENGEO Inc, Consulting Engineers, San Ramon, Ca., entitled: "Preliminary Trenching Evaluation."
 3. Report dated June 28, 2019, prepared by Crawford & Associates, Inc., Sacramento, Ca., entitled: "Final Geotechnical Report, Marina Coast Water District, Regional Urban Water Augmentation Project - Distribution Mains."

- D. Drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) that are known to Owner are attached as Appendices.
1. None of the contents is Technical Data on whose accuracy Contractor may rely.
- E. Contractor may examine copies of reports and drawings identified in SC 5.03.C and SC 5.03.D that were not included with the Bidding Documents at Marina Coast Water District, Engineering Office, 2840 4th Avenue, Marina, CA 93933, during regular business hours, or may request copies from Engineer.

SC-5.06 Hazardous Environmental Conditions

SC 5.06.A Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

SC 5.06.I Delete Paragraph 5.06.I in its entirety.

SC-5.07 Environmental Reports

Add the following new subparagraphs immediately before Article 6:

SC-5.07 Environmental Reports

- A. Environmental Report(s) have been prepared for this project under the California Environmental Quality Act (CEQA), as listed below. Contractor shall familiarize himself with these reports and implement the applicable mitigation measures during construction as outlined therein.
 1. Report dated *November 2005, prepared by Denise Duffy & Associates, Inc., Monterey, CA, entitled: "Initial Study / Negative Declaration for the Marina Station Property Annexation", consisting of 36 pages.*
 2. Report dated October 2006, prepared by Denise Duffy & Associates, Inc., Monterey, Ca, entitled: "Regional Urban Recycled Water Project, and Addendums No. 1, No. 2, and No. 3 to the Environmental Impact Report."
- B. Copies of reports itemized in SC-5.07.A that are not included with Bidding Documents may be examined at Marina Coast Water District, Engineering Office, 2840 4th Ave, Marina, CA 93933 during regular business hours. These reports are not part of the Contract Documents, but the controls and mitigation measures contained therein which are required for performance of the Work are incorporated therein by reference.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.02 Insurance—General Provisions

SC-6.02.A Replace 6.02.A with the following text:

" Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions".

SC-6.02.B Delete the words "Owner or" in first sentence of 6.02.B.

SC-6.02.C Add the following paragraph immediately after Paragraph 6.02.C:

1. All insurance shall be provided on policy forms acceptable to the Owner (Accord Form 25-S or equivalent), signed by the insurer's representative. Such evidence shall include an original copy of the additional insured endorsement signed by the insurer's representative. Each policy shall contain a cross liability or severability of interest clause or endorsement.

SC-6.02.D Delete paragraph 6.02.D in its entirety.

SC-6.02.E Delete paragraph and replace with following text:

"Failure of Owner to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance."

SC-6.02.I Delete paragraph 6.02I in its entirety.

SC-6.03 Contractor's Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
Jones Act coverage, if applicable:	
Bodily injury by accident, each accident	\$ <u>N/A</u>
Bodily injury by disease, aggregate	\$ <u>N/A</u>
Employer's Liability:	
Bodily injury, each accident	\$ <u>2,000,000.00</u>
Bodily injury by disease, each employee	\$ <u>2,000,000.00</u>
Bodily injury/disease aggregate	\$ <u>2,000,000.00</u>
For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$ <u>N/A</u>
Foreign voluntary worker compensation	<u>Statutory</u>

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.0 of the General Conditions:

General Aggregate \$ 5,000,000.00

Products - Completed Operations Aggregate \$ 5,000,000.00

Personal and Advertising Injury \$ 5,000,000.00

Each Occurrence (Bodily Injury and Property Damage) \$ 5,000,000.00

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person \$ 2,000,000.00

Each accident \$ 2,000,000.00

Property Damage:

Each accident \$ 2,000,000.00

4. Excess or Umbrella Liability:

Per Occurrence \$ 2,000,000.00

General Aggregate \$ 2,000,000.00

5. Contractor's Pollution Liability:

Each Occurrence \$ 2,000,000.00

General Aggregate \$ 2,000,000.00

If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following:

a. Owner's Construction Manager - Harris & Associates

b. City of Marina, CA

c. City of Seaside, CA

d. California State University Monterey Bay

e. County of Monterey

f. Monterey Bay Education, Science and Technology Center (MBEST Center)

g. University of California

h. University of California, Santa Cruz

7. Contractor's Professional Liability:

Each Claim	\$ <u>2,000,000.00</u>
Annual Aggregate	\$ <u>2,000,000.00</u>

8. All insurance maintained by the Contractor shall include coverage for work in and around areas of with munitions and explosives of concern, or claims, damage or injury which arise from munitions or explosives of concern.

SC-6.03.C In 6.03C.7, remove the following text:

"; or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent".

SC-6.05 Property Insurance

SC-6.05.A.1 Add the following new subparagraph after subparagraph 6.05.A.1:

- a. In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:
1. Owner's Inspector or Construction Manager - Harris and Associates
 2. City of Marina, CA
 3. City of Seaside, CA
 4. California State University
 5. County of Monterey
 6. University of California
 7. University of California Monterey Bay Education Science and Technology (UCMBEST)
 8. The California State Water Resources Control Board (SWRCB), its officers, its agents, employees, and servants.

SC-6.05.A. Add the following to the list of items in Paragraph 6.05.A, as numbered items:

17. include by express endorsement coverage of damage to Contractor's equipment.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Owner's legal holidays are:
 - a. New Year's Day

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- b. Martin Luther King Day
 - c. President's Day
 - d. Memorial Day
 - e. Independence Day
 - f. Labor Day
 - g. Veterans Day
 - h. Thanksgiving Weekend (Thursday and Friday)
 - i. Working Day immediately preceding Christmas Day
 - j. Christmas Day

SC-7.08 Permits

SC-7.08 Add the following new subparagraph immediately after Paragraph 7.08.A:

- B. The Owner shall provide the following permits:
 - 1. CEQA Environmental Documentation
 - 2. USACE Nationwide Permit
 - 3. Construction easement / right of entry

SC-7.10 Laws and Regulations

SC-7.10 Add the following new paragraphs immediately after Paragraph 7.10.C:

7.10.D. Public Contract Provisions

- 1. The Contractor is responsible for his own compliance, and is responsible for all Subcontractors' compliance, with all applicable sections of the California Labor Code regarding the payment of wages, the employment of apprentices, and hours of work, all as set forth in Section 1170 through Section 1815 of that Code. Those requirements are set forth below.
- 2. Payment of Prevailing Wages
 - a. Pursuant to Sections 1774 and 1775 of the Labor Code, unless the contract price is under \$1,000.00, the Contractor and any subcontractor under him, shall pay not less than the general prevailing rate of per diem wages, including holiday and overtime pay, to all workmen employed in the execution of this Contract. Failure to so comply will result in a fine of \$25.00 per day per violation, and the obligation to compensate each such employee the difference between the wage actually paid and the prevailing wage applicable to that employee's craft.
 - b. Pursuant to Section 1773.2 of the California Labor Code, the District has on file at its principal office, copies of the prevailing rate of per diem wages for each craft, and classification or type of workman needed to execute the contract, and a copy shall be available to any interested party upon request.
 - c. The Contractor shall obtain and post copies of the prevailing per diem wage rates at the job site during the term of this project.

- d. Pursuant to Labor Code Section 1776, the Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor or subcontractor in connection with the project, and such other information as required by law, and such payroll records shall be certified and made available for inspection and release all in accordance with Labor Code Section 1776 and 8 California Code of Regulations Section 16000 et seq. All contractors and subcontractors must furnish electronic certified payroll records directly to the Labor Commissioner (aka Division of Labor Standards Enforcement). The Contractor shall file with the District certified copies of its and all its subcontractors' payroll records within thirty (30) calendar days after completion of each payroll period at no cost to the District.
- e. Pursuant to Section 1773.8 of the Labor Code, travel and subsistence payments shall also be paid to each workman needed to execute such work if such travel and subsistence payments are set forth in the applicable collective bargaining agreements and filed with the Department of Industrial Relations thirty (30) days prior to the call for bids.
- f. Unless the Contract amount is under \$30,000 or will be completed in less than twenty (20) days (or if this Contract involves a specialty contractor under \$2,000 or less than 5 days) the Contractor shall comply with Section 1777.5 regarding the employment of registered apprentices upon public works by hiring, and by requiring that all subcontractors hire apprentices at the wage rate and ratio required, if at all, and by requiring the contribution of funds to appreciable crafts or trades as applicable under Section 1777.5.
- g. The Contractor shall, as a penalty to the District, forfeit not more than two hundred dollars (\$200.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of the Department of Industrial Relations for such work or craft in which such worker is employed for any public work done under this contract by the Contractor or by any subcontractor under the Contractor. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor. Labor Code Section 1775.
- h. Required California Department of Industrial Relations provisions:
- No contractor or subcontractor may be listed on a bid proposal for a public works project 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 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.

- i. The Contractor certifies that the Contractor and all subcontractors for this public works project have been registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.
 - j. The District shall not recognize any claim for additional compensation from the Contractor because of the payment by the Contractor of any wage rate in excess of the prevailing rate of per diem wages. The possibility of wage increases is one of the elements to be considered by the Contractor in determining its bid and will not, under any circumstances, be considered as the basis of a claim against the District under this contract.
 3. Hours of Labor
 - a. Pursuant to Sections 1810 through 1815 of the Labor Code, eight hours of labor constitutes a legal day's work, and work performed by employees of the Contractor or any subcontractor in excess of eight hours per day, and forty hours in any one week, shall be compensated at not less than one and one-half times their basic rate of pay. Violation of this condition shall result in a penalty of \$25.00 per day per workman so underpaid.
 4. Unidentified Utilities – Costs (Government Code 4215)
 - a. The District shall be responsible for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the construction site, if such utilities are not identified in the plans and specifications for the work. The Contractor shall be compensated for his actual costs of locating, repairing damage not due to his failure to exercise reasonable care, and removing or relocating such utility facilities not indicated in the plans and specifications with reasonable accuracy and for equipment on the project necessarily idled during such work. If the Contractor discovers utility facilities not identified in the contract plans or specifications, he shall immediately notify the District and the utility in writing. The Contractor shall not be assessed liquidated damages for delay if caused by the failure of the District or the owner of the utility to provide for removal or relocation of such utility facilities. The District shall provide a layout of all main lines and existing service laterals. The Contractor shall exercise due care in verifying the locations provided by the District and shall notify the District of site conditions that differ from those indicated.
 5. Dispute Resolution Procedures for Claims of Less Than \$375,000
 - a. Sections 20104 - 20104.6 of the Public Contract Code set forth required procedures for the parties to resolve claim disputes involving less than \$375,000, including the presentation of written claims with substantiating documents on or before the date of final payment, requests for additional documentation, time limits for responding to written claims, and requiring a conference to meet and confer; and also relating to filing a claim before suit, and required arbitration provisions in the event of a civil action filed to resolve the claim. All of such procedures, time limits and requirements shall be complied with if such Code sections are applicable to disputed claim.
 6. Assignment of Antitrust/Unfair Business Practice Claims

- a. Pursuant to Public Contract Code Section 7103, Contractor and any subcontractors supplying goods, services or materials under this contract agree to assign 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 this contract or the subcontract.
7. Substitution of Securities for Retention. Pursuant to Public Contract Code Section 22300 and upon Contractor's request, the District will make payments into escrow of funds which would otherwise be retained from progress payments under the payments to contractor provisions in the Agreement and the Supplementary and General Conditions if the Contractor deposits into that escrow securities eligible for investment under Public Contract Code Section 22300 (hereafter collectively referred to as "securities"), upon the following terms and conditions:
- a. The escrow agent shall be either the District Treasurer or a state or federal chartered bank acceptable to the District.
 - b. The Contractor shall bear all expenses of the District and of the escrow agent in connection with the escrow.
 - c. The fair market value of the securities shall be at least equal to 100 percent of the cash amount withheld as retention under the contract and the amount of the required securities shall be adjusted from time to time based upon changes in the fair market value of the securities on deposit with the escrow agent. Such securities shall be valued by the District Treasurer whose decision on valuation of the securities shall be final.
 - d. The Contractor shall enter into an escrow agreement substantially similar in form to that prescribed in Public Contract Code Section 22300.
 - e. The Contractor shall obtain the written consent to the escrow agreement of the surety or sureties furnishing Contractor with its performance and payment bonds.

SC-7.12 Safety and Protection

SC-7.12 Add the following new paragraphs after paragraph 7.12.G:

- H. In carrying out his/her work, the Contractor shall at all times, exercise all necessary precautions for the safety of employees appropriate to the nature of the work and the conditions under which the work is to be performed, and be in compliance with all federal, state and local statutory and regulatory requirements including California Department of Industrial Relations (Cal/OSHA) regulations; and the U.S. Department of Transportation Omnibus Transportation Employee Testing Act (as applicable). Safety precautions as applicable shall include, but shall not be limited to, adequate life protection, and lifesaving equipment; adequate illumination for underground and night operations; instructions in accident prevention for all employees such as 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; and adequate facilities for the proper inspection and maintenance of all safety measures.

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- I. 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 the District and the utility owner if he/she disturbs, disconnects, or damages any utility.
- J. In accordance with Section 6705 of the California Labor Code, the Contractor shall submit to the District 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 the District 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 the District before work begins.
- K. Trench Excavation: Approval of Plan for Protection from Caving
1. If the contract involves an estimated expenditure of more than \$25,000, for the excavation of any trench or trenches five feet or more in depth, the Contractor shall submit, for acceptance and approval by the District or its designated engineer, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provision to be made for worker protection from the hazard of caving ground during such excavation, all in accordance with Labor Code Section 6705.
- L. Excavations Deeper than Four Feet Involving Hazardous Wastes or Materially Different Site Conditions
1. If the contract involves digging trenches or other excavations that extend deeper than four feet below the surface:
 - a. The Contractor shall promptly, and before any of the following conditions are disturbed, notify the District, in writing, of any:
 - (1) Material that the Contractor believes may be material that is hazardous waste as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;
 - (2) Subsurface or latent physical conditions at the site differing from those indicated;

- (3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.
- b. The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work, it shall issue a change order under the procedures described in the Agreement.
 - c. In the event that a dispute arises between the District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the Agreement, but shall proceed with all work to be performed under the Agreement. The Contractor shall retain any and all rights provided either by contract or by law, which pertains to the resolution of disputes and protests between the contracting parties.

SC-7.16 Shop Drawings, Samples and Other Submittals

SC-7.16 Delete Paragraph 7.16.E.2 in its entirety and insert the following in its place:

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than two submittals. Engineer will record Engineer's time for reviewing a third or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

SC-7.18 Indemnification

SC-7.18.A Delete paragraph 7.18.A in its entirety and insert the following in its place:

- 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, 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 performance of the Work or the failure, neglect or refusal of the Contractor to perform the Work and all obligations under the Contract, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury 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.

ARTICLE 8 – OTHER WORK AT THE SITE

SC-8.01 Other Work

SC-8.01 Add the following new paragraph immediately after Paragraph 8.01.D of the General Conditions:

- E Owner is aware of Other Work at the Site which is planned by others and relates to the Work contemplated by these Bidding Documents:

Roadway reconstruction by the City of Marina of Imjim Road from (and including) the intersection of Abrams Drive to (and including) the intersection of Reservation Road. Work is scheduled to begin April 1, 2020.

Safety improvements by the City of Marina at the intersection of California Ave and Marina Heights Drive including pedestrian walkway, curb, and striping improvements. Work is scheduled to begin April 1, 2020.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

SC-9.13 Owner's Site Representative

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

SC-9.13 Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee. Owner's Site Representative will be Harris & Associates. The authority and responsibilities of Owner's Site Representative follow: to be determined and provided to contractor at the Preconstruction Conference Meeting.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

- B. On this Project, by agreement with the Owner, Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK*SC-SC-11.01 Amending and Supplementing Contract Documents*

SC-11.01 Insert the following subparagraphs immediately following 11.01.A.1.b.

- c. In signing a Change Order, the Owner and Contractor acknowledge and agree that:
- 1) the stipulated compensation (Contract Price or Contract Times, or both) set forth in the Change Order includes not only all direct costs of Contractor such as labor, material, job overhead, and profit markup, but also includes any costs for modifications or changes in sequence of work to be performed, delays, rescheduling, disruptions, extended direct overhead or general overhead, acceleration, material or other escalation which includes wages and other impact costs. This document will become a supplement to the Contract and all Contract provisions will apply hereto. It is understood that this Change Order shall be effective on the date approved by the Owner's Representative.
 - 2) the Change Order constitutes full mutual accord and satisfaction for the change to the Work;
 - 3) no reservation of rights to pursue subsequent claims on the Change Order will be made by either party; and
 - 4) no subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order.

SC-SC-11.05 Change of Contract Times

SC-11.05 Add the following new paragraphs immediately after 11.05.B:

C. Use of Float:

1. A request for adjustment of Contract Times (or Milestones), otherwise allowable under the Contract Documents, shall be granted only when the time lost or gained exceeds the float for the activity at the time of the event giving rise to the claim. Float, the amount of time between the early start date and the late start date, or the early finish date and the late finish date, is jointly owned by both Owner and Contractor whether expressly disclosed or implied in any manner.
2. Contractor shall not use float suppression techniques (including, but not limited to, preferential sequencing caused by late starts of follow-up trades, unreasonably small crews, extended durations, or imposed dates) in information provided to Engineer.

D. Weather Days:

1. The Contract Time includes a weather day allowance of 25 working days. No extension in Contract Time will be allowed for the first 25 working days lost due to weather conditions.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK*SC-13.02 Allowances*

SC 13.02 Add the following new subparagraph immediately paragraph 13.02.D:

- E. *Reimbursement Allowance:* Contractor agrees that a reimbursement allowance, if any, is for reimbursement of the actual cost or fee for which it is designated (typically permits), without additional markup for overhead, profit or handling. If the Owner includes a reimbursement allowance in the Bid Form, the Owner will establish its value.

SC-13.03 Unit Price Work

SC 13.03.E Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
1. if the extended price of a particular item of Unit Price Work amounts to 25 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 2. if there is no corresponding adjustment with respect to any other item of Work; and
 3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD*SC-15.03 Substantial Completion*

SC 15.03.B Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES*SC-17.01 Methods and Procedures*

SC-17.01 Add the following subparagraphs immediately after Paragraph 17.01.B.3:

4. resolve claims of \$375,000 or less pursuant to California Public Contract Code Section 20104 et seq., unless Owner elects to resolve the dispute pursuant to California Public Contract Code Section 10240 et seq.

ARTICLE 18 – MISCELLANEOUS

SC-18.07 Controlling Law

SC-18.07 Delete paragraph 18.07.A in its entirety and replace it with the following:

- A. 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 Monterey shall be the proper venue for any dispute arising hereunder.

STATE REVOLVING FUND AND PROPOSITION 1 FUNDING REQUIREMENTS

1. Project Access. CONTRACTOR shall ensure that the State Water Board, the Governor of the State, the United States Environmental Protection Agency, the Office of Inspector General, any member of Congress, the President of the United States, or any authorized representative 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 the Agreement.

2. Project Records. CONTRACTOR and its subcontractors shall maintain separate books, records and other material relative to Project. CONTRACTOR shall maintain such records for a minimum of thirty-six (36) years after Project Completion. CONTRACTOR and its subcontractors shall make such books, records, and other material available at all reasonable times (at a minimum during normal business hours) to inspection, copying, and audit by the State Water Board, the Bureau of State Audits, the United States Environmental Protection Agency (USEPA), the Office of Inspector General, the Internal Revenue Service, the Governor, or any authorized representatives of the aforementioned. CONTRACTOR shall allow and shall require its subcontractors to allow interviews during normal business hours of any employees who might reasonably have information related to such records. CONTRACTOR agrees to include a similar duty regarding audit, interviews, and records retention in any contract or subcontract related to the performance of the Agreement. The provisions of this section shall survive the expiration or termination of the Agreement.

3. Project Sign. CONTRACTOR shall place a sign at least four feet tall by eight feet wide made of ¾ inch thick exterior grade plywood or other approved material in a prominent location on the Project site and shall maintain the sign in good condition for the duration of the construction period. The sign must include the following disclosure statement and color logos (available from State Water Board):



"Funding for this \$ _____ RUWAP Recycled Water Distribution Pipelines project (the "Project") has been provided in full or in part by the Clean Water State Revolving Fund through an agreement with the State Water Resources Control Board. California's Clean Water State Revolving Fund is capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds."

The Project sign shall include Owner's required promotional information, if any, and shall ensure that the above logos and disclosure statement are equally prominent on the sign. The sign shall be prepared in a professional manner.

4. Compliance with Laws, Regulations, etc. CONTRACTOR shall, at all times, comply with and require its subcontractors to comply with all applicable federal and state laws, rules, guidelines,

regulations, and requirements. Without limitation of the foregoing, to the extent applicable, CONTRACTOR shall:

- (a) Comply with the provisions of the adopted environmental mitigation plan, if any, for the term of the Agreement;
- (b) Comply with the State Water Board's "Policy for Implementing the Clean Water State Revolving Fund," as amended from time to time.

5. Environmental Requirements.

- (a) Discovery of any potential archeological or historical resource. Should a potential archeological or historical resource be discovered during construction of the Project, CONTRACTOR agrees that all work in the area of the find will cease until a qualified archeologist has evaluated the situation and made recommendations regarding preservation of the resource, and the MCWD, in consultation with State Water Board, has determined what actions should be taken to protect and preserve the resource. CONTRACTOR shall implement appropriate actions as directed by MCWD.
- (b) Discovery of any unexpected endangered or threatened species, as defined in the federal Endangered Species Act. Should a federally protected species be unexpectedly encountered during construction of Project, CONTRACTOR agrees to promptly notify MCWD, and State Water Board, if directed by MCWD. This notification is in addition to CONTRACTOR's obligations under the federal Endangered Species Act.
- (c) Observation by State Water Board. CONTRACTOR shall ensure that prior to any Project monitoring, demonstration, or other implementation activities conducted or managed by CONTRACTOR, CONTRACTOR shall notify MCWD of the opportunity for State Water Board Division of Clean Water staff to observe and document such activities, and shall provide such notification directly upon request of MCWD.

6. Federal Disadvantaged Business Enterprise (DBE) Reporting. CONTRACTOR shall report DBE utilization to MCWD on the DBE Utilization Report, State Water Board Form DBE UR334. CONTRACTOR must submit such reports to MCWD annually within ten (10) calendar days following October 1 until such time as the "Notice of Completion" is issued. CONTRACTOR shall comply with 40 CFR § 33.301, and all DBE requirements set forth in Section 23 below.

7. State Non-Discrimination Provisions.

- (a) During the performance of this Agreement, CONTRACTOR and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, sexual orientation, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, denial of family care leave, or genetic information, gender, gender identity, gender expression, or military and veteran status.

(b) CONTRACTOR, and its subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment.

8. Water Board Excluded Parties Prohibition. CONTRACTOR shall not contract or allow subcontracting with excluded parties. CONTRACTOR shall not contract with any party who is debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which this funding is authorized. For any work related to this Agreement, CONTRACTOR shall not contract with any individual or organization on the State Water Board's List of Disqualified Businesses and Persons that is identified as debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which funding under this Agreement is authorized. The State Water Board's List of Disqualified Businesses and Persons is located at:

http://www.waterboards.ca.gov/water_issues/programs/ustcf/dbp.shtml.

CONTRACTOR, in executing the Agreement, represents and warrants that CONTRACTOR is not a disqualified or excluded party, as described above, and is entitled to participate in Project.

9. State Fair Employment and Housing Act.

(a) CONTRACTOR and its subcontractors shall comply with the provisions of the Fair Employment and Housing Act and the applicable regulations promulgated thereunder. (Gov. Code, §12990, subds. (a)-(f) et seq.; Cal. Code Regs., tit. 2, § 7285 et seq.) Such regulations are incorporated into this Agreement by reference and made a part hereof as if set forth in full.

(b) CONTRACTOR, 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.

(c) CONTRACTOR shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the Agreement.

10. State Water Board Rights in Data. CONTRACTOR agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work produced in the performance of the Agreement are subject to the rights of the State as set forth in this section. The State shall have the right to reproduce, publish, and use all such work, or any part thereof, in any manner and for any purposes whatsoever and to authorize others to do so. As to any work which is copyrighted by MCWD, the State reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, and use such work, or any part thereof, and to authorize others to do so.

Federal Requirements

CONTRACTOR agrees to comply with the following federal conditions:

11. American Iron and Steel. Unless a waiver has been obtained from USEPA and is on file with MCWD and State Water Board, CONTRACTOR shall not purchase, provide, use or allow to be

used "iron and steel products" produced outside of the United States on this Project, and CONTRACTOR hereby certifies and shall ensure that all "iron and steel products" used on Project will be produced in the United States. For purposes of this section, the term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials. "Steel" means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

12. Wage Rate Requirements (Davis-Bacon). CONTRACTOR shall comply with and shall include in full the applicable language provided in Exhibit 1, in all subcontracts. Exhibit 1 is incorporated herein by reference.

13. Public or Media Events. CONTRACTOR shall work with MCWD to ensure that notification is provided to State Water Board and the EPA contact as provided in the notice provisions of the SRF Agreement of public or media events publicizing the accomplishment of significant events related to Project and that opportunity for attendance and participation by federal representatives is provided with at least ten (10) working days' notice.

EPA General Terms and Conditions (USEPA GTCs)

CONTRACTOR shall comply with applicable EPA general terms and conditions found at <http://www.epa.gov/ogd>, including but not limited to the following:

14. Executive Compensation. If required by EPA or State Water Board, CONTRACTOR shall report the names and total compensation of each of its five most highly compensated executives for the preceding completed fiscal year, as set forth in the USEPA GTCs.

15. Contractors, Subcontractors, Debarment and Suspension, Executive Order 12549; 2 CFR Part 180; 2 CFR Part 1532. CONTRACTOR shall comply with Subpart C of 2 CFR Part 180 and shall ensure that its subcontracts include a requirement for such compliance. CONTRACTOR shall not subcontract with any party who is debarred or suspended or otherwise excluded from or ineligible for participation in federal assistance programs under Executive Order 12549, "Debarment and Suspension". CONTRACTOR shall not subcontract with any individual or organization on USEPA's List of Violating Facilities. CONTRACTOR shall certify that it and its principals, and shall obtain certifications from its subcontractors that they and their principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any federal department or agency;

(b) Have not within a three (3) year period preceding this Agreement been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and

(d) Have not within a three (3) year period preceding this application/proposal had one or more public transactions (federal, state or local) terminated for cause or default.

(e) Suspension and debarment information can be accessed at <http://www.sam.gov>. CONTRACTOR represents and warrants that it has or will include a term or conditions requiring compliance with this provision in all of its contracts and subcontracts under this Agreement. CONTRACTOR acknowledges that failing to disclose the information as required at 2 CFR 180.335 may result in the termination, delay or negation of this Agreement, or pursuance of legal remedies, including suspension and debarment.

16. Conflict of Interest. Within 10 days, CONTRACTOR shall disclose to MCWD, for submission to State Water Board, any potential conflict of interest consistent with section 4.0 of USEPA's Revised Interim Financial Assistance Conflict of Interest Policy at http://www.epa.gov/ogd/epa_revised_interim_financial_assistance_coi_policy_5_22_15.htm. A conflict of interest may result in disallowance of costs.

17. Copyright and Patent.

(a) USEPA and the State Water Board have the right to reproduce, publish, use and authorize others to reproduce, publish and use copyrighted works or other data developed under the Agreement.

(b) Where an invention is made with Project Funds, USEPA and the State Water Board retain the right to a worldwide, nonexclusive, nontransferable, irrevocable, paid-up license to practice the invention owned by MCWD. CONTRACTOR shall notify the MCWD when an invention report, patent report, or utilization report is filed.

18. Credit. CONTRACTOR agrees, and shall work with MCWD to ensure, that any reports, documents, publications or other materials developed for public distribution supported by this Agreement shall contain the following statement:

"This project has been funded wholly or in part by the United States Environmental Protection Agency and the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the State Water Resources Control Board, nor does the EPA or the Board endorse trade names or recommend the use of commercial products mentioned in this document."

19. Electronic and Information Technology Accessibility. CONTRACTOR is encouraged to follow guidelines established under Section 508 of the Rehabilitation Act, codified at 36 CFR Part 1194, with respect to enabling individuals with disabilities to participate in its programs supported by this Project.

20. Trafficking in Persons. CONTRACTOR, its employees, and subcontractors and their employees may not engage in severe forms of trafficking in persons during the term of this

Agreement, procure a commercial sex act during the term of this Agreement, or use forced labor in the performance of this Agreement. CONTRACTOR must include this provision in its subcontracts under this Agreement. CONTRACTOR must inform MCWD immediately of any information regarding a violation of the foregoing. CONTRACTOR understands that failure to comply with this provision may subject the State Water Board to loss of federal funds. CONTRACTOR agrees to compensate MCWD for any liability to State Water Board due to CONTRACTOR's failure to comply with this condition, or the failure of its contractors or subcontractors to comply with this condition.

21. Super Cross-Cutters - Civil Rights Obligations. CONTRACTOR must comply with the following federal non-discrimination requirements:

- (a) Title VI of the Civil Rights Act of 1964, which prohibits discrimination based on race, color, and national origin, including limited English proficiency (LEP). (EPA XC HB)
- (b) Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination against persons with disabilities. (EPA XC HB)
- (c) The Age Discrimination Act of 1975, which prohibits age discrimination. (EPA XC HB)
- (d) 40 CFR Part 7, as it relates to the foregoing (EPA XC HB)
- (e) Section 13 of the Federal Water Pollution Control Act Amendments of 1972, which prohibits discrimination on the basis of sex.

22. Federal Non-Discrimination Requirements - Executive Order No. 11246. CONTRACTOR shall comply with and shall include in its subcontracts related to the Project the following provisions. As used below "contractor" shall refer to CONTRACTOR and its subcontractors.

"During the performance of this contract, the contractor agrees as follows:

"(a) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

"(b) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

"(c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or

workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

"(d) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

"(e) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

"(f) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

"(g) The contractor will include the provisions of Paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of Sept. 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, That in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States."

23. Disadvantaged Business Enterprises (40 CFR Part 33). CONTRACTOR agrees to comply with the requirements of USEPA's Program for Utilization of Small, Minority and Women's Business Enterprises. The DBE rule can be accessed at www.epa.gov/osbp. CONTRACTOR shall comply with 40 CFR Section 33.301, and retain all records documenting compliance with the six good faith efforts. (IUP). Additional DBE provisions are included in Exhibit 2, and incorporated herein by reference.

24. Procurement Prohibitions under Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; 42 USC § 7606; 33 USC § 1368. Except where the purpose of this Agreement is to remedy the cause of the violation, CONTRACTOR may not procure goods, services, or materials from suppliers excluded under the federal System for Award Management: <http://www.sam.gov/>

25. Debarment and Suspension Executive Order No. 12549 (1986). CONTRACTOR certifies that it is not ineligible and certifies that it will not knowingly enter into a contract with anyone who is

ineligible under the 40 CFR Part 32 to participate in the Project. Subcontractors on the project must provide CONTRACTOR with the certification prior to the award of any subcontract.

26. Secured Connections. CONTRACTOR agrees that if its network or information system is connected to USEPA networks to transfer data using systems other than the Environmental Information Exchange Network or USEPA's Central Data Exchange, it will ensure that any connections are secure.

27. Anti-Lobbying Provisions (40 CFR Part 34). CONTRACTOR shall ensure that no funds under this Agreement are used to engage in lobbying of the federal government. CONTRACTOR agrees to comply with 40 CFR Part 24, New Restrictions on Lobbying. CONTRACTOR agrees to submit certification and disclosure forms in accordance with these provisions. In accordance with the Byrd Anti-Lobbying Amendment, any CONTRACTOR who makes a prohibited expenditure under 40 CFR Part 34 or fails to file the required certification or lobbying forms shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure. CONTRACTOR certifies that to the best of his/ her knowledge and belief no state, federal or local agency appropriated funds have been paid, or will be paid by or on behalf of the Consultant to any person for the purpose of influencing or attempting to influence an officer or employee of any state or federal agency; a Member of the State Legislature or United States Congress; an officer or employee of the Legislature or Congress; or any employee of a Member of the Legislature or Congress, in connection with the award of any state or federal contract, grant, loan, or cooperative agreement, or the extension, continuation, renewal, amendment, or modification of any state or federal contract, grant, loan, or cooperative agreement.

a) If any funds other than federal appropriated funds have been paid, or will be paid to any person for the purpose of influencing or attempting to influence an officer or employee of any federal agency; a Member of Congress; an officer or employee of Congress, or an employee of a Member of Congress; in connection with this Agreement, the CONTRACTOR shall complete and submit the attached Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with the attached instructions.

b) Contractor's certification provided in this section is a material representation of fact upon which reliance was placed when this Agreement was entered into, and is a prerequisite for entering into this Agreement.

c) Contractor also agrees by signing this Agreement that he/she shall require that the language set forth in this section be included in all Contractor's subcontracts which exceed \$100,000, and that all such subcontractors shall certify and disclose accordingly.

EXHIBIT 1
DAVIS BACON PROVISIONS

For purposes of this Exhibit only, “subrecipient” or “sub recipient” means MCWD.

For purposes of this Exhibit only, “recipient” means the State Water Board.

If a sub recipient has questions regarding when Davis-Bacon (DB) applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State Water Board. The recipient or sub recipient may also obtain additional guidance from DOL’s web site at <http://www.dol.gov/whd/>

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a clean water revolving loan fund. If a sub recipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the sub recipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Sub recipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the sub recipient shall monitor www.wdol.gov weekly to ensure that the wage determination contained in the solicitation remains current. The sub recipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the sub recipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the sub recipient.

(ii) If the sub recipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the sub recipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The sub recipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the sub recipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a

solicitation, the sub recipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(c) Sub recipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a sub recipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the sub recipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the sub recipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The sub recipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the sub recipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF - financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the Consolidated Appropriations Act, 2016, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time

actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The sub recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the sub recipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The sub recipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the sub recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the sub recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the sub recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub recipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29

CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and sub recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The sub recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The sub recipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with

the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section. (b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Sub recipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Sub recipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the USEPA and the Department of Labor and the State Water Board, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The sub recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The sub recipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The sub recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Sub recipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB. Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."

(c) The sub recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The sub recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the sub recipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial

payroll data and two weeks prior to the completion date the contract or subcontract. Sub recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The sub recipient shall periodically review contractors' and subcontractors' use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Sub recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/whd/america2.htm>.

EXHIBIT 2
DBE PROVISIONS

Compliance with the requirements of this document and submission of the required bid forms satisfies the Disadvantaged Business Enterprise (DBE) requirements for this construction contract. **Failure to take the six (6) affirmative steps listed under Good Faith Effort Requirements, prior to bid opening shall cause the bid to be rejected as a non-responsive bid.**

CONTRACTOR advises potential bidders that the project will be funded in whole or part with federal loan or grant funds through the California Safe Clean Water State Revolving Fund, and, therefore federal Disadvantaged Business Enterprise (DBE) regulations apply to this project. (Reference 40 Code of Federal Regulations Part 33 – Participation by Disadvantaged Business Enterprises in U.S. Environmental Protection Agency Programs).

The DBE rule requires that responsive bid shall conform with “Good Faith Efforts” to increase DBE awareness of procurement opportunities through race/gender neutral efforts. Race/gender neutral efforts are ones which increase awareness of contracting opportunities in general, including outreach, recruitment and technical assistance. Bidder agrees that it will cooperate with and assist the CONTRACTOR and OWNER in fulfilling the DBE Good Faith Effort Requirement achieving “fair share objectives” and will exercise “Good Faith Efforts” to achieve such minimum participation of small, minority and women owned businesses. In particular, in submitting a bid, the bidder shall, in the selection of any and all subcontractors, and vendors for the procurement of equipment, supplies, construction, and services related to the project, at a minimum, undertake the following affirmative “Good Faith Efforts” steps:

Good Faith Effort Requirements

1. Include disadvantaged business enterprises on solicitation lists.
2. Assure that disadvantaged business enterprises are solicited whenever they are potential sources, in a way that encourages and facilitates their participation in the competitive process.
3. Divide total requirements, when economically feasible, into small tasks or quantities to permit maximum participation by disadvantaged business enterprises.
4. Establish delivery schedules, when the requirements of the work permit, which will encourage participation by disadvantaged business enterprises.
5. Use the services and assistance of the Small Business Administration and the U.S. Minority Business Development Agency, as appropriate; and
6. If any contractor awards sub-agreements, require the contractor to take the affirmative steps in paragraphs (1) through (5) of this section.

Other Requirements:

1. The apparent successful low bidder must submit documentation showing that, prior to bid opening, the required “Good Faith Efforts” were made.

2. If the apparent successful low bidder is rejected or considered as non-responsible and/or has any non-responsive low DBE sub-bidder, a complete explanation must be provided to the CONTRACTOR.
3. If additional procurement becomes necessary after the award of the prime contract, the "Good Faith Efforts" shall be applied.
4. Failure of the apparent low bidder to perform the six affirmative "Good Faith Efforts" steps prior to bid opening will lead to its bid being declared non-responsive by MCWD. MCWD may then award the contract to the next low responsive, responsible bidder meeting the requirements of these contract provisions.
5. Prime contractor must pay its subcontractor(s) for satisfactory performance no more than 30 days from the prime contractor's receipt of payment.
6. Bidder's List- Contractor must create and maintain, and submit to MCWD, a Bidders List. The Bidders list must include all firms that bid or quote on prime contracts, or bid or quote on subcontracts, including both DBEs and non-DBEs. Information retained on the Bidder's List must include the following:
 - a. Entity's name with point of contact;
 - b. Entity's mailing address and telephone number;
 - c. The project description on which the entity bid or quoted and when;
 - d. Amount of bid/quote; and
 - e. Entity's status as a DBE or non-DBE.

Semiannual DBE Utilization Reporting

In order to fulfill federal reporting requirements, the selected prime contractor must, using the MBE/WBE Utilization form to be provided by MCWD, report to MCWD on a semiannual basis, their utilization of Minority Business Enterprise and Women's Business Enterprise subcontractor/supplier/vendors. MCWD will compile all MBE/WBE Utilization reports from prime contractor(s) and sub-contractor(s) into one report and submit to CDPH by April 15 and October 15 of each year until the last claim is submitted.

END OF DOCUMENT

General Decision Number: CA170029 06/16/2017 CA29

Superseded General Decision Number: CA20160029

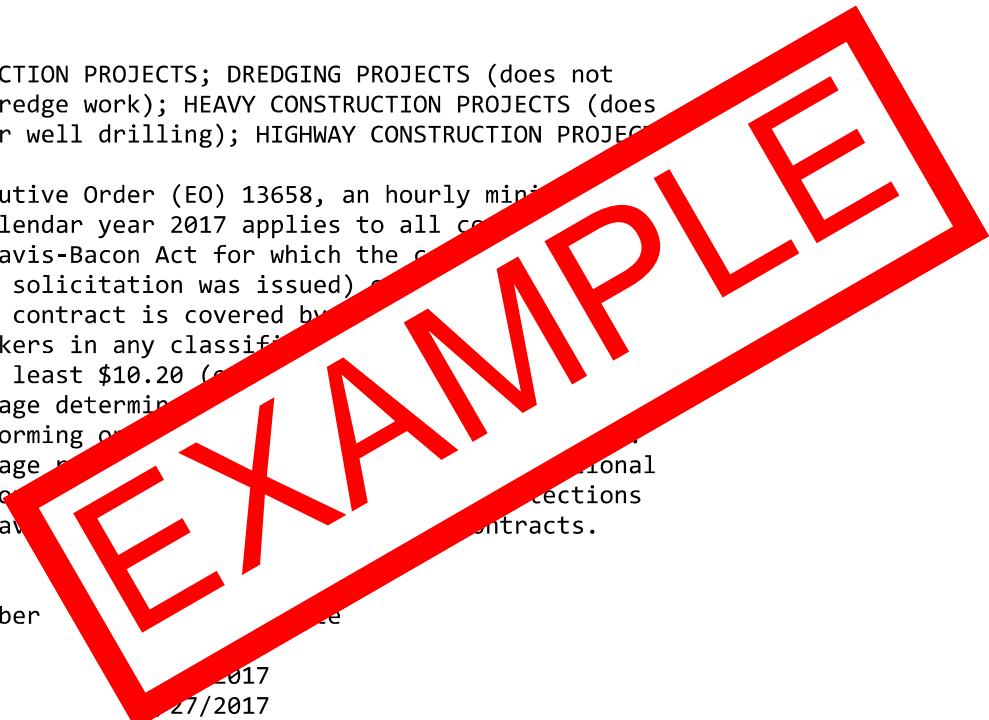
State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

Counties: Alameda, Calaveras, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Stanislaus and Tuolumne Counties in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.20 for calendar year 2017 applies to all contracts awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification covered by the EO a determination at least \$10.20 (or the minimum wage rate listed on this wage determination) for each hour spent performing work. The EO minimum wage rate applies to all contracts. For additional information on covered contracts, visit the EO website.



Modification Number	Effective Date
0	
1	01/01/2017
2	02/27/2017
3	02/17/2017
4	02/24/2017
5	03/03/2017
6	03/10/2017
7	03/31/2017
8	04/14/2017
9	04/21/2017
10	05/05/2017
11	05/12/2017
12	05/26/2017
13	06/02/2017
14	06/16/2017

ASBE0016-004 01/01/2017

AREA 1: CALAVERAS, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, MONTEREY, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, STANISLAUS & TOULMNE COUNTIES

AREA 2: ALAMEDA, CONTRA COSTA, SAN FRANSICO, SAN MATEO & SANTA CLARA COUNTIES

Rates Fringes

Asbestos Removal

worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)

Area 1.....	\$ 28.20	8.95
Area 2.....	\$ 32.98	8.95

ASBE0016-008 01/01/2017

AREA 1: ALAMEDA, CONTRA COSTA, MONTEREY, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA, & SANTA CRUZ

AREA 2: CALAVERAS, COLUSA, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAU, & TUOLUMNE

Rates

Asbestos Workers/Insulator (Includes the application of all insulating materials, Protective Coverings, Coatings, and Finishes on all types of mechanical equipment)

Area 1.....		22.98
Area 2.....		23.10

BOIL0549-001

AREA 1: ALAMEDA, CONTRA COSTA, SAN FRANCISCO, SAN MATEO & SANTA CLARA COUNTIES

AREA 2: REMAINING COUNTIES

Rates Fringes

BOILERMAKER

Area 1.....	\$ 43.28	37.91
Area 2.....	\$ 39.68	35.71

BRCA0003-001 02/01/2017

Rates Fringes

MARBLE FINISHER.....	\$ 31.17	14.99
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BRCA0003-003 02/01/2017

Rates Fringes

MARBLE MASON.....	\$ 41.77	26.76
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BRCA0003-005 05/01/2017

Rates Fringes

BRICKLAYER

(1) Fresno, Kings, Madera, Mariposa, Merced....	\$ 38.45	21.22
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DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352

0348-0046

(See reverse for public burden disclosure.)

1. Type of Federal Action: <input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance	2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award	3. Report Type: <input type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change For Material Change Only: year _____ quarter _____ date of last report _____
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, <i>if known</i> : Congressional District, if known:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime: Congressional District, if known:	
6. Federal Department/Agency:	7. Federal Program Name/Description: CFDA Number, <i>if applicable</i> : _____	
8. Federal Action Number, if known:	9. Award Amount, if known: \$ _____	
10. a. Name and Address of Lobbying Registrant <i>(if individual, last name, first name, MI):</i>	b. Individuals Performing Services <i>(including address if different from No. 10a)</i> <i>(last name, first name, MI):</i>	
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____	
Federal Use Only:		Authorized for Local Reproduction Standard Form LLL (Rev. 7-97)

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).
11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

Work Change Directive No.

Date of Issuance: _____ Effective Date: _____
Owner: Marina Coast Water District Owner's Contract No.: _____
Contractor: _____ Contractor's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Project: _____ Contract Name: _____

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price \$ _____ [increase] [decrease].
Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:

AUTHORIZED BY:

RECEIVED:

By: _____ By: _____ By: _____
Engineer (Authorized Signature) Owner (Authorized Signature) Contractor (Authorized Signature)
Title: _____ Title: _____ Title: _____
Date: _____ Date: _____ Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

Change Order No. _____

Date of Issuance:
 Owner: Marina Coast Water District
 Contractor:
 Engineer:
 Project:

Effective Date:
 Owner's Contract No.:
 Contractor's Project No.:
 Engineer's Project No.:
 Contract Name:

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:

ACCEPTED:

ACCEPTED:

By: _____
 Engineer (if required)
 Title: _____
 Date: _____

By: _____
 Owner (Authorized Signature)
 Title: _____
 Date: _____

By: _____
 Contractor (Authorized Signature)
 Title: _____
 Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

Date of Issuance: _____ Effective Date: _____
Owner: Marina Coast Water District Owner's Contract No.: _____
Contractor: _____ Contractor's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Project: _____ Contract Name: _____

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____
Specification(s) Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:		RECEIVED:	
By: _____	By: _____	By: _____	By: _____
Engineer (Authorized Signature)		Contractor (Authorized Signature)	
Title: _____	Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____	Date: _____

Copy to: Owner

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Detailed description of the Work.

1.02 THE WORK

- A. The Project consists of constructing approximately 5 miles of 8-inch diameter to 12-inch diameter ductile iron and polyvinyl chloride recycled water and potable water pipeline in paved and non-paved roadways and easements, connecting to existing pipelines, pipeline valves and appurtenances, a guided auger bore trenchless roadway crossing, five pressure reducing stations, and roadway paving for a complete in-place operational system.

1.03 LOCATION OF PROJECT

- A. The Work is located in Monterey County, portions of which are within the City of Marina, City of Seaside and unincorporated areas of Monterey County.

1.04 OWNER ASSIGNED SUBCONTRACTORS

- A. The Owner has not assigned subcontractors.

1.05 OWNER FURNISHED EQUIPMENT

- A. Owner shall not furnish any products or equipment.

1.06 ACTIVITIES BY OTHERS

- A. Activities by others which may affect performance of work include:
1. City of Marina:
 - a. Imjin Parkway roadway improvements.
 - b. Marina Heights Drive roadway improvements.
 2. See Section 01140 - Work Restrictions for major and local events in the Monterey area that may affect work days.

1.07 COORDINATION OF WORK

- A. Contractor shall have a preconstruction video made per Section 01340 - Photographic and Videographic Documentation that records the project sites (with the Engineer and Owner present, unless declined by the Engineer and Owner) including all concrete and asphalt pavements, curb and gutter, fencing to remain, structures to be demolished, and existing structures and facilities that are to be modified.

1. The original and 2 copies of the DVD shall be turned over to Engineer and Owner prior to beginning construction activities. Prior to beginning construction activities an additional copy shall be turned over to the local agency (Marina, Seaside, Monterey County, CSUMB, UCMBEST) containing only video of the work areas within the local agencies.
2. The format of the video file on the DVD shall be 1 file that can be played on a desktop in the windows media player.
3. The video shall clearly identify existing site and structural conditions prior to construction.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01140
WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for sequencing and scheduling the Work affected by existing site and facility, work restrictions, and coordination between construction operations and plant operations.

1.02 DEFINITION OF JURISDICTIONS

- A. The following are approximate locations of jurisdictions throughout the project. See the drawings for more detailed information.
- B. Beach Road Recycled Water Pipeline:
 - 1. STA 10+00 to STA 37+43: City of Marina.
 - 2. STA 37+43 to STA 42+98: MCWD Easement on Private Property.
 - 3. STA 42+98 to STA 48+25: MCWD Property.
 - 4. STA 48+25 to STA 49+83: MCWD Easement on Private Property.
- C. Beach Road Potable Water Pipeline: City of Marina.
- D. Crescent Avenue Connector to Reservoir 2:
 - 1. STA 10+00 to STA 12+38: MCWD Property.
 - 2. STA 12+38 to STA 14+72: MCWD Easement on Private Property.
 - 3. STA 14+72 to STA 15+18: City of Marina.
- E. Carmel Avenue: City of Marina.
- F. Marina Heights Drive: City of Marina.
- G. Abrams Drive:
 - 1. STA 11+50 to STA 21+03: City of Marina.
- H. Blanco Road & Reservation Road:
 - 1. Temporary access west of STA 10+00: University of California Monterey Bay Education, Science, and Technology Center (UCMBEST).
 - 2. STA 10+00 to STA 10+43: City of Marina.
 - 3. STA 10+43 to STA 71+65: Monterey County.
- I. 9th Street: City of Marina.
- J. Coe Avenue: City of Seaside.

1.03 GENERAL CONSTRAINTS ON WORK AND SCHEDULING OF WORK

- A. The listing of schedule constraints in this Section and Section 01550 - Traffic Control; and elsewhere in the contract documents shall not mean that all constraints or special conditions have been identified. The list does not substitute for the Contractor's coordination and planning for completion of work within the Contract Time in the Agreement.
- B. The Contractor shall allow for construction and schedule constraints in preparing the construction schedules required under Section 01324B - Progress Schedules and Reports. The schedules shall include the Contractor's activities necessary to satisfy all constraints included and referenced in the Contract Documents.
- C. Utilize description of critical events in work constraints in this Section as a guideline for scheduling and undertaking the Work.
- D. Business Licenses:
 - 1. Contractor shall obtain business licenses from the City of Marina, City of Seaside, and Monterey County prior to commencing work within the boundaries of the respective jurisdiction. Business license information can be found on each jurisdictions website.
- E. General:
 - 1. The Contractor shall schedule construction activities at each location in accordance with the requirements of all permits.
 - 2. The Contractor shall coordinate with local property owners before and during construction in accordance with the project specifications and requirements of all governing agencies.
 - 3. Only MCWD shall operate MCWD valves. The Contractor shall provide the MCWD with a minimum 2 weeks advance notice for any valve closure requests, such as those required for a temporary shutdown to tie-in new facilities. All closures / openings of existing MCWD valves shall be performed by the MCWD.
 - 4. For all segments of the project located in paved roadways, the Contractor shall at a minimum, backfill, compact and install temporary asphalt paving (or steel plating as allowed) for all open trenches, and reopen the roadway to traffic by the end of every working day. See Section 01734 - Work Within Public Right-of-Way for maximum trench plate length requirements.
 - 5. Temporary paving shall not be left in place for more than 30 consecutive days. Contractor shall inspect temporary paving for failure each calendar day. Where temporary paving has failed, Contractor shall immediately repair or replace it.
 - 6. For specific temporary traffic control constraints see Section 01550 - Traffic Control. Contractor shall inspect temporary traffic control facilities each calendar day. Where temporary traffic control facilities are damaged or different than the approved traffic control plan, Contractor shall immediately repair or replace the temporary traffic control facilities.
 - 7. Traffic Loops: Where traffic loops are damaged and/or impacted, traffic loops shall be temporarily restored within 3 calendar days of damage and/or impact.
 - 8. The Contractor is responsible for complying with all mitigation and monitoring measures identified in the CEQA/NEPA documents provided in the Appendices.

9. The Contractor shall sweep the streets daily to maintain the roadway clear of all debris and loose material.
10. Contractor shall provide a construction schedule, traffic control plans, and road closure schedule to all affected agencies prior to start of construction activities.
11. In addition to MCWD, agencies include but are not limited to:
 - a. City of Marina.
 - b. City of Seaside.
 - c. County of Monterey.
 - d. University of California Monterey Bay Education, Science, and Technology Center (UCMBEST).
12. General Work restrictions:
 - a. Work days:
 - 1) Work days are Monday through Friday, except Marina Coast Water District holidays, which are listed in Section 00 73 00 - Supplementary Conditions.
 - 2) Agencies where the work occurs may further restrict work days.
 - b. Work hours:
 - 1) Work hours are specific to the governing agency where work occurs, but not beyond Marina Coast Water District's work hours.
 - 2) Extended work hours, holiday, nighttime, and weekend work will be allowed only when approved in writing by the governing agency and Construction Manager.
 - 3) When extended hours, holiday, nighttime and/or weekend work is allowed, Contractor shall pay the costs for inspection by the Construction Manager during that time.
 - 4) Extended hours are any working hours over 8.5 consecutive work hours in a single day.
 - 5) Work outside of the normal working hours is subject to the availability of the Construction Manager/inspector.
 - c. Special Events:
 - 1) Pebble Beach Pro-Am Golf Tournament: Contractor shall anticipate that work will not be allowed the Wednesday, Thursday, and Friday of the golf tournament and the Monday following the tournament.
 - 2) Laguna Seca Raceway: Contractor shall anticipate that work will not be allowed the Thursday and Friday before a major race event and the Monday following a major race event.

F. Marina Coast Water District:

1. Work days: Per the general work restrictions.
2. Work Hours: Allowable working hours on Marina Coast Water District property are 7:00 a.m. to 5:00 p.m.

G. Draft Encroachment Permit:

1. Draft encroachment permits are included in the Appendices. Contractor shall anticipate the requirement to comply with all conditions of the draft encroachment permits.

H. City of Marina:

1. Road section: The standard road section is 4-inches of asphalt concrete above 12-inches of aggregate base course.

2. Work days: Per the general work restrictions and draft encroachment permit included in the Appendices. Where there is a conflict, the more restrictive requirements will govern.
3. Work hours: Per the requirements below and draft encroachment permit included in the Appendices.
4. 9th Street:
 - a. All work on 9th Street shall begin after August 31, 2020.
5. Abrams Drive:
 - a. All work on Abrams Drive shall be completed before October 2020.
6. Beach Road:
 - a. Work in Beach Rd shall only occur during the lone Olson Elementary School summer break period, which generally occurs from the second week in June to the first week in August. Contractor shall schedule work to occur during the time and anticipate normal allowable working hours when school is not in session.
 - b. If the Contractor is unable to complete work during the summer break, work hours will be limited to 9:00 a.m. to 2:00 p.m. and 3:30 p.m. to 5:00 p.m. when school is in session.
 - c. Contractor shall maintain pedestrian access to Windyhill Park at all times.
 - d. Contractor shall coordinate with Marina United Methodist Church prior to construction beginning adjacent or in front of the property and maintain pedestrian and vehicle access to the church.
 - e. Where damaged or removed by Contractor, Contractor shall replace the electronic crosswalk safety system in Front of Olson Elementary School in a timely manner. Information about the electronic crosswalk safety system are included in the Appendices.
7. Carmel Avenue:
 - a. Work in Carmel Avenue shall only occur during the Marina Vista Elementary School and Crumpton Elementary School summer break, which generally occurs from the second week in June to the first week in August. Contractor shall schedule work to occur during the time and anticipate normal allowable working hours when school is not in session.
 - b. If the Contractor is unable to complete work during the summer break, work hours will be limited to 9:00 a.m. to 2:00 p.m. and 3:30 p.m. to 5:00 p.m. when school is in session.
8. Marina Heights Drive:
 - a. All work on Marina Heights Drive shall be completed before October 2020.
9. Other requirements:
 - a. Staging, stockpiling, and placing material in the streets is prohibited (even if the material is excavated material or backfill material) without prior written City approval.
 - b. Traffic control plans shall be specific to each street and work location. A generic or typical plan will not be accepted.
 - c. Temporary paving shall not be left in place for more than 30 calendar days.
 - d. Final paving shall be completed after each location (Beach, Carmel, Abrams) is constructed (not all at once at the end of the project).
 - e. Compaction and paving testing data shall be provided to the City within 24 hours of performing the test.

- I. City of Seaside:
 - 1. Road section: The standard road section is 4-inches of asphalt concrete above 12-inches of aggregate base course.
 - 2. Work Days: Per the general work restrictions and draft encroachment permit included in the Appendices. Where there is a conflict, the more restrictive requirements will govern.
 - 3. Work Hours: Per the draft encroachment permit included in the Appendices.
 - 4. Coe Avenue:
 - a. Work in Coe Avenue shall only occur during the lone Seaside Middle School summer break, which generally occurs from the second week in June to the first week in August. Contractor shall schedule work to occur during the time and anticipate normal allowable working hours when school is not in session.
 - b. If the Contractor is unable to complete work during the summer break, work hours will be limited to 9:00 a.m. to 2:00 p.m. and 3:30 p.m. to 5:00 p.m. when school is in session.
- J. County of Monterey:
 - 1. Road section: The standard road section is 4 inches of asphalt concrete above 6 inches of aggregate base course.
 - 2. Work days: Per the general work restrictions and draft encroachment permit included in the Appendices. Where there is a conflict, the more restrictive requirements will govern.
 - 3. Work hours: Allowable working hours are 8:00 a.m. to 4:00 p.m. Traffic control setup may begin at 8:00 a.m. and must be removed by 4:00 p.m.
 - 4. The County reserves the right to have work suspended at any time to avoid any traffic conflicts with special event traffic related to events occurring at the Fort Ord Day Camp Cycling Area.
 - 5. Traffic signal modifications: Contractor shall be responsible for hiring and paying a traffic signal subcontractor for programming temporary signal changes, signal head adjustments, and/or out of service bagging at each intersection and work with County for signal change requirements.
- K. Marina Coast Water District Easement on Private Property (Beach Rd Alignment):
 - 1. Work days: Per the Marina Coast Water District allowable work days.
 - 2. Work hours: Per the Marina Coast Water District allowable working hours.
- L. University of California Monterey Bay Education, Science, and Technology Center (UCMBEST):
 - 1. Contractor shall pressure test and disinfect the existing recycled water system in UCMBEST property prior to connecting to it at Blanco Road.
 - 2. Pressure testing and disinfecting the existing recycled water system in UCMBEST property shall not occur before July 1, 2020.
 - 3. All other requirements are per the City of Marina requirements.

1.04 UTILITIES

- A. Provide advance notice to and utilize services of Underground Services Alert (U.S.A.) for location and marking of underground utilities operated by utility agencies other than the Owner.

- B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.
- C. New yard utilities were designed using existing facility drawings:
 - 1. Field verification of utilities locations was not performed during design.
 - 2. Services crossed or located nearby by new yard utilities may require relocation and possible shutdowns.
 - 3. Pipe alignments as indicated on the Drawings.
- D. Contact information for utility owners and property owners is listed below:
 - 1. AT&T:
 - a. Susan Barraza
515 Chappell Road
Watsonville, CA 95076
(831)728-6571
sb8239@att.com
 - 2. City of Marina:
 - a. Edrie Delos Santos
City of Marina - Engineering Division
209 Cypress Ave
Marina, CA 93933
(831)884-1212
edelossantos@ci.marina.ca.us
 - b. Nourdin Khayata
City of Marina - Engineering Division
209 Cypress Ave
Marina, CA 93933
nkhayata@ci.marina.ca.us
 - 3. City of Seaside:
 - a. Scott Ottmar, P.E.
City of Seaside - Senior Civil Engineer
440 Harcourt Ave
Seaside, CA 93966
(831) 899-6885
SOttmar@ci.seaside.ca.us
 - b. Rick Riedl, P.E.
City of Seaside - City Engineer
440 Harcourt Ave
Seaside, CA 93966
(831)899-6884
RRiedl@ci.seaside.ca.us
 - 4. Comcast:
 - a. Comcast
2440 Fremont Street Suite 207
Monterey, CA 93940
(800)391-3000

5. County of Monterey:
 - a. Michael K. Goetz - PLS
County Surveyor/Development Engineering Manager
Monterey County Resource Management Agency
(831) 755 4940
GoetzMK@co.monterey.ca.us
6. PG&E:
 - a. PG&E
2311 Garden Road
Monterey, CA 93940
(831)648-3231
7. Suddenlink Communications:
 - a. Robert Hager
Sudden Link Communications
761 Neeson Rd, Suite #7
Marina, CA 93933
(831)901-5682
Robert.Hager@Suddenlink.com

1.05 PERMIT FEES

- A. For bidding purposes, estimated permit fees are included in the Document 00 41 00 - Bid Form. Upon project completion, actual fees paid shall be compared to the estimated permit fees. Excess fees paid will be credited to the project; shortfall of fees paid will be owed to the Contractor.

1.06 CONNECTION TO EXISTING POTABLE AND RECYCLED WATER SYSTEMS

- A. Prior to connecting the new recycled water pipelines to existing recycled water pipelines, the Contractor shall test, and disinfect the newly constructed mains. Testing and disinfection shall be facilitated with temporary blow-offs located within 10-feet of the of the tie-in location to the existing recycled water pipeline.
- B. After all testing and disinfection has been completed, the Contractor shall remove the pipe spools at the PRV stations as indicated on the Drawings and install blind flanges.
- C. After the spools have been removed and flanges installed, the Contractor may perform the connection to the existing system.

1.07 PUBLIC OUTREACH

- A. Contractor shall pay for and perform the following public outreach activities:
 1. Install door hangers on all properties on the street where work will occur, within 500 feet of the work, 1 month before work will begin.
 2. Install door hangers on all properties on the street where work will occur, within 100 feet of the work, 1 week before work will begin.
 3. Depending on the timing of work, separate door hangers may be needed for separate work activities such as pipeline installation and paving.
 4. Door hangers shall be submitted for review and approval prior to being used.
 5. Door hangers shall including the following:

- a. Name of Project
- b. Name of Contractor
- c. Phone number to contact (Contractor's phone number)
- d. Name of Owner
- e. Date(s) when work is expected to occur at or near the residence
- f. Type of work being performed
- g. Date(s) when work is expected to be completed
- h. the back of the door hanger shall include the following text, " Funding for this \$_____ RUWAP Recycled Water Distribution Pipelines project (the "Project") has been provided in full or in part by the Clean Water State Revolving Fund through an agreement with the State Water Resources Control Board. California's Clean Water State Revolving Fund is capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds."

1.08 COMPLIANCE WITH CALIFORNIA WATERWORKS STANDARDS

- A. Construction of new potable water pipelines shall comply with current California Waterworks Standards. Similarly, new recycled water pipelines shall be constructed per the standards Key provisions of the standards include:
 1. New potable and recycled water pipeline shall not be installed in the same trench as another pipeline. Potable and recycled water pipeline shall not be installed in the same trench.
 2. Recycled water pipelines shall be installed a minimum 4 feet (edge to edge) from existing and new potable water pipelines.
 3. Potable water pipelines shall be installed a minimum 10 feet from sanitary sewer pipelines and 4 feet from storm drain pipelines.
 4. When a new potable or recycled water pipeline crosses above or below an existing sanitary sewer or storm drain pipeline, there shall be a minimum 1 foot clearance and the new pipeline shall be centered over the existing utility crossing. This may require cutting an adjacent pipeline short of a full pipe length.
 5. Contractor shall immediately notify Engineer if these criteria cannot be met.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01201

PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Procedures for submitting applications for payment and means used as a basis for Progress Payments, including:
 - 1. Cost Summaries.
 - 2. Payment for Mobilization.
 - 3. Start-up.
 - 4. Demobilization.
- B. Related Sections:
 - 1. Section 01292 - Schedule of Values.

1.02 BASIS FOR PROGRESS PAYMENTS

- A. Base Application for Payment on the breakdown of costs for each scheduled activity in the Progress Schedule and the Percentage of Completion for each activity. Generate Application for Payment by downloading cost data from the Progress Schedule to a spreadsheet type format. Identify each activity on the Progress Schedule that has a cost associated with it, the cost of each activity, the estimated Percent Complete for each activity, and the Value of Work Completed for both the payment period and job to date.

1.03 PAYMENT REQUESTS

- A. Prepare progress payment requests on a monthly basis. Base requests on the breakdowns of costs for each scheduled activity and the percentage of completion for each activity.
- B. Indicate total dollar amount of work planned for every month of the project. Equate sum of monthly amounts to Lump Sum Contract Price.
- C. Generate Progress Payment request forms by downloading cost data from the schedule information to a spreadsheet type format. Identify each activity on the Progress Schedule that has a cost associated with it, the cost for each activity, the estimated percent complete for each activity, and the value of work completed for both the payment period and job to date.
- D. Prepare summary of cost information for each Major Item of Work listed in the Schedule of Values. Identify the value of work completed for both the payment period and job to date.
- E. Submit progress payment requests at progress meetings.

1.04 COST SUMMARIES

- A. Prepare Summary of Cost Information for each Major Item of Work listed in the Schedule of Values. Identify the Value of Work Completed for both the payment period and job to date.
- B. Cash Flow Summary: Prepare cash flow summary, indicating total dollar amount of work planned for each month of the project. Equate sum of monthly amounts to Lump Sum contract price.

1.05 PAYMENT FOR MOBILIZATION

- A. Limit amounts included under Mobilization to the following items:
 - 1. Moving on the site any equipment required for first month operations.
 - 2. Installing temporary construction power and wiring.
 - 3. Developing construction water supply.
 - 4. Providing on-site sanitary facilities and potable water facilities as specified.
 - 5. Arranging for and erection of Contractor's work and storage yard.
 - 6. Subcontractor insurance and bonds.
 - 7. Obtaining all required permits, licenses, and fees.
 - 8. Developing construction schedule.
 - 9. Provide and erect the project sign.
 - 10. Contractor bonds and insurance.
- B. Furnish data and documentation to substantiate the amounts claimed under mobilization.
- C. Limit price for mobilization to no more than 5 percent of Contract Price.

1.06 PAYMENT FOR START-UP AND DEMOBILIZATION

- A. Total Price for start-up and demobilization shall not be less than 3 percent of Contract Price.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01270

UNIT PRICES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Procedures for measurement and payment of Work performed on a unit price basis.
- B. Related documents:
 - 1. Document 00 41 00 - Bid Form.

1.02 MEASUREMENT OF QUANTITIES

- A. Work paid at a unit price times number of units measured will be measured by Engineer in accordance with United States Standard Measures:
 - 1. 1 ton shall consist of 2,000 pounds avoirdupois.
- B. Provide and pay for accurate scales:
 - 1. Use platform scales of sufficient size and capacity to permit the entire vehicle or combination of vehicles to rest on the scale platform while being weighed.
 - 2. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed.
 - 3. Have scales inspected and certified as often as necessary to ascertain accuracy.
 - 4. Furnish weigh slips and daily summary weigh sheets to Engineer.
- C. When material is shipped by rail, certified car weights will be acceptable, provided that not more than the actual weight of material will be paid, without consideration of minimum car weight used for assessing freight tariff:
 - 1. Car weight will not be acceptable for materials passing through mixing plants.
- D. Daily, or at shorter intervals when necessary to ensure accuracy, weigh empty trucks used to haul material paid by weight:
 - 1. Provide such trucks with plainly, unique, permanent, legible, identification marks.
- E. Reinforcing steel, steel shapes, castings, and similar items paid by weight will be measured by handbook weights for the type and quantity indicated for the Work.

1.03 PAY ITEMS

- A. General: Pay items following are included in Document 00 41 00 - Bid Form.

- B. Schedule of Unit Price Bid Items:
1. Bid Item 1: Mobilization and Demobilization (Shall not exceed 5 percent of the Total of All Unit Price Bid Items):
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required for mobilization and demobilization, complete as specified, including, but not limited to, surveying to establish preconstruction conditions, preconstruction photographs and videos, cost of obtaining and complying with all necessary permits not obtained by the District or in other Bid Items, cost for complying with all conditions set by all of the required permits, move in of equipment, tools, supplies, materials, and manpower to the jobsite, move out and cleanup of job site after the project is complete and accepted by the District.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item. A maximum of 50 percent will be paid after satisfactory mobilization. The balance will be paid after satisfactory demobilization.
 2. Bid Item 2: Sheeting, Shoring, and Bracing:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required for sheeting, shoring, and bracing and all other actives required to provide all temporary sheeting, shoring, and bracing for excavations and grading required per the Contract Documents including, but not limited to, engineering, permits, materials, tools, labor, and equipment necessary to performing the Work.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
 3. Bid Item 3: Stormwater Pollution Prevention:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to comply with all regulatory requirements and install and maintain stormwater pollution prevention facilities, comply with Section 01355A - Stormwater Pollution Prevention and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
 4. Bid Item 4: Traffic Management:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete traffic management system including but not limited to temporary striping, signage, delineators, K-rails, cones, labor, flagmen, temporary fence, and equipment necessary for traffic control and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
 5. Bid Item 5: Locating and Verifying Concealed existing Utilities per Section 01350:

- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to locate and pothole existing utility crossings and nearby adjacent utilities per Section 01350 - Special Procedures and perform closed circuit television inspection of storm drain crossings per Section 01140 - Work Restrictions and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
6. Bid Item 6: Blow-off Assemblies:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install blow-off valves and assemblies including, but not limited to, trenching, earthwork, valve, piping, fittings, valve boxes, all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
7. Bid Item 7: Combination Air/Vacuum Valves:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install air valve assemblies including, but not limited to, earthwork, valve, piping, fittings, valve boxes, vent risers, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
8. Bid Item 8: 8-inch Isolation Valves (Gate):
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required furnish and installing valves including, but not limited to, earthwork, valve, piping, fittings, valve boxes, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
9. Bid Item 9: 12-inch Isolation Valves (Gate):
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required furnish and installing valves including, but not limited to, earthwork, valve, piping, fittings, valve boxes, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
10. Bid Item 10: Beach Road: 8-inch Pipeline (Ductile Iron):

- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
11. Bid Item 11: Beach Road: Pressure Reducing Station:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete pressure reducing station including the excavation, grading, subgrade installation, mechanical piping, concrete pad, and all work (excluding items included in other bid items) for the pressure reducing station including all civil, structural, mechanical, and other work required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
12. Bid Item 12: Beach Road: 8-inch Pipeline (PVC):
- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
13. Bid Item 13: Beach Road: Slurry Seal:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.

14. Bid Item 14: Beach Road: Pavement Striping:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
15. Bid Item 15: Potable Water Pipeline: Beach Road from Del Monte Blvd to De Forest Rd (PVC):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes mobilization / demobilization, excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents. This work is being funded from a separate funding source, so cost for this bid item shall include any mobilization or other costs required to complete this work.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
16. Bid Item 16: Potable Water Pipeline: Beach Road Blow-off Assemblies:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install blow-off valves and assemblies including, but not limited to, trenching, earthwork, valve, piping, fittings, valve boxes, all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
17. Bid Item 17: Potable Water Pipeline: Beach Road Combination Air/Vacuum Valves:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install air valve assemblies including, but not limited to, earthwork, valve, piping, fittings, valve boxes, vent risers, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.

18. Bid Item 18: Potable Water Pipeline: Beach Road 12-inch Isolation Valves (Gate):
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required furnish and installing valves including, but not limited to, earthwork, valve, piping, fittings, valve boxes, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
19. Bid Item 19: Potable Water Pipeline: From Reservoir 2 to Crescent Ave (PVC):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes all mobilization / demobilization, excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents. This work is being funded from a separate funding source, so cost for this bid item shall include any mobilization or other costs required to complete this work.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
20. Bid Item 20: Potable Water Pipeline: Reservoir 2 to Crescent Ave Blow-off Assemblies:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install blow-off valves and assemblies including, but not limited to, trenching, earthwork, valve, piping, fittings, valve boxes, all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
21. Bid Item 21: Potable Water Pipeline: Reservoir 2 to Crescent Ave Combination Air/Vacuum Valves:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install air valve assemblies including, but not limited to, earthwork, valve, piping, fittings, valve boxes, vent risers, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.

22. Bid Item 22: Potable Water Pipeline: Reservoir 2 to Crescent Ave 12-inch Isolation Valves (Gate):
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required furnish and installing valves including, but not limited to, earthwork, valve, piping, fittings, valve boxes, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
23. Bid Item 23: Carmel Avenue: 8-inch Pipeline (Ductile Iron):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
24. Bid Item 24: Carmel Avenue: Pressure Reducing Station:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete pressure reducing station including the excavation, grading, subgrade installation, pressure reducing vault, future flow meter vault, above ground air valve, mechanical piping, concrete pad, and all work (excluding items included in other bid items) for the pressure reducing station including all civil, structural, mechanical, and other work required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
25. Bid Item 25: Carmel Avenue: 8-inch Pipeline (PVC):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.

26. Bid Item 26: Carmel Avenue: Slurry Seal:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
27. Bid Item 27: Carmel Avenue: Pavement Striping:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
28. Bid Item 28: Marina Heights Drive: 16-inch Pipeline (Ductile Iron):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
29. Bid Item 29: Marina Heights Drive: Pressure Reducing Station:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete pressure reducing station including the excavation, grading, subgrade installation, pressure reducing vault, future flow meter vault, above ground air valve, mechanical piping, concrete pad, and all work (excluding items included in other bid items) for the pressure reducing station including all civil, structural, mechanical, and other work required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
30. Bid Item 30: Marina Heights Drive: Slurry Seal:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.

- b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
31. Bid Item 31: Marina Heights Drive: Pavement Striping:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
32. Bid Item 32: Abrams Drive North of Imjim Parkway: 12-inch Pipeline (DIP):
- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
33. Bid Item 33: Abrams Drive North of Imjim Parkway: Slurry Seal:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
34. Bid Item 34: Abrams Drive North of Imjim Parkway: Pavement Striping:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.

35. Bid Item 35: Pressure Test and Disinfect Existing Pipeline in UCMBEST Property:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a plan to pressure test and disinfect the existing recycled water facilities in UCMBEST property (as shown in the Appendix) including assuming not less than 5 days for a crew to physically locate and perform general cleaning and routine maintenance on and repair of all appurtenances (air valves, blow-offs, etc.) to ensure they are operational, flushing the entire existing system to remove any sediment buildup with the existing pipelines, pressure testing and disinfecting the system prior to connecting to it at Blanco Road.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
36. Bid Item 36: Blanco Road: 12-inch Pipeline (PVC):
- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
37. Bid Item 37: Allowance for sensitive plant species restoration on Blanco Road:
- a. Bid Item Description: A preconstruction survey for sensitive plant species identified Monterey Spineflower west of Blanco road, in the pipeline alignment from Research Drive to Reservation Road. MCWD will hire a biologist to develop a Rare Plant Restoration Plan, which is anticipated to generally consist of requirements to separately excavate, store, and re-place soil where the Monterey Spineflower was growing and temporarily provide water to help re-establish growth. Since the Restoration Plan has not yet been completed and the requirements defined, this allowance is a placeholder for that work.
 - b. Measurement: Measurement for this bid item is a defined allowance.
 - c. Payment: Payment for this bid item will be made based on actual costs of sensitive plant species restoration. Payment will only be made if specifically authorized in writing by the Construction Manager in advance of the work taking place.
38. Bid Item 38: Blanco Road: Launching Shaft for Guided Auger Boring Installation:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to install the launching shaft, as required, for the guided auger boring installation, including but not limited to designing and installing the shaft, groundwater dewatering, excavation material processing and disposal, restoration of existing improvements such as vegetation, and shaft restoration including, bedding, backfill, disposal of excess soil, specified testing procedures,

- and all other associated work (excluding items included in other bid items) per the Contract Documents.
- b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
39. Bid Item 39: Blanco Road: Guided Auger Boring Casing Pipeline Installation:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to set up the guided auger boring installation, boring the casing pipe, grouting the annular space outside the casing pipe, and ancillary operations, including but not limited to obtaining and boring with guided auger boring machine, head recovery, excavation material processing, grouting, and disposal of boring of debris, specified testing procedures, and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
40. Bid Item 40: Blanco Road: Guided Auger Boring Carrier Pipeline Installation (PVC):
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to set up the carrier pipeline installation within the bored casing, installing runners on the carrier pipe, installing the carrier pipe, grouting the annular space between the carrier and the casing pipe, installing end seals, and ancillary operations, including but not limited to and disposal of debris, specified testing procedures, and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
41. Bid Item 41: Reservation Road: Receiving Shaft for Guided Auger Boring Installation:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to install the receiving shaft, as required, for the guided auger boring installation, including but not limited to designing and installing the shaft, groundwater dewatering, excavation material processing and disposal, restoration of existing improvements such as vegetation, and shaft restoration including, bedding, backfill, disposal of excess soil, specified testing procedures, and all other associated work (excluding items included in other bid items) per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
42. Bid Item 42: Reservation Road: 12-inch Pipeline (PVC):
- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items)

- necessary to install the pipe complete and in place per the Contract Documents.
- b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
43. Bid Item 43: Reservation Road: 2.5-inch Grind and Inlay:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete asphalt pavement grind and inlay where shown on the drawings, including removal of pavement markings, wedge grinds, conform grinds, asphalt concrete, ensuring existing utility valve cans and monuments are flush with grade, all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
44. Bid Item 44: Reservation Road: Pavement Striping:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
45. Bid Item 45: 9th Street: 8-inch Pipeline (Ductile Iron):
- a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
46. Bid Item 46: 9th Street: Pressure Reducing Station:
- a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete pressure reducing station including the excavation, grading, subgrade installation, pressure reducing vault, future flow meter vault, above ground air valve, mechanical piping, concrete pad, and all work (excluding items included in other bid items) for the pressure reducing station including all civil, structural, mechanical, and other work required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.

47. Bid Item 47: 9th Street: 8-inch Pipeline (PVC):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
48. Bid Item 48: 9th Street: Slurry Seal:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
49. Bid Item 49: 9th Street: Pavement Striping:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
50. Bid Item 50: Coe Avenue: 8-inch Pipeline (Ductile Iron):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.

51. Bid Item 51: Coe Avenue: Pressure Reducing Station:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete pressure reducing station including the excavation, grading, subgrade installation, pressure reducing vault, future flow meter vault, above ground air valve, mechanical piping, concrete pad, and all work (excluding items included in other bid items) for the pressure reducing station including all civil, structural, mechanical, and other work required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
52. Bid Item 52: Coe Avenue: 8-inch Pipeline (PVC):
 - a. Bid Item Description: Work in this bid item generally includes installation of the pipeline and includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install the pipe complete and in place per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Linear Foot.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
53. Bid Item 53: Coe Avenue: Slurry Seal:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, and other activities required to furnish and install a complete slurry seal pavement treatment where shown on the drawings, including removal of pavement markings all labor, materials, tools and equipment in performing all Work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Square Yard.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
54. Bid Item 54: Coe Avenue: Pavement Striping:
 - a. Bid Item Description: Work in this bid item generally includes all materials, labor, equipment, developing a striping plan and obtaining approval of the plan, and other activities required to furnish and install a complete striping system on the road where striping was removed, damaged, or otherwise impacted by work, and all work (excluding items included in other bid items) required per the Contract Documents.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.
55. Bid Item 55: Reimbursement Allowance for City of Marina Encroachment Permit Fee:
 - a. Bid Item Description: This bid item is an allowance for the encroachment permit fee.
 - b. Measurement: Measurement for this bid item is a defined allowance.

- c. Payment: Payment for this bid item will be for actual cost paid for the encroachment permit. Markups, contingencies, labor, and/or any other costs shall not be included.
56. Bid Item 56: Reimbursement Allowance for Monterey County Encroachment Permit Fee:
- a. Bid Item Description: This bid item is an allowance for the encroachment permit fee.
 - b. Measurement: Measurement for this bid item is a defined allowance.
 - c. Payment: Payment for this bid item will be for actual cost paid for the encroachment permit. Markups, contingencies, labor, and/or any other costs shall not be included.
57. Bid Item 57: Reimbursement Allowance for City of Seaside Encroachment Permit Fee:
- a. Bid Item Description: This bid item is an allowance for the encroachment permit fee.
 - b. Measurement: Measurement for this bid item is a defined allowance.
 - c. Payment: Payment for this bid item will be for actual cost paid for the encroachment permit. Markups, contingencies, labor, and/or any other costs shall not be included.
58. Bid Item 58: Reimbursement Allowance for Business License Fees from Cities and County:
- a. Bid Item Description: This bid item is an allowance for business license fees from the City of Marina, City of Seaside, and County of Monterey.
 - b. Measurement: Measurement for this bid item is a defined allowance.
 - c. Payment: Payment for this bid item will be for actual cost paid for the business license. Markups, contingencies, labor, and/or any other costs shall not be included.
59. Bid Item 59: Potential Installation of 1-inch Service per Detail W-1:
- a. Bid Item Description: Work in this bid item generally includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install a recycled water service installation per MCWD Detail W-1. MCWD may elect to install 1-inch services that have not yet been identified. For bidding purposes, Contractor shall assume the service is from an 8-inch diameter recycled water main and the back of curb is 40 feet from the recycled water main.
 - b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
60. Bid Item 60: Potential Installation of 4-inch Service:
- a. Bid Item Description:: Work in this bid item generally includes excavation, disposal of debris, protection and restoration of existing improvements such as utility crossings, furnishing and installing pipeline, trench bedding, backfill, compaction, disposal of excess soil, compaction, specified testing procedures, temporary and permanent surface restoration and temporary and permanent paving, and all other associated work (excluding items included in other bid items) necessary to install a recycled water service installation per MCWD Detail W-1. MCWD may elect to install 4-inch services that have not yet been identified. For bidding purposes,

Contractor shall assume the service includes an 8-inch by 4-inch mechanical joint tee with restrained retainer glands, 4-inch gate valve, 40 feet of 4-inch diameter DR14 C900 PVC pipeline and a 4-inch mechanical joint cap.

- b. Measurement: Measurement for this bid item is by Each.
 - c. Payment: Payment for this bid item will be made at the Contract unit prices for the quantities determined as specified.
61. Bid Item 61: Contingency Allowance for Unknown Utility Conflicts:
- a. Bid Item Description: This bid item is an allowance for work associated with mitigating the impacts of an unknown utility, such a lowering the pipeline to avoid a conflict with the unknown utility.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made based on actual costs of mitigating the impacts of an unknown utility, and shall be tracked on a time and material basis. Payment will only be made if specifically authorized in writing by the Construction Manager in advance of the work taking place.
62. Bid Item 62: All work required to be completed for the project that is not included in the previous bid items:
- a. Bid Item Description: Work in this bid item generally includes all work needed to complete the project that is not specifically included in other Bid Items. This bid item is intended to provide a location for miscellaneous work required to complete the project that is not covered by any other bid item.
 - b. Measurement: Measurement for this bid item is by Lump Sum.
 - c. Payment: Payment for this bid item will be made for actual work completed in proportion to the total value of work for this bid item.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01292

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for preparation, format, and submittal of Schedule of Values.

1.02 PREPARATION

- A. Print out Schedule of Values from accepted Preliminary or Baseline Schedule submitted and accepted under Section 01324B - Progress Schedules and Reports - Medium Projects.
- B. Specific Items to Include in Schedule of Values:
 - 1. In addition to all the bid items, and items obtained from the preliminary or baseline schedule, the following items shall be specifically listed in the schedule of values:
 - a. Changeable message sign boards.
 - b. Door hangers for Public Notifications.
 - c. Quality control testing required to be performed by Contractor.
 - d. Pressure Reducing Station mechanical work.
 - e. Pressure Reducing Station structural work.
 - f. Pressure Reducing Station testing.
 - g. Potholing.
 - h. CCTV inspections.
 - i. Field surveying.
 - j. Dust control.
 - k. Trench cutoff walls.
 - l. Project schedule preparation and updates.
 - m. Unit prices for all work included in Bid Item 62.
- C. For unit price contracts, items should include a proportional share of the Contractor's overhead and profit so that the total of all items will equal the Contract value.
- D. Schedule of Values shall be a listing of all cost loaded, on- site construction activities from the progress schedule, listed in numerical order, showing that the sum total of all cost loaded activities equals the value of Contract.
- E. When the schedule is changed or revised to include added or deleted work, the Schedule of Values shall also be revised such that the sum total of all cost loaded activities continuously equals the current Contract value.

1.03 SUBMITTALS

- A. Submit Schedule of Values for the Preliminary Schedule in accordance with the requirements in Article "Preliminary Schedule", Section 01324B - Progress Schedules and Reports - Medium Projects.
- B. Submit Schedule of Values for the Baseline Schedule in accordance with the requirements in Article "Baseline Schedule", Section 01324B - Progress Schedules and Reports - Medium Projects.
- C. Submittal of the Schedule of Values is a condition precedent to the issuance of any payment under this Contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01294

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Procedures for preparation and submittal of Applications for Payment.

1.02 FORMAT

- A. Develop satisfactory spreadsheet-type form generated by downloading cost data from the Progress Schedule.
- B. Fill in information required on form.
- C. When Change Orders are executed, add Change Orders at end of listing of scheduled activities:
 - 1. Identify change order by number and description.
 - 2. Provide cost of change order in appropriate column.
- D. After completing, submit Application for Payment.
- E. Engineer will review application for accuracy. When accurate, Engineer will transmit application to Owner for processing of payment.
- F. Execute application with signature of responsible officer of Contractor.

1.03 SUBSTANTIATING DATA

- A. Provide Substantiating Data with cover letter identifying:
 - 1. Project.
 - 2. Application number and date.
 - 3. Detailed list of enclosures.
 - 4. For stored products with item number and identification on application, description of specific material, and proof of insurance coverage for offsite stored products.
 - 5. Submit "certified" payroll, if applicable.

1.04 SUBMITTALS

- A. Submit 2 copies of Application for Payment and Substantiating Data with cover letter.
- B. Coordinate requirements with Document 007200 - General Conditions Article 15 - Payments to Contractor; Set-offs; Completion; Correction Period.

1.05 PAYMENT REQUESTS

- A. Prepare progress payment requests on a monthly basis. Base requests on the breakdowns of costs for each scheduled activity and the percentage of completion for each activity.
- B. Indicate total dollar amount of work planned for every month of the project. Equate sum of monthly amounts to Lump Sum Contract Price.
- C. Generate Progress Payment request forms by downloading cost data from the schedule information to a spreadsheet type format.
- D. Identify each activity on the Progress Schedule that has a cost associated with it, the cost for each activity, the estimated percent complete for each activity, and the value of work completed for both the payment period and job to date.
- E. Prepare summary of cost information for each Major Item of Work listed in the Schedule of Values. Identify the value of work completed for both the payment period and job to date.

1.06 COST SUMMARIES

- A. Prepare Summary of Cost Information for each Major Item of Work listed in the Schedule of Values. Identify the Value of Work Completed for both the payment period and job to date.
- B. Cash flow summary: Prepare cash flow summary, indicating total dollar amount of work planned for each month of the project. Equate sum of monthly amounts to Lump Sum contract price.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01312

PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for conducting conferences and meetings for the purposes of addressing issues related to the Work, reviewing and coordinating progress of the Work and other matters of common interest, and includes the following:
 - 1. Qualifications of Meeting Participants.
 - 2. Pre-construction Conference.
 - 3. Progress Meetings.
 - 4. Pre-Installation Meetings.
 - 5. Pre-Paving Meetings.
 - 6. Pre-Shutdown Meetings.
 - 7. Post Construction Meeting.

1.02 QUALIFICATIONS OF MEETING PARTICIPANTS

- A. Representatives of entities participating in meetings shall be qualified and authorized to act on behalf of entity each represents.

1.03 PRE-CONSTRUCTION CONFERENCE

- A. Within 7 calendar days of issuance of Notice to Proceed, or earlier when mutually agreeable, Construction Manager will arrange pre-construction conference in place convenient for most invitees.
- B. Pre-construction Conference invitees: Contractor's project manager and superintendent, Construction Manager, Owner, Engineer, representatives of utilities, major subcontractors and others involved in performance of the Work, and others necessary to agenda.
- C. Construction Manager will preside at conference.
- D. Purpose of conference: To establish working understanding between parties and to discuss Construction Schedule, shop drawing and other submittals, cost breakdown of major lump sum items, processing of submittals and applications for payment, and other subjects pertinent to execution of the Work.
- E. Agenda will include:
 - 1. Adequacy of distribution of Contract Documents.
 - 2. Distribution and discussion of list of major subcontractors and suppliers.
 - 3. Proposed progress schedules and critical construction sequencing.
 - 4. Major equipment deliveries and priorities.
 - 5. Project coordination.
 - 6. Designation of responsible personnel.

7. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.
 - d. Change Orders.
 - e. Request for Information/Interpretations.
 - f. Applications for Payment.
 - g. Record Documents.
 8. Use of premises:
 - a. Office, construction, and storage areas.
 - b. Owner's requirements.
 9. Construction facilities, controls, and construction aids.
 10. Temporary utilities.
 11. Safety and first aid procedures.
 12. Security procedures.
 13. Housekeeping procedures.
- F. Construction Manager will record minutes of meeting and distribute copies of minutes within 7 days of meeting to participants and interested parties.

1.04 PROGRESS MEETINGS

- A. Construction Manager will schedule and administer meetings throughout progress of the Work at maximum weekly intervals.
- B. Construction Manager will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance required: Construction Manager, Owner, Engineer, Contractor, Contractor's Project Manager, superintendent, quality control manager, project scheduler, major subcontractors and suppliers as appropriate to agenda topics for each meeting.
- D. Additional invitees: All local agencies where project work is located shall be invited to progress meetings. Owner utility companies when the Work affects their interests, and others necessary to agenda.
- E. Agenda:
 1. Review minutes of previous meeting/minutes.
 2. Safety and security.
 3. Public comments and/or complaints.
 4. Construction schedule summary.
 5. Review of 6 weeks schedule.
 6. Review of off-site fabrication and delivery schedules.
 7. Review of submittals schedule and status of submittals.
 8. Request for information (RFI's) status.
 9. MOP's/shutdown coordination.
 10. Change order management status.
 11. Maintenance of quality standards (QA/QC).
 12. Field observations, problems, and conflicts.
 13. Commissioning and process start-up.
 14. Partnering recognition status (optional).
 15. General Items.

16. Action items.
17. Next meeting.

- F. Construction Manager will record minutes and distribute copies within 5 calendar days after meeting to participants, with copies to Contractor, Owner, and those affected by decisions made.

1.05 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections or requested by Construction Manager or Engineer, convene pre-installation meeting at Project site before commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Construction Manager no later than 7 calendar days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. Construction Manager will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- F. Contractor will record minutes and distribute electronic copies within 7 calendar days after meeting to participants, with copies to Construction Manager, Engineer, Owner, and those affected by decisions made.

1.06 PRE-PAVING MEETINGS

- A. Convene a separate pre-paving meeting with each local jurisdiction at Project site not less than 2 weeks before performing final paving:
 1. Only one pre-paving meeting should be anticipated with each local jurisdiction. Meetings with jurisdictions that are responsible for multiple project areas will include discussion of all project areas to be paved.
- B. Attendance required: Construction Manager, Owner, Contractor, paving subconsultant and a representative of the local jurisdiction.
- C. Contractor shall make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation, paving work to be performed, installation procedures, schedule and timing of work, traffic control and detours, quality control, and pavement striping.
 2. Review coordination with related work.

1.07 PRE-SHUTDOWN MEETINGS

- A. Follow Owner's standard Construction Method of Procedure (MOP). See Appendix A of Section 01140 - Work Restrictions for MOP format.
- B. All short-term and longer-term shutdowns and other tie-ins that require an Owner approved MOP also require a pre-shutdown meeting at Project site prior to commencing shutdown for tie-in or modification of specific plant systems.
- C. Require attendance of parties directly affecting, or affected by shutdown, including Construction Manager, specific work crews, Owner's construction, operations, and maintenance staff.
- D. Notify Construction Manager no later than 7 calendar days in advance of meeting date.
- E. Prepare agenda and preside at meeting:
 - 1. Review accepted MOP including conditions of shutdown, preparation, and installation procedures.
 - 2. Review timelines and sequences.
 - 3. Review responsibilities.
 - 4. Review dry run plan and schedule, as necessary.
 - 5. Review coordination with related work.
- F. Contractor will record minutes and distribute copies within 5 calendar days after meeting and prior to scheduled shutdown to participants, with copies to Construction Manager, Engineer, Owner, and those affected by decisions made.

1.08 POST CONSTRUCTION MEETING

- A. Meet with and inspect the Work 11 months after date of Substantial Completion with Owner, Construction Manager, and Engineer.
- B. Owner will arrange meeting at least 14 days before meeting.
- C. Meet in Owner's office or other mutually agreed upon place.
- D. Inspect the Work and draft list of items to be completed or corrected.
- E. Review service and maintenance contracts, and take appropriate corrective action when necessary.
- F. Complete or correct defective work and extend correction period accordingly.
- G. Require attendance of Contractor, Project Manager, or Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractors.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01324B

PROGRESS SCHEDULES AND REPORTS - MEDIUM PROJECTSGENERAL

1.01 SUMMARY

- A. Section includes: Preparation, submittal, and maintenance of computerized progress schedule and reports, contract time adjustments, and payment requests, including the following:
 - 1. Preliminary Schedule.
 - 2. Baseline Schedule.
 - 3. Monthly Schedule Updates.
 - 4. Weekly Summary Schedule.
 - 5. Schedule of Submittals.
 - 6. Manpower Schedule.
 - 7. Equipment Schedule.
 - 8. Commissioning and Process Start-up Schedule.
 - 9. As-built Schedule.

1.02 SCHEDULER

- A. Designate, in writing and within 5 calendar days after Notice of Award, person responsible for preparation, maintenance, updating and revision of all schedules.
- B. Qualifications of scheduler:
 - 1. Authority to act on behalf of Contractor.
 - 2. 5 years verifiable experience in preparation of complex construction schedules for projects of similar value, size, and complexity.
 - 3. Knowledge of critical path method (CPM) scheduling utilizing Primavera P6 Professional.
- C. Owner reserves the right to disapprove scheduler when submitted by Contractor if not qualified. Owner reserves the right to remove scheduler from the project if found to be incompetent.

1.03 SCHEDULING FORMAT AND SOFTWARE

- A. Schedule format: Utilize CPM format.
- B. Prepare computerized schedule utilizing Primavera P6 Professional, most current version.

1.04 PRECONSTRUCTION SCHEDULING MEETING

- A. Construction Manager will conduct Preconstruction Scheduling Meeting with Contractor's Project Manager, General Superintendent, scheduler and Engineer within 7 calendar days after Notice To Proceed. This meeting is separate from the Preconstruction Conference Meeting and is intended to cover schedule issues exclusively. However, for efficiency, this meeting can occur directly before or after the Preconstruction Conference Meeting.

- B. At the meeting, review scheduling requirements. These include schedule preparation, reporting requirements, updates, revisions, and schedule delay analysis. Present schedule methodology, planned sequence of operations, cost and resource loading methodology, and proposed activity coding structure.
- C. Coding structure:
 - 1. Submit proposed coding structure, identifying the code fields and the associated code values it intends to use in the project schedule.
 - 2. A minimum, include code fields for Project Segment or Phase, Area of Work, Type of Work.
 - 3. Submittal/Procurement/Construction and Responsibility/Subcontractor. Refer to NETWORK DETAILS AND GRAPHICAL OUTPUT for listing of activity categories to be included in the schedule.
- D. Naming convention: Name schedule files with the year, month and day of the data date, revision identifier, and a description of the schedule:
 - 1. Example 1: 2014_07_30 rev 1 draft baseline schedule.xer.
 - 2. Example 2: 2014_09_30 rev 2 sep final update.xer.
- E. Filing: Post submitted files to Owner's construction document control system.

1.05 SCHEDULE PREPARATION

- A. Preparation and submittal of Progress Schedule represents Contractor's intention to execute the Work within specified time and constraints. Failure to conform to requirement may result in termination for cause as specified in Document 00 72 00 - General Conditions under Suspension of Work and Termination.
- B. Contractor's bid covers all costs associated with the execution of the Work in accordance with the Progress Schedule.
- C. During preparation of the preliminary Progress Schedule, Construction Manager will facilitate Contractor's efforts by being available to answer questions regarding sequencing issues, scheduling constraints, interface points, and dependency relationships.
- D. Prepare schedule utilizing Precedence Diagramming Method (PDM).
- E. Prepare schedule utilizing activity durations in terms of working days. Do not exceed 15 working day duration on activities except concrete curing, submittal review, and equipment fabrication and deliveries. Where duration of continuous work exceeds 15 working days, subdivide activities by location, stationing, or other sub-element of the Work. Coordinate holidays to be observed with the Owner and incorporate them into the schedule as non-working days.

- F. Failure to include an activity required for execution of the Work does not excuse Contractor from completing the Work and portions thereof within specified times and at price specified in Contract. Contract requirements are not waived by failure of Contractor to include required schedule constraints, sequences, or milestones in schedule. Contract requirements are not waived by Owner's acceptance of the schedule. In event of conflict between accepted schedule and Contract requirements, terms of Contract govern at all times, unless requirements are waived in writing by the Owner.
- G. Reference schedule to working days with beginning of Contract Time as Day "1".
- H. Baseline Schedule and Project Completion: Should Contractor submit a Baseline Schedule showing project completion more than 20 working days prior to Contract completion date Owner may issue Change Order, at no cost to Owner, revising time of performance of Work and Contract completion date to match Contractor's schedule completion date. Adjust accordingly any Contract milestone dates.
- I. Contract float is for the mutual benefit of both Owner and Contractor. Changes to the project that can be accomplished within this available period of float may be made by Owner without extending the Contract time, by utilizing float. Time extensions will not be granted nor delay damages owed until Work extends beyond currently accepted Contract completion date. Likewise, Contractor may utilize float to offset delays other than delays caused by Owner. Mutual use of float can continue until all available float shown by schedule has been utilized by either Owner or Contractor, or both. At that time, extensions of the Contract time will be granted by Owner for valid Owner-caused or third party-caused delays which affect the planned completion date and which have been properly documented and demonstrated by Contractor.
- J. Schedule logic: Assembled to show order in which Contractor proposes to carry out Work, indicate restrictions of access, availability of Work areas, and availability and use of manpower, materials, and equipment. Form basis for assembly of schedule logic on the following criteria:
 - 1. Which activities must be completed before subsequent activities can be started?
 - 2. Which activities can be performed concurrently?
 - 3. Which activities must be started immediately following completed activities?
 - 4. What major facility, equipment or manpower restrictions are required for sequencing these activities?
- K. Non-sequestering of float: Pursuant to float sharing requirements of Contract, schedule submittals can be rejected for, use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, extended activity durations or imposed dates.
- L. Interim milestone dates, operational constraints: In event there are interim milestone dates and/or operational constraints set forth in Contract, show them on schedule. Do not use Zero Total Float constraint or Mandatory Finish Date on such Contract requirements.

- M. Schedule windows for owner-furnished, Contractor-installed equipment or materials: Immediately after Award of Contract, obtain from Construction Manager anticipated delivery dates of Owner furnished equipment or materials. Show these dates in the schedule in same manner indicated by Construction Manager.
- N. Cost loading: All schedules:
 - 1. Only on-site construction activities.
 - 2. The sum total of all cost loaded activities equal the current value of the Contract, including change orders, at all times.
 - 3. Owner acceptance of the Baseline Schedule creates the Schedule of Values required as specified in Section 01292 - Schedule of Values.
 - 4. Provide updated Schedule of Values as the monthly Payment Application as specified in Section 01294 - Applications for Payment.
 - 5. Payments will not be made until updated Schedule of Values is accepted.

1.06 NETWORK DETAILS AND GRAPHICAL OUTPUT

- A. Produce a clear, legible, and accurate calendar based, time scaled, graphical network diagram. Group activities related to the same physical areas of the Work. Produce the network diagram based upon the early start of all activities.
- B. Include for each activity, the description, activity number, estimated duration in working days, total float, and all activity relationship lines.
- C. Illustrate order and interdependence of activities and sequence in which Work is planned to be accomplished. Incorporate the basic concept of the precedence diagram network method to show how the start of 1 activity is dependent upon the start or completion of preceding activities and its completion restricts the start of following activities.
- D. Indicate the critical path for the project.
- E. Delineate the specified contract duration and identify the planned completion of the Work as a milestone. Show the time period between the planned and Contract completion dates, if any, as an activity identified as project float unless a Change Order is issued to officially change the Contract completion date.
- F. Identify system shutdown dates, system tie-in dates, specified interim completion or milestone dates and contract completion date as milestones.
- G. Include, in addition to construction activities:
 - 1. Submission dates and review periods for major equipment submittals, shoring submittals, and indicator pile program.
 - 2. Any activity by the Owner or the Construction Manager that may affect progress or required completion dates.
 - 3. Equipment and long-lead material deliveries over 8 weeks.
 - 4. Approvals required by regulatory agencies or other third parties.
- H. Produce network diagram on 22-inch by 34-inch sheets with grid coordinate system on the border of all sheets utilizing alpha and numeric designations.

- I. Identify the execution of the following:
 1. Mobilization.
 2. All required submittals and submittal review times showing 30 calendar day duration for such activities and equal amount of time for re-submittal reviews.
 3. Equipment and materials procurement/fabrication/delivery.
 4. Concrete, including installation of forms and reinforcement, placement of concrete, curing, stripping, finishing, and patching.
 5. Trenching, pipe laying, and trench backfill and compaction.
 6. Piping, fittings and appurtenances, including identification of ordering and fabrication lead time, layout, installation and testing.
 7. Valves, gates, and operators, including identification of order lead-time, installation, and testing.
 8. Preliminary testing of equipment.
 9. Commissioning Phase:
 - a. Owner Training.
 - b. Installation Testing.
 - c. Functional Testing.
 10. Start-up Phase:
 - a. Start-up.
 - b. Operational Period.
 11. Substantial completion.
 12. Punch list work.
 13. Demobilization.

1.07 SUBMITTAL OF PROGRESS SCHEDULES

- A. Submit preliminary and baseline schedule.
- B. Submit, on a monthly basis, updated schedules as specified.
- C. Submit final schedule update as specified.
- D. Submit revised schedules and time impact analyses as specified.
- E. Submit schedules in the media and number of copies as follows:
 1. 3 sets of the CPM network and/or bar chart (as specified by the Owner) on D-size sheets. Color-coding to be specified by the Owner.
 2. 3 sets of Tabular reports listing all activities sorted numerically identifying duration, early start, late start, early finish, late finish, total float, and all predecessor/successor information.
 3. 2 sets of CPM Schedule data electronic files in a native backed-up file (.xer) stored on CD/DVD.

1.08 PRELIMINARY SCHEDULE

- A. Submit Preliminary Schedule within 14 calendar days after Notice to Proceed. Include a detailed plan of operations for first 90 calendar days of Work after receipt of Notice to Proceed.
- B. Meet with Construction Manager within 7 calendar days after receipt of Preliminary Schedule to review and make necessary adjustments. Submit revised preliminary schedule within 5 calendar days after meeting.

- C. Submit schedule of costs for all activities on revised Preliminary Schedule.
- D. Schedule of costs:
 - 1. Schedule of Values required under Section 01292 - Schedule of Values for first 90 calendar days of Work.
 - 2. Submittal and acceptance of Preliminary Schedule is condition precedent to making of progress payments under Section 01294 - Applications for Payment and payments for mobilization costs otherwise provided for in the Contract.
 - 3. No pay item Work shall commence until Preliminary Schedule and schedule of costs have been accepted by Owner.
- E. Incorporated unchanged, the accepted Preliminary Schedule as first 90 calendar days of activity in Contractor's Baseline Schedule.
- F. Updated monthly during first 90 calendar days after Notice to Proceed. Updated Preliminary Schedule shall be the payment application required under Section 01294 - Applications for Payment.

1.09 BASELINE SCHEDULE

- A. No more than 45 calendar days after Notice to Proceed, submit the Baseline Schedule for all Work of the project. Show sequence and interdependence of all activities required for complete performance of all Work, beginning with date of Notice to Proceed and concluding with date of final completion of Contract.
- B. Acceptance of the Baseline Schedule by the Owner is a condition precedent to making payments as specified in Section 01294 - Applications for Payment after the first 90 calendar days after Notice to Proceed.

1.10 WEATHER DAYS ALLOWANCE

- A. Include as a separate identifiable activity on the critical path, an activity labeled "Weather Days Allowance." Insert this activity at the end of the schedule.
- B. Weather Days are defined as a day when the Contractor is prevented by inclement weather, or conditions resulting there from, from proceeding with at least 75 percent of the normal labor and equipment force for at least 5 hours toward completion of the current critical path item, or items.
- C. Duration of Weather Days Allowance is 20 days.
- D. Insert an activity in critical path to reflect weather day occurrences when weather days are experienced and accepted by Construction Manager. Identify this activity as a weather delay.
- E. Reduce duration of Weather Days Allowance activity as weather delays are experienced and inserted into the schedule. Remaining weather days in Weather Day Allowance at completion of project is considered float.

- F. Weather conditions that prevent or inhibit the Contractor's performance of the Work and affect the Critical Path indicated on the Schedule shall be referred to as a Weather Day. A Weather Day is defined as the Contractor being unable to perform at least 4 hours of work on the Critical Path. The Contractor shall provide a written notice to the Construction Manager of the occurrence of a weather day within 2 days after the onset of such weather and shall describe in reasonable detail the type of weather encountered and the Work interfered with or interrupted. A schedule update will not suffice as a written notice. The Construction Manager will determine if the weather day constitutes a use of a portion of the Weather Day Allowance. After use of all the Weather Day Allowance, the Construction Manager will determine if the Contractor is entitled to an extension of the Contract Time due to weather conditions. Weather days are considered excusable delay as defined in this Section.

1.11 REVIEW AND ACCEPTANCE OF SCHEDULES

- A. Construction Manager will review Baseline Schedule, Schedule Updates, Schedule Revisions, and Time Impact Analyses to ascertain compliance with specified project constraints, compliance with milestone dates, reasonableness of durations and sequence, accurate inter-relationships and completeness.
- B. Construction Manager and Owner will issue written comments following completion of review of Baseline Schedule within 21 calendar days after receipt.
- C. Written comments on review of Schedule Updates and Schedule Revisions and Time Impact Analyses will be returned to Contractor within 14 calendar days after receipt by Construction Manager.
- D. Revise and resubmit schedule in accordance with Construction Manager's comments within 7 calendar days after receipt of such comments, or request joint meeting to resolve objections.
- E. If Construction Manager requests a meeting the Contractor and all major subcontractors must participate in the meeting with Construction Manager:
1. Revise and resubmit schedule within 7 calendar days after meeting.
- F. Use accepted schedule for planning, organizing, and directing the work and for reporting progress.
- G. Construction Manager's submittal review response:
1. When schedule reflects Owner's and Contractor's agreement of project approach and sequence, schedule will be accepted by Owner.
 2. Construction Manager's submittal review response for schedule submittal will be "Receipt Acknowledged - Filed for Record" including applicable comments.
 3. Acceptance of the schedules by the Owner is for general conformance with the Contract Documents and for Owner's planning information, and does not relieve the Contractor of sole responsibility for planning, coordinating, and executing the Work within the contract completion dates. Omissions and errors in the accepted schedules shall not excuse performance less than that required by the Contract Documents. Acceptance by the Owner in no way constitutes an evaluation or validation of the Contractor's plan, sequence or means, methods, and techniques of construction.

1.12 SCHEDULE UPDATES

- A. Any update:
1. Prepare update using most recent accepted version of schedule including:
 - a. Actual start dates of activities that have been started.
 - b. Actual finish dates of activities that have been completed.
 - c. Percentage of completion of activities that have been started but not finished.
 - d. Actual dates on which milestones were achieved.
 - e. Update activities by inputting percent complete figures with actual dates.
 - f. Use retained logic in preparing Schedule Updates.
 - g. When necessary, input remaining durations for activities whose finish dates cannot be calculated accurately with a percent complete figure only.
 - h. Revisions to the schedule may be included that have been previously approved as specified in this Section under Revisions to Schedule.
- B. Monthly updates:
1. Submit written narrative report in conjunction with each Schedule Update including descriptions of the following:
 - a. Activities added to or deleted from the schedule are to adhere to cost and other resource loading requirements:
 - 1) Identify added activities in manner distinctly different from original activity designations.
 - b. Changes in sequence or estimated duration of activities.
 - c. Current or anticipated problems and delays affecting progress, impact of these problems and delays and measures taken to mitigate impact.
 - d. Assumptions made and activities affected by incorporating change order work into the schedule.
 2. Submit updated schedule and materials specified under Submittal of Progress Schedules, 5 calendar days before the monthly schedule update meeting.
 3. Since Monthly Schedule Update is the application for progress payment required as specified in Section 01294 - Applications for Payment, submittal and acceptance of the monthly Schedule Update is a condition precedent to the making of any progress payments.
- C. Weekly progress meeting:
1. Update the schedule prior to weekly progress meeting:
 - a. Identify overall progress of each Major Item of Work in the Summary Schedule.
 - b. If there are significant changes to the schedule, submit a written report at the weekly progress meeting.
 2. Should monthly Schedule Update show project completion earlier than current Contract completion date, show early completion time as schedule activity, identified as "Project Float".
 3. Should monthly Schedule Update show project completion later than current Contract completion date, prepare and submit a Schedule Revision in accordance with the Revisions to Schedule.

1.13 REVISIONS TO SCHEDULE

- A. Submit Revised Schedule within 5 calendar days:
 - 1. When delay in completion of any activity or group of activities indicates an overrun of the Contract time or milestone dates by 20 working days or 5 percent of the remaining duration, whichever is less.
 - 2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of activities.
 - 3. When the schedule does not represent the actual progress of activities.
 - 4. When any change to the sequence of activities, the completion date for major portions of the work, or when changes occur which affect the critical path.
 - 5. When Contract modification necessitates schedule revision, submit schedule analysis of change order work with cost proposal.
- B. Create a separate submittal for Schedule Revisions:
 - 1. Comply with schedule updates as specified in this Section.
 - 2. Do not submit with Schedule Updates.
- C. Schedule Revisions will not be reflected in the schedule until after the revision is accepted by the Owner:
 - 1. This includes Schedule Revisions submitted for the purpose of mitigating a Contractor-caused project delay (Recovery Schedule).

1.14 PAYMENT REQUESTS AND CASH FLOW

- A. After Baseline Schedule has been submitted and accepted by the Owner, submit on a monthly basis, a tabular and graphic report showing anticipated earnings each month of the contract period. This tabulation will be based on the summation of the cost-loaded activities each month. Submit an updated payment schedule each month showing actual earned amounts and anticipated remaining earnings.
- B. Utilize cost loaded monthly Progress Schedule Updates as the applications for payment specified in Section 01294 - Applications for Payment. List payment application in Excel format of all schedule activities showing cost and percentage completion during the current month for which payment is sought. Progress payments will not be made until monthly Progress Schedule Update is provided.

1.15 WEEKLY SCHEDULE

- A. Submit to Construction Manager, at every weekly progress meeting, a 6-Week Schedule showing the activities completed during the previous week and the Contractor's schedule of activities for following 5 weeks.
- B. Use the logic and conform to the status of the current progress schedule when producing a Weekly Schedule in CPM schedule or a bar chart format. In the event that the Weekly Schedule no longer conforms to the current schedule, Contractor may be required to revise the schedule as specified in this Section.
- C. The activity designations used in the Weekly Schedule must consistent with those used in the Baseline Schedule and the monthly Schedule Updates.
- D. Contractor and Construction Manager must agree on the format of the Weekly Schedule.

1.16 SCHEDULE OF VALUES

- A. Requirements for Schedule of Values are specified in Section 01292 - Schedule of Values.
- B. Submit, in conjunction with the Progress Schedule, a Schedule of Values identifying costs of all on-site construction activities as generated by the cost loaded schedule. Equate the aggregate of these costs to the Lump Sum Contract Price.

1.17 ADJUSTMENT OF CONTRACT TIMES

- A. Contract Time will be adjusted only for causes specified in Contract Documents:
 - 1. Non-excusable delay: Non-excusable delays include actions or inactions of the Contractor, or events for which the Contractor has assumed contractual responsibility (including actions or inactions of subcontractors, suppliers, or material manufacturers at any tier) that would independently delay the completion of the Work beyond the current Contract completion date). No time extensions will be granted for non-excusable delays.
 - 2. Excusable delay: Events which are unforeseeable, outside the control of, and without the fault or negligence of either the Owner or the Contractor (or any party for whom either is responsible), which would independently delay the completion of the Work beyond the current Contract completion date. The Contractor is entitled to a time extension only. No other damages will be approved.
 - 3. Compensable delay: Actions or inactions of the Owner, or events for which the Owner has assumed contractual responsibility, which would independently delay the completion of the Work beyond the current Contract completion date. The Contractor is entitled to a time extension and delay damages.
 - 4. Concurrent delay: Concurrent delay is any combination of the above 3 types of delay occurring on the same calendar date:
 - a. Exception to concurrent delay: Cases where the combination consists of 2 or more instances of the same type of delay occurring on the same calendar date. When one cause of delay is Owner-caused or caused by an event which is beyond the control and without the fault or negligence of either the Owner or the Contractor and the other Contractor-caused, the Contractor is entitled only to a time extension and no delay damages.
- B. If the Contractor believes that the Owner has impacted its work, such that the project completion date will be delayed, the Contractor must submit proof demonstrating the delay to the critical path. This proof, in the form of a Time Impact Analysis, may entitle the Contractor to an adjustment of contract time.
- C. The Time Impact Analysis:
 - 1. Use the accepted schedule update that is current relative to the time frame of the delay event (change order, third party delay, or other Owner-caused delay). Represent the delay event in the schedule by:
 - a. Inserting new activities associated with the delay event into the schedule,
 - b. Revising activity logic, or
 - c. Revising activity durations.
 - 2. If the project schedule's critical path and completion date are impacted as a result of adding this delay event to the schedule, a time extension equal to the magnitude of the impact may be warranted.

3. The Time Impact Analysis submittal must include the following information:
 - a. A fragment of the portion of the schedule affected by the delay event.
 - b. A narrative explanation of the delay issue and how it impacted the schedule.
 - c. A CD containing the schedule file used to perform the Time Impact Analysis.
- D. When a delay to the project as a whole can be avoided by revising preferential sequencing or logic, and the Contractor chooses not to implement the revisions, the Contractor will be entitled to a time extension and no compensation for extended overhead.
- E. Indicate clearly that the Contractor has used, in full, all project float available for the work involved in the request, including any float that may exist between the Contractor's planned completion date and the Contract completion date. Utilize the latest version of the Schedule Update accepted at the time of the alleged delay, and all other relevant information, to determine the adjustment of the contract time.
- F. Adjustment of the Contract Times will be granted only when the Contract Float has been fully utilized and only when the revised date of completion of the Work has been pushed beyond the contract completion date. Adjustment of the Contract Times will be made only for the number of days that the planned completion of the work has been extended.
- G. Actual delays in activities which do not affect the critical path work or which do not move the Contractor's planned completion date beyond the Contract completion date will not be the basis for an adjustment to the contract time.
- H. If completion of the project occurs within the specified contract time, the Contractor is not entitled to job-site or home office overhead beyond the Contractor's originally planned occupancy of the site.
- I. Notify Construction Manager of a request for contract time adjustment. Submit request as specified in Document 00 72 00 - General Conditions. In cases where the Contractor does not submit a request for contract time adjustment for a specific change order, delay, or Contractor request within the specified period of time, then it is mutually agreed that the particular change order, delay, or Contractor request has no time impact on the Contract completion date and no time extension is required.
- J. The Construction Manager will, within 30 calendar days after receipt of a contract time adjustment, request any supporting evidence, review the facts and advise the Contractor in writing:
 1. Include the new Progress Schedule data, if accepted by the Owner, in the next monthly Schedule Update.

1.18 SUMMARY SCHEDULE

- A. Provide Summary Schedule, which consolidates groups of activities associated with Major Items of Work shown on Baseline Schedule. Summary Schedule is intended to give an overall indication of the project schedule without a large amount of detail.
- B. Submit updated Summary Schedule at weekly progress meetings and after each Schedule Update or Schedule Revision.

1.19 SCHEDULE OF SUBMITTALS

- A. Schedule of Submittals shall include submittals required in the Contract Documents but not limited to Commissioning and Process Start-up Plans, Training Plans, test procedures, operation and maintenance manuals, shop drawings, samples, record documents, and specifically required certificates, warranties, and service agreements.
- B. Preliminary Schedule of Submittals:
 - 1. Due date: After Preliminary Schedule has been submitted and accepted by Owner.
 - 2. Format:
 - a. Include submittals anticipated in the first 90 calendar days after Notice to Proceed using early start dates.
 - b. Indicate week and month anticipated for each submittal.
 - c. Indicate "Priority" submittals where review time can impact Contractor's schedule:
 - 1) "Priority" indication will not alter review times specified in Section 01330 - Submittal Procedures.
 - 2) Engineer will endeavor to provide early review of "Priority" submittals where possible.
 - 3. Submittal of Preliminary Schedule of Submittals shall be a condition precedent to Owner making progress payments during the first 90 calendar days after Notice to Proceed.
- C. Final Schedule of Submittals:
 - 1. Due date: After Baseline Schedule has been submitted and accepted by Owner.
 - 2. Format:
 - a. Include submittals using early start dates.
 - b. Include all submittals, including those required in the preliminary Schedule of Submittals.
 - c. Indicate week and month anticipated for each submittal.
 - d. Indicate "Priority" submittals where review time can impact Contractor's schedule:
 - 1) "Priority" indication will not alter review times specified in Section 01330 - Submittal Procedures.
 - 2) Construction Manager will endeavor to provide early review of "Priority" submittals where possible.
 - 3. Submittal of Final Schedule of Submittals shall be a condition precedent to Owner making progress payments after the first 90 calendar days after Notice to Proceed.
- D. Provide updated Schedule of Submittals with updated schedules if schedule revisions change listing and timing of submittals.

1.20 MANPOWER SCHEDULES

- A. Due date: After Baseline Schedule has been submitted and accepted by Owner.

- B. Format:
 - 1. Schedule histogram depicting total craft manpower and craft manpower for Contractor's own labor forces and those of each subcontractor.
 - 2. Submit electronically on a computer disk in Excel format, with 1 paper copy.
- C. Progress payments after the first 90 calendar days after Notice to Proceed will not be made until manpower schedule is provided.

1.21 EQUIPMENT SCHEDULE

- A. Due date: After Baseline Schedule has been submitted and accepted by Owner.
- B. Format:
 - 1. Tabular report listing each major piece of construction equipment to be used in performing the Work.
 - 2. Include major equipment for Contractor and each subcontractor.
 - 3. Submit electronically on a computer disk in Excel format with 1 paper copy.
- C. Progress payments after the first 90 calendar days after Notice to Proceed will not be made until equipment schedule is provided.

1.22 FINAL SCHEDULE SUBMITTAL

- A. The final Schedule Update becomes the As-Built Schedule:
 - 1. The As-Built Schedule reflects the exact manner in which the project was constructed by reflecting actual start and completion dates for all activities accomplished on the project.
 - 2. Contractor's Project Manager and scheduler sign and certify the As-Built Schedule as being an accurate record of the way the project was actually constructed.
- B. Retainage will not be released until final Schedule Update is provided.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01329

SAFETY PLAN

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Development and maintenance of a Construction Safety Plan.

1.02 REFERENCES

- A. California Labor Code, Section 6401.7.
- B. National Fire Protection Association (NFPA):
 - 1. 70E - Standard for Electrical Safety in the Workplace.
- C. Occupational Safety and Health Administration (OSHA).

1.03 CONSTRUCTION SAFETY PLAN

- A. Detail the Methods and Procedures to comply with California Labor Code Section 6401.7, NFPA 70E, Federal, and Local Health and Safety Laws, Rules and Requirements for the duration of the Contract Times. Methods and procedures must also comply with the Owner's Safety Plan. Include the following:
 - 1. Identification of the Certified or Licensed Safety Consultant who will prepare, initiate, maintain and supervise safety programs, and procedures.
 - 2. Procedures for providing workers with an awareness of safety and health hazards expected to be encountered in the course of construction.
 - 3. Safety equipment appropriate to the safety and health hazards expected to be encountered during construction. Include warning devices, barricades, safety equipment in public right-of-way and protected areas, safety equipment used in multi-level structures, personal protective equipment (PPE) as required by NFPA 70E.
 - 4. Methods for minimizing employees' exposure to safety and health hazards expected during construction.
 - 5. Procedures for reporting safety or health hazards.
 - 6. Procedures to follow to correct a recognized safety and health hazard.
 - 7. Procedures for investigation of accidents, injuries, illnesses, and unusual events that have occurred at the construction site.
 - 8. Periodic and scheduled inspections of general work areas and specific workstations.
 - 9. Training for employees and workers at the jobsite.
 - 10. Methods of communication of safe working conditions, work practices and required personal protection equipment.
 - 11. Provision of a site specific emergency action and evaluation plan.
 - 12. Verify safety plan includes reference to and compliance with latest Owner safety policies.

- B. Assume sole responsibility for every aspect of Health and Safety on the jobsite, including the health and safety of subcontractors, suppliers, and other persons on the jobsite:
 - 1. Forward available information and reports to the Safety Consultant who shall make the necessary recommendations concerning worker health and safety at the jobsite.
 - 2. Employ additional health and safety measures specified by the Safety Consultant, as necessary, for workers in accordance with OSHA guidelines.

- C. Transmit to Owner and Construction Manager Copies of reports and other documents related to accidents or injuries encountered during construction.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements and procedures for submittals.

1.02 REFERENCES

- A. NSF International:
 - 1. NSF 61 - Drinking Water System Components - Health Effects.

1.03 DEFINITIONS

- A. Certificates: Describe certificates that document affirmations by the Contractor or other entity that the work is in accordance with the Contract Documents.
- B. Extra stock materials: Describe extra stock materials to be provided for the Owner's use in facility operation and maintenance.
- C. Maintenance material submittals: Use this article to categorize maintenance materials submittals requiring no Engineer action other than confirmation of receipt under an explanatory heading.
- D. Manufacturer's instructions: Instructions, stipulations, directions, and recommendations issued in printed form by the manufacturer of a product addressing handling, installation, erection, and application of the product; manufacturer's instructions are not prepared especially for the Work.
- E. Product data: Product data usually consists of manufacturers' printed data sheets or catalog pages illustrating the products to be incorporated into the project.
- F. Samples: Samples are full-size actual products intended to illustrate the products to be incorporated into the project. Sample submittals are often necessary for such characteristics as colors, textures, and other appearance issues.
- G. Spare parts: Describe spare parts necessary for the Owner's use in facility operation and maintenance; identify the type and quantity here, but include the actual characteristics of the spare parts in Product as part of the specification of the product.
- H. Shop drawings: Shop drawings are prepared specifically for the project to illustrate details, dimensions, and other data necessary for satisfactory fabrication or construction that are not shown in the contract documents. Shop drawings could include graphic line-type drawings, single-line diagrams, or schedules and lists of products and their application.

- I. Submittals: Submittals are samples, product data, shop drawings, and others that demonstrate how Contractor intends to conform with the Contract Documents.
- J. Tools: Tools are generally defined as items such as special wrenches, gauges, circuit setters, and other similar devices required for the proper operation or maintenance of a system that would not normally be in the Owner's tool kit.

1.04 GENERAL INSTRUCTIONS

- A. Certification: Contractor is responsible to determine and verify all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and check and coordinate each item with other applicable approved shop drawings and all Contract requirements.
- B. Provide submittals that are specified or reasonably required for construction, operation, and maintenance of the Work.
- C. Where multiple submittals are required, provide a separate submittal for each specification section:
 - 1. In order to expedite construction, the Contractor may make more than 1 submittal per specification section, but a single submittal may not cover more than 1 specification section:
 - a. The only exception to this requirement is when 1 specification section covers the requirements for a component of equipment specified in another section.
 - b. For example, circuit breakers are a component of switchgear. The switchgear submittal must also contain data for the associated circuit breakers, even though they are covered in a different specification section.
- D. Edit submittals so that the submittal specifically applies to only the equipment furnished.
- E. Neatly cross out all extraneous text, options, models, etc. that do not apply to the equipment being furnished, so that the information remaining is only applicable to the equipment being furnished.
- F. Prepare submittals in the English language. Do not include information in other languages.
- G. Present measurements in customary American units (feet, inches, pounds, etc.).
- H. Must be clear and legible, and of sufficient size for presentation of information.
- I. Minimum page size will be 8 1/2 inches by 11 inches:
 - 1. Maximum page size will be 11 inches by 17 inches.
- J. If submittal is more than 80 pages, additionally provide hardcopy.
- K. Show dimensions, construction details, wiring diagrams, controls, manufacturers, catalog numbers, and all other pertinent details.

- L. Provide submittal information from only 1 manufacturer for a specified product. Submittals with multiple manufacturers for 1 product will be rejected without review.
- M. Indicate project designated equipment tag numbers from P&IDs for submittal of devices, equipment, and assemblies.

1.05 SUBMITTAL ORGANIZATION

- A. Organize submittals in exactly the same order as the items are referenced, listed, and/or organized in the specification section.
- B. For submittals that cover multiple devices used in different areas under the same specification section, the submittal for the individual devices must list the area where the device is used.
- C. Bookmarks:
 - 1. Bookmarks shall match the table of contents.
 - 2. Bookmark each section (tab) and heading.
 - 3. Drawings: Bookmark at a minimum, each discipline, area designation, or appropriate division.
 - 4. At file opening, display all levels of bookmarks as expanded.
- D. Thumbnails optimized for fast web viewing.
- E. Sequentially number pages within the tabbed sections:
 - 1. Submittals that are not fully indexed and tabbed with sequentially numbered pages, or are otherwise unacceptable, will be returned without review.
- F. Attachments:
 - 1. Specification section: Include with each submittal a copy of the relevant specification section:
 - a. Indicate in the left margin, next to each pertinent paragraph, either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).
 - b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
 - 2. Drawings: Include with each submittal a copy of the relevant Drawing, including relevant addendum updates:
 - a. Indicate either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).
 - b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
 - c. Provide field dimensions and relationship to adjacent or critical features of the Work or materials.
- G. Contractor: Prepare submittal information in sufficient detail to show compliance with specified requirements:
 - 1. Determine and verify quantities, field dimensions, product dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.

2. Coordinate submittal with other submittals and with the requirements of the Contract Documents.
3. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions.

1.06 SUBMITTAL METHOD AND FORMAT

A. Submittal identification numbering:

1. Number each submittal using the format defined below:

	Spec Section Number	Dash	Initial Submittal - Sequential Number	Decimal Point	Subsequent Submittal Revisions Sequential Number
	03300	-	0008		
<i>Example 1 Description</i>	<i>Concrete</i>		<i>8th initial submittal</i>		
	03300	-	0008	.	1
<i>Example 2 Description</i>	<i>Concrete</i>		<i>8th initial submittal</i>		<i>First revision to the 8th initial submittal</i>

B. Submittals in electronic media format:

1. General: Provide all information in PC-compatible format using Windows® operating system as utilized by the Owner, Construction Manager, and Engineer.
2. Text: Provide text documents and manufacturer's literature in Portable Document Format (PDF).
3. Graphics: Provide graphic submittals (drawings, diagrams, figures, etc.) utilizing Portable Document Format (PDF).

1.07 SUBMITTAL PROCEDURE

A. Engineer: Review submittal and provide response:

1. Review description:
 - a. Engineer will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.
 - b. Engineer's review of submittals shall not release Contractor from Contractor's responsibility for performance of requirements of Contract Documents. Neither shall Engineer's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work.
 - c. Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.
 - d. Engineer's review does not extend to:
 - 1) Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.

- 2) Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
 - 3) Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.
 - e. Engineer can Approve or Not Approve any exception at their sole discretion.
2. Review timeframe:
 - a. Except as may be provided in technical specifications, a submittal will be returned within 30 days.
 - b. When a submittal cannot be returned within the specified period, Engineer will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.
 - c. Acceptance of progress schedule containing submittal review times less than those specified or agreed to in writing by Engineer will not constitute acceptance of review times.
 - d. Critical submittals:
 - 1) Contractor will notify Engineer in writing that timely review of a submittal is critical to the progress of Work.
 3. Schedule delays:
 - a. No adjustment of Contract Times or Contract Price will be allowed due to Engineer's review of submittals, unless all of the following criteria are met:
 - 1) Engineer has failed to review and return first submission within the agreed upon time frame.
 - 2) Contractor demonstrates that delay in progress of Work is directly attributable to Engineer's failure to return submittal within time indicated and accepted by Engineer.
 4. Review response will be returned to Contractor with one of the following dispositions:
 - a. Approved:
 - 1) No Exceptions:
 - a) There are no notations or comments on the submittal and the Contractor may release the equipment for production.
 - 2) Make Corrections Noted - See Comments:
 - a) The Contractor may proceed with the work, however, all notations and comments must be incorporated into the final product.
 - b) Resubmittal for review not required, however the submittal shall be updated by the Contractor and filed for record.
 - 3) Make Corrections Noted - Confirm:
 - a) The Contractor may proceed with the work, however, all notations and comments must be incorporated into the final product.
 - b) Submit confirmation specifically addressing each notation or comment to the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.
 - b. Not approved:
 - 1) Correct and resubmit:
 - a) Contractor may not proceed with the work described in the submittal.
 - b) Contractor assumes responsibility for proceeding without approval.

- c) Resubmittal of complete submittal package is required within 30 calendar days of the date of the Engineer's submittal review response.
 - 2) Rejected - See Remarks:
 - a) Contractor may not proceed with the work described in the submittal.
 - b) The submittal does not meet the intent of the Contract Documents. Resubmittal of complete submittal package is required with materials, equipment, methods, etc. that meet the requirements of the Contract Documents.
 - c. Receipt acknowledged - Filed for record:
 - 1) This is used in acknowledging receipt of informational submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc.
 - d. Receipt acknowledged with comments - Resubmit:
 - 1) This is used in acknowledging receipt of informational submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc. Feedback regarding missing information, conflicting information, or other information that makes it incomplete can be made with comments.
- B. Contractor: Prepare resubmittal, if applicable:
 - 1. Clearly identify each correction or change made.
 - 2. Include a response in writing to each of the Engineer's comments or questions for submittal packages that are resubmitted in the order that the comments or questions were presented throughout the submittal and numbered consistent with the Engineer's numbering:
 - a. Acceptable responses to Engineer's comments are listed below:
 - 1) "Incorporated" Engineer's comment or change is accepted and appropriate changes are made.
 - 2) "Response" Engineer's comment not incorporated. Explain why comment is not accepted or requested change is not made. Explain how requirement will be satisfied in lieu of comment or change requested by Engineer.
 - b. Reviews and resubmittals:
 - 1) Contractor shall provide resubmittals which include responses to all submittal review comments separately and at a level of detail commensurate with each comment.
 - 2) Contractor responses shall indicate how the Contractor resolved the issue pertaining to each review comment. Responses such as "acknowledged" or "noted" are not acceptable.
 - 3) Resubmittals which do not comply with this requirement may be rejected and returned without review.
 - 4) Contractor shall be allowed no extensions of any kind to any part of their contract due to the rejection of non-compliant submittals.
 - 5) Submittal review comments not addressed by the Contractor in resubmittals shall continue to apply whether restated or not in subsequent reviews until adequately addressed by the Contractor to the satisfaction of the reviewing and approving authority.
 - c. Any resubmittal that does not contain responses to the Engineer's previous comments shall be returned for Revision and Resubmittal.

No further review by the Engineer will be performed until a response for previous comments has been received.

3. Resubmittal timeframe:
 - a. Contractor shall provide resubmittal within 15 days.
 - b. When a resubmittal cannot be returned within the specified period, Contractor shall notify Construction Manager and Engineer in writing.
4. Review costs:
 - a. Costs incurred by Owner as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by Contractor.
 - b. Reimbursement to Owner will be made by deducting such costs from Contractor's subsequent progress payments.

1.08 SHOP DRAWINGS

- A. Contractor to field verify elevation, coordinates, and pipe material for pipe tie-in to pipeline or structure prior to the preparation of shop drawings.
- B. Details:
 1. Fabrication drawings: Drawn to scale and dimensioned.
 2. Front, side, and, rear elevations, and top and bottom views, showing all dimensions.
 3. Locations of conduit entrances and access plates.
 4. Component layout and identification.
 5. Weight.
 6. Finish.
 7. Temperature limitations, as applicable.
 8. Nameplate information.
- C. Minor or incidental products and equipment schedules:
 1. Details:
 - a. Shop Drawings of minor or incidental fabricated products will not be required, unless requested.
 - b. Submit tabulated lists of minor or incidental products showing the names of the manufacturers and catalog numbers, with Product Data and Samples as required to determine acceptability.

1.09 PRODUCT DATA

- A. Details:
 1. Supplier name and address.
 2. Subcontractor name and address.
- B. Include:
 1. Catalog cuts.
 2. Bulletins.
 3. Brochures.
 4. Manufacturer's Certificate of Compliance: Signed by product manufacturer along with supporting reference data, affidavits, and tests, as appropriate.
 5. Manufacturer's printed recommendations for installation of equipment.
 6. Quality photocopies of applicable pages from manufacturer's documents.

- C. Test reports including the following information:
 - 1. Test description.
 - 2. List of equipment used.
 - 3. Name of the person conducting the test.
 - 4. Date and time the test was conducted.
 - 5. Ambient temperature and weather conditions.
 - 6. All raw data collected.
 - 7. Calculated results.
 - 8. Clear statement if the test passed or failed the requirements stated in Contract Documents.
 - 9. Signature of the person responsible for the test.

- D. Certificates:
 - 1. As specified in technical sections.
 - 2. For products that will be in contact with potable water, submit evidence from a nationally recognized laboratory that the products comply with the requirements of the NSF 61 standard.

1.10 SAMPLES

- A. Details:
 - 1. Submit labeled samples.
 - 2. Samples will not be returned.
 - 3. Provide samples from manufacturer's standard colors, materials, products, or equipment lines:
 - a. Clearly label samples to indicate any that represent non-standard colors, materials, products, or equipment lines and that if selected, will require an increase in Contract Time or Contract Price.
 - 4. Provide number of sample submittals as below:
 - a. Total: 3 minimum:
 - 1) Owner: 1.
 - 2) Construction Manager: 1.
 - 3) Engineer: 1.
 - 4) Contractor: None.

- B. Field samples:
 - 1. As specified in technical sections.

1.11 DESIGN CALCULATIONS

- A. Defined in technical sections:
 - 1. Calculations must bear the original seal and signature of a Professional Engineer licensed in the state where the project is located and who provided responsible charge for the design.

1.12 SCHEDULES

- A. Progress schedules: As specified in Section 01324B - Progress Schedules and Reports - Medium Projects:
 - 1. Each schedule submittal specified in these Contract Documents shall be submitted as a native backed-up file (.xer) of the scheduling program as specified in Section 01324B - Progress Schedules and Reports - Medium Projects.

2. The schedule and all required reports shall also be submitted as a PDF file.
3. Schedule of values: As specified in Section 01292 - Schedule of Values.
4. Schedule of submittals: As specified in Section 01324B - Progress Schedules and Reports - Medium Projects.

A. Progress reports and quantity charts:

1. As specified in Section 01324B - Progress Schedules and Reports - Medium Projects.

1.13 REQUESTS FOR SUBSTITUTIONS (RFS)

- A. As specified in Section 01601 - Product Requirements.

1.14 CLOSEOUT SUBMITTALS

- A. Provide closeout submittals as specified in Section 01770 - Closeout Procedures.
- B. Operation and Maintenance Manuals: final documents shall be submitted as specified in Section 01782 - Operation and Maintenance Data.
- C. Extra materials, spare parts, etc.: Submittal forms shall indicate when actual materials are submitted.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 TRANSMITTAL FORM

- A. The Contractor Submittal Transmittal form attached to this Section shall be the first page of each submittal and shall be completed in full by the Contractor. Contractor may request electronic version of this form from Engineer.

END OF SECTION

**DOCUMENT 01330
CONTRACTOR SUBMITTAL TRANSMITTAL FORM**

Owner: Marina Coast Water District **Date:** MM/DD/YYYY
Contractor: Click here to enter text. **Project No.:** XXXXX.XX
Project Name: RUWAP: Recycled Water Distribution
Pipelines **Submittal Number:** 000
Submittal Title: Click here to enter text.
To: Click here to enter text.
From: Click here to enter text. Click here to enter text.
Click here to enter text. Click here to enter text.

Specification No. and Subject of Submittal / Equipment Supplier			
Spec ##:	Spec ##.	Subject:	Click here to enter text.
Authored By:	Click here to enter text.	Date Submitted:	XX/XX/XXXX

Submittal Certification
Check Either (A) or (B):
<input type="checkbox"/> (A) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with no exceptions.
<input type="checkbox"/> (B) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings except for the deviations listed.
Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.
General Contractor's Reviewer's Signature:
Printed Name:
In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order.
Firm: Click here to enter text. Signature: _____ Date Returned: XX/XX/XXXX

PM/CM Office Use
Date Received GC to PM/CM: _____
Date Received PM/CM to Reviewer: _____
Date Received Reviewer to PM/CM: _____
Date Sent PM/CM to GC: _____

SECTION 01340

PHOTOGRAPHIC AND VIDEOGRAPHIC DOCUMENTATION GENERAL

1.01 SUMMARY

- A. Section includes requirements for photographs and videos.
- B. The purpose of the photographs and videos is to document the condition of the facilities prior to the Contractor beginning work at the Project site, the progress of the Work, and the Project site after Substantial Completion of the Work.
- C. The scope of the photographic and videographic documentation shall be the sole responsibility of the Contractor, but shall be acceptable to the Engineer.

1.02 SUBMITTALS

- A. Pre-construction photographs and videos: Submit prior to beginning work at the Project site or prior to the Preconstruction Conference specified in Section 01312 - Project Meetings, whichever occurs earlier.
- B. Construction photographs: Submit with each application for payment.
- C. Post-construction photographs and videos: Submit with project closeout documents as specified in Section 01770 - Closeout Procedures.

1.03 PHOTOGRAPHER

- A. Photographer qualified and equipped to photograph either interior or exterior exposures, with lenses ranging from wide angle to telephoto.

1.04 KEY PLAN

- A. Submit key plan of Project site with notation of vantage points marked for location and direction of each photograph.
- B. Include the same label information as the corresponding set of photographs.

1.05 PHOTOGRAPHS

- A. Provide a digital copy of each photograph for each area of Work:
 - 1. Monthly: Indexed digital CD.
 - 2. Project record documents:
 - a. Catalog and index prints in chronological sequence.
 - b. Include typed table of contents.

1.06 PRE-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

- A. Provide photographs and video of the condition entire site including each area of Work and temporary work, equipment storage, and laydown areas prior to the start of Work:

1. Areas to be photographed and videoed shall include the site of the Work and all existing facilities, either on or adjoining the Project site, including the interior of existing structures that could be damaged as a result of the Contractor's Work.
2. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.
3. Pre-construction video of the pipeline alignments shall be performed in each direction with a continuous video for each alignment. Videoing the alignment in a slow moving (20 miles per hour) automobile with a go-pro or similar is acceptable.

1.07 CONSTRUCTION PHOTOGRAPHS AND VIDEOS

- A. Provide photographs and videos of construction in each area of Work throughout progress of Work including a key plan designating where each photograph was taken.
- B. Take site and interior photographs and videos from differing directions of building demolition, pre-excavation, footing excavation, soil testing, utility crossings, installation of bypass piping, excavation of access pits, installation of lining system in pipes, rehabilitation of manholes, building modifications, utilities, electrical and instrumentation modifications, and other applicable activities indicating relative progress of the work.
- C. Take photos a maximum of 7 calendar days prior to submittal.

1.08 POST-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

- A. Provide photographs of the entire site including each area of Work at the completion of Work:
 1. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.
 2. Take photos from same points in same direction as pre-construction examination.
 3. Take post-construction video with the same method and route of travel as the pre-construction video.
- B. Submittal of photos and videos is a condition of final payment.

PART 2 PRODUCTS

2.01 MEDIA

- A. Digital media:
 1. 120 millimeters, 700-MB, 80-minute CD compatible with current Microsoft Windows.
 2. Provide photos as individual, indexed JPG files with the following characteristics:
 - a. Compression shall be set to preserve quality over file size.
 - b. Highest resolution JPG images shall be submitted. Resizing to a smaller size when high resolution JPGs are available shall not be permitted.
 - c. JPG image resolution shall be 5 megapixels at 2,400 by 1,800 or higher.

- d. Images shall have rectangular clean images. Artistic borders, beveling, drop shadows, etc., are not permitted.
3. Identification: On photograph, provide the following information:
 - a. Name of project.
 - b. Date stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
 - c. Description of vantage point, indicating location and direction by compass point.

B. Videos:

1. DVD compatible, 120 millimeters, formatted for use with PC systems.
2. Video quality shall be 1080p or greater in MPG, AVCHD, AVI, or MP4 format.
3. Digital color video format.
4. Provide audio portion of the composite CD sufficiently free from electrical interference and background noise to provide complete intelligibility of oral report.
5. Identification: On each copy provide a label with the following information:
 - a. Name of project.
 - b. Date video was recorded.
6. Submit 4 copies of each video within 7 days of recording.

PART 3 EXECUTION

3.01 GENERAL

A. Videos:

1. Display continuous running time.
2. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

END OF SECTION

SECTION 01350

LOCATING AND VERIFYING CONCEALED EXISTING UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Special procedures for locating and verifying concealed existing facilities.

1.02 CONCEALED EXISTING FACILITIES

- A. Verify locations of utilities and facilities which may exist by consulting with the Owner, utility companies, and Underground Services Alert (USA) or other service available in area of Project:
 - 1. Abide by easement and right-of-way restrictions.
- B. Notify the Owner, owners of facilities when the Work will be in progress. Make arrangements for potential emergency repairs in accordance with requirements of owners of utility facilities, including individual or residential facilities.
- C. Assume responsibility for repair of facilities damaged by performance of the Work.
- D. Perform exploratory vacuum excavation potholing for all utility crossings and utilities within 4 horizontal feet of outside edge of new pipeline to more accurately identify location, depth, configuration, and utility services:
 - 1. Potholing shall be backfilled immediately after purpose has been satisfied and the surface restored and maintained in a manner satisfactory to Authority Having Jurisdiction and Construction Manager.
 - 2. Adjustments in construction methods shall be made to accommodate utility location information gained from potholing as necessary to protect existing utilities and maintain plant in operations.
 - 3. Note that installation of all underground yard piping and utilities in this project are considered to be installed in congested utility areas.
 - 4. Some variation from the conditions indicated on the Drawings is to be expected.
 - 5. Expose not less than two weeks before work will occur at that location to permit relocation of interfering utilities with minimum delaying effect on contract time.
- E. Work required for raising, lowering, or relocating utilities not indicated will be performed by affected utility owners or as part of the Work at option of affected owners of utilities:
 - 1. When part of the Work, perform work in accordance with standards of affected utility owner, and adjustment to Contract Price and Contract Times will be made as stipulated in conditions of contract.
- F. Closed Circuit Television (CCTV) of existing storm drain facilities:
 - 1. Qualifications of CCTV Contractor:

- a. Completion of a minimum of 10,000 linear feet of internal pipe condition assessment on projects of similar size and scope.
 2. Pre-construction CCTV. Perform a CCTV inspection of all existing storm drain pipelines that will be crossed, whether above or below. This shall be performed prior to crossing the storm drain. Submit CCTV video within 5 days of performing CCTV.
 3. Post-construction CCTV. Perform a CCTV inspection of all existing storm drain pipelines after they have been crossed, whether above or below. This shall be performed and submitted within 4 weeks of crossing the storm drain and before final paving occurs. Contractor shall evaluate the pre-construction and post-construction CCTV and notify the Construction Manager if damage or another change in the storm drain pipeline has occurred between the pre- and post-construction CCTV videos.
 4. It is the intent of this inspection to assess the internal structural and service condition of pipeline.
 5. CCTV shall be performed by a current PACP certified operator.
 6. The recorded video must show the entire circumference of the pipeline.
 7. Perform all CCTV inspections in accordance with NASSCO's Pipeline Assessment Certification Program (PACP). CCTV inspections will be conducted entirely in digital format. The entire inspection survey shall be recorded in MPEG-1 format written to DVD.
 8. The documentation of the work shall consist of PACP CCTV Reports, Unmodified PACP database, logs, electronic reports, etc. noting important features encountered during the inspection. The speed of travel shall be slow enough to inspect each pipe joint, tee connection, structural features, but should not, at any time, be faster than 30 feet per minute. The camera must be centered in the pipe to provide accurate distance measurements to provide exact locations of important features in the pipe and these footage measurements shall be displayed and documented on the video. The completed DVD will become the property of the City.
 9. The pipe shall be identified by alphanumeric on the video display.
- G. Locating Underground Utilities on MCWD Reservoir 2 Property:
1. Record drawings of existing underground utilities at the Reservoir 2 site, owned by the Owner, are not available.
 2. Contractor shall perform a ground penetrating radar survey of all new pipeline alignments through the Reservoir 2 site and submit results to Engineer, specifically identifying all underground utilities not identified on the design drawings, not less than 4 weeks before commencing construction at that location.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01355A

STORMWATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Requirements for the preparation and implementation of the Stormwater Pollution Prevention Plan (SWPPP) for the Contractor's construction activities. This document (and other requirements identified in this Section) will be used for the purpose of applying for and obtaining a State of California General Construction Activity Stormwater Permit.

1.02 REFERENCES

- A. National Pollutant Discharge Elimination System (NPDES).
- B. State of California, State Water Resources Control Board, Regional Water Quality Control Board (SWRCB).
- C. United States Code of Federal Regulation (CFR):
 - 1. 40 - Protection of Environmental:
 - a. 117 - Determination of reportable quantities for hazardous substance.
 - b. 302 - Designation, reportable quantities, and notification.

1.03 SUBMITTALS

- A. Qualifications of the Qualified SWPPP Developer (QSD).
- B. Qualifications of the Qualified SWPPP Practitioner (QSP).
- C. Construction General Permit:
 - 1. The Contractor shall pay for, prepare, and submit all Permit Registration Documents (PRDs) to the Engineer for review, approval, and certification by the Legally Responsible Person (LRP) prior to start of work and mobilization:
 - a. The LRP will electronically submit the PRDs to the Stormwater Multiple Application and Report Tracking System (SMARTS) to obtain approval of the Construction General Permit (CGP).
 - 2. The PRDs shall include but are not limited to the Notice of Intent (NOI), Risk Determination Worksheet, Site Maps, Stormwater Pollution Prevention Plan (SWPPP), Initial and Annual Fees and Owner Certification. It shall also include all other reports, calculations, studies, exhibits, and documentation required to obtain the CGP.
 - 3. Contractor shall provide a Qualified SWPPP Practitioner (QSP), who will be responsible for maintaining the existing CGP active throughout the duration of the project:
 - a. Contractor shall be responsible for providing all reports required by the CGP (monitoring, inspection, Rain Event Action Plans, sampling, exceedance reports, annual reports, etc.) to the Engineer for review.

- b. Upon approval, the Contractor's QSP shall upload the information to SMARTS.
 - c. Time-sensitive reports involving monitoring data shall be provided as soon as the information is made available.
 - d. All other reports shall be provided to the Engineer a minimum of 2 weeks prior to their deadline for submittal to the SWRCB through SMARTS.
 - e. All CGP documents shall be submitted to the Owner for reference, and a copy shall be located on site at all times.
- D. Pollution Prevention Plan:
- 1. Prepare and submit a site-specific Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section A of the General Construction Activity Stormwater Permit to the Owner for reference.
 - 2. Prepare and submit a monitoring program and reporting plan in accordance with Section B of the General Construction Activity Stormwater Permit to the Owner for reference.
 - 3. Submit to the Owner for reference a Stormwater Pollution Prevention Plan detailing the placement of physical Best Management Practices (BMPs) required for installation and the methods used to comply with those BMPs directed at operational procedures, Monitoring Program, and Reporting Plan.
 - 4. The plan shall specifically address and detail changes from the alternatives called out in this Section. The Contractor's preferred techniques shall show how it will comply with the stated objectives of the program.
 - 5. The SWPPP shall be prepared and amended by a Qualified SWPPP Developer (QSD), as defined by the CGP.
- E. Contractor shall submit a copy of the BMP Handbook with each BMP to be utilized checkmarked to show compliance or marked to show deviation.
- F. The entire plan shall be kept and maintained by the Contractor on the construction site during the duration of the project.
- G. Contractor shall be responsible for taking the proper actions to prevent contaminants and sediments from entering the storm sewer drainage system should any unforeseen circumstance occur. The Contractor shall take immediate action if directed by the Construction Manager or Engineer, or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further stormwater from entering the system.

1.04 REGULATORY REQUIREMENTS

- A. Contractor shall comply with the State Water Resources Control Board, Regional Water Quality Control Board, county, city, and other local agency requirements regarding stormwater discharges and management.
- B. Contractor shall not begin any construction work until the Owner receives the State of California General Construction Activity Stormwater Permit. The Contractor shall allow the Owner 30 days to obtain this permit after receipt of the information listed in this Section.

- C. Contractor shall comply with the following prohibitions and limitations, which are contained in the Stormwater Permit:
 - 1. Discharge prohibitions:
 - a. Discharges of materials other than stormwater, which are not otherwise regulated by a NPDES permit, to a separate stormwater sewer system or water of the nation are prohibited.
 - b. Stormwater discharges shall not cause or threaten to cause pollution, contamination (including sediment), or nuisance.
 - c. Stormwater discharges regulated by this general permit shall not contain a hazardous substance equal to or in excess of a reportable quantity listed in 40 CFR 117 and 40 CFR 302.
 - 2. Receiving water limitations:
 - a. Stormwater discharges to any surface or groundwater shall not adversely impact human health or the environment.
 - b. Stormwater discharge shall not cause or contribute to a violation of any applicable water quality standards contained in the California Ocean Plan, Inland Surface Waters and Enclosed Bays and Estuaries Plan, or the applicable Regional Water Board's Basin Plan.

- D. Requirements:
 - 1. In order to comply with the permit mandates the Monterey County has developed a County-Wide Stormwater Pollution Prevention Program and summary of Best Management Practices (BMPs) that are suggested to be utilized by the Contractor. BMPs are measures or practices used to reduce the amount of pollution entering surface water. BMPs may take the form of a process, activity, or physical structure. Some BMPs are simple and can be put into place immediately, while others are more complicated and require extensive planning or space. They may be inexpensive or costly to implement. No additional compensation shall be made for implementation of BMPs.
 - 2. The Monterey County-Wide Stormwater Pollution Prevention Program and Summary of BMPs are available for review at the Owner's Water Quality Control Plant.

1.05 STORMWATER POLLUTION PREVENTION PLAN IMPLEMENTATION

- A. Contractor's QSP shall implement all activities required by the General Permit and as detailed in the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan.

1.06 NON-STORMWATER MANAGEMENT

- A. Stormwater Pollution Prevention Plan shall discuss any non-stormwater sources (i.e., landscaping irrigation, pipe flushing, street washing, and dewatering). In addition, the Plan shall include standard observation measures and best management practices, including best available technologies economically achievable and best conventional pollutant control technologies that are to be implemented in order to reduce the pollutant loading to the waters.

1.07 AMENDMENTS

- A. Contractor's QSP shall amend the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan whenever there is a change in construction or operations which may affect the discharge of pollutants to stormwater.

- B. The Stormwater Pollution Prevention Plan shall also be amended if it is in violation of any conditions of the general permit or has not achieved the general objective of reducing pollutants in stormwater discharges.
- C. All amendments shall be completed at no additional cost to the Owner.

1.08 ANNUAL SUMMARY

- A. Contractor:
 - 1. Prepare an annual summary report (annual report) in accordance with all Regional Water Quality Control Board requirements.
 - 2. Utilize the annual report form available in the SMARTS and submit it to the Engineer a minimum of 2 weeks prior to the deadline for submittal.
 - 3. Upon approval of the report by the Engineer, the LRP will review and certify the report for final submittal via SMARTS.

1.09 NOTICE OF TERMINATION

- A. Contractor shall provide all necessary information for the completion of a Notice of Termination (NOT) upon completion of all construction activities (refer to Section C of the General Construction Activity Stormwater Permit for general requirements). Upon review of the information submitted, the LRP will certify and submit the NOT via SMARTS.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

3.01 GENERAL REQUIREMENTS

- A. Nonhazardous material/waste management:
 - 1. Designated area: The Contractor shall propose designated areas of the project site, for approval by the Construction Manager, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.
 - 2. Granular material:
 - a. Contractor shall store granular material at least 50 feet away from catch basin and curb returns.
 - b. Contractor shall not allow granular material to enter storm drains, creeks, or rivers.
 - c. When rain is forecast within 24 hours or during wet weather, the Construction Manager may require the Contractor to cover granular material with a tarpaulin and to surround the material with sand bags:
 - 1) All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.

3. Dust control: The Contractor shall control dust on a daily basis or as directed by the Construction Manager.
 4. Street sweeping and vacuuming:
 - a. At the end of each working day or as directed by the Construction Manager, the Contractor shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the work.
 - b. Contractor shall not use water to flush down streets in place of street sweeping.
 - c. Additionally, the Contractor shall not use kick brooms or sweeper attachments.
- B. Spill prevention and control:
1. Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
 2. Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials:
 - a. If the waste is hazardous, the Contractor shall dispose of hazardous waste only at authorized and permitted treatment, storage, and disposal facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.
 3. Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.
 4. Contractor shall immediately report any hazardous materials spill to the Owner, Construction Manager, and Engineer for reporting to all applicable regulatory agencies.
- C. Vehicle/equipment cleaning:
1. Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
 2. Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, creeks, or rivers.
- D. Vehicle/equipment maintenance and fueling:
1. Contractor shall perform maintenance and fueling of vehicles or equipment in designated, bermed area(s) or over a drip pan that will not allow run-on of stormwater or runoff of spills.
 2. Contractor shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
 3. Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
 4. Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section "Spill prevention and control" above.
 5. Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.

6. Contractor shall report any hazardous materials spill to the Owner, Construction Manager, and Engineer and all applicable regulatory agencies.
 7. Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
 8. Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.
 9. The Contractor shall comply with Federal, State, and City requirements for aboveground storage tanks.
- E. Contractor training and awareness:
1. Contractor's QSP shall train all employees/subcontractors on the stormwater pollution prevention requirements contained in these specifications.
 2. Contractor's QSP shall inform subcontractors of the stormwater pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
 3. Contractor shall post warning signs in areas treated with chemicals.
 4. Contractor shall paint new, reset, or raised catch basins, constructed as part of the project, with a "No Dumping" stencil.

3.02 SPECIFIC REQUIREMENTS

- A. Paving operations:
1. Project site management:
 - a. When rain is forecast within 24 hours or during wet weather, the Construction Manager or Engineer may prevent the Contractor from paving.
 - b. Construction Manager or Engineer may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bag, to divert runoff or trap and filter sediment in addition to those already shown on the construction plan sheets.
 - c. Contractor shall place drip pans or absorbent material under paving equipment when not in use.
 - d. Contractor shall cover catch basins and manholes when paving or applying seal coat, tack coat, slurry seal, or fog seal.
 - e. If the paving operation includes an on-site mixing plant, the Contractor shall comply with applicable Federal, State, and local General Industrial Activities Stormwater Permit requirements.
 2. Paving waste management:
 - a. Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks:
 - 1) Instead, the Contractor shall either collect the sand and return it to the stockpile, or dispose of it in a trash container.
 - b. Contractor shall not use water to wash down fresh asphalt concrete pavement.
- B. Saw cutting:
1. During saw cutting, Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bags, and fine gravel

- dams, to keep slurry out of the storm drain system. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.
2. Contractor shall vacuum saw cut slurry and pick up the waste prior to moving to the next location or at the end of each working day, whichever is sooner.
 3. If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.

C. Concrete, grout, and mortar waste management:

1. Material management: Contractor shall store concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.
2. Concrete truck/equipment washout:
 - a. Contractor shall not washout concrete trucks or equipment into streets, gutters, storm drains, creeks, or rivers:
 - 1) Washout areas should be located at least 50 feet from storm drains, open ditches, or water bodies.
 - b. Contractor shall perform washout of concrete trucks or equipment in a designated area:
 - 1) Washout site should be lined so there is no discharge into the underlying soil.
3. Exposed aggregate concrete wash water:
 - a. Contractor shall avoid creating runoff from washing of exposed aggregate concrete. Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

END OF SECTION

SECTION 01424

ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Abbreviations and meanings.

1.02 INTERPRETATIONS

- A. Interpret abbreviations by context in which abbreviations are used.

1.03 ABBREVIATIONS

- A. Abbreviations used to identify reference standards:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Bearing Manufacturers' Association (formerly AFBMA, Anti-Friction Bearing Manufacturers' Association)
ABPA	Acoustical and Board Products Association
ACGIH	American Conference of Government Industrial Hygienists
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ADC	Air Diffusion Council
ABMA	American Bearing Manufacturers' Association (formerly AFBMA, Anti-Friction Bearing Manufacturers' Association)
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers' Association
AHRI	Air-Conditioning, Heating, and Refrigeration Institute
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association International, Inc.
AMG	Arizona Masonry Guild
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers

ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	ASTM International
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWSC	American Welding Society Code
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BSI	Building Stone Institute
Caltrans	California Department of Transportation
Cal-OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulations
CFR	United States Code of Federal Regulations
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	U.S. Consumer Product Safety Commission
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSA	CSA International
CSI	Construction Specifications Institute
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
EIFS	Exterior Insulation and Finish System
EJCDC	Engineers Joint Contract Documents Committee
EPA	United States Environment Protection Agency
FDA	Food and Drug Administration
FGMA	Flat Glass Marketing Association
FHWA	Federal Highway Administration
FIA	Factory Insurance Association
FM	FM (Factory Mutual) Global
FS	Federal Specifications
FTI	Facing Tile Institute
GA	Gypsum Association
HI	Hydraulic Institute
HMMA	Hollow Metal Manufacturers Association
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
ICC	International Code Council
ICEA	Insulated Cable Engineer's Association

ICRI	International Concrete Repair Institute
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISA	International Society of Automation
ISO	International Organization for Standardization
JIC	Joint Industrial Council
MCWD	Marina Coast Water District
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International
NAPA	National Asphalt Pavement Association
NAVFAC	Department of the Navy Facilities Engineering Command
NBHA	National Builders Hardware Association
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NETA	InterNational Electrical Testing Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMWIA	National Mineral Wool Insulation Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NSF	NSF International
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDCA	Paint and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard
RCSC	Research Council on Structural Connections
RILEM	International Union of Testing and Research Laboratories for Materials and Structures
SAE	SAE International
SCPA	Structural Clay Products Association
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute

SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Society for Protective Coatings
TABB	Testing, Adjusting, and Balancing Bureau
TCA	Tile Council of America
UL	Underwriters Laboratories, Inc.
UNS	Unified Numbering System
USDA	United States Department of Agriculture
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumber Inspection Bureau
WPA	Western Pine Association
WPOA	Western Plumbing Officials Association
WRC	Welding Research Council
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Abbreviations used in Specifications and Drawings:

a	year or years (metric unit)
A	ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbl	barrel or barrels
bd	board
bhp	brake horsepower
BIL	basic impulse insulation level
bil gal	billion gallons
BOD	biochemical oxygen demand
Btu	British thermal unit or units
Btuh	British thermal units per hour
bu	bushel or bushels
BV	bed volume(s)
C	degrees Celsius
cal	calorie or calories
cap	capita
cd	candela or candelas
cfm	cubic feet per minute
Ci	curie or curies
CIPP	Cured-in-Place Pipe
cm	centimeter or centimeters

cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO ₂	carbon dioxide
COD	chemical oxygen demand
Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
cu yd	cubic yard or yards
d	day (metric units)
day	day (English units)
db	decibels
D/d	column diameter to particle diameter ratio
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
EBCT	empty bed contact time
EER	energy efficiency ratio
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons
gal/day	gallons per day
gal/min	gallons per minutes
gal/sec	gallons per second
gfd	gallons per square foot per day
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/cap	gallons per day per capita

gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute
gpm/sq ft	gallons per minute per square foot
gps	gallons per second
g/cm ³	grams per cubic centimeter
h	hour or hours (metric units)
ha	hectare or hectares
hp	high point
hp	horsepower
hp-hr	horsepower-hour or horsepower-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
ihp	indicated horsepower
Inc.	Incorporated
inch	inch
inches	inches
inches/sec	inches per second
I/O	input/output
J	joule or joules
JTU	Jackson turbidity unit or units
k	kips
K	kelvin
K	thermal conductivity
kA	kiloampere
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
kip	kilopound or kilopounds
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt or kilovolts
kVA	kilovolt-ampere or kilovolt-amperes
kW	kilowatt or kilowatts
kWh	kilowatt hour
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre
lb/cu ft	pounds per cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre
lb/sq ft	pounds per square foot
L/D Ratio	Ratio of filter height to filter media particle diameter

lin	linear, lineal
lin ft	linear foot or feet
lm	lumen or lumens
lmh	liters per square meter per hour
log	logarithm (common)
ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentration)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
meq/mL	milliequivalents per milliliter
MFBM	thousand feet board measure
mfr	manufacturer
mg	milligram or milligrams
mgd/ac	million gallons per day per acre
mgd	million gallons per day
mg/L	milligrams per liter
mrem	millirem
μF	microfarad or microfarads
Mil	0.001 inch (used for coating thickness)
mile	mile
mil. gal	million gallons
miles	miles
min	minimum
min	minute or minutes
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
MPT	National Pipe Thread, male fitting
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
μg/L	micrograms per liter
μm	micrometer or micrometers
μS/cm	microSeimens per centimeter
N	newton or newtons
N	normal (concentration)
ND	not detected
nm	nanometer
No.	number
Nos	numbers

NPT	National Pipe Thread
NRC	noise reduction coefficient
NTU or ntu	nephelometric turbidity unit
oc	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine
OTA	ortha-tolidine-arsenite
oz	ounce or ounces
oz/sq ft	ounces per square foot
Pa	pascal or pascals
pl	plate or property line
pm	post meridiem (afternoon)
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second
s	second (metric units)
S	Siemens (mho)
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SDI	sludge density index or silt density index
sec	second (English units)
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm ² or sq cm	square centimeter or centimeters
sq ft	square feet or foot
sq inch	square inch
sq inches	square inches
km ² or sq km	square kilometer or kilometers
m ² or sq m	square meter or meters

mm ² or sq mm	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class
SVI	sludge volume index
TDS	total dissolved solids
TEFC	totally enclosed, fan-cooled
TKN	total Kjeldahl nitrogen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand
TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U Factor/U Value
U	Coefficient of Heat Transfer
U	heat transfer coefficient
UNS	Uniform Numbering System
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
WRT	water remediation technologies
wt	weight
yd	yard or yards
yr	year or years (English unit)

C. Abbreviations used on Drawings: As listed on Drawings or in Specifications.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Quality control and control of installation.
 - 2. Tolerances.
 - 3. References.
 - 4. Mock-up requirements.
 - 5. Authority and duties of Owner's representative or inspector.
 - 6. Sampling and testing.
 - 7. Testing and inspection services.
 - 8. Contractor's responsibilities.

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Construction Manager before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
- H. When specified, products will be tested and inspected either at point of origin or at Work site:
 - 1. Notify Construction Manager in writing well in advance of when products will be ready for testing and inspection at point of origin.
 - 2. Do not construe that satisfactory tests and inspections at point of origin is final acceptance of products. Satisfactory tests or inspections at point of origin do not preclude retesting or re-inspection at Work site.
- I. Do not ship products which require testing and inspection at point of origin prior to testing and inspection.

1.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. When Manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.04 REFERENCES

- A. ASTM International (ASTM):
 - 1. E329 - Standard for Agencies Engaged in Construction Inspection, Testing or Special Inspection.

1.05 PRODUCT REQUIREMENTS

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.06 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Engineer.

1.07 AUTHORITY AND DUTIES OF OWNER'S REPRESENTATIVE OR INSPECTOR

- A. Owner's Project Representative employed or retained by Owner is authorized to inspect the Work.
- B. Inspections may extend to entire or part of the Work and to preparation, fabrication, and manufacture of products for the Work.

- C. Deficiencies or defects in the Work which have been observed will be called to Contractor's attention.
- D. Inspector will not:
 - 1. Alter or waive provisions of Contract Documents.
 - 2. Inspect Contractor's means, methods, techniques, sequences, or procedures for construction.
 - 3. Accept portions of the Work, issue instructions contrary to intent of Contract Documents, or act as foreman for Contractor. Supervise, control, or direct Contractor's safety precautions or programs; or inspect for safety conditions on Work site, or of persons thereon, whether Contractor's employees or others.
- E. Inspector will:
 - 1. Conduct on-site observations of the Work in progress to assist Construction Manager in determining when the Work is, in general, proceeding in accordance with Contract Documents.
 - 2. Report to Construction Manager whenever Inspector believes that Work is faulty, defective, does not conform to Contract Documents, or has been damaged; or whenever there is defective material or equipment; or whenever Inspector believes the Work should be uncovered for observation or requires special procedures.

1.08 SAMPLING AND TESTING

- A. General:
 - 1. Prior to delivery and incorporation in the Work, submit listing of sources of materials, when specified in sections where materials are specified.
 - 2. When specified in sections where products are specified:
 - a. Submit sufficient quantities of representative samples of character and quality required of materials to be used in the Work for testing or examination.
 - b. Test materials in accordance with standards of national technical organizations.
- B. Sampling:
 - 1. Furnish specimens of materials when requested.
 - 2. Do not use materials which are required to be tested until testing indicates satisfactory compliance with specified requirements.
 - 3. Specimens of materials will be taken for testing whenever necessary to determine quality of material.
 - 4. Assist Construction Manager in preparation of test specimens at site of work, such as soil samples and concrete test cylinders.

1.09 TESTING AND INSPECTION SERVICES

- A. Contractor will employ and pay for specified services of an independent firm to perform Contractor quality control testing as required in the technical specifications for various work and materials.
- B. Owner will employ and pay for specified services of an "Owner's independent testing firm" certified to perform testing and inspection as required in the technical specifications for various work and materials or stipulated in

Section 01455A - Special Tests and Inspections to confirm Contractor's compliance with Contract Documents.

- C. The Owner's independent testing firm will perform tests, inspections and other services specified in individual specification sections and as required by Owner and requested by the Construction Manager and Engineer.
- D. The qualifications of laboratory that will perform the testing, contracted by the Owner or by the Contractor, shall be as follows:
 - 1. Has authorization to operate in the state where the project is located.
 - 2. Meets "Recommended Requirements for Independent Laboratory Qualification," published by American Council of Independent Laboratories.
 - 3. Meets requirements of ASTM E329.
 - 4. Laboratory Staff: Maintain full time specialist on staff to review services.
 - 5. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to National Bureau of Standards (NBS) or accepted values of natural physical constants.
 - 6. Will submit copy of report of inspection of facilities made by Materials Reference Laboratory of NBS during most recent tour of inspection, with memorandum of remedies of deficiencies reported by inspection.
- E. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing inspections and source quality control as required by Construction Manager, Engineer or Owner.
- F. Contractor shall cooperate with Owner's independent testing firm, furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested:
 - 1. Notify Construction Manager and Owner's independent testing firm 48 hours prior to expected time for operations requiring testing.
 - 2. Make arrangements with Owner's independent testing firm and pay for additional samples and tests required for Contractor's use.
- G. Limitations of authority of testing Laboratory: Owner's independent testing firm or Laboratory is not authorized to:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.
- H. Testing and employment of an Owner's independent testing firm or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- I. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same Owner's independent testing firm on instructions by Construction Manager. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- J. The Owner's independent testing firm responsibilities will include:
 - 1. Test samples of mixes submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Construction Manager and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Construction Manager and Contractor of observed irregularities or non-conformance of Work or products.
 6. Perform additional tests required by Construction Manager or Engineer.
 7. Attend preconstruction meetings and progress meetings.
- K. Owner's independent testing firm individual test reports: After each test, Owner's independent testing firm will promptly submit electronically and 3 hard copies of report to Engineer and to Contractor, Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Certified test results stamped and signed by a registered Engineer in the State of California.
 10. Summary of conformance with Contract Documents.
 11. When requested by Construction Manager or Engineer, the Owner's independent testing firm will provide interpretation of test results.
- L. Owner's independent testing firm will provide monthly report of certification to identify all work performed for special inspections and other contract requirements on this project. The following certified monthly report at a minimum will include but not limited to:
1. Results of testing.
 2. Testing logs.
 3. Outstanding deficiencies.
 4. Various statistical data.
 5. Testing curves (up to 4 types) as required by the Engineer.

1.10 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with Owner's independent testing firm or laboratory personnel and provide access to construction and manufacturing operations.
- B. Secure and deliver to Owner's independent testing firm or laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
- C. Provide to Owner's independent testing firm or laboratory and Engineer preliminary mix design proposed to be used for concrete, and other materials mixes which require control by testing laboratory.
- D. Furnish electronically and 5 hard copies of product test reports.

- E. Furnish incidental labor and facilities:
 - 1. To provide access to construction to be tested.
 - 2. To obtain and handle samples at Work site or at source of product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. For storage and curing of test samples.

- F. Notify Owner's independent testing firm or laboratory 48 hours in advance of when observations, inspections and testing is needed for laboratory to schedule and perform in accordance with their notice of response time.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01455A

SPECIAL TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: This Section describes the requirements for providing special tests and inspections.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 530 - Building Code Requirements for Masonry Structures.
 - 2. 530.1 - Specification for Masonry Structures.
- B. American Institute of Steel Construction (AISC):
 - 1. 360 - Specification for Structural Steel Buildings.
- C. ASTM International (ASTM):
 - 1. A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
- D. California Building Code (CBC).

1.03 DEFINITIONS

- A. Special Inspection: Inspection of the materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.
- B. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- C. Special Inspection, Periodic: The part-time, or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed and at the completion of the work.
- D. Structural Observation: The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents at significant construction stages and at completion of the structural system.

1.04 DESCRIPTION

- A. This Section describes special inspections, special tests and structural observation of structural assemblies and components to be performed in compliance with the building code specified.

- B. These special tests and inspections are in addition to the requirements specified in Section 01450 - Quality Control, and by the individual sections.
- C. The Owner will employ 1 or more inspectors who will provide special inspections during construction.

1.05 SPECIAL INSPECTION

- A. Owner will employ 1 or more special inspectors who will provide special inspections during construction.
- B. Special inspector(s) shall be qualified for inspection of the particular type of materials or operations requiring special inspection.
- C. Duties of Special Inspector:
 - 1. Reporting: Special inspector(s) shall provide reports of each inspection to the Contractor. Contractor shall distribute copies of inspection reports to the Owner:
 - a. Reports shall, at a minimum, include the following items:
 - 1) Date and time of inspection, and name(s) of individual(s) performing the inspection.
 - 2) Structures and areas of the structure where work or testing was observed.
 - 3) Discrepancies between the requirements of the Contract Documents and the work or testing observed.
 - 4) Other areas of deficiency in the Work.
- D. Special inspections shall not be construed as fulfilling the requirements for structural observation.

1.06 TESTING

- A. Testing laboratory: Special tests will be performed by Owner's testing laboratory as specified in Section 01450 - Quality Control.
- B. Selection of the material to be tested shall be by Owner's testing laboratory, and not the Contractor.

1.07 STRUCTURAL OBSERVATION

- A. Owner will employ 1 or more registered design professionals who will provide structural observation(s) during construction:
 - 1. Registered design professional shall be a civil or structural engineer currently licensed as such in the State of California and regularly engaged in the structural design of structures equivalent or similar to those indicated on the Drawings.
- B. Structural observations shall not be construed as fulfilling the requirements for special inspections.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 SPECIAL TESTING AND INSPECTIONS

- A. The following types of work require special inspection, refer to the following schedules:
 - 1. Appendix A - Cast-In-Place Concrete Special Inspection Schedule.
 - 2. Appendix B - Architectural, Mechanical, and Electrical Component Special Inspection Schedule.
 - 3. Appendix C - Soils Verification and Inspection Schedule.

3.02 STRUCTURAL OBSERVATION

- A. The following work requires structural observation in accordance with Section 1704.5 of the building code specified in Section 01455 - Regulatory Requirements.
- B. All structures in all areas:
 - 1. Foundations.
 - 2. Elevated slabs.
 - 3. Walls and columns.
 - 4. Roof framing and diaphragms.

3.03 SCHEDULE

- A. Contractor shall allow time necessary for Special Inspections as listed above.
- B. Sufficient notice shall be given so that the Special Inspections can be performed. This includes time for off-site Special Inspectors to plan the inspection and travel to site.

3.04 PROCEDURE

- A. The Special Inspector will immediately notify the Construction Manager of any corrections required and follow notification with appropriate documentation.
- B. Contractor shall not proceed until the work is satisfactory to the Construction Manager.

END OF SECTION

APPENDIX A
CAST-IN-PLACE CONCRETE SPECIAL INSPECTION SCHEDULE

(Reference: IBC 2012 Table 1705.3)

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Inspection of reinforcing steel, and placement.		-	X
2. Verifying use of required design mix.		-	X
3. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.		X	-
4. Inspection of concrete and shotcrete placement for proper application techniques.		X	-
5. Inspection for maintenance of specified curing temperature and techniques.		-	X
6. Inspect formwork for shape, location, and dimensions of concrete member being formed.			X

APPENDIX B
ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENTS
SPECIAL INSPECTION SCHEDULE

(Reference IBC 2012 Sections 1705.11.5 through 1705.11.70)

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
Mechanical Components:			
ME4. Anchorage of pipelines greater than 8 inches in diameter.		-	X

APPENDIX C
SOILS VERIFICATION AND INSPECTION SCHEDULE

(Reference IBC 2012 Table 1705.6)

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Verify materials below footings/shallow foundations are adequate to achieve the design bearing capacity.		-	X
2. Verify excavations are extended to proper depth and have reached proper material.		-	X
3. Perform classification and testing of compacted fill materials.		-	X
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of fill.		X	-
5. Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly.		-	X

SECTION 01460

CONTRACTOR QUALITY CONTROL PLAN

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Contractor Quality Control Plan.

1.02 SUBMITTALS

- A. Qualifications of the Contractor's Quality Control (CQC) Plan Manager must include all qualifying registrations and show that the candidate has had experience (minimum 10 years) on projects of similar type and size.
- B. Contractor's Daily Quality Control Report: Submit to Construction Manager within 1 day of completion of each inspection.
- C. Daily Inspection Report: Submit to Construction Manager at the end of each working day or no later than prior to the beginning of the next working day.

1.03 CONTRACTOR'S INSPECTION OF THE WORK

- A. Work performed by Contractor shall be inspected by the Contractor's CQC Plan Manager. Non-conforming Work and any safety hazards in the Work area shall be noted and promptly corrected.
- B. No materials or equipment shall be used in Work without inspection and acceptance by Contractor's CQC Plan Manager.

1.04 QUALIFICATIONS

- A. Contractor's CQC Plan Manager: Demonstrate having performed similar CQC functions on similar type projects. Submit records of personnel experience, training, and qualifications.

1.05 COVERING WORK

- A. Whenever Contractor intends to backfill, bury, cast in concrete, or otherwise cover any Work, notify Construction Manager not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of Contractor to notify Construction Manager in accordance with this requirement shall be resolved according to Article 14 of the General Conditions.

1.06 REJECTED WORK

- A. Failure to promptly remove and replace rejected Work will be considered a breach of this Contract, and Owner may proceed under provisions of the General Conditions.

1.07 CONTRACTOR'S QUALITY CONTROL PROGRAM

- A. General: Establish and execute a Quality Control (CQC) Plan for Work. The plan shall establish adequate measures for verification and conformance to defined requirements by Contractor personnel and lower-tier Subcontractors (including Fabricators, Suppliers, and Subcontractors). This program shall be described in a Plan responsive to this Section.

- B. CQC personnel:
 - 1. Contractor's CQC Plan Manager shall report to a Senior Project Manager of the Contractor and shall have no supervisory or managerial responsibility over the workforce.
 - 2. The Contractor CQC Plan Manager shall be on-site as often as necessary, but not less than the daily working hours specified in the Contract Documents to remedy and demonstrate that Work is being performed properly and to make multiple observations of Work in progress.
 - 3. The Contractor is to furnish personnel with assigned CQC functions reporting to the CQC Manager. Persons performing CQC functions shall have sufficient qualifications, authority, and organizational freedom to identify quality problems and to initiate and recommend solutions.

- C. CQC Plan:
 - 1. Contractor's CQC Plan shall include a statement by the Senior Project Manager designating the CQC Plan Manager and specifying the authority delegated to the CQC Plan Manager to direct cessation or removal and replacement of defective Work.
 - 2. Describe the CQC program and include procedures, work instructions, and records. Describe methods relating to areas that require special testing and procedures as required by the specifications.
 - 3. Include specific instructions defining procedures for observing Work in process and comparing this Work with the Contract requirements (organized by specifications section).
 - 4. Describe procedures to ensure that equipment or materials that have been accepted at the Site are properly stored, identified, installed and tested.
 - 5. Include procedures to verify that procured products and services conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to lower-tier Suppliers and/or Subcontractors.
 - 6. Commissioning quality control: Include procedures to verify that the commissioning requirements of the Contract Documents are integrated into the Contractor's CQC Plan and conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to the Contractor and the lower-tier Suppliers and/or Subcontractors.
 - 7. Include instructions for recording inspections and requirements for demonstrating through the Daily Inspection Reports that Work inspected was in compliance or a deficiency was noted and action to be taken.
 - 8. Procedures to preclude the covering of deficient or rejected Work.
 - 9. Procedures for halting or rejecting Work.
 - 10. Procedures for resolution of differences between the CQC Plan Manager and the production personnel.
 - 11. Identify contractual hold/inspection points as well as any Contractor-imposed hold/inspection points.

- D. Daily Inspection Report: Include, at a minimum:
1. Inspection of specific work.
 2. Quality characteristics in compliance.
 3. Quality characteristics not in compliance.
 4. Corrective/remedial actions taken.
 5. Statement of certification.
 6. CQC Manager's signature.
 7. Information provided on the daily report shall not constitute notice of delay or any other notice required by the Contract Documents.
- E. Deficient and Non-conforming Work and Corrective Action: Include procedures for handling deficiencies and non-conforming Work. Deficiencies and non-conforming Work are defined as documentation, drawings, material, equipment, or Work not conforming to the indicated requirements or procedures. The procedure shall prevent non-conformances by identification, documentation, evaluation, separation, disposition, and corrective action to prevent reoccurrence. Conditions having adverse effects on quality shall be promptly identified and reported to the senior level management. The cause of conditions adverse to quality shall be determined and documents and measures implemented to prevent recurrence. In addition, at a minimum, this procedure shall address:
1. Personnel responsible for identifying deficient and non-complying items within Work.
 2. How and by whom deficient and non-compliant items are documented "in the field."
 3. The personnel and process utilized for logging deficient and non-compliant Work at the end of each day onto a deficiency log.
 4. Tracking processes and tracking documentation for deficient and non - conforming Work.
 5. Personnel responsible for achieving resolution of outstanding deficiencies.
 6. Include detailed procedures for the performance and control of special process (e.g., welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).
- F. Audits: The CQC program shall provide for regularly scheduled documented audits to verify that CQC procedures are being fully implemented by Contractor and its Subcontractors. Audit records shall be made available to Construction Manager upon request.
- G. Documented control/quality records:
1. Establish methods for control of Contract Documents that describe how Drawings and Specifications are received and distributed to ensure the correct issue of the document being used. Describe how record document/drawing data are documented and furnished to Construction Manager and Engineer.
 2. Maintain evidence of activities affecting quality. Including operating logs, records of inspection, audit reports, personnel qualification and certification records, procedures, and document review records.
 3. Maintain quality records in a manner that provides for timely retrieval and traceability. Protect quality records from deterioration, damage and destruction.
 4. Develop a list of specific records as required by the Contract Documents that will be furnished to Construction Manager and Engineer at the completion of activities.

- H. Acceptance of CQC Plan: Engineer's acceptance of the CQC Plan shall not relieve Contractor from any of its obligations for performance of Work. Contractor's CQC staffing is subject to Construction Manager's and Engineer's review and continued acceptance. Owner, at its sole discretion, and without cause, may direct Contractor to remove and replace the CQC Plan Manager:
1. Acceptance of the CQC Plan by the Engineer is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction.
 2. After acceptance of the CQC Plan, notify the Construction Manager and Engineer in writing of any proposed change. Proposed changes are subject to acceptance by the Construction Manager or Engineer.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, field offices and sheds, and removal after construction.

1.02 REFERENCE

- A. American National Standards Institute (ANSI).
- B. Occupational Safety and Health Administration (OSHA).

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.

1.04 TEMPORARY UTILITIES

- A. Temporary electrical power:
 - 1. Arrange with local utility to provide adequate temporary electrical service.
 - 2. Provide and maintain adequate jobsite power distribution facilities conforming to applicable Laws and Regulations.
 - 3. Provide, maintain, and pay for electric power for performance of the Work except for power required for the final 7 day operational test:
 - a. When using permanent facilities, provide separate meter and reimburse Owner for power used in connection with performance of the Work.
- B. Temporary electrical lighting:
 - 1. In work areas, provide temporary lighting sufficient to maintain lighting levels during working hours not less than lighting levels required by OSHA and state agency which administers OSHA regulations where Project is located.
 - 2. When available, permanent lighting facilities may be used in lieu of temporary facilities:
 - a. Prior to Substantial Completion of the Work, replace bulbs, lamps, or tubes used by Contractor for lighting.
- C. Temporary heating, cooling, and ventilating:
 - 1. Heat and ventilate work areas to protect the Work from damage by freezing, high temperatures, weather, and to provide safe environment for workers.
 - 2. Permanent heating system may be utilized when sufficiently completed to allow safe operation.

- D. Temporary water:
1. Pay for and construct facilities necessary to furnish potable water for human consumption and non-potable water for use during construction.
 2. Remove temporary piping and connections and restore affected portions of the facility to original condition before Substantial Completion.
 3. Construction water will be provided by the District. The Contractor is responsible for obtaining hydrant meters, paying applicable fees and deposits, and paying for water.
 4. Fees are listed below. Contractor shall coordinate with the District for payment procedure.
 - a. Temporary Water Service Fees and Deposits
 - 1) Meter Deposit Fee - \$702.00
 - 2) Hydrant Meter Fee (Set/Remove Fee) one-time fee - \$152.00
 - 3) Hydrant Meter Fee (Relocate Fee) per occurrence - \$152.00
 - 4) Minimum Monthly Service Charge per month - \$163.70
 - 5) Estimated Water Consumption Deposit minimum - \$1,188.00
 - b. Water Consumption Charge (hcf = hundred cubic feet = 748 gallons)
 - 1) 0-10 hcf
 - a) First Tier
 - b) \$4.13 per hcf
 - 2) 10+ hcf
 - a) Second Tier
 - b) \$8.04 per hcf
- E. Temporary sanitary facilities:
1. Provide suitable and adequate sanitary facilities that are in compliance with applicable Laws and Regulations.
 2. Existing facility use is not allowed.
 3. At completion of the Work, remove sanitary facilities and leave site in neat and sanitary condition.
- F. Temporary fire protection: Provide sufficient number of fire extinguishers of type and capacity required to protect the Work and ancillary facilities.
- G. First aid: Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.
- H. Utilities in existing facilities: As specified in Section 01140 - Work Restrictions.

1.05 CONSTRUCTION AIDS

- A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.
- B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.
- C. Design temporary supports with adequate safety factor to ensure adequate load bearing capability:
1. When requested, submit design calculations by professional registered engineer prior to application of loads.
 2. Submitted design calculations are for information and record purposes only.

- D. Accident prevention:
 - 1. Exercise precautions throughout construction for protection of persons and property.
 - 2. Observe safety provisions of applicable Laws and Regulations.
 - 3. Guard machinery and equipment, and eliminate other hazards.
 - 4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.
 - 5. Before commencing construction work, take necessary action to comply with provisions for safety and accident prevention.

- E. Barricades:
 - 1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.
 - 2. Provide barriers with flashing lights after dark.
 - 3. Keep barriers in place until excavations are entirely backfilled and compacted.
 - 4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

- F. Warning devices and barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers:
 - 1. Devices shall conform to minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

- G. Hazards in public right-of-way:
 - 1. Comply with local jurisdiction standards and requirements for right-of-way barricades and other safety devices.
 - 2. Mark at reasonable intervals, trenches, and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours:
 - a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
 - 3. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades:
 - a. During hours of darkness, provide warning lights at close intervals.

- H. Hazards in protected areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

- I. Above grade protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

- J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage, or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

- K. Fences:
 - 1. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence, and vandalism.

2. When entire or part of site is to be permanently fenced, permanent fence may be built to serve for both permanent and temporary protection of the work site, provided that damaged or defaced fencing is replaced prior to Substantial Completion.
3. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons:
 - a. Bear responsibility for protection of plant and material on site of the Work when openings in existing fences are not closed.
4. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
5. Fence temporary openings when openings are no longer necessary.

1.06 SECURITY

- A. Make adequate provision for protection of the work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

1.07 STAGING AREAS

- A. Contractor must provide, at Contractor's sole expense, a staging area for material, equipment, sanitary facilities, utilities, storage, scaffolds, barricades and any other temporary structure required to safely perform the Work. Contractor shall coordinate with the appropriate agencies having jurisdiction regarding feasible areas for staging prior to mobilization:
 1. Staging area must be safe and adequate for the intended use, and maintained in accordance with all applicable federal, state, and local laws, codes, and regulations.
 2. Contractor must fence and screen the staging area, and its operation must minimize inconvenience to neighboring properties.
 3. Contractor must promptly remove all temporary facilities when they are no longer needed or upon completion of the Work, whichever comes first. Contractor must promptly repair any damage to City's property or to other property caused by the installation, use, or removal of the temporary facilities, and must promptly restore the property to its original or intended condition.

1.08 ACCESS ROADS

- A. General:
 1. Build and maintain access roads to and on site of the Work to provide for delivery of material and for access to existing and operating plant facilities on site.
 2. Build and maintain dust free roads which are suitable for travel at 20 miles per hour.
- B. Off-site access roads:
 1. Build and maintain graded earth roads.
 2. Build roads only in public right-of-way or easements obtained by Owner.
 3. Obtain rights-of-way or easements when electing to build along other alignment.

- C. On-site access roads:
 - 1. Maintain access roads to storage areas and other areas to which frequent access is required.
 - 2. Maintain similar roads to existing facilities on site of the Work to provide access for maintenance and operation.
 - 3. Protect buried vulnerable utilities under temporary roads with steel plates, wood planking, or bridges.
 - 4. Maintain on-site access roads free of mud. Under no circumstances shall vehicles leaving the site track mud off the site onto the public right-of-way.

1.09 TEMPORARY CONTROLS

- A. Dust control:
 - 1. Prevent dust nuisance caused by operations, unpaved roads, excavation, backfilling, demolition, or other activities.
 - 2. Control dust by sprinkling with water, use of dust palliatives, modification of operations, or other means acceptable to agencies having jurisdiction.
- B. Noise control:
 - 1. Comply with noise and work hours regulations by local jurisdiction.
 - 2. In or near inhabited areas, particularly residential, perform operations in manner to minimize noise.
 - 3. In residential areas, take special measures to suppress noise during night hours.
- C. Mud control:
 - 1. Prevent mud nuisance caused by construction operations, unpaved roads, excavation, backfilling, demolition, or other activities.

1.10 PROJECT SIGN

- A. The following requirements are in addition to those listed in Section 00 73 50 - State Revolving Fund and Proposition 1 Funding Requirements.
- B. Provide and maintain Project identification sign consisting of painted 8-foot wide by 4-foot high exterior grade plywood and minimum 10-foot long, 4 by 4 lumber posts, set in ground at least 3 feet, with exhibit lettering by professional sign painter using no more than 5 sign colors:
 - 1. List at least the title of the Project, and names of the Owner, Engineer, Construction Manager and Contractor.
 - 2. Contractor's Engineer's and Construction Manager's names shall be identified in upper right hand corner underneath the bid number.
 - 3. Text of second line: Estimated Completion Date: month and year.
 - 4. On third line, list the bid price.
 - 5. On the fourth line, list the state agency administering the state revolving fund loan for the project - coordinate with Owner for this information. Include the EPA and state agency logo on the sign.

- C. Each segment of work shall have 2 project signs installed (one from each major direction of travel to the work area) and maintained in place until work is complete in that segment. Coordinate location of project sign with Construction Manager. Erect signs in each segment at least 14 days before works begins in the respective segment. Project signs may be used in more than one segment if they are in good condition and work in the prior segment has been completed to the satisfaction of the Construction Manager and Owner.
- D. Replace or repair the project sign if it is damaged or covered with graffiti within 2 working days of observation or notification of damage or graffiti.

1.11 REMOVAL

- A. Remove temporary facilities and controls before inspection for Substantial Completion or when directed.
- B. Clean and repair damage caused by installation or use of temporary facilities.
- C. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.
- D. Restore existing facilities used during construction to specified or original condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01550
TRAFFIC CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Traffic control requirements to keep streets and traffic ways open for the passage of vehicles, bicyclists, and pedestrians during the construction period.

1.02 SUBMITTALS

- A. Approved and signed copies of:
 - 1. Encroachment permits.
 - 2. Qualifications of Engineer preparing traffic control plan.
 - 3. Traffic control plan (TCP).
 - 4. Notification plan.

1.03 AUTHORITIES HAVING JURISDICTION (AHJ)

- A. Authorities Having Jurisdiction (AHJ) are listed in Section 01140.
- B. AHJ traffic control requirements supersede the requirements of this Section.
- C. Comply with AHJ traffic control requirements.

1.04 MEASUREMENT AND PAYMENT

- A. Contractor is responsible for paying all costs associated with permits, plans, implementation, and maintenance as specified in Section 01294 - Applications for Payment.

1.05 ENCROACHMENT PERMIT

- A. Contractor shall be responsible for paying and obtaining Encroachment Permits approved by AHJ.
- B. Draft Encroachment Permits are included as Appendices and are the result of coordination between the AHJ, MCWD, and Engineer during design development. For bidding purposes, Contractors shall assume the terms of the Draft Encroachment Permits will be consistent with the terms of the final encroachment permits.

1.06 TRAFFIC CONTROL PLAN (TCP)

- A. Contractor shall pay for traffic control plans to be developed and submit to the ADJ for review and approval. Contractor shall revise traffic control plans as needed.

- B. Traffic control plans shall be prepared and stamped by a California licensed professional engineer with at least 5 years' experience preparing traffic control plans.
- C. Traffic control plans shall include:
 1. Specific plans for traffic control at each location of work, rather than generic plans.
 2. Schedule, duration and phasing of proposed work.
 3. Detour, lane closure and proposed signage plan.
 4. Location of K-rail with detail of appropriate end treatments.
 5. The traffic control plans shall show the locations of all traffic control devices, signage, and markings per California MUTCD.
- D. Approval of the TCP by the AHJ shall in no way relieve the Contractor of the responsibility for traffic and safety requirements.
- E. Include labor, material, equipment, tools, and services used in the regulation of construction traffic to and from the project site as well as public vehicular and pedestrian traffic within the project limits.
- F. Provide a TCP for each phase or segment of the construction meeting the requirements of the AHJ and this Section. Plans should be street specific, not generic:
 1. Each TCP shall be considered separately.
- G. TCP constraints:
 1. The following are general guidelines for preparing traffic control plans and shall be used where no other information is available.
 2. Road closures have been discussed with each agency and are not permitted.
 3. Access to all local streets and residences shall be maintained at all times, except as noted. Turn lanes are not considered as travel lanes. Provide one travel lane that is 12 feet wide in each direction at all times. The table below describes the traffic control restrictions.

Traffic Control Lane Closure Special Requirements		
Street Name	Days/Hours	Minimum Lanes to Remain Open
Street with two lanes (one lane in each direction) or less than 36 feet wide	Allowable working hours	One lane shall remain open at all times, alternating traffic flow in each direction for a wait time of not more than 5 minutes. Traffic shall not be allowed to back up into any intersections.
Street with more than two lanes or 36 feet or more wide	Allowable working hours	One lane shall remain open at all times, alternating traffic flow in each direction for a wait time of not more than 5 minutes. Traffic shall not be allowed to back up into any intersections.

- H. Intersection of Blanco Road and Reservation Road
 1. The receiving shaft at the Intersection of Blanco Road and Reservation road will require a specifically developed traffic control plan for both working and non-working hours.

2. At all times, at least one standard 12-foot width lane of traffic shall be maintained in the southeast bound direction on Reservation Road through the intersection and one standard 12-foot lane width shall be maintained for a dedicated turning lane for southeast bound traffic on Reservation Road turning left onto Blanco Road.
 3. During hours where lighting is reduced from clear sky daytime hours (nighttime, fog, rain, etc.) temporary traffic control lighting shall be used to provide advance notice of a temporary detour and notice at the temporary detour.
- I. Submittal process:
1. Submit TCP to Engineer for review for conformance with the contract requirements. TCPs not in conformance with the contract requirements will be returned from the Engineer to the Contractor for revision and resubmittal.
 2. Once the Engineer accepts the TCP for conformance with the contract requirements, Contractor shall submit the TCP to the AHJ for approval.
 3. Contractor shall revise the TCP per comments from the AHJ.
 4. Contractor shall submit approved TCP to the Engineer within 48 hours of approval by the AHJ.
- J. Changes to the TCP:
1. If, during the execution of the work, the Contractor determines that the traffic control is not functioning as intended, the Contractor shall submit revised TCP to AHJ for approval.
 2. Submit approved revised TCP to the Engineer within 48 hours of completing a change.
- K. Provide for the protection of the traveling public, pedestrians, bicyclists, and workers within the area covered by the limits of construction, at all times when the area is affected by construction facilities or activities including the following:
1. Public traffic access.
 2. Business access.
 3. Private property access:
 - a. Warn, control, protect, and expedite vehicular and pedestrian traffic through the private property.
 4. Driveway access.
 5. Pedestrian access.
 6. Bus stop access:
 - a. Provide Bus Stop Closure Schedule (BSCS) attached to TCP.
 - b. BSCS shall identify specific durations and times of day for all proposed bus stop closures.
 - c. Closures are not to exceed 2 consecutive bus stops at a time or 1,000 feet at a time.
 - d. During construction, coordinate with AHJ regarding specific dates of bus stop closures:
 - 1) Inform Owner of coordination details.
 7. Sanitation (trash) truck access.
 8. Bike access:
 - a. Maintain safe bike facilities through the work zone and associated traffic control layouts.
 - b. Provide alternative bike facilities or designated detour routes when necessitated by temporary removal of existing bike lanes.

9. Emergency vehicle access:
 - a. Maintain access for emergency vehicles at all times.
10. School zones and safe routes to school:
 - a. When a designated Safe Route to School is encroached upon by a construction work zone or the AHJ identifies a need for students to be assisted in the safe crossing through the work zone, provide a qualified crossing guard approved by the AHJ:
 - 1) Crossing guard shall be present for the full duration of time that children are likely to be present, as determined by the AHJ.
 - 2) Contractor is responsible for fees associated with the use of crossing guards.
11. Protection from excavations:
 - a. Open trench signs (sign number C27 (CA) or similar) shall be in place when there is an open trench or excavation. The open trench sign shall be placed on all open trenches in accordance with California MUTCD Section 6F.103.
 - b. Continuous barricades shall be installed preventing the travelling public including, but not limited to, motorists, bikers and pedestrians from entering the construction zone from the direction of the traffic flow and shall be installed near the trench or excavation area.
12. Limit access to work sites.

1.07 NOTIFICATION PLAN

- A. See Section 01140 for additional requirements.
- B. Submit Notification Plan to Engineer for approval.
- C. Define who will notify, how they will notify, and when they will notify:
 1. Notify affected emergency agencies, residences, and businesses within the area of current work 1 month prior to start of operations.
 2. Notify AHJ for any traffic control or work areas affecting traffic signals, public bus routes, or bus stops at a minimum of 1 week prior to any the work.
- D. Notify Construction Manager 15 days prior to start of construction.
- E. Notify the AHJ a minimum of 2 working days prior to the anticipated beginning of construction:
 1. Emergency services, such as police and fire.
 2. Other services, such as bus service, mail and garbage collection.
- F. Vehicular Traffic: Define placement of the following:
 1. Project signs:
 - a. See Sections 00 73 50 - State Revolving Fund and Proposition 1 Funding Requirements and 01500 - Temporary Facilities and Controls for project sign requirements.
 - b. A minimum of 1 sign is required at each project location from the time work begins until final paving and striping is completed:
 - 1) Once final paving and striping is completed, Contractor may relocate project sign to another location.

- c. Locate project signs as indicated on the Drawings.
- 2. Text message boards (changeable message signs):
 - a. Locate text message boards in all directions where traffic enters the work area, while work is occurring. Provide text message boards a minimum of 1 week before work begins. Text message boards shall be used for the duration of work through final paving and striping.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01562

TEMPORARY TREE AND PLANT PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Tree and plant protection.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 1. A300 - For Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance Standard Practices (Pruning).

1.03 MEASUREMENT AND PAYMENT

- A. Payment for tree protection, including tree pruning or tree removal, shall be paid as a lump sum basis that shall include all items specified in this Section unless payment is specified otherwise in this Section.
- B. Unit price procedures: As specified in Section 01294 - Applications for Payment.

1.04 SUBMITTALS

- A. As specified in Section 01330 - Submittal Procedures.
- B. Submit name and experience of qualified Arborist, proposed for use on the Work, to Project Manager.

1.05 PROJECT CONDITIONS

- A. Preserve and protect existing trees and plants to remain from foliage, branch, trunk, or root damage that could result from construction operations.
- B. Prevent damage including, but not limited to, the following:
 1. Trunk damage from equipment operations, material storage, or from nailing or bolting.
 2. Trunk and branch damage caused by ropes or guy wires.
 3. Root or soil contamination from spilled solvents, gasoline, paint, lime slurry, and other noxious materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pruning paint: Black latex, water based paint, free of all petroleum products.
- B. Tree protection fencing: Orange, plastic mesh fencing, 4 feet in height with 6 feet high "t" bar posts installed 10 feet on centers as indicated on the Drawings.

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING TREES AND SHRUBS

- A. Site preparation work and/or construction work shall not begin in any area where tree preservation measures have not been completed and approved.
- B. Protect exposed roots and root zone areas from contamination from stabilization materials and concrete using polyethylene.
- C. Designate limited areas as concrete washout areas. Locate concrete washout areas away from root zones.
- D. Install tree protection fencing around each tree to be preserved as indicated in the tree treatment schedule and on the tree protection plan:
 - 1. Each tree to be preserved shall be protected with a tree protection fence:
 - a. The fencing shall be continuous between posts, shall be pulled taut prior to securing to posts, and shall be firmly attached to the posts with a minimum of 4 wire ties.
 - 2. All tree protection fencing shall be installed prior to site work or construction activity.
 - 3. Damage to tree fences occurring during the progress of the work shall be repaired immediately at no additional cost to Owner:
 - a. Workers shall be clearly instructed to exercise caution in performance of work near trees being preserved.
- E. Pruning of trees:
 - 1. Trees shall be pruned in accordance with the ANSI A300 for tree pruning:
 - a. Pruning shall be completed by professional arborists who have received training in proper pruning techniques.
 - b. Arborist must be present and provide recommendations for any root cutting for roots 2" and larger.
 - 2. All cuts should be made sufficiently close to the parent limb or trunk without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions:
 - a. All lateral cuts shall be made to a lateral that is least 1/3 the diameter of the parent limb.
 - b. Clean cuts shall be made at all times.

3. Trees shall be pruned in a manner that will not destroy or alter the natural shape and character of the tree:
 - a. Apply black latex paint to all fresh wounds on Oak (Quercus) species immediately after each cut is made.
4. Crown cleaning prune designated trees shall include selective removal of dead, diseased, and/or broken limbs.

END OF SECTION

SECTION 01601
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Product requirements.

1.02 REFERENCES

- A. California Health and Safety Code.
- B. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.
 - 2. 372 - Drinking Water System Components - Lead Content.

1.03 DEFINITIONS

- A. Products: Inclusive of raw materials, finished goods, equipment, systems, and shop fabrications.
- B. Manufacturer's Certificate of Source Testing: When applicable, the form is used during Source Testing for the manufacturer to confirm that the applicable source tests have been performed and results conform to the Contract Documents. The form is provided at the end of this Section.

1.04 SUBMITTALS

- A. As specified in Section 01330 - Submittal Procedures.
- B. Calculations/certifications in accordance with NSF 61 and NSF 372 for materials in contact with drinking water.

1.05 GENERAL REQUIREMENTS

- A. Comply with Specifications and referenced standards as minimum requirements.
- B. Provide products by same manufacturer when products are of similar nature, unless otherwise specified.
- C. When necessary, modify manufacturer's standard product to conform to specified requirements or requirements indicated on the Drawings.

1.06 SUBSTITUTIONS

- A. Formal substitution request procedure:
 - 1. Submit a written formal substitution request to Engineer for each proposed substitution within 30 days of effective date of Contract.

2. Engineer will return initial opinion and request for additional information within 30 days.
 3. Engineer will notify Contractor in writing of decision to accept or reject the substitution request within 30 days of receiving required information.
- B. Formal substitution request contents:
1. Provide Substitution Request Form, Appendix A, as specified in this Section.
 2. Manufacturer's literature including:
 - a. Manufacturer's name and address.
 - b. Product name.
 - c. Product description.
 - d. Reference standards.
 - e. Certified performance and test data.
 - f. Operation and maintenance data.
 3. Samples, if applicable.
 4. Shop drawings, if applicable.
 5. Reference projects where the product has been successfully used:
 - a. Name and address of project.
 - b. Year of installation.
 - c. Year placed in operation.
 - d. Name of product installed.
 - e. Point of contact: Name and phone number.
 6. Itemized comparison of the proposed substitution with product specified including a list of significant variations:
 - a. Design features.
 - b. Design dimensions.
 - c. Installation requirements.
 - d. Operations and maintenance requirements.
 7. Define impacts:
 - a. Impacts to construction schedule.
 - b. Impacts to other contracts.
 - c. Impacts to other work or products.
 - d. Impact to Contract Sum:
 - 1) Do not include costs under separate contracts.
 - 2) Do not include Engineer's costs for redesign or revision of Contract Documents.
 - 3) Required license fees or royalties.
 - e. Availability of maintenance services and sources of replacement materials.
 8. Contractor represents the following:
 - a. Contractor shall pay associated costs for Engineer to evaluate the substitution.
 - b. Contractor bears the burden of proof of the equivalency of the proposed substitution.
 - c. Proposed substitution does not change the design intent and will have equal performance to the specified product.
 - d. Proposed substitution is equal or superior to the specified product.
 - e. Contractor will provide the warranties or bonds that would be provided on the specified product on the proposed substitution, unless Owner requires a Special Warranty.

- f. Contractor will coordinate installation of accepted substitution into the Work and will be responsible for the costs to make changes as required to the Work.
 - g. Contractor waives rights to claim additional costs caused by proposed substitution which may subsequently become apparent.
- C. Substitutions will not be considered for acceptance under the following conditions:
 - 1. No formal substitution request is made.
 - 2. The substitution is simply implied or indicated on shop drawings or product data submittals.
 - 3. The formal substitution request is submitted by a subcontractor or supplier.
- D. Substitution requests submitted after the deadline will not be considered unless the following evidence is submitted to the Engineer:
 - 1. Proof that the specified product is unavailable for reasons beyond the control of the Contractor:
 - a. Reasons may include manufacturing discontinued, bankruptcy, labor strikes, or acts of God.
 - b. Contractor placed or attempted to place orders for the specified products within 10 days after the effective date of the Agreement.
 - c. The formal substitution request is submitted to Engineer within 10 days of Contractor discovering the specified product cannot be obtained.
- E. Engineer's decision on a substitution requests will be final and binding:
 - 1. Approved substitutions will be incorporated into the Contract Documents with a Change Order.
 - 2. Requests for time extensions and additional costs based on submission of, approval of, or rejection of substitutions will not be allowed.

1.07 QUALITY CONTROL

- A. Manufacturer to provide permanent quality control department and laboratory facility capable of performing inspections and testing as required by the Contract Documents:
 - 1. Material testing, inspection procedures, and manufacturing process are subject to inspection by Engineer.
 - 2. Contractor shall notify Engineer in writing of the manufacturing start date not less than 14 days prior to the start of manufacturer of project pipe.
 - 3. Perform manufacturer's tests and inspections required by the referenced standards and as specified in this Section including the following:
 - a. Provide the Manufacturer's Certificate of Source Testing.
 - b. Calibration within last 12 months for equipment such as scales, measuring devices and calibration tools used in the manufacturing of pipe as required by ISO 9001:
 - 1) Each device used in the manufacturer of pipe is required to have a tag recording date of last calibration.
 - 2) Provide calibration certificate.
 - 3) Devices are subject to inspection by Engineer.

1.08 SERVICES OF MANUFACTURER'S REPRESENTATIVES

- A. Qualification of manufacturer's representative as specified in the Contract Documents technical sections include the following:
 - 1. Authorized representative of the manufacturer, factory trained and experienced in the technical applications and installation of respective products with full authority by the product manufacturer to issue the certifications required of the manufacturer.
 - 2. Competent, experienced technical representative of the product manufacturer for installation.
 - 3. Additional qualifications may be specified in the individual sections.
 - 4. Submit qualifications of the manufacturer's representative no later than 30 days in advance of required observations. Representative subject to approval by Owner and Engineer.
 - 5. No substitute representatives will be allowed until written approval by Owner and Engineer has been obtained.

- B. Completion of manufacturer on-site services: Engineer approval required:
 - 1. The manufacturer's representative will advise aspects of installation including but not limited to:
 - a. Handling.
 - b. Storing.
 - c. Cleaning and inspecting.
 - d. Coating and lining repairs.
 - e. Tapping.
 - f. General construction methods affecting pipe.

- C. Manufacturer is responsible for determining the time required to perform the specified services:
 - 1. No additional costs associated with performing the required services will be approved.
 - 2. Manufacturer required to schedule services in accordance with the Contractor's project schedule up to and including making multiple trips to project site when there are separate milestones associated with installation of each occurrence of manufacturer's product.

- D. Manufacturer's on-site services as specified in the Contract Documents include the following:
 - 1. Assistance during Construction.
 - 2. Provide weekly copies of manufacturer's representatives field notes and data to Engineer.
 - 3. Other requirements as specified in the Contract Documents.

1.09 TEST PLANNING

- A. Testing plans:
 - 1. Provide separate testing plans for each individual product requiring field testing that include the following:
 - a. Approach to testing including procedures and schedule.
 - b. Test objective: Demonstrate product meets the design requirements as specified in the technical sections.

- c. Test descriptions, forms, temporary systems (pumps, piping, etc.), shutdown requirements for existing systems, test forms, test logs, witness forms, and checklists to be used to control and document the required tests.
 - d. Test forms: Include, but not limited to, the following information:
 - 1) Name of product to be tested.
 - 2) Test date.
 - 3) Names of persons conducting the test.
 - 4) Names of persons witnessing the test, where applicable.
 - 5) Test data.
 - 6) Applicable project requirements.
 - 7) Check offs for each completed test or test step.
 - 8) Place for signature of person conducting tests and for the witnessing person, as applicable.
2. Engineer approval of test plan is required prior to performing test:
- a. Revise and update test plans based on review comments, actual progress, or to accommodate changes in the sequence of activities.
 - b. Submit test reports for each phase of testing for each product.
 - c. Engineer approval of preceding test reports is required prior to start of next test.
 - d. Tests will be rescheduled if test plan is not approved by the required deadline:
 - 1) Contractor is responsible for any resulting delay.
3. Contractor is responsible to reproduce and distribute final test procedures:
- a. Provide 3 copies for Engineer.
4. Tests may commence only after Engineer has received approved test plan copies.
5. Submittals:
- a. Submit test plans not less than 30 calendar days prior to planned installation testing of system.
 - b. Test procedures and forms: Provide signed-off copy of test forms and test reports upon completion of the test:
 - c. Test reports:
 - 1) Submit preliminary copies within 1 day after testing completion.
 - 2) Submit final copies and report within 14 days after testing completion.
 - d. Furnish labor, power, tools, equipment, instruments, and services required for and incidental to completing testing activities in accordance with the approved Testing Plans.
 - e. Prior to testing, verify equipment protective devices and safety devices have been installed, calibrated, and tested.
 - f. Acceptable tests: Demonstrate the system performance meets the requirements stated in the Contract Documents:
 - 1) When the system fails to meet the specified requirements, perform additional, more detailed, testing to determine the cause, correct, repair, or replace the causative components and repeat the testing that revealed the deficiency.

1.10 SOURCE TESTING

- A. As specified in Section 01450 - Quality Control.

- B. Also referred to as factory testing or factory acceptance testing (FAT).
- C. Test products for proper performance at point of manufacture or assembly as specified in the technical sections.
- D. Notify Engineer in writing when the product is ready for source inspection and testing.
- E. Source Test Plan:
 - 1. As specified in this Section and other technical sections.
 - 2. Source testing requirements as specified in technical sections:
 - a. Non-witnessed: Provide Manufacturer's Certificate of Source Testing, Appendix B.
 - b. Witnessed: 1 Owner's representative and 1 Engineer's representative present during testing, unless otherwise specified, and provide Manufacturer's Certificate of Source Testing, Appendix B.
 - a. Contractor is responsible for costs associated with Owner's representatives and Engineer's representative witnessing Source Tests:
 - 1) Include costs for at least the following:
 - a) Transportation:
 - (1) Travel 1 day on commercial airline to site including air flight costs and \$1,600 allowance per person per day.
 - (2) Travel 1 day on commercial airline from site including air flight costs and \$1,600 allowance per person per day.
 - (3) Rental car from hotel to and from the test site.
 - b) Hotel costs at a facility with an American Automobile Association 4 star rating or equivalent for single occupancy room per person per day.
 - c) Meal allowance of \$60 per person per day.
 - d) On-site time: 1 day at the site, unless specified otherwise, including \$1,600 allowance per person per day.
 - 2) If Source Test is not ready when the witnesses arrive or if the Source Test fails, the witnesses will return home with Contractor responsible for costs associated with the trip including costs described above. Contractor is responsible for rescheduling the Source Test and witnesses' costs associated with the second trip including costs described above.
 - 3) Contractor is responsible for witnesses' costs associated with retests including costs described above.
 - 3. Prepared by Contractor as specified in the Contract Documents.
 - 4. Provide the following items for each Source Test:
 - a. Purpose and goals of the test.
 - b. Identification of each product.
 - c. Description of the pass/fail criteria that will be used.
 - d. Listing of pertinent reference documents (Contract Documents and industry standards or sections applicable to the testing).
 - e. Complete description, including drawings or photographs, of test stands and/or test apparatus.
 - f. Credentials of test personnel.
 - g. Descriptions of test equipment to be used, product information, and all appropriate calibration records for the test equipment.
 - h. Test set-up procedures.

- i. Detailed step-by-step test procedures:
 - 1) Provide sufficient level of detail for any witness with a rudimentary technical aptitude to be able to follow the steps and develop confidence that the tests were being performed as planned.
- j. Sample data logs and data recording forms.
- k. Sample computations or analyses with the results in the same format as the final report to demonstrate how data collected will be used to generate final results:
 - 1) Complete disclosure of the calculation methodologies.
 - 2) Include a sample for each type of computation required for the test and analysis of the results.
- l. Detailed outline of the Source Test report.
- m. Sample test reports.
- 5. Submit Source Test Plan and forms as specified in the technical sections:
 - a. Submit a copy of the Source Test Plan at least 21 days before any scheduled test date.
 - b. Engineer approval of Source Test Plan required prior to beginning source testing.
 - c. Schedule the testing after approval of the test procedures submittal.
- 6. Indicate the desired dates for source inspection and testing:
 - a. Notify Engineer of the scheduled tests a minimum of 15 days before the date of the test.

F. Test results:

- 1. Prepare and submit test results with collected data attached.
- 2. Contractor is responsible for costs associated with Owner's representatives and Engineer's representative witnessing Source Tests:
 - a. Include costs for at least the following:
 - 1) Transportation:
 - a. Travel 1 day on commercial airline to site including air flight costs and \$1,600 allowance per person per day.
 - b. Travel 1 day on commercial airline from site including air flight costs and \$1,600 allowance per person per day.
 - c. Rental car from hotel to and from the test site.
 - 2) Hotel costs at a facility with an American Automobile Association 4 star rating or equivalent for single occupancy room per person per day.
 - 3) Meal allowance of \$60 per person per day.
 - 4) On-site time: 1 day at the site, unless specified otherwise, including \$1,600 allowance per person per day.
 - b. If Source Test is not ready when the witnesses arrive or if the Source Test fails, the witnesses will return home with Contractor responsible for costs associated with the trip including costs described above. Contractor is responsible for rescheduling the Source Test and witnesses' costs associated with the second trip including costs described above.
 - c. Contractor is responsible for witnesses' costs associated with retests including costs described above.
- 3. Contractor is responsible for providing fuel, chemicals, and other consumables needed for Source Testing.

1.11 INSTALLATION TESTING

- A. Field test backfill, welded joints, alignment and grade, and pipeline pressure as specified in technical sections.

1.12 FUNCTIONAL TESTING

- A. Notify Engineer 5 days prior to when the Work is ready for Functional Testing:
 - 1. Perform testing in the presence of the Engineer.
- B. Perform Functional Testing in addition to the other tests specified in the technical sections:
 - 1. Contractor is responsible for providing fuel, chemicals, and other consumables needed.
- C. Repair or replace products that perform improperly and retest.
- D. Submit testing results as specified in technical sections.

1.13 CLOSEOUT DOCUMENTATION

- A. Submittals:
 - 1. Provide test records.

PART 2 PRODUCTS

2.01 MATERIAL REQUIREMENTS

- A. Materials: Provide corrosion resistance suitable for project conditions as specified in Section 01610 - Seismic Design Criteria.
- B. Dissimilar metals: Separate contacting surfaces with dielectric material.
- C. Mark each length of pipe in accordance with applicable standards.

2.02 PRODUCTS IN CONTACT WITH DRINKING WATER

- A. This project shall be considered a drinking water project, even though it is a recycled water project.
- B. Materials in contact with drinking waters: In accordance with NSF 61 and NSF 372:
 - 1. Certification by an independent ANSI accredited third party, including, but not limited to, NSF International, as being lead free.
- C. Materials in contact with drinking waters: In accordance with California Health and Safety Code, Section 116875.

2.03 PRODUCT SELECTION

- A. When products are specified by standard or specification designations of technical societies, organizations, or associations only, provide products that meet or exceed reference standard and Specifications.

- B. When products are specified with names of manufacturers but no model numbers or catalog designations, provide:
 - 1. Products by one of named manufacturers that meet or exceed Specifications.
 - 2. Engineer deemed "or equal" evidenced by an approved shop drawing or other written communication.

- C. When products are specified with names of manufacturers and model numbers or catalog designations, provide:
 - 1. Products with model numbers or catalog designations by one of named manufacturers.
 - 2. Engineer deemed "or equal" evidenced by an approved shop drawing or other written communication.

- D. When products are specified with names of manufacturers, but with brand or trade names, model numbers, or catalog designations by one manufacturer only, provide:
 - 1. Products specified by brand or trade name, model number, or catalog designation.
 - 2. Products by one of named manufacturers proven, in accordance with requirements for an "or equal", to meet or exceed quality, appearance and performance of specified brand or trade name, model number, or catalog designation.
 - 3. Engineer deemed "or equal" evidenced by an approved shop drawing or other written communication.

- E. When Products are specified with only one manufacturer followed by "or Equal," provide:
 - 1. Products meeting or exceeding Specifications by specified manufacturer.
 - 2. Engineer deemed "or equal" evidenced by an approved shop drawing or other written communication.

2.04 SHIPMENT

- A. Mandatory requirements prior to shipment of product:
 - 1. Engineer approved shop drawings.
 - 2. Engineer approved Manufacturer's Certificate of Source Testing.

- B. Prepare products for shipment by:
 - 1. Tagging or marking products to agree with delivery schedule or shop drawings.
 - 2. Including complete packing lists and bills of material with each shipment.
 - 3. Packaging products to facilitate handling and protection against damage during transit, handling, and storage.
 - 4. Securely attach special instructions for proper field handling, storage, and installation to product before packaging and shipment.

- C. Transport products by methods that avoid product damage.

- D. Deliver products in undamaged condition in manufacturer's unopened containers or packaging.

PART 3 EXECUTION

3.01 DELIVERY AND HANDLING

- A. Handle product in accordance with manufacturer's instructions.
- B. Provide product and personnel to handle products by methods to prevent soiling or damage.
- C. Upon delivery, promptly inspect shipments:
 - 1. Verify compliance with Contract Documents, correct quantities, and undamaged condition of products.
 - 2. Acceptance of shipment does not constitute final acceptance of product.

3.02 STORAGE AND PROTECTION

- A. Immediately store and protect products and materials until installed in Work.
- B. Store products with seals and legible labels intact.
- C. Maintain products within temperature and humidity ranges required or recommended by manufacturer.
- D. Protect or coated surfaces against impact, abrasion, discoloration, and damage:
 - 1. Or recoat damaged or coated surfaces.
- E. Exterior storage of fabricated products:
 - 1. Place on aboveground supports that allow for drainage.
 - 2. Cover products subject to deterioration with impervious sheet covering.
 - 3. Provide ventilation to prevent condensation under covering.
- F. Store moisture sensitive products in watertight enclosures.
- G. Store loose granular materials on solid surfaces in well-drained area:
 - 1. Prevent materials mixing with foreign matter.
 - 2. Provide access for inspection.
- H. Payment will not be made for or product and materials improperly stored or stored without providing Engineer with the manufacturer's instructions for storage.

3.03 PROTECTION AFTER INSTALLATION

- A. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations:
 - 1. Remove covering when no longer needed.
 - 2. Replace corroded, damaged, or deteriorated product before acceptance of the project.

3.04 QUALITY ASSURANCE

- A. Verify project conditions are satisfactory before executing subsequent portions of the Work.

3.05 CLOSEOUT ACTIVITIES

- A. Owner may request advanced delivery of spare parts, maintenance products, and special tools:
 - 1. Deduct the delivered items from the inventory list and provide transmittal documentation.

- B. Immediately prior to the date of Substantial Completion, arrange to deliver spare parts, maintenance products, and special tools to Owner at a location on site chosen by the Owner:
 - 1. Provide itemized list of spare parts and special tools that matches the identification tag attached to each item.
 - 2. Owner and Engineer will review the inventory and the itemized list to confirm it is complete and in good condition prior to signing for acceptance.

3.06 ATTACHMENTS

- A. Appendix A - Sample Substitution Request Form.

- B. Appendix B - Manufacturer's Certificate of Source Testing.

END OF SECTION

APPENDIX A
SUBSTITUTION REQUEST FORM

**DOCUMENT 01601
SUBSTITUTION REQUEST FORM**

Owner: _____ **Date:** _____
Contractor: _____ **Project No.:** _____
Project Name: _____
To: _____ **From:** _____
Re: _____
Contract For: _____
Engineering Project Number: _____ **Substitution Request Number:** _____

Specification Information	
Title:	_____
Number:	_____ Page: _____ Article/Paragraph: _____
Description:	_____

Proposed Substitution					
Product:	_____				
Manufacturer:	_____				
Address:	_____ Phone: _____				
Trade Name:	_____ Model No.: _____				
Installer:	_____				
Address:	_____ Phone: _____				
History:	<table style="width: 100%;"><tr><td style="text-align: center;">New Product</td><td style="text-align: center;">2-5 years old</td><td style="text-align: center;">5-10 years old</td><td style="text-align: center;">More than 10 years old</td></tr></table>	New Product	2-5 years old	5-10 years old	More than 10 years old
New Product	2-5 years old	5-10 years old	More than 10 years old		
Differences between proposed substitution and specified product: _____					
Point-by-point comparative data and impacts attached - REQUIRED BY ENGINEER					

Reason For Not Providing Specified Item

Reason: _____
Similar Installation: _____
Project: _____
Address: _____ Date Installed: _____
Owner: _____ Architect: _____
Proposed substitution affects other parts of Work:
____ No ____ Yes, Explain: _____

Benefit to Owner For Accepting Substitution

Savings: _____ (\$)
Proposed substitution changes Contract Time:
____ No ____ Yes **(Add)** **(Deduct)** _____ days

Supporting Data Attached

____ Drawings ____ Product Data ____ Samples ____ Tests ____ Reports
____ Reference Other: _____
____ Projects _____

Certifications

The undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product, unless Owner requires a Special Warranty.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including Engineer design, detailing, and construction costs caused by the substitution.

Certifications	
<ul style="list-style-type: none"> • Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects. 	
Submitted by:	_____
Signed by:	_____
Firm Name	_____
Firm Address:	_____

Phone:	_____
Attachments:	_____

Engineer's Review And Action	
<input type="checkbox"/>	Substitution accepted - Make submittals as specified in Section 01330 - Submittal Procedures.
<input type="checkbox"/>	Substitution accepted as noted - Make submittals as specified in Section 01330 - Submittal Procedures.
<input type="checkbox"/>	Substitution rejected - Use specified materials.
<input type="checkbox"/>	Substitution Request received too late - Use specified materials.
Signed by:	Date
_____	: _____

Additional Comments	
Additional Comments:	
<input type="checkbox"/>	Contractor
<input type="checkbox"/>	Subcontractor
<input type="checkbox"/>	Supplier
<input type="checkbox"/>	Manufacturer
<input type="checkbox"/>	Engineer
Other:	_____
Comments:	_____

APPENDIX B

MANUFACTURER'S CERTIFICATE OF SOURCE TESTING

MANUFACTURER'S CERTIFICATE OF SOURCE TESTING

OWNER _____ EQPT/SYSTEM _____
PROJECT NAME _____ EQPT TAG NO. _____
PROJECT NO. _____ EQPT SERIAL NO. _____
SPECIFICATION NO. _____
SPECIFICATION TITLE _____

Comments: _____

I hereby certify Source Testing has been performed on the above-referenced product as defined in the Contract Documents, and results conform to the Contract Document requirements. Testing data is attached.

Date of Execution: _____, 20____

Manufacturer: _____

Manufacturer's Authorized Representative Name (*print*): _____

(Authorized Signature)

If applicable, Witness Name (*print*): _____

(Witness Signature)

SECTION 01610

PROJECT DESIGN CRITERIA

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Project design criteria such as temperature and site elevation.

1.02 PROJECT DESIGN CRITERIA

- A. All equipment and materials for the project are to be suitable for performance in potable water conveyance system environment and under following conditions:
 - 1. Design temperatures are:
 - a. Outdoor temperatures: 32 to 100 degrees Fahrenheit.
 - 2. Design groundwater elevation: Not present.
 - 3. Moisture conditions: Defined in individual equipment sections.
 - 4. Site elevation: Approximately 30 to 500 feet above mean sea level.
 - 5. Marine environment with coastal fog and sea salt spray.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01612

SEISMIC DESIGN CRITERIA

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Seismic design criteria for the following:
1. Anchorage of mechanical and electrical equipment.
 2. Seismic design and design of anchorage for small tanks fabricated off site and shipped to the Project site.
 3. Other structures or items as specified or indicated on the Drawings.

1.02 REFERENCES

- A. American Society of Civil Engineers (ASCE):
1. 7-10 - Minimum Design Loads for Buildings and Other Structures.

1.03 SYSTEM DESCRIPTION

- A. Design in accordance with the requirements of the California Building Code.
- B. Design spectral acceleration at short period, S_{DS} : Engineer performing calculation shall obtain the current value, but not less than 0.981g.
- C. Design of non-structural components and their connections to structures:
1. Component amplification factor, a_p : In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.
 2. Component response modification factor, R_p : In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.
 3. Component importance factor, I_p :

Component	Description	I_p
Electrical	Equipment and appurtenances provided and installed under Division 16.	1.5
Mechanical	Equipment and appurtenances provided and installed under Division 15.	1.5

- D. Seismic Design Category (SDC): D.
- E. Design requirements: Anchorage of equipment to structures:
1. Do not use friction to resist sliding due to seismic forces. Do not design or provide connections that use friction to resist seismic loads. Resist seismic forces through direct tension and/or shear on anchors and fasteners.
 2. Do not use more than 70 percent of the weight of the mechanical and electrical equipment for designing anchors for resisting overturning due to seismic forces.

3. Do not use more than 70 percent of the weight of the tank for resisting overturning due to seismic forces.
4. Anchoring and fastening to concrete and masonry:
 - a. Provide anchors specified in Section 03055 - Adhesive-Bonded Reinforcing Bars and All Thread Rods.

1.04 SUBMITTALS

- A. Shop drawings and calculations: Complete shop drawings and seismic calculations.
- B. Calculations shall be signed and stamped by a civil or structural engineer licensed in the state where the Project is located.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01722
FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Field engineering to establish lines and grades for the Work.

1.02 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Qualifications of the professional land surveyor or registered civil engineer in California that will be performing the field engineering. Electronic CAD drawings of the pipeline vertical and horizontal alignment will be provided from the Engineer to the Contractor for use by the Contractor's surveyor to lay out the alignment at locations where lines and grades are not indicated on the drawings.
- C. Pre-Excavation Report.

1.03 PRE-EXCAVATION REPORT

- A. Prior to the start of the Work, create a report confirming the verification of the following data:
 - 1. Site elevation.
 - 2. Existing structures including but not limited to buildings, manholes (sanitary, storm, electrical, and other), drainage inlets:
 - a. Location coordinates.
 - b. Top of wall elevation and coordinates.
 - c. Floor elevations.
 - d. Invert elevations.
 - 3. Proposed building corners, tank, and equipment locations.
 - 4. Verify existing electrical, instrumentation, and phone utilities.
- B. Incorporate information from Pre-Excavation Report into the record drawings.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 SURVEY REFERENCE POINTS

- A. Basic survey reference points are provided on the Drawings.

- B. Contractor is required to establish its own control and reference points as required to properly lay out the Work.
- C. Locate and protect control points prior to starting site work, and preserve permanent reference points during construction:
 - 1. Make no changes or relocations without prior written notice.
 - 2. Replace Project control point, when lost or destroyed, in accordance with original survey control.
- D. Set monuments for principal control points and protect them from being disturbed and displaced:
 - 1. Re-establish disturbed monuments.
 - 2. When disturbed, postpone parts of the Work that are governed by disturbed monuments until such monuments are re-established.

3.02 PROJECT SITE SURVEY REQUIREMENTS

- A. Establish minimum of 2 new permanent benchmarks to reference survey control points throughout construction. At least one new permanent benchmarks shall be located on MCWD property at the MCWD's Reservoir 2 site (between Beach Road and Crescent Avenue).
- B. Record permanent benchmark locations with horizontal and vertical data on Project Record Documents.
- C. Perform verifications and checking in accordance with standard surveying practice.
- D. Maintain complete, accurate log of control points and survey.
- E. Affix civil engineer's or professional land surveyor's signature and registration number to Record Drawings to certify accuracy of information shown.

3.03 CONSTRUCTION STAKES, LINES, AND GRADES

- A. Execute the Work in accordance with the lines and grades indicated.
- B. Make distances and measurements on horizontal planes, except elevations and structural dimensions.

3.04 QUALITY CONTROL

- A. Accuracy of stakes, alignments, and grades may be checked randomly by Construction Manager:
 - 1. Notice of when checking will be conducted will be given.
 - 2. When notice of checking is given, postpone parts of the Work affected by stakes, alignments, or grades to be checked until checked.
 - 3. Engineer's check does not substitute or complement required field quality control procedures.

3.05 RECORD DOCUMENTS

- A. Prepare and submit Record Documents as specified in Section 01770 - Closeout Procedures.
 - 1. Record, on as-built drawings, locations where the pipeline alignment changed.

- B. Provide certified site survey to 0.010 foot precision of buildings, structures, pads, and benchmarks signed by professional land surveyor or registered civil engineer:
 - 1. File with permitting agency, as required.

END OF SECTION

SECTION 01734

WORK WITHIN PUBLIC RIGHT-OF-WAY

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for maintenance, support, protection, relocation, reconstruction and adjusting-to-grade, restoration, construction of temporary and new facilities, and abandonment of existing utilities affected by construction work within the public right-of-way.

1.02 DEFINITIONS

- A. Utility: For purpose of this Section, utility means any public or private service, such as electric light and power systems; gas distribution systems; telephone, telegraph, cable television and other communication services; water distribution; storm drain and sanitary sewer services; police and fire communication systems; street lighting and traffic signs and signals; parking meters; and steam distribution systems.
- B. Trenching:
 - 1. Open trench:
 - a. General: Includes excavation, pipe laying, backfilling, and pavement replacement.
 - 2. Any excavated areas shall be considered as "open trench" until all pavement replacement has been made, or until all trenches outside of pavement replacement areas have been backfilled and compacted in accordance with these Contract Documents.

1.03 DESIGN REQUIREMENTS

- A. Trenching:
 - 1. Except where otherwise specified, indicated on the Drawings, or accepted in writing by the Engineer, the maximum length of open trench, where construction is in any stage of completion, shall not exceed 200 linear feet.
 - 2. Completely backfill trenches across streets and install temporary or permanent pavement as soon as possible after pipe laying.
- B. Trench Plates (Steel Plating):
 - 1. When the contractor is not onsite all excavations shall be covered with steel plates or backfilled with a temporary surface pavement.
 - 2. Warning signs shall be posted in advance of trench plates for motorists and bicyclists providing notification of upcoming trench plates. Wording shall be, "Steel Plate Ahead" or similar.
 - 3. Use substantial steel plates with adequate trench bracing to bridge across trenches at street and alley crossings, commercial driveways, and residential driveways where trench backfill and temporary patch have not been completed during regular working hours.
 - 4. Trench plates shall comply with the Caltrans requirements for "Temporary Steel Plate Bridging - With a Non-Skid Surface"

5. In areas where the speed limit is 25 miles per hour or less, trench plates shall be feathered at edges and bolted down.
6. In areas where the speed limit is greater than 25 miles per hour, trench plates shall be recessed and bolted down.
7. A maximum of 20 linear feet of steel plating is allowed to be left in the public right-of-way overnight.

C. Site Conditions:

1. Provide safe and convenient passage for pedestrians.
2. Maintain access to fire stations, fire hydrant, and hospitals at all times.
3. Provide traffic control devices, barricades, and signage as required by the regulating agency.
4. Safe travel routes shall be provided for pedestrians, bicyclists, and motorists.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01757

DISINFECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Cleaning and disinfection requirements for both potable and recycled water facilities, and both new and existing facilities, affected by the Work.
- B. Contractor shall perform and pay for all disinfection and testing.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C651 - Disinfecting Water Mains.
 - 2. C652 - Disinfection of Water Storage Facilities.
 - 3. C653 - Disinfection of Water Treatment Plants.

1.03 SUBMITTALS

- A. Submit disinfection test plan which details procedure to be utilized to disinfect the facilities including:
 - 1. Method and locations of disinfectant application.
 - 2. Locations of sampling points.
 - 3. Method of flushing and location of flushing ports (as appropriate for method of chlorination).
 - 4. Method of dechlorination (as appropriate for method of chlorination).
 - 5. Disposal location for chlorinated water (as appropriate for method of chlorination).
- B. Submit disinfection reports and include the following:
 - 1. Date issued.
 - 2. Project name and location.
 - 3. Treatment subcontractor's name, address, and phone number.
 - 4. Type and form of disinfectant used.
 - 5. Time and date of disinfectant injection start.
 - 6. Time and date of disinfectant injection completion.
 - 7. Test locations.
 - 8. Initial and 24 hour disinfectant residuals in milligrams per liter for each outlet tested.
 - 9. Time and date of flushing start.
 - 10. Time and date of flushing completion.
 - 11. Disinfectant residual after flushing in milligrams per liter for each outlet tested.
- C. Submit bacteriological reports and include the following:
 - 1. Date issued.
 - 2. Project name and location.
 - 3. Laboratory's name, certification number, address, and phone number.
 - 4. Time and date of water sample collection.

5. Name of person collecting samples.
6. Test locations.
7. Time and date of laboratory test start.
8. Coliform bacteria test results for each outlet tested.
9. Certification that water conforms or fails to conform to bacterial standards of SDWA.
10. Bacteriologist's signature and bacteriological laboratory's evidence of certification.

1.04 QUALITY ASSURANCE

- A. Bacteriological and physical chemistry laboratory: Certified by state in which Project is located.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect chlorine and bacteriological samples against damage and contamination.
- B. Maintain caution labels on hazardous materials.
- C. Maintain storage room dry and with temperatures as uniform as possible between 60 degrees Fahrenheit and 80 degrees Fahrenheit.

1.06 PROTECTION

- A. Provide necessary signs, barricades, and notices to prevent persons from accidentally consuming water or disturbing system being treated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Disinfectant: Free chlorine in liquid, powder, tablet, or gas form in accordance with AWWA C653.
- B. Dechlorination agent: Sulfur dioxide, sodium bisulfate, sodium sulfite, or sodium thiosulfate in accordance with AWWA C653.

PART 3 EXECUTION

3.01 PRELIMINARY CLEANING

- A. Complete hydrostatic/leakage tests prior to disinfection.
- B. Clean all newly constructed and/or modified facilities, including filters and conveyance facilities, such as pipes and channels at the plant, in accordance with AWWA C653 and the following:
 1. Remove all debris and material not associated with the structure or process prior to disinfection.
 2. Clean all wall, floor, ceiling, and attached surfaces by use of high-pressure water jet, sweeping, scrubbing, or equally effective means.

3. Remove all water, paint flakes, sediment, dirt, and foreign material accumulated during cleaning.
 4. Remove by flushing or other means, soil and debris from water pipes and channels in accordance with AWWA C651.
 5. Protect surfaces from adverse environmental exposure between the preliminary cleaning and the disinfection stages.
- C. Prior to chlorination, clean all newly constructed and/or modified facilities to be disinfected in accordance with AWWA C651, C652, or C653, as applicable.

3.02 SURFACES TO BE DISINFECTED

- A. All wetted surfaces associated with conveyance elements, such as pipes and channels downstream of the filters, basins.
- B. Piping systems that are used to convey water, solutions, or chemicals to potable water facilities.

3.03 DISINFECTION OF WATER LINES

- A. Cleaning:
 1. Remove by flushing or other means, soil and debris from the water tanks in accordance with AWWA C652 prior to chlorination.
- B. Inspection:
 1. Verify that water system is completed and cleaned of soil and debris prior to chlorination.
 2. Start disinfection when conditions are satisfactory.
- C. System treatment:
 1. Perform disinfection of water lines and structures in accordance with AWWA C651, C652, and C653, and as specified in this Section.
 2. Starting at outlet closest to water source, bleed water from each outlet until water produces odor of disinfectant. Repeat process at each outlet throughout system.
 3. Test for disinfectant residual at each of following locations and other locations in accordance with submitted disinfection test plan:
 - a. Ends of piping runs.
 - b. Remote outlets.
 - c. Tanks.
 - d. At least 2 outlets on each building floor where directed.
 - e. Drain lines.
 - f. Filters and effluent channels and piping.
 4. Maintain disinfectant in system for appropriate 6 hour or 24 hour interval in accordance with AWWA C652.
 5. When disinfectant residual is less than 10 milligrams per liter after 24 hours, repeat system treatment.

3.04 REPAIRS OR CONNECTIONS TO EXISTING LINES

- A. Clean and sterilize the interior surfaces of new piping, fittings, equipment, and appurtenances to be installed in an existing potable water system or connected to an existing system.

- B. Clean and sterilize the existing pipe or facilities for a minimum distance of 3 pipe diameters back from the ends of the pipe. Plug the ends of the line when work is not being performed on the pipe.
- C. Perform sterilization by swabbing each item with a concentrated chlorine solution:
 - 1. Each piece is to be disinfected prior to being assembled for installation in the existing pipe.
 - 2. Disinfect each piece just prior to assembly to help prevent recontamination.
 - 3. Plug the ends of the assembly until a new item is to be added to the assembly.
 - 4. Store disinfected materials on blocks to prevent contact with the ground.

3.05 FLUSHING

- A. Remove disinfection water from the facilities as appropriate for the type of disinfectant and method used for disinfection.
- B. Flush facilities with potable water containing no more disinfectant residual than the active distribution system or 1.0 milligrams per liter, whichever is greater (as appropriate for method of chlorination).
- C. Continue flushing until water at designated flushing ports contains disinfectant residual equal to concentration specified above.

3.06 DISPOSAL OF CHLORINATED WATER

- A. Dispose of chlorinated water in accordance with the submitted disinfection test plan and applicable requirements of federal, state, county, and city having jurisdiction over disposal of hazardous wastes in location of the Project and disposal site.
- B. Chlorinated water may only be disposed of in a sanitary sewer system with the written permission of the Owner. If allowed, discharge the chlorinated water at a low rate so it does not surcharge the sewer line.

3.07 BACTERIOLOGICAL TEST

- A. Instruct bacteriological laboratory to collect water samples no sooner than 24 hours after start of disinfection of each facility.
- B. A minimum of 24 hours after flushing system and within 24 hours before the water main is placed in service, collect bacteriological quality samples at each of following locations and other locations in accordance with the submitted disinfection test plan and Standard Methods for the Examination of Water and Wastewater:
 - 1. Where water enters system.
 - 2. Inlet piping.
 - 3. Ends of piping runs.
 - 4. Drain lines.
 - 5. Remote outlets.
 - 6. Each appurtenance (air valve and blow-off).
 - 7. Tanks.
 - 8. At least 2 outlets on each building floor.

- C. Analyze water samples in accordance with Standard Methods for Examination of Water and Wastewater.
- D. When bacteriological test proves water quality to be unacceptable, repeat disinfection treatment process until water meets quality standards for disinfection.
- E. Contractor shall pay costs for bacteriological testing.

END OF SECTION

SECTION 01770
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Contract closeout requirements including:
 - 1. Final cleaning.
 - 2. Waste disposal.
 - 3. Touch-up and repair.
 - 4. Disinfection of systems.
 - 5. Preparation and submittal of closeout documents.
 - 6. Certificate of Substantial Completion.

1.02 REFERENCES

- A. American Water Works Association (AWWA).

1.03 FINAL CLEANING

- A. Perform final cleaning prior to inspections for Substantial Completion.
- B. Employ skilled workers who are experienced in cleaning operations.
- C. Use cleaning materials which are recommended by manufacturers of surfaces to be cleaned.
- D. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.
- E. Clean roofs, gutters, downspouts, and drainage systems.
- F. Broom clean exterior paved surfaces and rake clean other surfaces of site work:
 - 1. Police yards and grounds to keep clean.
- G. Remove dust, cobwebs, and traces of insects and dirt.
- H. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.
- I. Remove non-permanent protection and labels.
- J. Probes, elements, sample lines, transmitters, tubing, and enclosures have been cleaned and are in like-new condition.

1.04 WASTE DISPOSAL

- A. Arrange for and dispose of surplus materials, waste products, and debris off-site:
 - 1. Prior to making disposal on private property, obtain written permission from Owner of such property.
- B. Do not fill ditches, washes, or drainage ways which may create drainage problems.
- C. Do not create unsightly or unsanitary nuisances during disposal operations.
- D. Maintain disposal site in safe condition and good appearance.
- E. Complete leveling and cleanup prior to Final Completion of the Work.

1.05 TOUCH-UP AND REPAIR

- A. Touch-up or repair finished surfaces on structures, equipment, fixtures, and installations that have been damaged prior to inspection for Substantial Completion.
- B. Refinish or replace entire surfaces which cannot be touched-up or repaired satisfactorily.

1.06 FINAL CLEANING AND DISINFECTION OF SYSTEMS OF POTABLE WATER MAINS

- A. Clean interior of pipe and fittings.
- B. When pipe contains dirt that cannot be removed by flushing, swab pipe interiors with solution containing not less than 500 parts per million of chlorine until clean.
- C. Flush 12-inch in diameter and smaller pipe as thoroughly as available water sources will permit.
- D. Fill pipe with chlorine solution of sufficient strength to provide 10 parts per million chlorine residual at end of 24 hours.
- E. Flush pipes with potable water until chlorine residual is less than 0.6 parts per million before pipe are put into service.

1.07 CLOSEOUT DOCUMENTS

- A. Submit following Closeout Submittals before Substantial Completion:
 - 1. Punch list of items to be completed or corrected with the request for issuance of Substantial Completion.
 - 2. Evidence of Compliance with Requirements of Governing Authorities.
 - 3. Project Record Documents.
 - 4. Approved Operation and Maintenance Manuals.
 - 5. Approved Warranties and Bonds.
 - 6. Keys and Keying Schedule.
 - 7. Completed contract requirements for commissioning and process start-up.

- B. Submit following Closeout Submittals before final completion of the Work and at least 7 days prior to submitting Application for Final Payment:
 1. Punch list of items have been completed and Construction Manager, Engineer, and Owner are satisfied that all deficiencies are corrected.
 2. Evidence of Payment and Release of Liens or Stop Payment Notices as outlined in Conditions of the Contract.
 3. Release of claims as outlined in Conditions of the Contract.
 4. Submit certification of insurance for products and completed operations, as specified in the General Conditions.
 5. Final statement of accounting.

1.08 PROJECT RECORD DOCUMENTS

- A. Maintain at Project site, available to Owner, Construction Manager, and Engineer, 1 copy of the Contract Documents, shop drawings, and other submittals in good order:
 1. Mark and record field changes and detailed information contained in submittals and change orders.
 2. Record actual depths, horizontal and vertical location of underground pipes, duct banks, and other buried utilities. Reference dimensions to permanent surface features.
 3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.
 4. Identify location of spare conduits including beginning, ending, and routing through pull boxes and manholes. Record spare conductors, including number and size, within spare conduits and filled conduits.
 5. Provide schedules, lists, layout drawings, and wiring diagrams.
 6. Make annotations in hard copy format with erasable colored pencil conforming to the following color code:

Additions:	Red
Deletions:	Green
Comments	Blue
Dimensions:	Graphite

- B. Maintain documents separate from those used for construction:
 1. Label documents "RECORD DOCUMENTS."
- C. Keep documents current:
 1. Record required information at the time the material and equipment is installed and before permanently concealing.
 2. Construction Manager or Engineer will review Record Documents weekly to ascertain that changes have been recorded.
- D. Affix civil engineer's or professional land surveyor's signature and registration number to Record Drawings to certify accuracy of information shown.
- E. Deliver Record Documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

- F. Record Documents will be reviewed monthly by the Construction Manager to determine the percent complete for the monthly pay application.
- G. Updated Record Documents are a condition for Construction Manager's or Engineer's recommendation for progress payment.
- H. Final Schedule Submittal as specified in Section 01324B - Progress Schedules and Reports - Medium Projects.

1.09 MAINTENANCE SERVICE

- A. Maintenance service as specified in technical specifications.

1.10 SUBSTANTIAL COMPLETION

- A. Obtain Certificate of Substantial Completion.

1.11 FINAL COMPLETION

- A. When Contractor considers the Work is complete, submit written certification that:
 - 1. Work has been completed in accordance with the Contract Document.
 - 2. Punch list items have been completed or corrected.
 - 3. Work is ready for final inspection.
 - 4. SWPPP is properly closed out; Notice of Termination has been processed.
 - 5. Encroachment Permits are listed, closed out and paid.
 - 6. Written confirmation from property owner's where Contractor rented space for staging or material storage is provided releasing the District.
- B. Construction Manager will make an inspection to verify the status of completion with reasonable promptness.
- C. Should the Construction Manager consider that the Work is incomplete or defective:
 - 1. Construction Manager will promptly notify the Contractor in writing, listing the incomplete or defective work.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Construction Manager that the Work is complete.
 - 3. Construction Manager shall re-inspect the Work.

1.12 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Construction Manager at least 7 days prior to final Application for Payment.
- B. Statement shall reflect all adjustments to the Contract amount:
 - 1. The original Contract amount.
 - 2. Additions and deductions resulting from:
 - a. Change Orders.
 - b. Units installed and unit prices.
 - c. Set-offs for uncorrected or incomplete Work.
 - d. Set-offs for liquidated damages.
 - e. Set-offs for reinspection payments.
 - f. Extended engineering and/or inspection services and inspection overtime.

- g. Excessive shop drawings review cost by the Engineer.
- h. Other adjustments.
- 3. Total Contract amount, as adjusted.
- 4. Previous payments.
- 5. Remaining payment due.

C. Construction Manager will prepare a final Change Order reflecting approved adjustments to the Contract amount which were not previously made by Change Orders.

1.13 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment reflecting the agreed upon information provided in the final statement of accounting.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01782

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Preparation and submittal of Operation and Maintenance Manuals.

1.02 GENERAL

- A. Submit Operation and Maintenance Manuals as specified in technical sections.
- B. Make approved manuals available at project site for use by construction personnel and Owner.

1.03 SUBMITTALS

- A. Draft Operation and Maintenance Manuals:
 - 1. Submit prior to shipment of equipment or system to site.
 - 2. Shipment will be considered incomplete without the draft Operation and Maintenance Manuals.
 - 3. Quantity:
 - a. Hard copy: 4 sets.
 - b. Electronic: 2 CD-ROM or DVD.
- B. Final Operation and Maintenance Manuals:
 - 1. Make additions and revisions in accordance with Owner's and Engineer's review comments on draft manuals.
 - 2. Submit approved Operation and Maintenance Manuals at least 30 days prior to Functional Testing and at least 60 days prior to Owner Training.
 - 3. Quantity:
 - a. Hard copy: 4 sets.
 - b. Electronic: 2 CD-ROM or DVD.

1.04 PREPARATION

- A. General requirements:
 - 1. Provide dimensions in English units.
 - 2. Assemble material, where possible, in the same order within each volume.
 - 3. Reduce drawings and diagrams to 8 1/2 by 11-inch size, if possible unless otherwise specified.
 - 4. Complete forms on computer, handwriting not acceptable.
 - 5. Delete items or options not provided in the supplied equipment or system.
 - 6. Provide package control system annotated ladder logic for PLC, if applicable.

- B. Hard copy requirements:
 - 1. Binders: 3-ring with rigid covers:
 - a. Break into separate binders as needed to accommodate large size.
 - 2. Utilize numbered tab sheets to organize information.
 - 3. Provide original and clear text on reproducible non-colored paper, 8 1/2 by 11-inch size, 24 pound paper.
 - 4. Drawings larger than 8 1/2 by 11 inch:
 - a. Fold drawings separately and place in envelope bound into the manual.
 - b. Label each drawing envelope on the outside regarding contents.

- C. Electronic requirements:
 - 1. File format:
 - a. Entire manual in PDF format:
 - 1) Include text and drawing information.
 - 2) Provide a single PDF file even if the hard copy version is broken into separate binders due to being large.
 - 3) Create PDF from the native format of the document (Microsoft Word, graphics programs, drawing programs, etc.):
 - a) If material is not available in native format and only available in paper format, remove smudges, fingerprints, and other extraneous marks before scanning to PDF format.
 - b) Hard copy record drawing requirements:
 - (1) Provide a single multipage PDF file of each set of the scanned drawings.
 - (2) Page 1 shall be the cover of the drawing set.
 - c) At file opening, display the entire cover:
 - (1) Scan drawings at 200 to 300 dots per inch (DPI), black and white, Group IV Compression, unless otherwise specified.
 - (2) Scan drawings with photos in the background at 400 dots per inch (DPI), black and white, Group IV Compression.
 - 4) Pagination and appearance to match hard copy.
 - 5) Searchable.
 - 6) Scanned images are not acceptable.
 - 7) Bookmarks:
 - a) Bookmarks shall match the table of contents.
 - b) Bookmark each section (tab) and heading.
 - c) Drawings: Bookmark at a minimum, each discipline, area designation, or appropriate division.
 - d) At file opening, display all levels of bookmarks as expanded.
 - 8) Thumbnails optimized for fast web viewing.
 - b. Drawing requirements:
 - 1) Provide additional copy of drawings in most current version of AutoCAD format.
 - 2) Drawings shall have a white background.
 - 3) Drawing shapes shall not degrade when closely zoomed.
 - 4) Screening effects intended to de-emphasize detail in a drawing must be preserved.
 - 5) Delete items or options not provided in the supplied equipment or system.

2. Media:
 - a. CD-ROM or DVD-ROM compatible with Microsoft Windows.
 - b. Flash drive.
 - c. Secure Electronic File Transfer (SEFT).
3. Label media with the following information:
 - a. Operation and Maintenance Manual.
 - b. Equipment name.
 - c. Specification Section Number.
 - d. Equipment tag number.
 - e. Owner's name.
 - f. Project number and name.
 - g. Date.
4. If multiple submittals are made together, each submittal must have its own subdirectory that is named and numbered based on the submittal number.

1.05 CONTENTS

- A. Label the spines:
 1. Equipment name.
 2. Tag number.
 3. Project name.
 4. Owner name.
- B. Cover page:
 1. Operation and Maintenance Manual.
 2. Equipment name.
 3. Specification Section Number
 4. Equipment tag number.
 5. Owner's name.
 6. Project number and name.
 7. Date.
- C. Table of Contents: General description of information provided within each tab section.
- D. Equipment Summary Form: Completed form as specified in Appendix A of this Section.
- E. Equipment Maintenance Summary Form: Completed form as specified in Appendix B of this Section.
- F. Electric Motor Technical Data Form: Completed form as specified in Appendix C of this Section.
- G. Description of equipment function, normal operating characteristics, and limiting conditions.
- H. Manufacturer's product data sheets:
 1. Where printed material covers more than 1 specific model, indicate the model number, calibrated range, and other special features.
- I. Assembly, installation, alignment, adjustment, and checking instructions.

- J. Storage instructions: Control diagrams:
 - 1. Internal and connection wiring, including logic diagrams, wiring diagrams for control panels, ladder logic for computer based systems, and connections between existing systems and new additions, and adjustments such as calibrations and set points for relays, and control or alarm contact settings.
 - 2. Complete set of 11-inch by 17-inch drawings of the control system.
 - 3. Complete set of control schematics.

- K. Programming: Copies of Contractor furnished programming.

- L. Start-up procedures: Recommendations for installation, adjustment, calibration, and troubleshooting.

- M. Operating procedures:
 - 1. Step-by-step instructions including but not limited to the following:
 - a. Safety precautions.
 - b. Guidelines.
 - c. Manual keyboard entries.
 - d. Entry codes.
 - e. System responses.
 - f. Other information as needed for safe system operation and maintenance.
 - 2. Modes:
 - a. Startup.
 - b. Routine and normal operation.
 - c. Regulation and control.
 - d. Shutdown under specified modes of operation.
 - e. Emergency operating shutdown.

- N. Preventative maintenance procedures:
 - 1. Recommended steps and schedules for maintaining equipment.
 - 2. Troubleshooting.

- O. Lubrication information: Required lubricants and lubrication schedules.

- P. Overhaul instructions: Directions for disassembly, inspection, repair and reassembly of the equipment; safety precautions; and recommended tolerances, critical bolt torques, and special tools that are required.

- Q. Parts list:
 - 1. Complete parts list for equipment including but not limited to the following information.
 - 2. Catalog data: Generic title and identification number of each component part of equipment.
 - 3. Include bearing manufacturer, model and ball or roller pass frequencies for every bearing.
 - 4. Availability.
 - 5. Service locations.

- R. Spare parts list: Recommended number of parts to be stored at the site and special storage precautions.

- S. Engineering data:
 - 1. Drawings: Complete set of 11-inch by 17-inch equipment drawings.

2. Exploded view or plan and section views with detailed callouts.
 3. Outline, cross-section, and assembly drawings.
 4. System drawings: Provide interconnection and wiring diagrams, plan views, panel layouts, bill of materials, etc.
 5. Packaged equipment system drawings: Provide instrumentation loop drawing, control schematic diagrams, interconnection and wiring diagrams, plan views, panel layouts, bill of materials, etc.
 6. System drawings and data sheets: Include drawings and data furnished by the Engineer and the Supplier; provide "as installed" version.
 7. Provide electrical and instrumentation schematic record drawings.
- T. Test data and performance curves, when applicable.
- U. Manufacturer's technical reference manuals.
- V. Source (factory) Test results: Provide copies of Source Tests reports as specified in technical sections.
- W. Functional Test results: After Functional Tests are completed, insert Functional Test reports as specified in technical sections.

1.06 ARCHIVAL DOCUMENTATION

- A. Typically does not require updating to remain valid and should be stored in a format that preserves the document and limits one's ability to make changes.
- B. Types of archival documents include the following:
1. Record drawings.
 2. Reports.
 3. Specifications.
 4. Shop drawings.
 5. Vendor Equipment O & M Manuals.
 6. Photos.
 7. Demonstration and training videos.
 8. Other.

1.07 LIVING DOCUMENTATION

- A. Requires periodic updates to remain valid and should be stored in formats that are easy to update.
- B. Types of living documents include the following:
1. Facility O&M Manuals.
 2. Standard Operating Procedures.
 3. Other.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

APPENDIX A

EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM _____
2. MANUFACTURER _____
3. EQUIPMENT IDENTIFICATION NUMBER(S) _____
(maps equipment number)
4. LOCATION OF EQUIPMENT _____
5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

NAMEPLATE DATA -

Horsepower _____
Amperage _____
Voltage _____
Service Factor (S.F.) _____
Speed _____
ENC Type _____
Capacity _____
Other _____

7. MANUFACTURER'S LOCAL REPRESENTATIVE
Name _____
Address _____
Telephone Number _____
8. MAINTENANCE REQUIREMENTS _____

9. LUBRICANT LIST _____

10. SPARE PARTS (recommendations) _____

11. COMMENTS _____

APPENDIX B

EQUIPMENT MAINTENANCE SUMMARY

1. Equipment Item: _____
2. Manufacturer: _____
3. Serial No. (if applicable): _____
4. Manufacturer's Order No. (if applicable): _____
5. Nameplate Data (horsepower, voltage, speed, etc.): _____

6. Manufacturer's Local Representative:
 Name: _____
 Address: _____
 Telephone: _____

7. Maintenance Requirements:

Maintenance Operation	Frequency	Lubricant (if applicable)	Comments
(List each operation required. Refer to specific information in Manufacturer's Manual, if applicable)	(List required frequency of each maintenance operation)	(Refer by symbol to lubricant list as required)	

8. Lubricant List:

Reference Symbol	Conoco Phillips	Exxon/Mobil	BP/Amoco	Other (List)
(Symbols used in Item 7 above)	(List equivalent lubricants, as distributed by each manufacturer for the specific use recommended)			

9. Spare Parts: (Include recommendation on what spare parts should be kept on the job):

SECTION 02050

SOILS AND AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Material requirements for soils and aggregates.

1.02 REFERENCES

- A. ASTM International (ASTM):
1. C117 - Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 2. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 3. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 4. C535 - Standard Test Method for Resistance to Degradation of Larger-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 5. D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 6. D2844 - Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils.
 7. D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 8. D4829 - Standard Test Method for Expansion Index of Soils.
 9. D5821 - Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.
- B. California - California State Transportation Agency, Department of Transportation (CALTRANS):
1. Standard Specifications.
 2. California Test Methods (CTM):
 - a. California Test 205 - Method of Test for Determining Crushed Particles.
 - b. California Test 211 - Method of Test for Abrasion of Coarse Aggregate by Use of the Los Angeles Abrasion Testing Machine.
 - c. California Test 217 - Method of Test for Sand Equivalent.
 - d. California Test 229 - Method of Test for Durability Index.
 - e. California Test 301 - Method of Test for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.03 SUBMITTALS

- A. Product data:
1. Material source.
 2. Gradation.
 3. Testing data.

- B. Quality control for aggregate base course:
 1. Test reports: Reports for tests required by Sections of Standard Specifications.
 2. Certificates of Compliance: Certificates as required by Sections of Standard Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection: Protect from segregation and excessive moisture during delivery, storage, and handling.

PART 2 PRODUCTS

2.01 MATERIALS - GENERAL

- A. Provide material having maximum particle size not exceeding 4 inches and that is free of trash, lumber, debris, leaves, grass, roots, stumps, and other organic matter.
- B. Recycled asphalt concrete is prohibited. Materials derived from processing demolished or removed asphalt concrete are not acceptable.

2.02 NATIVE MATERIAL

- A. Native soil:
 1. Sound, earthen material.
 2. Expansion index less than 35 when tested in accordance with ASTM D4829.
 3. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Sizes (Square Openings)	Percent by Weight Passing Sieve
1-inch	100
Number 200	30 maximum

2.03 AGGREGATE BASE COURSE

- A. Material requirements:
 1. Class 2, 3/4 inch maximum aggregate size, free from organic matter and other deleterious substances, and of such nature that aggregate can be compacted readily under watering and rolling to form a firm, stable base.
 2. Aggregate base course for structures:
 - a. Consist of crushed or fragmented particles.
 - b. Coarse aggregate material retained in Number 4 sieve shall consist of material of which at least 25 percent by weight shall be crushed particles when tested in accordance with California Test 205.
 3. Aggregate shall not be treated with lime, cement, or other chemical material.
 4. Durability index: Not less than 35 when tested in accordance with California Test 229.
 5. Aggregate grading and sand equivalent tests shall be performed to represent not more than 500 cubic yards or 1 day's production of material, whichever is smaller.

6. Sand equivalent: Not less than 25 when tested in accordance with California Test 217.
7. Resistance (R-value): Not less than 78 when tested in accordance with California Test 301.
8. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

Sieve Sizes (Square Openings)	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90 - 100
Number 4	35 - 60
Number 30	10 - 30
Number 200	2 - 9

2.04 DRAIN ROCK

A. Material requirements:

1. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
2. Durability index: Percentage of wear not greater than 40 when tested in accordance with California Test 229.
3. Consists of hard, durable particles of stone or gravel; screened or crushed to specified size and gradation; and free from organic matter, lumps or balls of clay, or other deleterious matter.
4. Crush or waste coarse material and waste fine material as required to meet gradation requirements.
5. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and C136:

Sieve Size (Square Openings)	Percent By Weight Passing Sieve
2 inch	100
1-1/2 inch	95 - 100
3/4 inch	50 - 100
3/8 inch	15 - 55
Number 200	0 - 2

2.05 CLASS 2 PERMEABLE FILL

A. Material requirements:

1. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
2. Durability index: Percentage of wear not greater 40 when tested in accordance with California Test 229.

3. Consists of hard, durable particles or fragments of stone or gravel; crushed to required size and grading; and free from organic matter, lumps or balls of clay, alkali, adobe, or other deleterious matter.
4. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
5. Aggregate base course for structures:
 - a. Consist of crushed or fragmented particles.
6. When sampled and tested in accordance with specified test methods, material shall comply with following requirements: Sand equivalent: Not less than 75 when tested in accordance with ASTM D2419.
7. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90 - 100
3/8 inch	40 - 100
Number 4	25 - 40
Number 8	18 - 33
Number 30	5 - 15
Number 50	0 - 7
Number 200	0 - 3

2.06 SAND

- A. Clean, coarse, natural sand.
- B. Non-plastic when tested in accordance with ASTM D4318.
- C. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
1/2 inch	100
Number 200	0 - 20

2.07 STABILIZATION MATERIAL

- A. Durability: Percentage of wear not greater than 40 percent when tested in accordance with ASTM C131.
- B. Durability percentage of wear not greater than 40 percent when tested in accordance with California Test 211.

- C. Consists of clean, hard, durable particles of crushed rock or gravel; screened or crushed to the specified sizes and gradations; and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance.
- D. Shall be free of slaking or decomposition under the action of alternate wetting and drying.
- E. The portion of material retained on the 3/8 inch sieve shall contain at least 50 percent of particles having 3 or more fractured faces. Not over 5 percent shall be pieces that show no such faces resulting from crushing. Of that portion which passes the 3/8 inch sieve but is retained on the Number 4 sieve, not more than 10 percent shall be pieces that show no faces resulting from crushing.
- F. Conforms to size and grade when tested in accordance with ASTM C117 and ASTM C136:

Sieve Size (Square Openings)	Percent by Weight Passing Sieve
1 inch	100
3/4 inch	90 - 100
Number 4	0 - 10
Number 200	0 - 2

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02085

PRECAST CONCRETE VAULTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Precast concrete vaults.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. LRFD Bridge Design Specifications.
- B. American Concrete Institute (ACI):
 - 1. 318 - Building Code Requirements for Structural Concrete and Commentary.
- C. ASTM International (ASTM):
 - 1. C150 - Standard Specification for Portland Cement.
 - 2. C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete utility Structures.
 - 3. C858 - Standard Specification for Underground Precast Concrete utility Structures.
- D. Occupational Safety and Health Administration (OSHA).

1.03 SUBMITTALS

- A. General:
 - 1. Furnish submittals as specified in Section 01330 - Submittal Procedures.
- B. Shop drawings:
 - 1. Show dimensions, locations, lifting inserts, reinforcement, and joints.
 - 2. Structural design calculations for vaults, signed by a licensed registered Civil or Structural Engineer licensed in the State where project is located.
- C. Manufacturer's Certification for Vaults: Written certification that the vault complies with the requirements of this Section.

1.04 QUALITY ASSURANCE

- A. Inspection:
 - 1. During factory fabrication, notify Engineer 2 weeks prior to pouring concrete to inspect the reinforcing and precast vault, if desired.
 - 2. After installation, the Contractor shall demonstrate that vaults have been properly installed, level, with tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.

PART 2 PRODUCTS

2.01 VAULTS

- A. Manufacturers: One of the following or equal:
 - 1. Utility Vault Co.
 - 2. Oldcastle Precast.

- B. Provide precast vaults for the size indicated on the Drawings.

- C. The minimum structural member thickness for vaults shall be 5 inches:
 - 1. Cement shall be Type II or III portland cement in accordance with ASTM C150.
 - 2. The minimum 28-day concrete compressive strength shall be 4,000 pounds per square inch.
 - 3. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.

- D. Design requirements: Loads on structures:
 - 1. In accordance with ASTM C857, except as modified in this Section.
 - 2. Loads at the ground surface:
 - a. "Roadway": Load from heavy, frequently repeated vehicle traffic:
 - 1) ASTM C857, Table 1, Designation A-16 (AASHTO HS20-44).
 - 3. Loads against walls. Include effects of groundwater (as indicated in geotechnical borings) and seismic accelerations on earth pressures:
 - a. Equivalent lateral pressure:
 - 1) Triangular distribution: 70 pounds per square foot per foot of depth (triangular distribution).
 - 2) Rectangular distribution backfill-induced live load surcharge: 240 pounds per square foot.
 - b. Surface surcharge load: In accordance with ASTM C857 A-16 wheel load if such surcharge exceeds backfill loads described in the preceding paragraph.
 - c. Groundwater effects: Geotechnical borings indicated the groundwater is not at or near elevations of the vault.
 - d. Seismic acceleration effects:
 - 1) As specified in Section 01612 - Seismic Design Criteria.
 - 2) On opposite sides of the structure, uniform equivalent lateral load in pressure type distribution, with a pressure of 37.5 in pounds per square foot where it is the depth of structure.
 - 3) Adding lateral force for soil accelerating toward structure:
 - a) Direct uniform pressure distribution toward the wall, effectively increasing the static lateral soil pressure.
 - 4) Reducing lateral force for soil accelerating away from structure:
 - a) Direct inverted pressure distribution away from the wall, effectively reducing the static lateral soil pressure.
 - 4. Soil bearing pressure at base:
 - a. Maximum 1,500 pounds per square foot total pressure on prepared subgrade soils.
 - 5. Lifting and handling loads:
 - a. Make provision in the design for the effects of loads or stresses that may be imposed on structures during fabrication, transportation, or erection.

6. Load combinations:
 - a. Design structures to sustain the specified loads individually or in combination.
- E. Design requirements: Structural analysis, design and detailing:
 1. Analyze and design structures including the effects of 2-way action ("plate action") and of load transfer around current and future openings.
 2. Where structures include panels designed for future removal ("knockout panels"), design structures for loads and stresses with any combination of any or all such panels in place or removed.
 3. Design structures in accordance with the requirements of ACI 318 and this Section.
 4. Provide reinforcement at all areas subject to tensile stress when loaded with the specified loads and combinations thereof.
 5. Provide temperature and shrinkage reinforcement to equal or exceed ACI 318 requirements in all concrete sections.
 6. Provide minimum clear concrete cover over reinforcement at both interior and exterior faces of all members in accordance with the following:
 - a. Vaults: 2 inches.
 7. Reinforcement details:
 - a. Walls: For structures with wall thickness of 8 inches or less, locate a single mat of reinforcement at the center of the wall.
 - b. Slabs: For structures with slab thickness of 7 inches or less, locate a single mat of reinforcement at the center of the slab.
 - c. Structures with wall or slab thicknesses exceeding these limits shall have a reinforcement at each face of the member.
 8. Joints:
 - a. Provide structures with watertight joints between sections, and detailed to minimize water infiltration at duct bank and conduit penetrations.
 - b. Provide structures with non-skid, shiplap, or tongue and groove joints between sections.
- F. Design requirements: Materials:
 1. Portland cement concrete vaults:
 - a. In accordance with ASTM C858, except as modified in this Section.
 - b. Proportion concrete mixes to resist damage from freezing and thawing in a moist environment, and for exposure to deicing chemicals. In accordance with ACI 318 requirements for minimum specified compressive strength and air entrainment.
 2. Seal joints watertight with precast concrete joint sealant as specified in Section 07900 - Joint Sealants.
- G. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.
- H. Vault shall be solid walled construction:
 1. Where penetration of the pre-cast concrete vault are required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or core-drilled sections.

2. Openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing.
 3. Vaults need not be designed to resist thrust from piping passing through the vault.
 4. Coordinate pipe penetration locations with piping arrangement as indicated on the Drawings.
- I. Slope bottom of vault to Drainage Sump as indicated on the Drawings.
- J. Drainage Sump: Dimensions as indicated on the Drawings:
1. Drainage Sump shall consist of an open channel in the bottom of the vault as indicated on the drawings. Provide additional reinforcing as required to accommodate channel.
 2. Provide grating with seat as indicated on the Drawings:
 - a. Grating shall be designed for 300 pounds per square foot load with L/200 maximum deflection.
- K. Ladders:
1. General:
 - a. Type:
 - 1) Safety type conforming to local, State, and OSHA standards as minimum.
 - 2) Furnish guards for ladder wells.
 - b. Size: 18 inches wide between side rails of length, size, shape, detail, and location indicated on the Drawings.
 2. Aluminum ladders:
 - a. Materials: 6063-T5 aluminum alloy.
 - b. Rungs:
 - 1) 1-inch minimum solid square bar with 1/8-inch grooves in top and deeply serrated on all sides.
 - 2) Capable of withstanding 1,000 pound load without failure.
 - c. Side rails: Minimum 4-inch by 1/2-inch flat bars.
 - d. Fabrication:
 - 1) Welded construction, of size, shape, location, and details indicated on the Drawings.

2.02 ACCESS HATCH

- A. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.
- B. Access hatch as specified in Section 08320 - Floor Access Doors for access floor requirements.

2.03 COATINGS

- A. Coat interior and exterior of valve vault in accordance with Section 09960 - High-Performance Coatings or as indicated on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations:
 - 1. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended.
 - 2. Where no lifting devices are provided, the Contractor shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting.

- B. Buried pre-cast concrete vaults shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Pre-cast concrete vaults shall be set to grade and oriented to provide the required dimensions and clearances from pipes and other structures.

- C. Apply coatings in accordance with manufacturer's instructions.

- D. Ladders:
 - 1. Secure to supporting surface with bent plate clips providing minimum 8 inches between supporting surface and center of rungs.
 - 2. Anchorage by manufacturer.
 - 3. Erect rail straight, level, plumb, and true to position indicated on the Drawings. Correct deviations from true line or grade which are visible to the eye.

END OF SECTION

SECTION 02200

SITE CLEARING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Clearing, grubbing, and stripping project site.

1.02 REFERENCES

- A. United States Code of Federal Regulations (CFR):
 - 1. 40 - Protection of Environment.
 - a. 503 - Standards for the Use or Disposal of Sewage Sludge.

1.03 DEFINITIONS

- A. Clearing: Consists of removal of natural obstructions and existing foundations, buildings, fences, lumber, walls, stumps, brush, weeds, rubbish, trees, boulders, utility lines, and any other items which interferes with construction operations or are designated for removal.
- B. Grubbing: Consists of the removal and disposal of wood or root matter below the ground surface remaining after clearing and includes stumps, trunks, roots, or root systems greater than 1 inch in diameter or thickness to a depth of 6 inches below the ground surface.
- C. Stripping: Includes the removal and disposal of all organic sod, topsoil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped. The depth of stripping is estimated to be 6 inches, but the required depth of stripping will be determined by the Engineer.

1.04 QUALITY ASSURANCE

- A. Regulatory requirements: Verify and comply with applicable regulations regarding those governing noise, dust, nuisance, drainage and runoff, fire protection, and disposal.
- B. Pre-construction conference: Meet with Engineer to discuss order and method of work.
- C. Do not cut down any trees without prior written approval.

1.05 SEQUENCING AND SCHEDULING

- A. Clearing and grubbing: Perform clearing and grubbing in advance of grading operations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine site and verify existing conditions for beginning work.

3.02 PREPARATION

- A. Protect existing improvements from damage by site preparation work.

3.03 INSTALLATION

- A. Clearing:
 1. Clear areas where construction is to be performed and other areas as indicated on the Drawings, or specified in this Section, of fences, lumber, walls, stumps, brush, roots, weeds, trees, shrubs, rubbish, and other objectionable material of any kind which, if left in place, would interfere with proper performance or completion of the work, would impair its subsequent use, or form obstructions.
 2. Do not incorporate organic material from clearing and grubbing operations in fills and backfills.
 3. Contractor's temporary construction facilities: Fill or remove pits, fill, and other earthwork required for erection of facilities, upon completion of the work, and level to meet existing contours of adjacent ground.
- B. Grubbing:
 1. From excavated areas: Grub stumps, roots, and other obstructions 3 inches or over in diameter to depth of not less than 18 inches below finish grade.
 2. In embankment areas or other areas to be cleared outside construction area: Do not leave stumps, roots, and other obstructions higher than the following requirements:

Height of Embankment over Stump	Depth of Clearing and Grubbing
0 feet to 2 feet	Grub stumps or roots 3 inches or over in diameter to 18 inches below original grade. Cut others flush with ground.
2 feet to 3 feet	Grub stumps 1 foot and over in diameter to 18 inches below original grade. Cut others flush with ground.
Over 3 feet	Leave no stumps higher than stump top diameter, and in no case more than 18 inches.

- 3. Backfill and compact cavities left below subgrade elevation by removal of stumps or roots to density of adjacent undisturbed soil.

- C. Stripping:
 - 1. Remove soil material containing sod, grass, or other vegetation to depth of 6 inches from areas to receive fill or pavement and from area within 5 feet outside foundation walls.
 - 2. Deposit stripped material in accordance with following requirements:
 - a. At locations acceptable to Engineer.
 - b. Use accepted material in top 6 inches of areas to be used for future planting.
 - 3. Replace topsoil where removed.

- D. Material reuse and recycling:
 - 1. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until project completion.
 - 2. Contractor shall provide Engineer with list of local markets and salvage sites for reuse of clearing debris.

END OF SECTION

SECTION 02224

GUIDED BORING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. The minimum requirements for installing a casing pipeline by guided boring at the location indicated on the Drawings. Contractor shall furnish all labor, equipment, power, and materials necessary for pipe installation.
- B. Reference codes and standards:
 - 1. The publications listed below form a part of this Specification to the extent referenced. Where conflicts between these Specifications and the referenced specification, code, or standard occur, the more restrictive specification shall govern. The latest edition available on the date of issue of Contract Documents shall be used.
 - 2. ASTM D 1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimen by Tension Loading (Metal-to-Metal).
 - 3. ASTM G 8. Standard Test Methods for Cathodic Disbonding of Pipe Coatings.
 - 4. Occupational Safety and Health Administration (OSHA) Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction, and Subpart P, Excavations.
 - 5. AREMA "Manual for Railway Engineering" 2018 Edition.

1.02 DEFINITIONS

- A. Guided Boring: a multi-stage method of installing a product pipe to precise line and grade by use of a guided pilot tube, followed by upsizing to install the product pipe. The system uses a theodolite guidance system to ensure accuracy, which is remotely operated and does not require personnel entry to the tunnel for normal operations. Pipe may be installed in a 2-phase operation (1 - pilot tube, 2 - product pipe with augers inside smaller diameter casing for spoil removal during upsizing), or 3-phase operation (1 - pilot tube, 2 - steel casings with augers, 3 - product pipe). Upsizing may be accomplished by a number of different methods such as auger boring or hand mining. The key aspect of a guided boring operation is that the equipment used to upsize the bore is connected to the tail end of the installed pilot tubes such that the jacking pipe is accurately installed along the line and grade established during the pilot step.
- B. Carrier Pipe: Permanent pipe for operational use.
- C. Casing: A pipe used to support a bore that is inserted simultaneously with the boring operation.

- D. Jacking Pipe: Pipe jacked after pilot tubes are installed. The jacking pipe may be the carrier pipe or casing pipe, and must be specifically designed to be installed by pipejacking using guided boring equipment.
- E. Obstruction: Object located wholly or partially within the cross-sectional area excavated that prevents the forward movement of the pipe string.

1.03 DESIGN CRITERIA

- A. Guided boring machine:
 - 1. The boring machine shall be manufactured by a company that specializes in the design and fabrication of this type of equipment and has had at least 5 years of experience manufacturing and marketing guided boring systems.
 - 2. The boring equipment selected for the project shall be suitable for and capable of efficiently advancing through the geologic conditions anticipated by the Contractor and indicated in the Geotechnical Report.
 - 3. The method of guidance shall be electronic theodolite with camera and electronic (LED) target that can continuously monitor line and grade during the pilot bore to ensure accuracy is maintained within the tolerances specified.
 - 4. The guided boring machine shall be monitored continuously by the operator during the pilot bore. A display showing the position of the machine in relation to design line-and-grade shall be provided at the operation console to allow the operator to continuously monitor vertical and horizontal offsets during the pilot bore.
- B. A pipe lubrication injection system shall be provided to inject pipe lubricants as required to minimize torque and jacking forces.
- C. The Contractor shall use manual data acquisition for collecting information for the jacking record. The Engineer and Owner's representative shall have reasonable access to all areas of the work, including the operations control area and shafts, for inspection and collection of data, measurements, and observations.
- D. Due to the sandy nature of the soil and risk of soil running into the cutter head a radial overcut shall not be performed. Contractor shall determine and submit the planned soil plug to be used at the face of the casing and auger.
- E. Methods and equipment shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements. Ground movements (settlement/heave) shall be limited to values that do not cause damage or distress to surface features, utilities, or improvements. In no case shall settlements exceed the maximum allowable values listed in Section 02233 - Settlement Monitoring. The Contractor shall be responsible for any damage to existing features, improvements, or utilities, and shall repair any damage to the satisfaction of the Engineer, at no additional cost to the Owner, and without schedule extension.
- F. A thrust block (or similar jacking backboard) shall be used to transfer jacking loads to the soil behind the jacking shaft. The thrust block shall be installed perpendicular to the proposed pipe alignment, and shall be designed to withstand the maximum

jacking pressure anticipated, with a factor of safety of at least 1.5 without excessive deflection or displacement.

- G. Provide portal stabilization/ground improvement as necessary to prevent loss of ground and uncontrolled inflows at entry and exit locations as specified in Section 02261 - Shaft Excavation and Support.

1.04 QUALITY ASSURANCE

- A. Contractor or subcontractor performing the guided boring is required to meet the following qualification requirements:
 - 1. All guided boring work shall be performed by an experienced Contractor or subcontractor who has at least 3 years of experience in performing guided boring installations and has completed a minimum of 5 drives of similar diameter and length in similar ground conditions.
 - 2. The project superintendent shall have at least 3 years of experience involving guided boring construction.
- B. The boring machine operator(s) shall have technical training and experience in the operation of the proposed boring equipment and shall have completed, as a primary operator, at least 5 guided boring drives of similar length to the drive on this project.
- C. The site safety representative and personnel responsible for air quality monitoring shall be experienced in tunnel construction and shall be certified by OSHA.
- D. The surveyor responsible for line-and-grade control shall be a Licensed Surveyor registered in the State of California who has prior experience on trenchless projects.
- E. The Contractor shall provide at least 72 hours advance written notice to Engineer prior to beginning the bore.
- F. All Work by the Contractor shall be done in the presence of the Engineer unless the Engineer grants prior written approval to perform such Work in Engineer's absence.
- G. The Contractor shall immediately notify the Engineer, in writing, when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those represented within the Contract Documents. Notification shall happen as soon as it is safe to do so.
- H. The Contractor shall allow access to the Engineer and shall furnish necessary assistance and cooperation to aid the Engineer in observations, measurements, data, and sample collection, including, but not limited to the following:
 - 1. The Owner and/or Engineer shall have access to the operator control panel prior to, during, and following all guided boring operations. This shall include, but not be limited to, providing visual access to real-time operator control screens, gauges, and indicators.
 - 2. The Owner and/or Engineer shall have access to the jacking and reception shafts prior to, during, and following all boring operations. This shall include, but not be limited to, visual inspection of installed pipe and verification of line and grade. The Contractor shall provide safe access in accordance with all safety regulations.

3. The Owner and/or Engineer shall have access to spoils removed from the tunnel excavation during and following all guided boring operations. The Engineer shall be allowed to collect soil samples from the spoil piles a minimum of once per installed pipe section, or every 10 feet, whichever is more often, and at any time when changes in soil conditions or obstructions are apparent or suspected.

1.05 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of the City Standard Specifications, and shall provide sufficient detail to allow the Engineer to judge whether the proposed equipment, materials, and procedures will meet the City Standard Specifications requirements. All drawings shall be legible with dimensions accurately shown and clearly marked in English. Review of submitted details and data will be based on consideration of requirements for the completed work, protection of existing utilities, and the possibility of unnecessary delays in the execution of the work to be constructed under this Contract. Review and acceptance of the Contractor's Submittals by the Engineer shall not be construed in any way as relieving the Contractor of its responsibilities under this Contract.
- B. Qualifications:
 1. The Contractor shall submit the name, description, and current client contact information of at least 5 referenced projects including owner's name and current contact information, project superintendent, and machine operators.
 2. Submit the names of the personnel planned for this project including project superintendent, machine operators, and site safety representative. Submit personnel qualifications in accordance with Quality Assurance requirements of this Section.
 3. Provide evidence of OSHA certification for site safety representative and personnel responsible for air quality monitoring.
- C. Submit the following describing the guided boring equipment and construction methods to be employed:
 1. A detailed description of the guided boring equipment and procedures to be employed.
 2. Manufacturer's literature describing the guided boring system to be used including:
 - a. Machine type.
 - b. Equipment dimensions.
 - c. Spoil removal system.
 3. Provide descriptions of projects on which this system has been successfully used including names, addresses, and telephone numbers of owner's representatives for these projects as well as length, diameter, and pipe material used.
 4. A description of the alignment control and steering systems:
 - a. Provide manufacturer's literature, drawings showing set up and support provisions, and other details for the guidance system.
 - b. Submit a description of surveying methods to set reference points and a description of procedures to check the guidance system and reset or realign it during construction.
 - c. Confirm that these systems can achieve the required pipeline line and grade within the specified tolerances.

5. Jacking system details. Provide details of:
 - a. Jacking frame design and thrust ring.
 - b. Jacking controls, and pressure gauges. Provide a conversion factor for hydraulic pressure to force.
 - c. Thrust block details, including dimensions.
 6. Provide details of pipe lubrication injection system and pipe lubricants to be used as required during construction. Include a description of proposed lubrication procedures during jacking.
 7. Describe spoil handling, transport, disposal equipment and procedures, and spoil disposal sites. Provide written documentation from the disposal site(s) indicating that they will accept the spoil and are in compliance with prevailing (and applicable) regulations.
- D. Work Area Layout Drawings: The Contractor shall submit work area layout drawings detailing dimensions and locations of all equipment, including overall work area boundaries.
- E. Casing pipeline details including diameter, thickness, class of steel, joint type and details, and fabrication drawings from casing supplier.
- F. Calculations by a California licensed professional engineer showing anticipated jacking forces on casing pipeline, and pipe capacity indicating a safety factor of 2.0 or more.
- G. Product data, material safety data sheets, and written manufacturer recommendation for the casing pipeline factory and field coating.
- H. Grouting equipment, procedures, and proposed mixes for grouting the annular space and voids.
- I. Contingency plan for:
 1. Surface subsidence or heave.
 2. Equipment failure.
 3. Encountering obstructions.
 4. Tunnel failure.
- J. Schedule:
 1. Provide a schedule for guided boring work identifying all major construction activities as independent items:
 - a. The schedule shall include as a minimum the following activities: mobilization; shaft excavation and support; jacking equipment setup; pilot installation, reaming/boring pass, pipe installation pass; site restoration; cleanup; and demobilization.
 - b. The schedule shall also include the planned work hours and work days for each activity.
 - c. Detailed schedule may be included in the overall project schedule. If the overall project schedule does not included the above required details, submit a separate more detailed schedule.
- K. Daily records: The following daily records shall be submitted by noon on the day following the shift for which the data or records were taken:
 1. Jacking records:

- a. The Contractor shall provide complete jacking records to the Engineer. These records shall include, at a minimum: date, time, name of operator, drive identification, installed pilot tube/pipe number and corresponding bore length, jacking forces, use of lubrication, volume of soil removed, line and grade offsets, any movement of the guidance system, problems encountered with the jacking frame or other components or equipment, and durations and reasons for delays.
 - b. Manually recorded observations should be made at intervals of not less than once every 9 feet during the pilot bore and once per pipe during the reaming pass, whenever conditions change, and as directed by the Engineer.
 - c. At least 7 business days prior to beginning the bore, the Contractor shall submit samples of the manual jacking records.
- L. Calculations: Calculations shall be submitted in a neat, legible format. Assumptions used in calculations shall be consistent with information provided in the Geotechnical Report:
- 1. Provide an estimate of the maximum jacking force expected to complete each drive.
 - 2. Provide calculations demonstrating that the soils behind the thrust block can transfer the maximum planned jacking forces exerted by the main jacks to the ground during pipe installation with a factor of safety of at least 1.5, without excessive deflection or displacement.
 - 3. Submit calculations a minimum 60 days before guided boring operations are scheduled.
- M. Submit a safety plan for the guided boring operations.
- N. Submit pilot bore as-built drawing with alignment in plan and profile.

1.06 SAFETY

- A. The Contractor is responsible for safety on the job site. Methods of construction shall ensure the safety of the work, Contractor's and other employees on site, and the public. Perform all work in accordance with the current applicable regulations of the Federal, State, and local agencies. Comply with all applicable provisions of Tunnel Safety Orders of the State of California and 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations, by OSHA. In the event of conflict, comply with the more restrictive applicable requirement.
- B. No gasoline powered equipment shall be permitted in jacking and receiving shafts. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable local, State, and Federal regulations.
- C. Furnish and operate a temporary ventilation system and air monitoring system conforming to the requirements of OSHA when personnel are in the shaft or underground. Operate and maintain a ventilation system that provides a sufficient supply of fresh air and maintains an atmosphere free of toxic or flammable gasses in all underground work areas.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Casing pipe:
 - 1. Type: Steel conforming to ASTM A 283, Grade C or ASTM A 1097. Shop and field joints shall be butt welded:
 - a. Press-fit interlocking connection system joints (Permalok or equal) are also acceptable in lieu of field welded butt joints. If used, submit joint details for approval.
 - 2. Diameter: As indicated on the Drawings and be within 1-1/2 percent of being true circle.
 - 3. Wall Thickness: As indicated on the Drawings, or in accordance with the design calculations in 1.05F, or a minimum of 1/2 inch, whichever is thickest.

PART 3 EXECUTION

3.01 GENERAL

- A. Guided boring shall not begin until the following have been completed:
 - 1. All required submittals have been provided, reviewed, and accepted.
 - 2. Jacking shaft and receiving shaft excavations and support systems have been completed in accordance with the requirements of 02261 - Shaft Excavation and Support.
 - 3. If necessary, soil and groundwater control and portal stabilization for breaking out of jacking shafts and into receiving shafts has been established, as specified in 02261 - Shaft Excavation and Support.
 - 4. All settlement monitoring instruments have been installed, surveyed, and accepted by the Engineer as specified in 02433 - Settlement Monitoring.
 - 5. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with OSHA and other applicable requirements. Provide the Engineer with a copy of each prior to starting guided boring.
 - 6. Hold safety meetings and provide safety instruction for new employees as required by Cal/OSHA.
 - 7. The Contractor shall notify the California One Call system to request marking of utilities by utility owners/operators that subscribe to One Call, and shall individually notify all other known or suspected utilities to request marking of these utilities. The Contractor shall confirm that all requested locates are made prior to commencing guided boring operations. The Contractor shall visually confirm and stake all existing lines, cables, or other underground facilities including exposing all crossing utilities and utilities within 10 feet laterally of the designed bore.
- B. Furnish all necessary equipment, power, water, and utilities for equipment, pipe lubricant mixing and pumping, removal and disposal of spoil, and other associated work required for the Contractor's methods of construction.
- C. Conduct all operations such that trucks and other vehicles do not create a dust or noise nuisance in the streets and adjacent properties. Promptly clean up, remove, and dispose of any spoil spillage.

- D. All work shall be done so as not to disturb roadways, adjacent structures, landscaped areas, or utilities. Any damage shall be immediately repaired to the satisfaction of the Engineer at no additional cost to the Owner.
- E. Notify the Engineer at least 15 days before beginning any excavation.
- F. Size and locate shafts to minimize interference with vehicular and pedestrian traffic. All equipment and operations must be contained within the allowable construction zones shown on the Drawings.
- G. All Work shall be in accordance with applicable permits.

3.02 INSTALLATION

- A. Pipe installation by guided boring shall be completed in accordance with the shop drawings, reviewed and accepted submittals, and permit conditions.
- B. Guided boring equipment shall meet the specified requirements of this Section.
- C. Provide a suitable jacking frame and thrust block to carry out the work.
- D. Prior to starting guided boring operations, survey the location and orientation of the pilot tube jacking frame to ensure it is on the proper line and grade.
- E. Pilot tubes shall be advanced while continuously monitoring line and grade. Jacking forces shall also be continuously monitored during the pilot tube installation.
- F. The axial forces from the jacking frame shall be distributed to the pipe uniformly through a properly designed thrust adaptor to prevent damage to the ends of the pipe. The jacking system shall be capable of continuously monitoring the jacking pressure.
- G. Pipes shall be jacked into position following the design line and grade of the pipeline without damaging the pipe.
- H. In the event a section of pipe is damaged during the jacking operation, the damaged section of pipe shall be removed. Methods of repairing the damaged pipe may be proposed, subject to approval by the Engineer.
- I. Provide a lubrication system, and inject pipe lubricants through injection ports as necessary to minimize pipe friction.
- J. Ground Movements (Settlement/Heave):
 - 1. The guided boring equipment shall be operated in a manner to prevent both surface heave and loss of ground. Control the advance rate and monitor the volume of material excavated and adjust advance rate, as required, to avoid loss of ground, over-excavation, and surface heave.
 - 2. Methods and equipment shall control surface settlement and heave above the pipeline to prevent damage to existing utilities, facilities, and improvements.
 - 3. Ground movements shall be limited to values that do not cause damage or distress to surface features, utilities, or improvements.
 - 4. In no case shall settlement exceed the maximum allowable values listed in Section 02233 - Settlement Monitoring.

5. The Contractor shall be responsible for any damage to existing features, improvements, or utilities resulting from construction activities, and shall repair any damage to the satisfaction of the Engineer, at no additional cost to the Owner and without extension of schedule for completion.
- K. Transport and dispose of all excavated materials properly away from the construction site. Solids shall be disposed of at acceptable facilities in accordance with current state regulations for disposal of these materials. Only use the disposal sites identified in the submittals for spoil disposal.
- L. Install product pipe in accordance with Section 02349 - Installation of Carrier in Casing.

3.03 CONTROL OF LINE AND GRADE

- A. Establish not less than 3 survey control points in the vicinity of the guided boring operation prior to the start of construction.
- B. Contractor shall use survey control points to furnish and maintain all reference lines and grades for guided boring operations.
- C. The Contractor shall use these lines and grades to establish the location of the pipe using a guidance system. Submit to the Engineer copies of field notes used to establish all lines and grades and allow the Engineer to check guidance set up prior to beginning boring. The Contractor remains fully responsible for the accuracy of the work and the correction of it, as required.
- D. The jacking pipe shall be installed in accordance with the following tolerances:
 1. Variations from design line or grade: +/-3 inches maximum.
- E. The guidance system shall be mounted independently from the thrust block and jacking frame to maintain the alignment of the system.
- F. Stop pilot tube operations and reset the guidance system if alignment shifts or is moved off of design alignment and/or grade for any reason.
- G. Guidance system should only be reset by qualified surveying personnel in accordance with approved procedures.
- H. If the pipe installation exceeds the specified tolerances, the Contractor shall correct the installation, including, if necessary, redesign of the pipeline or structures. All corrective work shall be performed as approved by the Engineer at no additional cost to the Owner.

3.04 OBSTRUCTIONS

- A. If the guided boring operations should encounter an object or condition that impedes forward progress, the Contractor shall notify the Engineer immediately. The Contractor shall correct the condition, and remove, clear, or otherwise make it possible for the guided boring equipment and jacking pipe to advance past any objects or obstructions that impede forward progress. The Contractor shall proceed with removal of the object or obstruction by methods submitted by the Contractor and accepted by the Engineer. The Contractor will receive compensation for

removal of obstructions, which cannot be broken up by the cutting tools with diligent effort, and that are located partially or wholly within the cross-sectional area of the bore. Payment will be negotiated with the Contractor by the Engineer on a case-by-case basis. The Engineer shall be provided an opportunity to view obstruction prior to removal. Any removal process that does not allow direct inspection of the nature and position of the obstruction will not be considered for payment. The Contractor will receive no additional compensation for removing, clearing, or otherwise making it possible for the guided boring equipment to advance past objects consisting of cobbles, boulders, wood, unreinforced concrete, and other nonmetallic objects or debris with maximum lateral dimensions less than 30 percent of the outer diameter of the casing pipe.

3.05 CLEANUP AND RESTORATION

- A. After completion of the guided boring and pipe installation, all construction debris, slurry, oil, grease, and other materials shall be removed from the installed pipe, jacking and receiving shafts, and all Contractor work areas. Cleaning shall be incidental to the construction.
- B. Restoration shall follow construction as the work progresses and shall be completed as soon as possible. Restore and repair any damage resulting from surface settlement or heave caused by shaft excavation or boring. Any property damaged or destroyed shall be restored to a condition equal to or better than existing prior to construction. Restoration shall be completed no later than 30 days after the pipe is in place along any boring segment.

END OF SECTION

SECTION 02233

SETTLEMENT MONITORING

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes requirements for settlement monitoring of the ground surface over trenchless pipeline installations.

1.02 SUBMITTALS

- A. The Contractor shall prepare and submit information required herein in accordance with the submittal requirements.
- B. Initial Survey Report of settlement monitoring points:
 - 1. One report shall be submitted for each trenchless crossing.
 - 2. The report shall include a table of horizontal coordinates (northing and easting), elevation, approximate station and offset along the pipeline for each settlement monitoring point, and a map showing control points and control point number.
 - 3. Identify the control point number, horizontal coordinates and elevation of the survey control points used to determine the above data for each monitoring point.
 - 4. Elevations and coordinates shall use the same coordinate system and datum as the topographic survey for the project.
 - 5. Submit prior to beginning shaft excavation or tunneling operations.
- C. Survey Monitoring Reports:
 - 1. One report shall be submitted for each trenchless crossing at the locations identified on the Drawings.
 - 2. This report shall consist of a table showing the settlement monitoring point (labeled by station), date of measurement, and the elevation recorded for each measurement. The report shall also contain a map identifying the location and naming convention for identifying control points.
 - 3. The surveyor shall record subsequent measurements to the table as they are taken, so that trends can be easily noticed.
 - 4. Submit within 24 hours of taking measurements.
- D. Submit the surveyor's California Professional Land Surveyor's license number. The report shall be stamped and signed by a California Professional Land Surveyor.
- E. Submit additional information required by permits for the trenchless crossings.

1.03 QUALIFICATIONS

- A. Surveying shall be performed by a California licensed Professional Land Surveyor, paid and provided by the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Settlement points:
 - 1. Surface settlement points located on pavement shall be surveying nails. Shiners may be used at the discretion of the surveyor.
 - 2. Surface settlement points located on concrete shall be chiseled "X" or survey nail.
 - 3. Surface settlement points located on soil shall be 2-inch by 2-inch wooden hub stakes with a nail in the top. Surveyor shall field determine the length of the wooden hub stake to ensure it is securely staked into the ground.
 - 4. All survey settlement points shall be circled with temporary paint marks.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Location: Settlement monitoring points shall be located as shown on the drawings or where required in the specifications.
- B. In general, settlement monitoring is required in the following locations for guided auger boring:
 - 1. Launching Shaft shoring/bracing - 2 locations, field located.
 - 2. Receiving Shaft shoring/bracing - 2 locations, field located.
 - 3. Along the pipeline alignment every 50 linear feet, 10 feet left of pipeline centerline, at pipeline centerline, and 10 feet right of pipeline centerline.

3.02 SURVEYING ACCURACY

- A. Elevations shall be measured to 0.005-foot accuracy.

3.03 MONITORING FREQUENCY

- A. Monitoring shall include all of the following:
 - 1. A baseline survey prior to beginning the work
 - 2. Every 2 hours while actively tunneling.
 - a. For surveying purposes, active tunneling is the period while the tunneling machine is advancing casing pipeline installation and occurs from launching of the tunneling machine until after the casing pipe is fully installed.
 - 3. At the conclusion of the tunneling (2 - 4 days following casing pipe installation).
 - 4. Post installation shall occur at approximately:
 - a. 14 days following casing pipe installation
 - b. 60 days following casing pipe installation
 - c. 120 days following casing pipe installation
- B. Submit survey reports as described in Part 1.

3.04 MAXIMUM ALLOWABLE SETTLEMENT (OR HEAVE)

- A. Notify Engineer immediately if any settlement occurs.

- B. The maximum allowable settlement (or heave) is 0.25-inch at any monitoring location.
- C. Corrective action to avoid additional settlement or heave shall be taken by the Contractor if the measured settlement (or heave) exceeds one-half of the maximum allowable settlement (or heave). Potential corrective actions include modifying the tunneling technique, changing equipment, etc.
- D. If the maximum allowable settlement (or heave) is exceeded, the Contractor shall implement a corrective action plan acceptable to the City of Marina and the jurisdictional authority. The Contractor shall restore the pavement, ground surface and all other surface features to the pre-construction elevations to the satisfaction of the City of Marina and Caltrans.

END OF SECTION

SECTION 02240

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Installation and maintenance of dewatering systems.
 - 2. Disposal of water entering excavation or other parts of the work.

1.02 SYSTEM DESCRIPTION

- A. Design requirements:
 - 1. Keep excavations reasonably free from water. The static water level shall be drawn down a minimum of 2 feet below the bottom of excavations.
 - 2. The analysis shall include an evaluation of the anticipated subsurface conditions, required well spacing, diameter of wells, depth screen interval, backfill and filter pack, pump size, drawdown duration, drawdown and steady state flow rates, desilting tank, and settlements.
 - 3. Dewatering calculations shall include water drawdown curves.
 - 4. Dewatering design shall be coordinated with excavation and shoring design. The shoring and excavation design shall recognize the changes in groundwater conditions and earth pressures.
 - 5. Do not place concrete or masonry foundations or floors in water, nor allow water to rise over them until concrete or mortar has set at least 24 hours.
 - 6. Maintain operation of the dewatering system until the complete structure including walls, slabs, beams, struts, and all other structural elements have been constructed and the concrete has attained specified strength, and backfill has been completed to 3 feet above the normal static groundwater level.
 - 7. Provide standby power to ensure continuous dewatering in case of power failure.
- B. Secure written permission from the Engineer before locating wells, well points, or drain lines for purposes of dewatering within limits of structure foundation.
- C. Locate dewatering facilities where they will not interfere with utilities and construction work to be performed by others.
- D. Open manholes will not be allowed for discharge piping. Approval of each discharge location shall be obtained from the Engineer.

1.03 SUBMITTALS

- A. Dewatering plan:
 - 1. Arrangement, location, depths of system components.
 - 2. Type and sizes of filters.
 - 3. Required permits.

- B. Well construction logs that include:
 - 1. Descriptions of actual materials encountered.
 - 2. Construction details.
 - 3. Well development procedures and results.
 - 4. Deviations from original design.
- C. Laboratory test results.
- D. Identify the proposed alignment of the discharge pipe and method of for the pipe to enter the manhole. Provide details of the pipe entering the manhole.
- E. Qualifications:
 - 1. Dewatering contractor.
 - 2. Dewatering design engineer.
 - 3. Testing laboratory.

1.04 QUALITY ASSURANCE

- A. Qualifications of a Dewatering Design Engineer:
 - 1. Dewatering Plan and Dewatering System Analysis:
 - a. Prepared by a registered Civil Engineer, registered in the state where the Project is located. The Civil Engineer shall have at least 8 years of experience in designing similar systems.
 - b. Submit qualifications of the dewatering contractor, the Dewatering Design Engineer, sampling service, and testing laboratory.
- B. Regulatory requirements:
 - 1. Assume responsibility for obtaining water discharge permits that are required.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide and maintain during construction: Ample means and devices with which to promptly remove and properly dispose of water entering excavation or other parts of the work, whether water is surface water or underground water.
- B. Intercept and divert precipitation and surface water away from excavations through the use of dikes, curb walls, ditches, pipes, sumps, or other means.
- C. Disposing of water:
 - 1. Dispose of water from the work in suitable manner without damage to adjacent property.
 - 2. Do not drain water into work built or under construction.
 - 3. Dispose of water in such manner as not to be a menace to public health.

- D. Wells, well points, and drain lines for dewatering:
 - 1. Locate after receiving Engineer's written permission.
 - 2. Fill dewatering wells, pipes, and French drains to be left in place within structure foundation limits with Class "C" concrete as specified in Section 03300 - Cast-in-Place Concrete or grout as specified in Section 03600 - Grouting.

3.02 CONSTRUCTION

- A. Interface with other work:
 - 1. Prior to release of groundwater to its static level:
 - a. All groundwater pressure relief devices for the structure shall be fully operational.
 - b. Construction of structure shall be complete and the concrete shall have reached specified strength.
 - c. Backfill of structure shall be complete.
 - d. Release of groundwater to its static level shall be controlled to prevent disturbance of the natural foundation soils or compacted backfills and fills and to prevent flotation or movement of structures or pipelines.

END OF SECTION

SECTION 02260

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Requirements for designing, providing, maintaining, and removing excavation support and protection.

1.02 REFERENCES

- A. American Society of Civil Engineers (ASCE):
 - 1. Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
- B. California Code of Regulations (CCR):
 - 1. Title 8 - Industrial Relations:
 - a. Division 1. Department of Industrial Relations:
 - 1) Chapter 4. Division of Industrial Safety.
 - a) Subchapter 4. Construction Safety Orders:
 - (1) Article 6. Excavations.
- C. Department of the Navy Naval Facilities Engineering Command (NAVFAC):
 - 1. Design Manual 7.2 - Foundations and Earth Structures.
 - 2. Design Manual 7.3 - Soil Dynamics and Special Design Aspects.
- D. State of California Department of Transportation (Caltrans):
 - 1. Caltrans California Trenching and Shoring Manual.
- E. United States Steel Corporation (USS):
 - 1. Steel Sheet Piling Design Manual.

1.03 DEFINITIONS

- A. General Engineering Design Practice: General engineering design practice in area of the Project, performed in accordance with recent engineering literature on subject of shoring and stability of excavations.
- B. Shoring: A temporary structural system designed to support vertical faces, or nearly vertical faces, of soil or rock for purposes of excavation. Shoring includes cantilevered sheet piling, internally braced sheet piling, slurry walls, soldier piles and lagging, and other similar shoring systems. Sloping of the soil is not shoring.
- C. Support levels: Level of tiebacks, wales, rackers, bottom of excavation, and other types of support.

1.04 SYSTEM DESCRIPTION

- A. Where General Engineering Design Practice is specified, provide drawings and calculations that are performed and signed by civil or structural engineer registered in State where Project is located:
1. Clearly disclose assumptions made, criteria followed, and stress values used for materials being used in design calculations.
 2. Submit list of references acceptable to Engineer that substantiating appropriateness of design assumptions, criteria, and stress values.
- B. Design requirements:
1. General:
 - a. In accordance with requirements in CCR, Title 8, Chapter 4, Subchapter 4, Article 6 for trench excavations 5 feet or more in depth and for trenches less than 5 feet in depth when there is potential for cave-in:
 - 1) Where such designs vary from excavation support standards set forth in CCR, Title 8, Chapter 4, Subchapter 4, Article 6, submit design calculations pursuant to general engineering design practice.
 - 2) Provide means for safe and stable excavations that are not less effective than required in CCR, Title 8, Chapter 4, Subchapter 4, Article 6.
 - 3) The preceding requirements do not apply to trench excavation support conforming to standards set forth CCR, Title 8, Chapter 4, Subchapter 4, Article 6.
 - b. Dewatering:
 - 1) Dewater soil inside shoring as specified in Section 02240 - Dewatering for Structures.
 - 2) Do not lower groundwater outside of shoring more than 1 foot.
 - 3) Recharge groundwater outside shoring to limit groundwater draw down outside of shoring to amount specified above.
 - c. When electing to design with material stresses for temporary construction higher than allowable stresses prescribed in the Manual of Steel Construction and the Uniform Building Code, increase in such stresses shall not exceed 10 percent of value of prescribed stresses.
 - d. Minimum safety factor used for design shall not be less than 1.5.
 - e. The calculated minimum depth of penetration of shoring below bottom of excavation shall be increased not less than 30 percent if full value of allowable passive pressure is used in design.
 - f. Maximum height of cantilever shoring above bottom of excavation shall not exceed 15 feet. Use braced shoring when height of shoring above bottom of excavation exceeds 15 feet.
 - g. The location of point of fixity for shoring shall not be less than half calculated minimum embedment depth below bottom of excavation.
 - h. Generally acceptable references for design of shoring and excavations are as follows:
 - 1) ASCE Guidelines of Engineering Practice for Braced and Tied-Back Excavations.
 - 2) Caltrans California Trenching and Shoring Manual.
 - 3) NAVFAC Design Manual 7.2.
 - 4) NAVFAC Design Manual 7.3.
 - 5) USS Steel Sheet Piling Design Manual.

- i. Maximum total deflection of shoring at any point on shoring shall not be more than 1/2 inch.
- 2. Soldier piles and lagging:
 - a. Provide lagging over full face of excavation. Joints between pieces of lagging shall be tight to prevent loss of soil.
 - b. Provide full face lagging all around penetrations through lagging.
 - c. If the soldier piles are installed in predrilled holes and are not concrete encased, fill predrilled holes with controlled low strength material as specified in Section 02312 - Controlled Low Strength Material (CLSM) after soldier's piles are installed.
 - d. Assumed effective width for passive soil resistance:
 - 1) Effective width of driven soldier piles shall not exceed 2 times width of pile.
 - 2) Effective width of CLSM encased soldier piles in drilled holes shall not exceed 2 times width of pile.
 - 3) Effective width of concrete encased soldier piles shall not exceed 2 times width of concrete encasement.
 - e. Fill voids behind lagging with gravel or other material acceptable to Engineer.
 - f. Apply loads from tie back soil, rock, or deadman anchors concentrically to soldier piles or wales spanning between soldier piles:
 - 1) Wales shall be back-to-back double channels or other members acceptable to Engineer.
 - 2) Do not eccentrically load structural section of soldier piles or wales.
 - g. Design soldier piles for downward loads including vertical loads from tieback anchors.
- 3. Soil anchors, rock anchors, and deadman anchors:
 - a. Design tieback anchors for a safety factor of not less than 2 times calculated load from shoring.
 - b. Proof load all production anchors to 150 percent of calculated load from shoring.
 - c. Lock off production anchors at calculated load from shoring.
 - d. Length of soil anchors used to calculate resistance to load from shoring shall not include any length within potential active pressure soil failure zone behind face of shoring.
 - e. Design tie rods for tieback anchors for 130 percent of calculated load from shoring.
 - f. Design tie rods for tieback anchors for 150 percent of the calculated load from shoring when tie rod couplers are used and for other conditions where stress concentrations can develop.
- 4. Set inside face of shoring back from structure not less than greater of following:
 - a. 5 feet from face of wall.
 - b. 2 foot 6 inches from edge of foundation.
 - c. Depth of excavation below bottom of foundation.

C. Performance requirements:

- 1. General:
 - a. Support faces of excavations and protect structures and improvements in vicinity of excavations from damage and loss of function due to settlement or movement of soils, alterations in ground water level caused by such excavations, and related operations.

- b. Specified provisions:
 - 1) Complement, but do not substitute or diminish, obligations of Contractor for furnishing of safe place of work pursuant to provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and regulations and for protection of Work, structures, and other improvements.
 - 2) Represent minimum requirement for:
 - a) Number and types of means needed to maintain soil stability.
 - b) Strength of such required means.
 - c) Methods and frequency of maintenance and observation of means used for maintaining soil stability.
- 2. Provide safe and stable excavations by means of sheeting, shoring, bracing, sloping, and other means and procedures, such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain stability of soils and rock.
- 3. Provide support for trench excavations for protection of workers from hazard of caving ground.
- 4. Provide shoring:
 - a. Where, as result of excavation work and analysis performed pursuant to general engineering design practice, as defined in this Section:
 - 1) Excavated face or surrounding soil mass may be subject to slides, caving, or other types of failures.
 - 2) Stability and integrity of structures and other improvements may be compromised by settlement or movement of soils, or changes in soil load on structures and other improvements.
 - b. For trenches 5 feet and deeper.
 - c. For trenches less than 5 feet in depth, when there is potential for cave-in.
 - d. Where indicated on the Drawings.
- 5. For safe and stable excavations, use appropriate design, construction, and maintenance procedures to minimize settlement of supported ground and to prevent damage to structures and other improvements, including:
 - a. Using stiff shoring systems.
 - b. Following appropriate construction sequence.
 - c. Using shoring system that is tight enough to prevent soil loss through the shoring.
 - d. Using shoring system that extends far enough below bottom of excavation to prevent piping, heave, or flow of soil under shoring.
 - e. Design for safety factor of not less than 1.50.
 - f. Providing surface runoff routing and discharge away from excavations.
 - g. Where dewatering inside shoring is necessary, recharge groundwater outside shoring as necessary to prevent settlement in area surrounding shored excavation.
 - h. Where sheet piling is used, use interlocking type sheets:
 - 1) Sheet piles shall be continuous and driven in interlock.
 - 2) If bottom of the excavation is located below the water table, use "ball and socket" or "thumb and finger" type interlock.
 - i. Not applying shoring loads to existing structures and other improvements.
 - j. Not changing existing soil loading on existing structures and other improvements.
 - k. Provide welded steel packing between soil retaining members such as sheet piles and wales and similar members when gap exceeds 1/2 inch before wales are loaded.

1.05 SUBMITTALS

- A. Shop drawings and calculations:
 - 1. Calculations for different load, support, and other conditions that occur during the sequence of installation of shoring, construction of facilities protected by shoring, and sequence of removal of shoring.
 - 2. Sketches showing the condition at various stages of installation and removal of shoring.
 - 3. Show on plan shoring, structures, pipelines, and other improvements located near shoring.
 - 4. When utilities penetrate shoring, show location of penetrations on elevation of all sides of shoring.
 - 5. Show details for ground support and sealing around utility penetrations.
 - 6. Indicate method used for installing driven shoring.
- B. Control points and schedule of measurements:
 - 1. Submit location and details of control points and method and schedule of measurements.
 - 2. Survey data.
- C. Detailed sequence of installation and removal of shoring:
 - 1. Consider effects of ground settlement in sequence of installation and removal of shoring.
 - 2. Provide sketches showing conditions at various stages in sequence of installation and removal of shoring.
- D. Submit submittals for excavation support and protection as complete package and include all items required in this Section:
 - 1. Incomplete submittals will not be reviewed and will be returned for resubmittal as complete package.
- E. Submit dewatering submittals as specified in Section 02240 - Dewatering for Structures with submittals for excavation support and protection.

1.06 SEQUENCING

- A. Do not begin construction of any shoring or excavation operations until:
 - 1. Submittals for shoring and dewatering have been accepted.
 - 2. Control points as specified in this Section and on existing structures and other improvements as indicated on the Drawings have been established and surveyed to document initial elevations and locations.
 - 3. Materials necessary for installation are on site.
- B. Submit submittals minimum of 60 days prior to scheduled date to begin excavation work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Installation of shoring:
 - 1. Install means for providing safe and stable excavations as indicated in submittals.

- B. Removal of shoring:
 - 1. Except for concrete encased soldier piles, slurry walls, and similar shoring systems, remove shoring by completion of Work.
 - 2. Select shoring system and method of removal, which will minimize soil that sticks to shoring from creating voids and causing settlement.
 - 3. To prevent settlement caused by pulling shoring, fill voids with pressure injected grout:
 - a. Inject grout starting at bottom of void and progressively fill void to grade.
 - b. Minimize length of shoring removed ahead of grouting operation and limit time void is left ungrouted to prevent void from closing up before being grouted.
 - 4. Pressure preservative treated wood lagging may be left in place if acceptable to Engineer.

- C. Control points:
 - 1. Establish control points on shoring and on structures and other improvements in vicinity of excavation for measurement of horizontal and vertical movement:
 - a. Set control points on shoring support system:
 - 1) Set points at distances not exceeding 25 feet at each support level.
 - 2. Promptly upon completion of construction of control points survey control points. Submit copy of field notes with measurement.
 - 3. Perform horizontal and vertical survey and measurement of control points at least once every week:
 - a. Field notes shall show current measurement and change in measurement from first measurement taken.
 - 4. Set control points on corners of existing structures and on curbs, manholes, and other improvements at the locations indicated on the Drawings.
 - 5. Provide plumb bobs with horizontal targets indicating original position of plumb bobs in relation to shoring at control points.

- D. Maintenance:
 - 1. Where loss of soil occurs, plug gap in shoring and replace lost soil with fill material acceptable to Engineer.
 - 2. Where measurements and observations indicate possibility of failure or excessive movement of excavation support, determined in accordance with general engineering design practice, take appropriate action immediately.

END OF SECTION

SECTION 02261

SHAFT EXCAVATION AND SUPPORT FOR TRENCHLESS PIPELINE INSTALLATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section provides the minimum requirements and acceptable construction methods for excavation and support of the shafts for the trenchless pipeline installations. Refer to Section 02260 - Excavation Support and Protection for all other excavation support and protection.
- B. The Contractor shall design, furnish, install, and maintain a system of temporary supports, including all bracing and associated items, to retain excavations in a safe manner, to control ground movements and to control groundwater inflows. Upon completion of the required excavation and pipe installation, the Contractor shall remove the support system as Specified herein, and shall backfill the excavations with aggregate base course in accordance with Section 02300 - Earthwork or controlled low strength material in accordance with Section 02312 - Controlled Low Strength Material (CLSM).
- C. The work shall include site grading; temporary access road construction where needed; safety fencing and signage; protection of utilities; construction staging areas; design and construction of shaft excavations and excavation support systems; material disposal; ground improvement where necessary and where shown on the Drawings; control and disposal of groundwater (in locations where dewatering is allowed), infiltrating groundwater, surface water, and construction water; removal, backfilling and abandoning shafts; and site restoration.
- D. The Contractor shall have sole responsibility for selection of shaft types (subject to the requirements of this Specification), construction methods, and exact sizing and locations of the excavations to accommodate shoring, bracing, and pipe installation to the specified lines, grades and tolerances. The shafts shall be sized to facilitate construction of all facilities shown on the Drawings.
- E. Acceptable shaft types include: interlocking sheetpiles, slide rail systems, soldier piles and lagging, or other contractor proposed construction methods subject to review and written approval by the Engineer. The following shaft construction methods shall not be allowed at any crossing: trench boxes, speed shores or sloped open excavations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02233 - Settlement Monitoring.
- B. Section 02300 - Earthwork.
- C. Section 02240 - Dewatering.

- D. Section 02261 - Excavation Support and Protection.
- E. Section 02224 - Guided Auger Boring.
- F. Section 03360 - Contact Grouting.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The publications listed below form a part of this Specification to the extent referenced. Where conflicts between these Specifications and the referenced specification, code, or standard occur, the more restrictive specification shall govern. The latest edition available on the date of issue of Contract Documents shall be used.
- B. Commercial standards:
 - 1. AISC - Manual of Steel Construction.
 - 2. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 3. ANSI/AWS - D1.1, Structural Welding Code.
 - 4. ASTM A328 - Standard Specification for Steel Sheet Piling.
 - 5. Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Part 1926 Subpart P - Excavations and Subpart S - Underground Construction.
- C. Standard Specifications and guidelines:
 - 1. ASCE Standard Design and Construction Guidelines for Microtunneling, ASCE/CI 36-15.

1.04 DEFINITIONS

- A. Sheetpile Shaft: A watertight excavation support system consisting of interlocking steel sheetpiles driven, vibrated, or hydraulically-pressed into place, with a concrete working slab and/or tremie slab designed to prevent groundwater inflows, heave, shaft uplift, and equipment support.
- B. Slide Rail Shaft: An excavation support system composed of vertical steel posts and steel sheets that slide into pre-fabricated slots or grooves in the steel posts. The posts extend beneath the excavation bottom sufficient distance to resist rotation and lateral deformation from external earth pressures. The sheets are pushed downward as the excavation is advanced, and typically should not lag behind excavation by more than 2 feet, depending on soil conditions. Excessive unsupported excavation depths can lead to sloughing or caving. Slide rail systems are not considered watertight shaft support systems and are not recommended if groundwater is anticipated above the shaft bottom, unless adequate provisions have been made for external dewatering. The shaft bottom may be covered with a concrete slab, gravel/aggregate, or left exposed depending on soil and groundwater conditions and intended use.
- C. Soldier Pile and Lagging Shaft: A non-watertight excavation support system composed of vertical steel H-piles, wales, struts, and lagging. The vertical H-piles extend from ground surface to a sufficient depth below the final excavation depth to provide adequate resistance against earth pressures. Lagging, consisting of wooden boards or steel sheets is inserted between the flanges of the adjacent H-beams to support the excavation and prevent soil from sloughing or caving into

the excavation. Wales are horizontal support beams installed and welded to the vertical soldier piles to stiffen the support system and are sized and installed at a vertical spacing to safely support external earth loads. The shaft bottom is covered with a concrete slab with 1 or more sumps.

1.05 DESIGN CRITERIA

- A. The Contractor shall have sole responsibility for selection of shaft types, construction methods, and shaft excavation sizes to complete the Work, meeting the requirements of these Specifications. The size of the shafts shall be adequate to complete all trenchless construction as described in the Contractor's submittals, and to construct all pipelines and structures shown on the Drawings. Shaft sizes shown on the drawings are approximate and the Contractor shall size and design the required shaft. Shafts shall not interfere with existing utilities.
- B. Excavation support systems shall be designed and stamped by a Civil or Structural Engineer registered in the State of California who has a minimum of 5 years of experience in the design of soil retaining structures.
- C. Where a thrust block is used for trenchless construction (jacking, boring, microtunneling, etc.) the thrust block shall be designed and stamped by the same Civil or Structural Engineer designing the excavation support system to confirm the thrust block and shoring system can handle the construction loads.
- D. Shafts shall be designed to provide a continuous, stable, dry excavation support system that shall support all earth pressures, bottom heave pressures, equipment, applicable traffic, and construction loads and pressures (i.e. annulus grouting pressures) and other surcharge loads in accordance with the site conditions, the conditions described in the Geotechnical Report, the conditions anticipated by the Contractor, and other requirements described in these Drawings and Specifications.
- E. Design excavation support systems in accordance with AISC and ACI code provisions, as applicable.
- F. The shaft design shall allow the safe and expeditious construction of the permanent facilities without excessive movement or settlement of the ground, and in a manner that will prevent damage to, or movement of, any adjacent structures, utilities, or other facilities. Monitor and protect adjacent utilities from horizontal and vertical movements.
- G. The Contractor shall ensure that the depth of the shaft excavations allows sufficient vertical clearance for placement of the tremie/working slab and jacking frame at the required elevations to install the pipeline, as shown on the Drawings. Survey of final shaft bottom elevations shall be recorded and submitted.
- H. All shaft components, including external supports shall be within the construction easement or public rights-of-way.
- I. The design of shoring and protection methods that meet the specification requirements herein are the Contractor's responsibility and shall be of a size large enough to facilitate all the necessary groundwater control, construction operations, guided boring operations, carrier pipe installation, and to accommodate indicated

connections to other reaches of the project. Shoring design is subject to review and approval by the Engineer. Allowable shoring options include:

1. Interlocking steel sheetpiles.
 2. Solider piles and lagging.
 3. Slide rail.
- J. The jacking shaft and thrust block shall be designed to provide adequate jacking capacity to resist anticipated jacking forces with a factor of safety of not less than 1.5.
- K. The shaft floors shall be designed with a sump to allow removal of any groundwater, surface water, rainwater, or construction water that enters the shaft. The Contractor shall not discharge water into storm sewers, sanitary sewers, water bodes, or streets without obtaining and submitting copies of the required permits.
- L. The Contractor shall ensure that the depth of the shaft excavations allows sufficient vertical clearance for placement of the jacking frame at the required elevations to install the pipeline, as shown on the Drawings. Shaft bottom elevations shall be surveyed and submitted.
- M. Shafts shall be designed for staged installation and removal of all or portions of at least the upper 5 feet to accommodate construction of connections and backfill sequences.
- N. When in use, shafts shall have protective guard rails or fencing surrounding the shaft that complies with OSHA requirements.
- O. Portal stabilization:
1. The Contractor shall provide portal stabilization to prevent soil inflows and to control groundwater inflows during launch and retrieval of the guided boring equipment, as necessary.
 2. Portal stabilization methods shall ensure that no soil and not more than 5 gallons per minute of water enter the shaft when creating portals for the launch or retrieval of the boring equipment.
 3. The Contractor may accomplish portal stabilization by the use of grouting, the guillotine wall (double-wall) method, methods integral to the shoring system, or by other Contractor proposed methods, subject to the requirements of these Specifications and Engineer's written approval.
- P. Sheetpile shafts:
1. Fully interlocking steel sheetpiles shall be used to construct the sheetpile shafts.
 2. Sheetpile corners shall be installed with interlocks and bulbs properly engaged for full depth of sheetpiles. If interlocks and bulbs cannot be properly engaged for full depth, connections shall be welded continuously to seal all cracks and avoid inflows of groundwater and soils.
 3. Sheetpiles shall be installed plumb to within 1 percent of vertical. Sheetpiles that do not meet plumb tolerances will be pulled and reinstalled by Contractor, at no additional cost to the Owner.
 4. Internal supports, including wales, struts, and corner braces, shall be installed sequentially as the shaft is excavated. At no time shall the unbraced shoring depth exceed the design spacing of horizontal support members plus 2 feet,

as shown on approved submittals. All internal supports shall be installed within +/-3 inches of design locations shown on approved submittals.

5. All struts shown or required in the Contractor's approved design submittal shall be installed after each level of wales are installed and preloaded by jacking to 50 percent of design capacity, before excavation resumes. Steel wedges, or shims, shall be installed and welded in place to lock in preloaded stresses and prevent excessive lateral deformations.
6. The strength of any grout mixture used behind the steel sheetpiles for the purposes of guided boring shall be selected to allow the guided boring machine to penetrate and excavate or advance through the grouted zone during both launch and retrieval.

Q. Soldier pile shafts:

1. Internal supports, including wales, struts, and corner braces, shall be installed sequentially as the shaft is excavated. At no time shall the unsupported excavation depth exceed the Contractor's design location for wales or struts, plus 2 feet, as shown on the Contractor's submittals. All internal supports shall be installed within +/-3 inches of design locations shown on approved submittals.
2. Struts shall be installed and preloaded by jacking to 50 percent of design capacity, before excavation resumes. Steel wedges, or shims, shall be installed and welded in place to lock in preloaded stresses and prevent excessive lateral deformations.
3. It is anticipated that pre-drilling will be required to install soldier piles.
4. Install piles to the tip elevations shown in approved submittals.
5. Provide timber, steel, or precast concrete lagging or sheets of sufficient thickness to withstand lateral earth pressures.
6. Install lagging with no vertical or horizontal gaps between adjacent boards or sheets. As installation progresses, backfill the voids between the excavation face and the lagging with sand or pea gravel, or lean grout packed into place. Pack with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of fines due to piping.

R. Slide rail shafts:

1. Vertical posts shall be embedded sufficient depth below shaft bottom to adequately resist earth loads that could cause excessive rotation or lateral deformation. Vertical posts shall be sized and spaced to safely resist lateral earth pressure and any surcharge and traffic loads.
2. It is anticipated that pre-drilling will be required to install vertical posts.
3. Steel sheets shall be fully engaged in the slots in the adjacent vertical posts for the full perimeter. The sheets shall be sized to safely span and resist earth loads between posts.
4. Steel sheets shall be advanced concurrent with the excavation and at no time shall the unsupported excavation depth exceed 2 feet.
5. As installation progresses, backfill voids between sheets and soil with sand or pea gravel. Pack voids with hay or burlap when necessary to allow drainage without loss of fines.

1.06 QUALITY CONTROL, TESTS, AND INSPECTIONS

- A. Contractor qualifications and experience: The Contractor who shall perform the work specified herein shall have successfully completed at least 3 shafts using each

of the proposed shaft construction methods of similar size, depth, and complexity, and in similar soil conditions, within the past 6 years. In addition, the superintendent(s) for the construction work shall have demonstrated successful experience with the proposed shaft construction method(s).

- B. The Contractor shall immediately notify the Engineer, in writing, when any problems are encountered with equipment or materials, or if the Contractor believes the conditions encountered are materially and significantly different than those represented within the Contract Documents.
- C. Construction Monitoring: Settlement of adjacent property and/or facilities will not be permitted. Monitor shaft excavations in accordance with Section 02233 - Settlement Monitoring.
- D. The Contractor shall coordinate with the Engineer regarding additional quality assurance testing to be provided at the Owner's discretion. The Contractor shall permit free access during construction of shoring systems for the Owner's testing staff. The Contractor shall allow access to the Engineer and shall furnish necessary assistance and cooperation to aid the Engineer in observations and data and sample collection.
- E. Quality control, testing, and inspection shall be provided as required by the Contractor's design engineer and in accordance with approved submittals. The Contractor's design engineer shall visit the site to observe the work in progress.
- F. All work shall be performed in the presence of the Construction Manager, unless the Construction Manager has granted prior approval in writing to perform such work in her/his absence.

1.07 SUBMITTALS

- A. Provide sufficient detail to allow the Engineer to judge whether the proposed equipment, materials, and procedures will meet the Contract requirements. All drawings shall be legible with dimensions accurately shown and clearly marked in English. Review and acceptance of the Contractor's submittals by the Engineer shall not be construed in any way as relieving the Contractor of its responsibilities under this Contract.
- B. Qualifications:
 - 1. Submit the names and qualifications of the design engineer responsible for each excavation support system design.
 - 2. Submit qualifications of shaft contractor who will be installing each shaft type to be constructed in accordance with the requirements listed in Paragraph 1.6 A. Provide project name, date, Owner's contact information, details of shaft geometry and construction, and soil and groundwater conditions.
 - 3. Submit the name and qualifications of Superintendent(s) who will be supervising shaft construction for each shaft type.

- C. For each shaft type submit the following describing the equipment and construction methods to be employed:
 - 1. Scaled drawings (plan, profile, and section views with dimensions and sizes) showing:
 - a. The proposed shaft elements and shoring system to be used.
 - b. Adjacent and nearby existing structures and utilities.
 - c. Details of trenchless pipe penetrations.
 - d. Details of pipe penetrations for connection to open cut sections of the pipeline.
 - e. Staging areas for all shaft construction operations.
 - 2. Methods and sequencing of excavation and installation of staged excavation support including a schedule with major milestones such as driving of piles, installation of lagging, pouring of concrete working slab, thrust block construction, grouting, and dewatering of shaft interior, etc.
 - 3. Design Calculations: Submit all calculations in a legible, comprehensible format. The calculations shall be performed by or under the direct supervision of a Civil or Structural Engineer registered in the State of California, who shall stamp and sign the design calculations:
 - a. Provide design calculations for the shoring and bracing indicating it can withstand all earth and groundwater pressures, thrust forces, equipment, applicable traffic, and construction loads and other surcharge loads in accordance with the site conditions, the geotechnical information listed in the Geotechnical Report, and any other requirements described in these Drawings and Specifications.
- D. Methods and details of excavation, containment, hauling, and disposal of the excavated materials, all spoils, and other materials used in shaft construction.
- E. Written documentation signed by the disposal site owner or manager indicating that the site will accept the spoil and that the site is in compliance with all applicable local, State, and Federal regulations. Submit muck transport plans including route to be used and measures to avoid spillage onsite or onto streets and highways.
- F. Describe procedures for excavation of the soils from the shaft interior. Describe the procedures for excavation of hard/very dense soils and soft rock.
- G. Describe procedures for control of groundwater inflows after excavation has been completed, method of maintaining bottom stability, and protection of subgrade.
- H. Concrete mix information and placement procedures for the working slab and/or any annular grouting. Describe the procedure for installing concrete working slab to the required grade and at the correct elevation.
- I. Details for protecting existing utilities and structures within zone of influence.
- J. Details of procedures for preloading bracing members.
- K. Procedures for checking and maintaining plumbness of the shaft and ensuring proper elevation is reached.
- L. Method for establishing survey control and transferring line and grade to shaft entry and exit locations.

- M. Contingency plans for anticipated difficulties and proposed resolutions including:
1. Excessive movement of shaft elements.
 2. Flooding.
 3. Bottom heave.
 4. Inability to install the shaft to the required depth.
- N. Steel sheetpile shafts:
1. Describe equipment and procedures to be used to construct the sheetpile shafts.
 2. Describe procedure for installing and sealing corners.
 3. Describe procedure for verifying that shaft bottom is at the correct elevation.
 4. Describe procedures for providing control of groundwater inflows and soil at launch/retrieval locations.
- O. Soldier pile shafts and slide rail shafts:
1. Describe the equipment, procedures, and sequence to be used to construct the soldier pile shafts or slide rail shafts.
 2. Describe the equipment and procedures and its successful use on other projects with similar soil conditions.
 3. Provide details for installing piles, lagging, plates, wales, struts and braces.
 4. Describe method of monitoring deviation of shaft supports and proposed corrective measures to be implemented if necessary.
 5. Describe method for ensuring dry shaft bottom for tunneling operations.
- P. Portal stabilization:
1. Submit in detail the steps that will be taken to ensure the soil is stable prior to boring through/removal of the shaft wall. The Contractor shall submit ground improvement methods that will be used, if necessary, to stabilize soil at the launch/retrieval locations to prevent inflow of soil and groundwater into the shaft.
 2. Provide a description of the methods to be used for each portal stabilization technique proposed. Provide a description of the method for verifying soil stability prior to removing shoring at entry and exit portals. Provide shop drawings showing the details and dimensions of each stabilization system and full narrative describing the procedures.
 3. Provide a description of the secondary or remedial methods that will be employed if the initial stabilization efforts fail to achieve the required stabilization.
 4. Provide mix designs for any concrete or grout proposed as a part of the portal stabilization work.
- Q. Construction records: The Contractor shall submit the following to the Engineer at the times indicated:
1. Written daily progress reports shall be submitted during construction. The progress reports shall have field logs recorded at intervals of 5 feet or less during excavation and shall be submitted to the Engineer within 1 working day of the shift for which the logs were created. As a minimum, the logs shall include:
 - a. The date, starting time, and finish time.
 - b. Equipment used.
 - c. Actual quantities and descriptions of excavated material.

- d. Any unusual conditions, breakdowns, and delays, including problems with support, bottom instability, and obstructions.
 - e. Detailed description of the support installed, including sizes, lengths, spacing, and elevations relative to excavation elevation.
 - f. Pumping rates from shaft sumps and inflow conditions.
 - g. Deformation monitoring results, and record of action taken by the Contractor's designer and the Contractor if excessive deflections are observed.
2. Post-construction: Within 15 days of backfill of excavations, the Contractor shall submit a detailed as-built location plan of all remaining buried shoring members including size, location, and cutoff elevation.

1.08 SAFETY

- A. The Contractor shall be solely responsible for, and bear the sole burden of cost for any and all damages resulting from improper shoring or failure to shore.
- B. The safety of workers, the protection of adjacent structures, property and utilities, and the installation of adequate supports for all excavations shall be the sole responsibility of the Contractor.
- C. The design, planning, installation and removal of all shoring shall be accomplished in such a manner as to maintain stability of the required excavation and prevent movement of soil that may cause damage to adjacent shoring systems, structures and utilities, damage or delay the Work, or endanger life and health.
- D. No gasoline powered equipment shall be permitted in jacking and receiving shafts. Diesel, electrical, hydraulic, and air powered equipment are acceptable, subject to applicable local, State, and Federal regulations.

1.09 TIME LIMITS ON RECEIVING SHAFT IN RESERVATION ROAD

- A. The time to construct the receiving shaft at the intersection of Blanco Road and Reservation Road, restore the shaft, and temporary pave shall not exceed 14 calendar days. See Section 00 52 00 - Agreement for liquidated damages associated with exceeding this allowable duration.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All structural steel used for the supporting systems, whether new or used, shall be sound and free from defects which may impair strength.
- B. Structural steel: ASTM A36.
- C. Steel sheetpiles: ASTM A328.

PART 3 EXECUTION

3.01 GENERAL

- A. Work hours and work days shall comply with all permit restrictions and shall be in accordance with requirements established in the Contract Documents.
- B. Shaft excavations and site development shall commence only after approval of applicable submittals by the Engineer. Install excavation support systems in accordance with approved submittals.
- C. Shaft construction activities shall not begin until the following tasks have been completed:
 - 1. Site safety representative has prepared a code of safe practices and an emergency plan in accordance with OSHA and other applicable requirements. Provide the Engineer with a copy of each prior to starting pipejacking.
 - 2. Hold safety meetings and provide safety instruction for new employees as required by OSHA.
 - 3. Conduct a pre-construction safety conference in accordance with OSHA requirements. Arrange this conference and inform the Engineer of the time and place of the conference at least 7 days in advance.
 - 4. Contractor has requested locates from all utility owners, in accordance with State One-call Laws and Common Ground Alliance best practices, and all requested utility locates have been made, or area marked clear.
 - 5. Contractor shall conduct visual site inspection and records search of as-builts to investigate potential unmarked, mismarked, and abandoned utilities.
 - 6. Contractor shall confirm locates of all marked and discovered utilities, using vacuum potholing or other soft dig techniques for all adjacent utilities within the tolerance zone defined by State One-Call Laws.
- D. Before beginning construction, adequately protect existing structures, utilities, trees, and other existing facilities. The repair of or compensation for Contractor-caused damage to existing facilities shall be at no cost to the Owner.
- E. The Contractor shall furnish all necessary equipment, materials, power, water, and utilities for shaft construction, utility protection, utility replacement, and other associated work required for the Contractor's methods of construction.
- F. Excavation shall be performed in sequence with installation of shoring and bracing in a manner that limits settlement of surrounding ground and adjacent vaults, utilities, structures, or roads, and that presents no hazard to traffic.
- G. The Contractor shall conduct all excavation, shoring, temporary facilities, materials storage, and construction traffic within construction easements established for this project. All work shall be in accordance with applicable permits.
- H. All welding shall conform to the applicable provisions of ANSI/AWS D1.1.
- I. The Contractor shall provide temporary safety railing and fencing around all excavations.

- J. The deviation from plumb shall not exceed 1 foot in 100 feet or 1 percent. Any correction of shaft deviation, and any construction and associated costs resulting from relocation of appurtenances inside the shaft, including pipe connections and the launch and retrieval seals, caused by the shaft's deviation from plumb or other deficiencies in workmanship shall be accomplished at the Contractor's expense and shall not be cause for schedule extension.
- K. All excavated spoils, polymers, or other materials used during shaft construction shall be completely contained when stockpiled on site, and shall be disposed of by Contractor at a licensed landfill site at completion of the shaft construction. Any spills shall be completely contained and cleaned up promptly by the Contractor. Under no circumstances will spoils or polymers be allowed to enter sanitary or storm sewers or any water body.
- L. Pumping from shaft sumps shall not result in boils, softening of the ground, or loss of fines. Sumps, sub-drains, and drain blankets shall be installed as necessary, using suitable filters or screens so that fines are not removed from the formation.

3.02 INTERNAL BRACING SUPPORT SYSTEM

- A. Internal supports, including wales, struts, and corner braces, if needed, shall be installed sequentially as the shaft is excavated. At no time shall the unsupported excavation depth exceed the design spacing plus 2 feet of horizontal support members as shown on approved submittals. All internal supports shall be installed within ± 3 inches of design locations shown on approved submittals.
- B. The internal bracing support system shall include wales, struts, corner braces, and/or plate stiffeners, as appropriate to safely support the design loads and consistent with means and methods of Contractor:
 - 1. Struts with intermediate bracing shall be provided as needed to enable shafts to carry maximum design load without distortion or buckling.
 - 2. Web stiffeners, plates, or angles shall be included as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.
 - 3. All bracing support members shall be installed and maintained in tight contact with each other and with the surface being supported.
 - 4. Bracing members shall be preloaded by jacking struts to control shoring movement. Bracing members shall be preloaded in accordance with methods, procedures, and sequences as described in the submittals. Excavation work shall be coordinated with installation of bracing and preloading. Steel shims and steel wedges shall be welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure. Support and preload shall be installed immediately after installation and prior to continuing excavation.
 - 5. Procedures that produce uniform loading of bracing member shall be used without eccentricities or overstressing and distortion of members of system.

3.03 STEEL SHEETPIILING INSTALLATION

- A. Steel sheetpiling shall be used only where the existing subsurface conditions are suitable for the installation of sheetpiling, including the use of pre-drilling to loosen the soils, to the full depth of penetration required, and to proper alignment and plumbness, without damage to the sheetpiling or rupture of its interlocks.
- B. Sheetpiles shall be driven in plumb position with each sheetpile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Sheetpiles shall be driven to the depth indicated on the shop drawings. Care shall be exercised in driving so that interlocking members can be extracted without damaging adjacent structures or utilities. The methods of driving, cutting, and splicing shall conform to the Shop Drawings.
- C. Sheetpile corners shall be installed with interlocks and bulbs properly engaged for full depth of sheetpiles. If interlocks and bulbs cannot be properly engaged for full depth, connections shall be welded continuously to seal all cracks and avoid inflows of groundwater and soils.

3.04 SOLDIER PILE AND LAGGING SHAFT INSTALLATION

- A. Install piles in predrilled holes, to the tip elevations shown in approved submittals. Provide casing or drilling mud, as necessary, to prevent caving of holes and loss of ground.
- B. After each soldier pile has been seated plumb in the drill hole, encase it with concrete or crushed rock from the tip to the bottom level of the final excavation.
- C. Apply vibration through the pile.
- D. Concrete strength shall be in accordance with submittals, and concrete shall be placed by means of a tremie system.
- E. Provide timber, steel, or precast concrete lagging or sheets of sufficient thickness to withstand lateral earth pressures.
- F. Install lagging with no gap between adjacent boards. As installation progresses, backfill the voids between the excavation face and the lagging with sand, pea gravel, or lean grout packed into place. Pack with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of ground due to piping.

3.05 SLIDE RAIL SHAFTS

- A. The Contractor shall embed vertical posts in predrilled holes with sufficient depth below shaft bottom to adequately resist earth loads that could cause excessive rotation or lateral deformation. Vertical posts shall be sized and spaced to safely resist lateral earth pressures and any surcharge and traffic loads.
- B. The Contractor shall ensure that steel sheets shall be fully engaged in the slots in the adjacent vertical posts for the full perimeter. The sheets shall be sized to safely span and resist earth loads between posts.

- C. Steel sheets shall be advanced concurrent with the excavation and at no time shall the unsupported excavation depth exceed 2 feet.
- D. As installation progresses, backfill the voids between the excavation face and the lagging with sand, pea gravel, or lean grout packed into place. Pack with materials such as hay, burlap, or geotextile fabric where necessary to allow drainage of groundwater without loss of ground due to piping.

3.06 PORTAL STABILIZATION

- A. The Contractor shall provide portal stabilization to prevent soil inflows and to control groundwater inflows during launch and retrieval of the guided boring equipment, as necessary.
- B. Portal stabilization methods shall ensure that no soil and not more than 5 gallons per minute of water enter the shaft when creating portals for the launch or retrieval of the boring equipment.
- C. The Contractor may accomplish portal stabilization by the use of grouting, the guillotine wall (double-wall) method, methods integral to the shoring system, or by other Contractor proposed methods, subject to the requirements of these Specifications and Engineer's written approval.

3.07 SETTLEMENT MONITORING

- A. Performance of excavation support system shall be monitored for both horizontal and vertical deflections.
- B. If excessive settlement or deflection of supports or surface features occur that exceed allowable values predicted by the Contractor's shoring designer or the maximum allowable values specified in Section 02233 - Settlement Monitoring, modifications to the excavation and shoring approach will be required:
 - 1. Revised submittals and calculations shall be submitted to the Engineer.
 - 2. Changes to excavation sequence and shoring shall be implemented as may be necessary at no additional cost to the Owner.

3.08 REMOVAL OF SUPPORT SYSTEM

- A. No portion of the excavation support shall be removed until support can be removed without damage to existing facilities, completed work, or adjacent property.
- B. Excavation support shall be removed in a manner that will maintain support as excavation is backfilled and will not leave voids in backfill. Removal of the support system shall be performed in a manner that will not disturb the pipeline, the compacted backfill, or adjacent construction or facilities.
- C. Any void left by shoring system or voids created by the removal of the shoring system shall be filled with controlled density fill, lean concrete, or cement grout, as approved by the Engineer to provide soil support between backfill zone and the native soil.
- D. The support system removed from the excavation shall remain the property of the Contractor and shall be removed from the site.

- E. As a minimum, excavation support shall be removed between the existing adjacent surface grade and 5 feet below the adjacent surface grade. As-built Drawings shall be prepared showing location of temporary shoring and bracing that remains in place.

3.09 CLEANUP

- A. The Contractor shall remove all construction debris, spoil, polymer, slurry, oil, grease, and other materials from the shaft, pipeline, and all surface work areas upon completion of construction of the pipeline. Cleanup will be incidental to the construction. No separate payment shall be made for the cleanup.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Loosening, excavating, filling, grading, borrow, hauling, preparing subgrade, compacting in final location, wetting and drying, and operations pertaining to site grading for buildings, basins, reservoirs, boxes, roads, and other facilities.
 - 2. Backfilling and compacting under and around structures.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specifications for Highway Bridges.
- B. ASTM International (ASTM):
 - 1. D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
 - 2. D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).

1.03 DEFINITIONS

- A. Backfill adjacent to structure: Backfill within volume bounded by the exterior surfaces of structure, the surface of undisturbed soil in the excavation around structure, and finish grade around structure.
- B. Embankments: Dikes, levees, berms, and similar facilities.
- C. Excavation: Consists of loosening, removing, loading, transporting, depositing, and compacting in final location, wet and dry materials, necessary to be removed for purposes of construction of structures, ditches, grading, roads, and such other purposes as are indicated on the Drawings.

1.04 SYSTEM DESCRIPTION

- A. Performance requirements:
 - 1. Where mud or other soft or unstable material is encountered, remove such material and refill space with stabilization material. Wrap stabilization material with stabilization fabric.
 - 2. Obtain acceptable import material from other sources if surplus or borrow materials obtained within Project site does not conform to specified requirements or are not sufficient in quantity.
 - 3. No extra compensation will be made for hauling of fill materials nor for water required for compaction.

1.05 SUBMITTALS

- A. Copy of Property Owner's Agreement allowing placement of surplus soil material on their property.
- B. Excavation plan.
- C. Testing lab: Owner shall select the testing laboratory.
- D. Test reports:
 - 1. Submit certified test reports of all tests specified to be performed by the Contractor.
 - 2. Sign and seal test reports by a registered Geotechnical Engineer in the State of California.

1.06 QUALITY ASSURANCE

- A. Contractor shall perform and pay for all testing.
- B. Initial compaction demonstration:
 - 1. Adequacy of compaction equipment and procedures: Demonstrate adequacy of compaction equipment and procedures before exceeding any of following amounts of earthwork quantities:
 - a. 50 cubic yards of backfill adjacent to structures.
 - b. 100 cubic yards of embankment work.
 - c. 100 cubic yards of fill.
 - d. 50 cubic yards of roadway base material.
 - e. 100 cubic yards of road fill.
 - 2. Compaction sequence requirements: Until specified degree of compaction on previously specified amounts of earthwork is achieved, do not perform additional earthwork of the same kind.
 - 3. After satisfactory conclusion of initial compaction demonstration and at any time during construction, provide confirmation tests as specified under "FIELD QUALITY CONTROL."
- C. Contractor shall perform all work related to this Section in accordance with the approved Stormwater Pollution Prevention Plan (SWPPP) and as specified in Section 01355A - Stormwater Pollution Prevention.

1.07 SEQUENCING AND SCHEDULING

- A. Schedule earthwork operations to meet requirements specified in this Section for excavation and uses of excavated material.
- B. If necessary, stockpile excavated material in order to use it at specified locations.
- C. Excavation, backfilling, and filling: Perform excavation, backfilling, and filling during construction in manner and sequence that provides drainage at all times.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Water for compacting: Use water from source acceptable to Engineer.
- B. Soil and rock materials:
 - 1. General:
 - a. Provide aggregate base course, Class 2 permeable, controlled low-strength material, drain rock, gravel, native material, sand, select material, and stabilization material where specified or indicated on the Drawings.
 - b. If suitable surplus materials are available, obtain native material and select material from cut sections or excavations or from borrow areas.
 - 2. Aggregate base course materials: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 3. Class 2 permeable: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 4. Drain rock: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 5. Gravel: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 6. Native material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 7. Sand: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 8. Select material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
 - 9. Stabilization material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
- C. Controlled low-strength material: As specified in Section 02312 - Controlled Low Strength Materials (CLSM).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions:
 - 1. Character and quantity of material:
 - a. Verify character and quantity of rock, gravel, sand, silt, water, and other inorganic or organic materials to be encountered in work to be performed.
 - b. Determine gradation, shrinkage, and swelling of soil, and suitability of material for use intended in work to be performed.
 - c. Determine quantity of material, and cost thereof, required for construction of backfills, cuts, embankments, excavations, fills, and roadway fills, whether from onsite excavations or borrow areas. Include in cost of work to be performed.
 - d. Include wasting of excess material, if required, in cost of work to be performed.

3.02 PREPARATION

A. Backfills:

1. After clearing and excavation are completed, scarify entire areas that underlie backfills or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
2. Recompact scarified areas to density specified before placing backfill material or concrete.
3. If foundation areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.
4. Do not place backfill against walls until:
 - a. Walls have been cast full height of structure and concrete has reached the specified strength.
 - b. Connecting slabs and beams have been cast, and concrete has reached the specified strength.
5. Prior to backfilling:
 - a. Remove all forms.
 - b. Clean all trash and debris from the excavation site.
6. After inspection of foundation, walls, and pipes, place backfill symmetrically around structures to prevent eccentric loading of structures.

B. Embankments:

1. After clearing is completed, scarify entire areas that underlie embankments to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
2. Recompact scarified areas to density specified for embankments before placing of embankment material.
3. If embankment areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.

C. Fills:

1. After clearing is completed, scarify entire areas that underlie fill sections or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
2. Recompact scarified areas to density specified for compacted fills before placing of fill material or concrete.
3. If fill areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.

D. Roadway fills:

1. After clearing is completed, scarify entire areas that underlie roadway fills to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.

2. Recompact scarified areas to density specified for roadway fills before placing of roadway fill material.
 3. If roadway fill areas have cemented rock, cobbles, or boulders, do not scarify the top 6 inches prior to compaction. Moisten the native soil and compact the coarse fill as specified in this Section.
- E. Sloped surfaces for fill or foundations:
1. Foundations for fill having slopes in excess of 1 vertical to 4 horizontal:
 - a. Bench or terrace to adequately key existing ground and fill built thereon.
 2. Slopes of original hillsides and old fills: Bench minimum of 10 feet horizontally as fill is placed.
 3. Provision of new benches:
 - a. Start new bench wherever vertical cut of next lower bench intersects existing grade.
 - b. Recompact material thus cut out along with new embankment material at no additional cost to the Owner.

3.03 INSTALLATION

- A. General:
1. Dispose of excavated materials that are not required or are unsuitable for fill and backfill in lawful manner.
 2. Dispose of surplus material on private property only when written permission agreement is furnished by owner of property. Submit copies of such agreements.
 3. Rocks, broken concrete, or other solid materials larger than 4 inches in greatest dimension: Remove from project site at no additional cost to the Owner.
 4. Stabilization of subgrade: Provide materials used, or perform work required, to stabilize subgrade so it can withstand loads that may be placed upon it by Contractor's equipment.
- B. Compaction:
1. Provide specified compaction for backfills, cuts, embankments, fills, roadway fills, and other earthwork.
 2. Perform confirmation tests to verify and confirm that work has complied, and is complying at all times, with compaction requirements specified in this Section for initial compaction demonstration and field quality control testing.
 3. In-place density of compacted backfills, cuts, embankments, fills, and roadway fills determined in accordance with ASTM D1556, or with ASTM D6938.
 4. Maximum density, laboratory compaction: Soil maximum density and optimum water content when tested in accordance with ASTM D1557.
 5. To prevent damage to structures due to backfilling operations, place backfill with equipment that does not exceed AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading, within a distance from the face of the structure of not less than 1/2 the depth of backfill. The depth of backfill is the distance between the level being compacted and the bottom of the excavation. Outside this distance, heavier compaction equipment may be used.
 6. Compact to percentage of maximum density as follows:
 - a. Backfill adjacent to structures: 95 percent.
 - b. Backfilling voids: 95 percent.
 - c. Embankments: 95 percent.

- d. Other areas: 90 percent.
- e. Under present and future structures: 95 percent.
- f. Under roadways, parking and storage areas, curbs, and sidewalks: 95 percent.
- g. Upper 6 inches of cuts: 95 percent.
- h. Fills: 95 percent.

C. Dewatering: As specified in Section 02240 - Dewatering for Structures.

D. Excavation:

- 1. Excavations for trenching: As specified in Section 02318 - Trenching.
- 2. Excavations for structures:
 - a. Provide excavations conforming to dimensions and elevations indicated on the Drawings for each structure.
 - b. After clearing is complete, excavate for the structure, down to the elevation indicated on the Drawings. Unless directed by Engineer, do not carry excavations below elevation indicated on the Drawings.
 - c. Where soil is encountered having unsuitable bearing value, Engineer may direct in writing that excavation be carried to elevations below those indicated on the Drawings.
 - d. Where excavations are made below elevations indicated on the Drawings, adjust elevations of excavations in accordance with the following requirements:
 - 1) Under slabs: Restore to proper elevation in accordance with procedure specified for backfill in this Section.
 - 2) Under footings: Restore to the proper elevation using one of the following:
 - a) Aggregate base course.
 - e. Excavation width:
 - 1) Extend excavations at least 1 foot clear from walls and foundations of structures to allow for placing and removal of forms, installation of services, and inspection.
 - 2) Do not undercut slopes.
 - f. Difficulty of excavation: No extra compensation will be made for removal of rock or any other material due to difficulty of excavation.
- 3. Excavation of lined channels:
 - a. Excavations in open cut for lined channels may be made so as to place concrete directly against excavated surfaces providing faces of excavations are:
 - 1) Firm and unyielding.
 - 2) Will stand or can be made to stand without sloughing.
 - b. Excavations to provide subgrade for lined channel or subdrainage material: Excavate to lines and grades indicated on the Drawings.
- 4. Excavation of unlined channels and basins:
 - a. Excavate to lines and grades indicated on the Drawings.
 - b. Perform excavation and grading so that finish surfaces are in uniform planes with no abrupt breaks in surface.
- 5. Excavation of ditches and gutters:
 - a. Cut ditches and gutters accurately to cross sections and grades indicated on the Drawings.
 - b. Take care not to excavate ditches and gutters below grades indicated on the Drawings.

- c. Backfill excessive ditch and gutter excavations to grade with suitable material acceptable to the Engineer.
 - d. Do not deposit any material within 3 feet of edge of ditch unless otherwise indicated on the Drawings.
 - 6. Necessary over excavation:
 - a. Where it becomes necessary to excavate beyond normal lines of excavation in order to remove boulders or other interfering objects, backfill voids remaining after removal as specified in backfilling of voids below, or as acceptable to the Engineer.
 - b. Backfill voids with material acceptable to the Engineer:
 - 1) With acceptance of the Engineer, backfill with one of the following:
 - a) Aggregate base course.
 - b) Controlled low-strength material.
- E. Materials for backfills, embankments, fills, and roadway fills:
- 1. General:
 - a. Obtain import material from other sources if surplus materials from cuts and excavations obtained from within Project site or borrow areas do not conform to specified requirements or are not sufficient in quantity for construction of Project.
 - 2. Backfills:
 - a. Backfill adjacent to structures, slabs, or walls: CLSM or aggregate base course, unless otherwise specified or indicated on the Drawings.
 - b. Backfill material under concrete structures: Aggregate base course material, except in areas where controlled low-strength material or concrete encasement are indicated on the Drawings.
 - c. Extend backfill in any area under concrete structures from undisturbed soil or rock to the bottom aggregate base course material layer.
- F. Placement:
- 1. General:
 - a. Lines and grades:
 - 1) Construct backfills, embankments, fills, and road fills, at locations and to lines and grades indicated on the Drawings.
 - 2) Overbuild all permanent fill slopes by at least 1 foot and then cut to final grade to provide adequate compaction of the remaining fill.
 - 2. Backfills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted backfills: Remove and recompact.
 - 3. Fills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted fills: Remove and recompact.

4. Coarse fill:
 - a. When materials are coarsely graded so that performance of field density tests are impossible:
 - 1) Placement and compaction: Place material in lifts so as to obtain compacted thickness of 6 inches and roll with pneumatic roller or power roller.
 - 2) Moisture content: Provide moisture content of fraction of material passing 3/4 inch sieve within plus or minus 2.0 percent of optimum moisture as determined in accordance with ASTM D1557, Method C.
5. Embankments:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted embankments: Remove and recompact.
6. Roadway fills:
 - a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
 - b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
 - c. Defective compacted roadway fills: Remove and recompact.

3.04 FIELD QUALITY CONTROL

- A. Confirmation tests:
 1. Contractor's responsibilities:
 - a. Pay for and perform all quality control testing.
 - b. Adequacy of compaction equipment and procedures:
 - 1) Demonstrate adequacy of compaction equipment and procedures.
 - 2) At each test location include tests for each type or class of backfill from bedding to finish grade.
 - c. Compaction sequence requirements:
 - 1) Do not perform additional earthwork of the same kind until specified degree of compaction has been demonstrated.
 - d. Cost of confirmation tests: Paid for by the Contractor.
 - e. Qualifications of Contractor's testing laboratory: Acceptable to Engineer.
 - f. Copies of confirmation test reports: Submit promptly to the Engineer.
 2. Frequency of confirmation testing:
 - a. Maximum dry density versus moisture:
 - 1) Backfill: 50 cubic yards.
 - 2) Fills: 50 cubic yards.
 - 3) Roadway fills: 50 cubic yards.
 - b. Cost of confirmation tests:
 - 1) Paid for by the Contractor.
 - c. Qualifications of Contractor's testing laboratory:
 - 1) Perform confirmation testing by soils testing laboratory acceptable to the Owner.

- B. Tolerances:
1. Finish grading of backfills, cuts, embankments, fills, and roadway fills:
 - a. Perform fine grading under concrete structures such that finish surfaces are never above the grade or cross section indicated on the Drawings and are never more than 0.10 feet below.
 - b. Provide finish surface for areas outside of structures that are within 0.10 feet of grade or cross section.
 2. Unlined channels and basins:
 - a. In both cut and fill, and levee and access road side slopes in cut: Vertical tolerance of none above and 3 inches below grade on bottom and side slopes.
 - b. On top surface of levee and access road in both cut and fill, and levee and access road side slopes in fill: Vertical tolerance of none below and 3 inches above grade.
 3. Areas which are not under structures, concrete, asphalt, roads, pavements, sidewalks, dikes, and similar facilities:
 - a. Provide finish graded surfaces of either undisturbed soil, or cohesive material not less than 6 inches deep.
 - b. Intent of proceeding is to avoid sandy or gravelly areas.
 4. Finish grading of surfaces:
 - a. Reasonably smooth, compacted, and free from irregular surface changes.
 - b. Provide degree of finish that is ordinarily obtainable from blade grader operations, except as otherwise specified.
 - c. Uniformly grade areas that are not under concrete.
 - d. Finish ditches and gutters so that they drain readily.
- C. Compliance tests:
1. Frequency of testing: Periodic compliance tests will be made by the Engineer to verify that compaction is meeting requirements previously specified.

3.05 ADJUSTING

- A. Finish grades of excavations, backfills, and fills:
1. Repair and reestablish grades to required elevations and slopes due to any settlement or erosion that may occur from action of the elements or any other cause prior to final acceptance.

3.06 PROTECTION

- A. Finish grades of backfills, cuts, excavations, and fills:
1. Protect newly graded areas from erosion and deterioration by action of the elements.
- B. Ditches and gutters:
1. Maintain ditches and gutters free from detrimental quantities of debris that might inhibit drainage until final acceptance.

END OF SECTION

SECTION 02312

CONTROLLED LOW STRENGTH MATERIAL (CLSM)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Controlled low strength material (CLSM), also known as "flowable fill."

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 1. 229R - Report on Controlled Low-Strength Materials.
 2. 301 - Specifications for Structural Concrete.
- B. ASTM International (ASTM):
 1. C33 - Standard Specification for Concrete Aggregates.
 2. C94 - Standard Specification for Ready Mix Concrete.
 3. C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
 4. C150 - Standard Specification for Portland Cement.
 5. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 6. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 7. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).
 8. D4832 - Standard Test Method of Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 9. D5971 - Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material.
 10. D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material.

1.03 SYSTEM DESCRIPTION

- A. Mixture of portland cement, water, pozzolan, fine aggregate and admixtures, proportioned in accordance with the recommendations of ACI 229 to produce a homogeneous mixture that is flowable, that will readily work into corners and angles; that will not segregate in the plastic state; and that is self-compacting at the time of placement without the use of mechanical vibration.
- B. Performance requirements:
 1. Air content, total calculated in accordance with ASTM D6023: Not less than 8.0 percent, nor greater than 12.0 percent.
 2. Compressive strength, measured in accordance with ASTM D4832 at 28 days: Not less than 50 pounds per square inch, nor greater than 150 pounds per square inch.

3. Wet density: Not greater than 132 pounds per cubic foot.
4. Slump, measured in accordance with ASTM C143 at the point of placement: Greater than 9 inches and that allows CLSM to flow freely and to be self-compacting during placement.

1.04 SUBMITTALS

- A. Product data: Submit data completely describing materials in the mix and demonstrating compliance with the requirements of this Section:
 1. Cement: Mill tests. Indicate alkali content representative of each shipment.
 2. Fly ash: Identify source and type of fly ash.
 3. Water: Identify source and quality if not from a municipal treatment source.
 4. Admixtures: Manufacturer's product data indicating suitability for use in CLSM mixes and recommended dosage rates.
 5. Aggregate:
 - a. Submit source, type, and sieve analyses. Include testing to demonstrate that materials in accordance with ASTM C33 requirements.
 - b. Resubmit at any time there is a significant change in grading of materials.
- B. Mix design:
 1. Submit full details, including mix design calculations for mix proposed for use.
 2. Trial batch test data:
 - a. Submit data for each test cylinder.
 - b. Submit data that identifies mix and slump for each test cylinder.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store or stockpile cement, fly ash, and aggregate in accordance with ACI 301.
- B. Store admixtures in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement:
 1. Portland cement in accordance with ASTM C150, Type II.
 2. Having total alkali content not more than 0.60 percent.
- B. Fly ash: Class F fly ash in accordance with ASTM C618.
- C. Water:
 1. Potable water: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
- D. Admixtures: Products of a single manufacturer, specifically manufactured or recommended by that manufacturer for use in CLSM:
 1. Air entraining admixture: In accordance with ASTM C260.

- E. Aggregate:
1. Non-expansive, non-reactive, inert natural sand conforming to the following requirements:
 - a. Not more than 12 percent passing a No. 200 sieve.
 - b. No plastic fines present.
 - c. Including pea gravel no larger than 3/8 inch.

2.02 MIXES

- A. Suggested design mix:

Material	Weight	Specific Gravity	Absolute Volume Cubic Foot
Cement	30 pounds	3.15	0.15
Fly Ash	300 pounds	2.30	2.09
Water	283 pounds	1.00	4.54
Coarse Aggregate	1,465 pounds	2.68	8.76
Fine Aggregate	1,465 pounds	2.68	8.76
Admixture (Air)	4-6 ounces	-	2.70
TOTAL	3,543 pounds	-	27.00

2.03 SOURCE QUALITY CONTROL

- A. Trial batch:
1. After mix design has been accepted by Engineer, have trial batch of the accepted mix design prepared by testing laboratory acceptable to Engineer.
 2. Prepare trial batches using the specific cement, fly ash, admixtures, aggregates, and water proposed for the Work.
 3. Prepare trial batch with quantity sufficient to determine slump, workability, and consistency; and to provide test cylinders as indicated in this Section.
- B. Trial batch testing:
1. Determine slump in accordance with ASTM C143, with the following modifications:
 - a. Do not rod the concrete material.
 - b. Place material in slump cone in one semi-continuous filling operation, slightly overfill, tap lightly, strike off, and then measure and record slump.
 2. Prepare and test trial batch specimens in accordance with ASTM D4832, with the following modifications:
 - a. Provide cylindrical test specimens, each 6-inches in diameter by 12-inch high.
 - b. Provide a minimum of 8 cylinders for testing of each trial batch.
 - c. Fill the molds to overflowing and tap sides lightly to settle the mix.
 - d. Do not rod the mix for consolidation in the cylinder.
 - e. Strike off the excess material.
 3. Place test cylinders in a moist curing room. Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.

4. Do not remove the test cylinder from mold until that cylinder is to be capped and tested:
 - a. Perform the capping carefully to prevent premature fractures.
 - b. Do not perform initial compression test until the cylinders reach a minimum age of 3 days.
 5. Provide compressive strength tests:
 - a. Test 4 test cylinders at 7 days after casting, and another 4 cylinders at 28 days after casting.
 - b. The compression strength of the 4 test cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength.
- C. If the trial batch tests do not meet the Specifications for strength or density, revise and re-submit the mix design, prepare additional trial batch(es), and complete additional trial batch tests. Repeat until an acceptable trial batch is that conforms to the Specifications is produced:
1. All the trial batches and acceptability of materials shall be paid by the Contractor.
 2. After acceptance, do not change the mix design without submitting a new mix design, trial batches, and test information.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not place CLSM until preparation and condition of surfaces receiving the fill have been observed and accepted by the Engineer.
- B. Remove debris foreign matter, and standing or running water from excavations and areas receiving CLSM before placement.

3.02 INSTALLATION

- A. Pipes and trenches:
 1. Install cellular concrete as indicated on the Drawings and specified.
 2. Where CLSM is placed around and over pipes, secure pipes in place, or place CLSM in lifts to prevent pipe flotation.
 3. Where CLSM is placed in long, open trenches, confine material using bulkheads of sandbags, earth dams, or stiffer concrete at open ends of placement.
 4. Place CLSM at specified access points in the abandoned in-place pipe.
- B. Soil preparation:
 1. Prior to placement of CLSM, prepare underlying soils as follows:
 - a. Scarify surface to a depth of 8 inches.
 - b. Adjust moisture content to or slightly above the optimum in accordance with ASTM D1557.
 - c. Re-compact scarified surface to a minimum of 95 percent relative density in accordance with ASTM D1557.

3.03 MEASURING, BATCHING, MIXING AND TRANSPORTING

- A. Measure, batch, mix and transport CLSM in accordance with the requirements of ASTM C94 and this Section.
- B. Mix until there is uniform distribution of materials.
- C. Discharge mixer completely prior to recharging.
- D. After trial batch testing and mix acceptance, maintain slump during construction within plus or minus 1 inch of the design slump.

3.04 PLACING

- A. Place controlled low strength material by method that preserves the quality of the material in terms of compressive strength and density.
- B. Maintain fluid properties of the mix during placement:
 - 1. At point of placement, provide material that flows easily around, beneath, or through walls, pipes, conduits, or other structures.
 - 2. Do not place CLSM that has partially hardened or that has been contaminated by foreign materials.
 - 3. Handle and place CLSM using methods that minimize segregation of the mix.
 - 4. Deposit mix as near its final position as possible to avoid segregation due to rehandling or flowing.
 - 5. Contain and confine mix while it is fluid. Design containment structures and bracing at walls and forms to withstand lateral pressures of wet mix.
- C. Lifts:
 - 1. Limit lift heights of CLSM placed against structures and other facilities that could be damaged due to the pressure from the CLSM, to the lesser of 3 feet or the lift height indicated on the Drawings.
 - 2. Do not place another lift of CLSM until the last lift of CLSM has set and gained sufficient strength to prevent additional lateral load against the forms or structure due to the weight of the next lift of CLSM.
- D. Water conditions:
 - 1. Do not place CLSM in standing or flowing water.
 - 2. Do not permit water to flow over the surface of freshly placed or un-hardened CLSM.
 - 3. Do not submerge CLSM in water within 24 hours after placement.
- E. Manage CLSM bleed water:
 - 1. Grade top surface of CLSM to drain away from the fill.
 - 2. Provide side containment that permits bleed water to drain to a contained management area away from the fill.

3.05 CURING AND PROTECTION

- A. Curing:
 - 1. Prior to and during curing, install barriers to prevent equipment or personnel from falling into or becoming entrapped in CLSM.

- B. Protect CLSM from:
 - 1. Damage from the elements.
 - 2. Damage of any nature during surrounding construction operations.

3.06 FIELD QUALITY CONTROL

- A. Provide quality control over the Work of this Section as specified in Section 01450 - Quality Control and Section 01460 - Contractor Quality Control Plan and as specified in this Section.
- B. General:
 - 1. Engineer inspection and acceptance required prior to placement.
 - 2. Make provisions for and furnish all material for the test specimens, and provide manual assistance to assist the Engineer in preparing said specimens.

3.07 FIELD QUALITY ASSURANCE

- A. Provide quality control over the work of this Section as specified in Section 01450 - Quality Control and Section 01460 - Contractor Quality Control Plan.
- B. Field inspections:
 - 1. Engineer shall provide on-site inspection for the Work of this Section.
 - 2. Advise Engineer of readiness to proceed at least 24 hours prior to each placement of CLSM.
 - 3. Required inspections:
 - a. Engineer will observe the prepared areas. Do not place CLSM until Engineer has observed and accepted preparations.
 - 4. Record of inspections.
- C. Field sampling and testing:
 - 1. During construction, Owner shall provide sampling and testing to determine whether the CLSM, as produced and placed, complies with the requirements specified:
 - a. Make provisions for and furnish material for test specimens. Cooperate by allowing free access for Owner's independent testing firm to sample and test materials. Provide assistance in obtaining and preparing said specimens.
 - 2. Sample CLSM for testing in accordance with ASTM D5971.
 - 3. Required tests:
 - a. Air content: Prepare sample and test in accordance with ASTM D6023.
 - b. Compressive strength: Prepare and test cylinder specimens in accordance with ASTM D4832:
 - 1) Prepare 6-inch diameter by 12-inch high specimens for testing:
 - a) Provide one set of specimens for each 150 cubic yards of CLSM placed, but not less than 1 set for each half day's placement.
 - b) Prepare and test not less than 3 cylinders for each set.
 - c) Place CLSM in the molds in accordance with ASTM D4832. Do not rod or otherwise consolidate the material in the mold.
 - d) In accordance with ASTM D4832 recommendations for displacing bleed water at the top of the molds and refilling the molds before covering with a lid. Do not use air-tight lids.

- 2) Place the cylinders in a safe location away from construction activities:
 - a) Protect cylinders from bumping and impact.
 - b) Maintain temperature surrounding cylinders between 60 and 80 degrees Fahrenheit until delivery to the laboratory for testing.
 - c) After the first day, surround molds with a high humidity environment by covering with wet burlap, or equivalent highly absorptive material. Maintain saturation of the cover. Do not sprinkle water directly on the cylinders.
- 3) After 4 days, place the cylinders in a protective container for transport to the laboratory for testing:
 - a) Exercise caution in moving and transporting the cylinders since they are fragile and will withstand only minimal bumping, banging, or jolting without damage.
 - b) Transport container may be a box with a Styrofoam or similar lining that will limit jarring and bumping of the cylinders.
- 4) Upon receipt at the testing laboratory, place test cylinders in a moist curing room until dates for testing.
- 5) Do not remove test cylinders from molds until the day that cylinders is to be capped and tested.
- 6) Cap and test for compressive strength in accordance with ASTM D4832:
 - a) Do not perform initial compression test until the cylinders reach an age of at least 4 days.
 - b) Test 1 cylinder at 7 days and 2 at 28 days.
- 7) Compressive strength of the cylinders tested at 28 days shall be equal to or greater than the minimum required compression strength, but shall not exceed maximum compression strength specified.

3.08 NON-CONFORMING WORK

- A. When testing or observation indicates CLSM with properties outside the specified and accepted range, Engineer will issue instructions regarding disposition of nonconforming materials.
- B. Engineer may:
 1. Reject CLSM represented by those test specimens and require its removal and replacement.
 2. Require modification of the mix design to provide CLSM with the properties specified.
- C. Make such modifications at no additional expense to the Owner and with no adjustment to the schedule.

END OF SECTION

SECTION 02318

TRENCHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Trench excavation and trench backfill.
- B. Contractor shall not anticipate that trenches will maintain a vertical cut. See available geotechnical investigations and trenching evaluation for more information about the existing soil.
- C. Plan and profile drawings call out trenching all pipe per Typical Detail P002. The trench backfill material and requirements are provided in this specification, under PART 3. Where work occurs in the City of Marina, use the City of Marina's Detail SD-1 for trench paving restoration. Where work occurs in the City of Seaside, use the City of Seaside's Detail S601 for trench paving restoration. Where work occurs in the County of Monterey or Marina Coast Water District, use the Detail P002 for trench paving restoration. Road section depths (Asphalt and Aggregate Base Course) are listed in Section 01140.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
 - 2. D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).

1.03 SUBMITTALS

- A. As specified in Section 01330 - Submittal Procedures.
- B. Product data on soils and aggregates:
 - 1. Material source.
 - 2. Gradation.
 - 3. Test data to demonstrate compliance with this Section.
- C. Samples:
 - 1. Provide 50-pound sample of materials when requested by the Engineer.
- D. Confirmation testing:
 - 1. Certification of Contractor's testing laboratory.
 - 2. Record copy report for tests performed by Contractor's testing laboratory.

1.04 DEFINITIONS

- A. Backfill: Material placed in trench above the pipe embedment zone.

- B. Bedding: Material placed under, around, and over pipes or ducts in trenches.
- C. Center bedding: Material placed at the bottom of the trench directly under the center of the pipe to provide a malleable resting surface.
- D. Fine grading: Material placed directly below pipes or ducts to provide support at the bottom of the trench and to bring those elements to required grades and elevations.
- E. Flexible pipe: Includes steel, ductile iron, thermoplastics such as polyvinyl chloride (PVC) and high-density polyethylene (HDPE), thermosetting plastics such as fiberglass-reinforced polymer (FRP), bar-wrapped concrete cylinder pipe, and corrugated steel pipes.
- F. Haunch zone: Material placed below and beside the pipe up to the pipe springline.
- G. Lift: A layer of soil or aggregate material, measured before compaction.
- H. Maximum density, laboratory compaction: Soil maximum density and optimum water content when tested in accordance with ASTM D1557.
- I. Maximum density, field compaction: Soil density and water content when tested in accordance with ASTM D1556.
- J. Pavement section: Includes pavement plus underlying courses such as base course and subgrade.
- K. Pipe embedment zone: Includes bedding, fine grading, center bedding, and haunch zone.
- L. Pipe foundation: Material placed at the bottom of trench to provide support.
- M. Pipe springline: A horizontal reference line located at mid-height, or halfway point, of a circular conduit, pipe, or tunnel. It is the maximum horizontal dimension or diameter of a circular conduit, pipe, or tunnel.
- N. Rigid pipe: Includes reinforced non-cylinder concrete, reinforced concrete cylinder, prestressed concrete cylinder, vitrified clay, polymer concrete, cast iron, asbestos cement and cast-in-place pipes.

PART 2 PRODUCTS

2.01 MATERIALS

- A. As specified in Section 02050 - Soils and Aggregates for Earthwork.
- B. Class C concrete: As specified in Section 03300 - Cast-in-Place Concrete.
- C. Controlled low-strength material: As specified in Section 02312 - Controlled Low Strength Material (CLSM).

PART 3 EXECUTION

3.01 PREPARATION

- A. Stabilize excavations as specified in Section 02260 - Excavation Support and Protection.

3.02 DEWATERING

- A. As specified in Section 02240 - Dewatering.

3.03 TRENCH EXCAVATION

- A. Excavate bottom of trench to depth indicated on the Drawings.
- B. Areas of new fill or embankment:
 - 1. Prior to laying pipes or electrical service, place fill and compact as specified to not less than 2 feet above top of pipe, conduit, or duct bank.
 - 2. Excavate through fill for pipe trench.
- C. Trench widths as specified in the following table:

Buried Pipe Or Accessory	Minimum Trench Width	Maximum Trench Width
Nominal Pipe Diameter: 4 inch to 24 inch	OD + 18 inches	OD + 24 inches
Nominal Pipe Diameter: Greater than 24 inch	OD + 24 inches	OD + 36 inches
Manholes, valves, or other accessories	12 inches between outer surface and trench side or shoring	Not applicable

- D. At road crossings or existing driveways:
 - 1. Make provision for channel or trench crossings at these points, either by means of trenchless technologies or temporary bridges.
 - 2. Engineer approval for remedy, without additional cost to Owner, when trench width at top of pipe is increased beyond width specified in this Section because of soil conditions, safety requirements, or other reasons:
 - a. Remedy may include upgrade laying conditions or install stronger pipe designed in accordance with Specifications.

3.04 TRENCH BACKFILL - GENERAL

- A. Place material, except CLSM and concrete, in maximum 6 inch lifts, measured before compaction.
- B. Backfilling of manhole excavation: Conform to backfilling requirements as specified for trenches in this Section.

3.05 PIPE FOUNDATION

- A. Provide trench bottom with firm, dry, uniform bearing surface at the grade indicated on the Drawings:
 - 1. Prepare pipe foundation, with any unauthorized excess excavation below elevation indicated on the Drawings, at no additional cost to Owner.

- B. If bottom of trench excavation consists of soil:
 - 1. Scarify bottom of trench to a depth of 6 inches below the grade indicated on the Drawings.
 - 2. Materials and placement:
 - a. Re-compact scarified native material to 95 percent of maximum density.

- C. If bottom of trench excavation consists of rock or any material that, by reason of its hardness, cannot be excavated to provide uniform bearing surface:
 - 1. Remove such rock or other material to a depth of not less than 4 inches below pipe embedment zone.
 - 2. Materials:
 - a. CLSM.
 - b. Class C concrete.

- D. If bottom of trench excavation consists of unacceptable material:
 - 1. Remove such unacceptable material to a depth of not less than 18 inches below pipe embedment zone.
 - 2. Material and placement:
 - a. Stabilization material compacted to 95 percent of maximum density:
 - 1) Maximum particle size for backfill material limited as specified in the following table:

Buried Pipe	Maximum Particle Size
Nominal Pipe Diameter: 6 inch to 8 inch	3/4 inch
Nominal Pipe Diameter: 10 inch to 16 inch	3/4 inch
Nominal Pipe Diameter: Greater than 18 inch	3/4 inch

3.06 PIPE EMBEDMENT ZONE

- A. General:
 - 1. Pipe displacement:
 - a. Take necessary precautions in placement and compaction of bedding material to prevent displacement of piping.
 - b. In event there is movement or floating of the piping, re-excavate, re-lay, and backfill the pipe.
 - 2. Depressions for joints or couplings:
 - a. Excavate holes in graded trench bottom.
 - b. Provide holes of sufficient width to provide ample room for grouting, banding, or welding as necessary for making joints and to ensure that pipe rests upon prepared trench bottom and not supported by any portion of the joint.

- B. Fine grading:
 - a. Compacted depth below bottom of pipe: 6 inch minimum.
 - b. Materials and placement:
 - 1) Native compacted to 95 percent maximum dry density.
- C. Bedding:
 - a. Compacted depth above top of pipe: 12 inch minimum.
 - b. Materials and placement:
 - 1) Native compacted to 95 percent maximum dry density.

3.07 BACKFILL

- A. All trench backfill above pipe embedment zone:
 - 1. Materials and placement:
 - a. Native soil compacted to 95 percent maximum dry density.
 - b. Aggregate base course compacted to 95 percent maximum dry density.
 - c. CLSM.
- B. Trenches in rock:
 - 1. Backfill to top of rock:
 - a. Materials and placement:
 - 1) CLSM.
 - 2) Class C concrete.
 - 2. Backfill from top of rock to grade, if applicable:
 - a. Materials and placement:
 - 1) Aggregate base course compacted to 95 percent of maximum density.
- C. Trenches below or within 10 feet of the outside perimeter of structures:
 - 1. Backfill to underside of aggregate base course below structure.
 - 2. Materials and placement:
 - a. Aggregate base course compacted to 95 percent of maximum density.
 - b. CLSM.
- D. Trenches in roadways and paved areas:
 - a. Above the trench backfill, the road structural section (asphalt cement above aggregate base course) shall be as specified in Section 01140.
- E. Trenches in areas outside the improved section of roadways or in open country:
 - 1. Backfill to finished grade.
 - 2. Materials and placement:
 - a. Native soil, native soil - select, imported material, or aggregate base course compacted to 95 percent of maximum density.
- F. Trenches under existing intersecting pipes, duct banks, or conduits larger than 3 inches in diameter:
 - 1. Backfill from above top of new pipe embedment zone to springline of intersecting pipe or conduit:
 - a. Extend backfill at least 2 feet on either side of intersecting pipe or conduit to ensure backfill material remains in place while other backfill is being placed.
 - b. Materials and placement:
 - 1) CLSM, unless otherwise indicated on the Drawings.

2. Backfill remainder of trench:
 - a. Materials and placement:
 - 1) CLSM or ABC.

3.08 EXCESS MATERIAL

- A. Remove excess excavated material from the Project site as specified in Section 02300 - Earthwork.

3.09 FIELD QUALITY CONTROL

- A. Provide field quality control for the Work as specified in Section 01450 - Quality Control.
- B. The Owner's Construction Manager will pay for and obtain a qualified testing agency to perform the Initial Compaction Demonstration.
- C. The following confirmation and compliance testing is required at a minimum. Local agencies where work occurs have additional testing requirements, which the Contractor must also comply with.
- D. Initial Compaction Demonstration:
 1. An initial compaction demonstration is required at each project location.
 2. The Owner's Construction Manager will pay for and obtain a qualified testing agency to perform initial compaction testing.
 3. Contractor's responsibilities:
 - a. Provide access for the Construction Manager to perform testing.
 - b. Notify the Construction Manager not less than 24 hours before Initial Compaction testing is needed so the Construction Manager can coordinate the testing.
 4. Adequacy of compaction equipment and procedures: Demonstrate adequacy of compaction equipment and procedures before exceeding the following:
 - a. 25 linear feet of pipeline.
 5. Compaction sequence requirements: Until specified degree of compaction on previously specified amounts of trenching is achieved, do not perform additional trenching of the same kind.
- E. Confirmation tests:
 1. The Owner's Construction Manager will pay for and perform all compaction confirming testing after the Initial Compaction Demonstration.
 2. Contractor's responsibilities:
 - a. Provide access for the Construction Manager to perform testing.
 - b. Notify the Construction Manager not less than 24 hours before compaction confirmation testing is needed so the Construction Manager can coordinate the testing.
 - c. Do not perform additional trenching until specified degree of compaction has been achieved.
 - d. Where the Contractor does not meet the minimum specified compaction, as tested by the Construction Manager, Contractor shall be responsible for paying the costs of subsequent follow-up retesting.
 3. Frequency of confirmation testing:
 - a. Contractor shall anticipate compaction confirmation testing up to every 50 linear feet.

- F. Piping system testing:
 - 1. As specified in Section 15956 - Piping Systems Testing.

END OF SECTION

SECTION 02349

INSTALLATION OF CARRIER PIPE IN CASING

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section includes requirements for the installation of carrier pipe inside steel casings at locations shown on the Drawings.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- B. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
- C. ASTM C150 - Specification for Portland Cement.
- D. ASTM C494 - Specification for Chemical Admixtures for Concrete.
- E. Occupational Safety and Health Administration (OSHA) Regulations and Standards for Underground Construction, 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavation.

1.03 DEFINITIONS

- A. Carrier Pipe: Permanent pipe for operational use that is used to convey flows.
- B. Steel Casing Pipe: A pipe installed by direct jacking using guided boring. The steel casing pipe supports the ground and provides a stable underground excavation for installation of the carrier pipe.

1.04 DESIGN CRITERIA

- A. Carrier pipe shall be installed within the horizontal and vertical tolerances as indicated in Part 3 of this Specification, incorporating all support/insulator dimensions.
- B. The Contractor shall provide end seals, as approved by the Owner at each end of the casing. The end seals shall be watertight to prevent groundwater from entering the casing.
- C. The Contractor shall provide casing spacers/insulators to support the carrier pipe during installation. The casing spacers shall provide a minimum 2 inches of clearance between the carrier pipe and the casing surface. The casing spacers shall hold the pipe stable during operations and prevent floating.

1.05 QUALITY CONTROL

- A. The Contractor responsible for installation of the carrier pipe shall have completed similar work on at least 3 projects within the last 5 years.
- B. The surveyor responsible for carrier pipe line-and-grade control shall be a Licensed Surveyor registered in the State of California who has prior experience in similar projects.

1.06 SUBMITTALS

- A. Qualifications: The Contractor shall submit personnel requirements meeting the requirements of Paragraph 1.06 A.
- B. Submit a Work Plan describing the carrier pipe installation equipment, materials, and construction methods to be employed.
- C. Submit detail drawings and manufacturer's information for the casing isolators/spacers that will be used. Include dimensions, component materials, and installation procedures.
- D. A safety plan for the carrier pipe installation operations including air monitoring equipment and procedures and provisions for ventilation, and electrical system safeguards. Provide name of site safety representative responsible for implementing safety program. Notify Engineer if safety plan is the same as for the tunneling operations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Casing Spacers / Isolators:
 - 1. Band: Minimum 14-gauge stainless steel band:
 - a. 8-inch minimum width.
 - 2. Finish:
 - a. Rust inhibiting paint.
 - b. Fusion Bonded PVC Coating:
 - 1) 10-16 mils.
 - 2) Durometer - shore A2 (10 sec, ASTM D1706-61T): 80.
 - 3. Runners:
 - a. Painted 2-inch Wide Glass Reinforced Polymer:
 - 1) Tensile Strength (ASTM D638): 17,600 pounds per square inch minimum.
 - 2) Flexural Strength (ASTM D790): 25,300 pounds per square inch minimum.
 - 4. Liner: Polyvinyl Chloride:
 - a. Thickness: 0.09-inch minimum.
 - b. Hardness Durometer "A": 85-90.
 - 5. Risers: 10 gauge steel MIG welded to band.
 - 6. Manufacturers: One of the following or approved equal:
 - a. Pipeline Seal and Insulator, Inc.

- b. Advance Products & Systems.
 - c. Cascade Waterworks Manufacturing Company.
- B. Casing End Seals:
 - 1. Materials:
 - a. Seal: 1/8 inch thick synthetic rubber.
 - b. Bands and Clamps: Stainless steel.
 - 2. Manufacturers: One of the following or approved equal:
 - a. Pipeline Seal and Insulator, Inc., Model S or C.
 - b. Advance Products & Systems, Model AC.
 - c. Maloney Technical Products, MULTIFLEX End Seal.
- C. Material for Filling of Voids:
 - 1. Contact Grout shall conform to Section 03360 - Contact Grouting.

PART 3 EXECUTION

3.01 GENERAL

- A. Carrier pipe installation shall not begin until the following tasks have been completed:
 - 1. All required submittals have been provided, reviewed, and accepted.
 - 2. All casing joints are watertight and no water is entering casing from any sources.
 - 3. Casing alignment has been confirmed by the Contractors surveyor as meeting the design alignment and grade within the allowable guided boring tolerances.
- B. The carrier pipe shall be installed within the casing to the specified lines and grades, and utilizing methods which include due regard for safety of workers, adjacent structures and improvements, utilities, and the public.
- C. Furnish all necessary equipment, power, water, and utilities for carrier pipe installation, casing spacer runner lubricant, and other associated Work required for the Contractor's methods of construction.

3.02 CONTROL OF LINE AND GRADE

- A. Carrier pipe shall be installed inside the steel casing within the following tolerances:
 - 1. Horizontal: +/-3 inches from design line.
 - 2. Vertical: +/-3 inches from design grade.
- B. Contractor shall check line and grade set up prior to beginning carrier pipe installation. Contractor shall perform survey checks of line-and-grade of carrier pipe during installation operations. The Contractor is fully responsible for the accuracy of the Work and the correction of it, as required.
- C. Where the carrier pipe installation exceeds the specified tolerances, correct the installation, including, if necessary, redesign of the pipe, end seal, or casing spacers.

3.03 INSTALLATION OF CARRIER PIPE

- A. Pipe installation: Remove all loose soil from casing. Grind smooth all rough welds at casing joints. Provide casing spacers, or insulators, to prevent flotation, movement, or damage to the pipe during installation. Install casing isolators/spacers on the pipeline, 2 feet inside each end of casing, and at 8 feet on center (maximum) for the length of casing. Carrier pipe shall be installed without sliding or dragging it on the ground or in the casing in a manner that could damage the pipe. Coat the casing spacer runners with a non-corrosive/environmentally safe lubricant to minimize friction when installing the carrier pipe.
- B. Testing of Carrier Pipe:
 - 1. Prior to filling of the annular space the carrier pipe shall be pressure tested. Any leakage found during this inspection shall be corrected.

3.04 SAFETY

- A. The Contractor is responsible for safety on the job site. Perform all Work in accordance with the current applicable regulations of the Federal, State, and local agencies. In the event of conflict, comply with the more restrictive applicable requirement.
- B. No gasoline powered equipment shall be permitted in jacking shafts and receiving shafts/pits. Diesel, electrical, hydraulic, and air powered equipment is acceptable, subject to applicable local, State, and Federal regulations.
- C. Methods of construction shall be such as to ensure the safety of the Work, Contractor's and other employees on site, and the public.
- D. Furnish and operate a temporary ventilation system in accordance with applicable safety requirements when personnel are underground. Perform all required air and gas monitoring. Ventilation system shall provide a sufficient supply of fresh air and maintain an atmosphere free of toxic or flammable gasses in all underground work areas.
- E. Perform all Work in accordance with all current applicable regulations and safety requirements of the federal, state, and local agencies. Comply with all applicable provisions of 29 CFR Part 1926, Subpart S, Underground Construction and Subpart P, Excavations, by OSHA.
- F. Contractor shall develop an emergency response plan for rescuing personnel trapped underground in a shaft excavation or pipe. Keep on-site all equipment required for emergency response in accordance with the agency having jurisdiction.

END OF SECTION

SECTION 02742A

ASPHALTIC CONCRETE PAVING (CA)

PART 1 GENERAL

1.01 SUMMARY

- A. Paving shall comply with the paving requirements of the local agency having jurisdiction, which shall take precedence over the requirements in this Section.
- B. Where paving is required in other areas, or if the local agency having jurisdiction does not have paving requirements, the requirements of this Section shall govern.
- C. Temporary paving is defined in this Section. If a local agency having jurisdiction has a temporary paving requirement, the local agency requirement shall take precedence over the requirements in this Section.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft. lbf/f₄³)(2,700 kN-m/m³).
 - 2. D1561 - Standard Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor.
- B. Caltrans Standard Test Methods:
 - 1. Calif Test 202 - Sieve Analysis of Fine and Coarse Aggregates.
 - 2. Calif Test 304 - Preparation of Bituminous Mixtures for Testing.
 - 3. Calif Test 362 - Determining Asphalt Content in Bituminous Mixtures by Vacuum Extraction.
 - 4. Calif Test 375 - Determining the In-Place Density and Relative Compaction of AC Pavement.
 - 5. Calif Test 379 - Determining Asphalt Content in Bituminous Mixtures (Troxler Nuclear Gauge Model 3241).
- C. State of California Department of Transportation Standard Specifications, latest edition (Caltrans Standard Specifications):
 - 1. Section 37 - Bituminous Seals.
 - 2. Section 39 - Hot Mix Asphalt.
 - 3. Section 88 - Geosynthetics.
 - 4. Section 92 - Asphalts.
 - 5. Section 93 - Liquid Asphalts.
 - 6. Section 94 - Asphaltic Emulsions.

1.03 SYSTEM DESCRIPTION

- A. This Work shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant, spreading and compaction of the mixture as specified and as indicated on the Drawings.

- B. In general, asphalt concrete and asphalt concrete base shall conform to Section 39 "Hot Mix Asphalt," and all applicable referenced sections of the Caltrans Standard Specifications:
 - 1. Where conflicts exist, this specification shall govern.
- C. Temporary paving:
 - 1. Temporary paving shall be per the requirements of the Authority Having Jurisdiction. Where the Authority Having Jurisdiction does not specify temporary paving requirements, the following requirements shall apply:
 - a. Trenches shall be paved with temporary Hot Mix Asphalt pavement immediately following the trench backfill.
 - b. All temporary asphalt shall be a minimum 2 inches thick for roads with a speed limit of 25 miles per hour or less and a minimum 3 inches thick for roads with a speed limit over 25 miles per hour.
 - c. Temporary asphalt shall be properly compacted flush with existing paving using a vibratory roller or vibratory plate.
 - 2. All temporary paving must be kept up daily at the Contractor's expense.

1.04 DEFINITIONS

- A. "Asphalt Concrete" as used by Caltrans shall be considered the "Surface Course," or the final lift of the pavement section.
- B. "Asphalt Concrete Base" as used by Caltrans shall be the remaining portion of the asphalt pavement section excluding the final lift.
- C. "Asphalt Pavement" shall be the total pavement section of asphalt including Asphalt Concrete and Asphalt Concrete Base.

1.05 SUBMITTALS

- A. Mix design.
- B. Shop drawings.
- C. Product data:
 - 1. Asphalt.
 - 2. Asphalt aggregate.
 - 3. Pavement reinforcing fabric.
- D. Quality control submittals:
 - 1. Test results.
 - 2. Certificate of Compliance.
 - 3. Certificate of Competence.
- E. Equipment list.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Asphalt pavement delivery:
 - 1. Transport the mixture from the mixing plant to the point of use in vehicles having tight bodies previously cleaned of all foreign materials.
 - 2. Treat bodies as necessary to prevent material from sticking to the bodies.

3. Cover each load with canvas or other suitable material of sufficient size and thickness to protect the asphalt mixture from the weather.

1.07 PROJECT CONDITIONS

- A. Environmental requirements:
 1. Asphalt concrete:
 - a. Place asphalt concrete only when surface is dry, and when atmospheric temperature in the shade is 40 degrees Fahrenheit and rising, or above 50 degrees Fahrenheit if falling.
 - b. Do not place asphalt concrete when weather is foggy or rainy, when base on which material is to be placed is in wet or frozen conditions, or when, in the opinion of the Engineer, weather conditions will prevent proper handling, finishing, or compaction of the mixtures.
 2. Prime coat:
 - a. Do not apply prime coat when atmospheric temperature is below 60 degrees Fahrenheit.
 - b. Apply prime coat only when base course is dry or contains moisture not in excess of that which will permit uniform distribution and desired penetration.

PART 2 PRODUCTS

2.01 ASPHALT PAVEMENT MATERIALS

- A. Asphalts:
 1. Asphalt binder: Steam-refined paving asphalt, PG 64-10 conforming to Section 92-1.02C "Grades" of the Caltrans Standard Specifications.
 2. Prime coat and tack coat: Grade SC-70 conforming to Section 93 of the Caltrans Standard Specifications.
 3. Fog seal: Asphaltic emulsion, Grade SS-1h.
- B. Asphalt aggregate:
 1. Aggregate for asphalt concrete shall conform to Section 39-1.02E of the Caltrans Standard Specifications for Type B grading, 1/2-inch maximum, medium.
 2. Aggregate for asphalt concrete base shall conform to Section 39-1.02E of the Caltrans Standard Specifications for Type B grading.
- C. Asphalt pavement shall be produced in a batch mixing plant, a continuous pugmill mixing plant, or dryer-drum mixing plant:
 1. Proportioning shall conform to Section 39-3.03 of the Caltrans Standard Specifications.
 2. Mixing shall conform to Section 39-3.04 of the Caltrans Standard Specifications.

2.02 PAVEMENT-REINFORCING FABRIC

- A. Pavement-reinforcing fabric shall conform to Section 88-1.02 and all applicable referenced sections of the Caltrans Standard Specifications, at the following locations:
 1. All asphalt pavement.

2.03 SLURRY SEAL

- A. Slurry seal, Type II, shall be applied in conformance with the provisions in Section 37-2, and all applicable referenced sections of the Caltrans Standard Specifications, at the following locations:
 - 1. At all locations indicated on the Drawings.

2.04 AGGREGATE BASE COURSE

- A. Aggregate base course: As specified in Section 02050 - Soils and Aggregates for Earthwork.
- B. Aggregate base course shall be placed at the following locations:
 - 1. Trench structural section below asphalt pavement.
- C. Compacted thickness of aggregate base course shall be the 12 inches or match existing, whichever is greater, unless otherwise indicated.

2.05 EQUIPMENT

- A. Spreading and compacting equipment:
 - 1. Spreading equipment shall conform to Section 39-1.10 and all applicable referenced sections of the Caltrans Standard Specifications:
 - a. Only in areas inaccessible to the machine, by approval of the Engineer, will hand spreading be permitted.
 - 2. Compaction equipment shall conform to Section 39-1.10 and all applicable referenced sections of the Caltrans Standard Specifications.

2.06 SOURCE QUALITY CONTROL

- A. The Engineer will perform sampling and tests of materials in accordance with California Test Method Number 304 and California Test Method Number 362 or 379, as applicable. Samples will be taken from materials as delivered to the site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Verify surfaces and site conditions are ready to receive work. If unsatisfactory conditions exist, do not commence installation until such conditions have been corrected. Beginning application means acceptance of existing conditions.

3.02 PREPARATION

- A. Protection:
 - 1. Protect concrete pavements and walks, curbs and bases, and other improvements adjacent to the operations with suitable materials.

2. Building and other surfaces shall be covered with paper or other protection, when required.
3. Contractor shall be responsible for any damage caused by Contractor's employees. All damage caused by the Contractor's operations shall be repaired to the satisfaction of the Engineer at no additional cost to Owner.

B. Subgrade preparation:

1. Immediately prior to applying prime coat or tack coat, or immediately prior to placing the asphalt pavement when prime coat or tack coat is not required, the subgrade to receive asphalt pavement shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be cleaned to remove any loose or extraneous material.
2. If the asphalt pavement is to be placed on an existing base or pavement that was not constructed as part of the contract, the Contractor shall clean the surface by sweeping, flushing, or other means to remove all loose particles of paving, all dirt, and all other extraneous material immediately before applying the prime coat or tack coat.

3.03 PRIME COAT AND TACK COAT

A. Prime coat:

1. A prime coat of liquid asphalt shall be applied on all surfaces of base course material to be paved.
2. Prime coat shall be applied at a rate of 0.25 gallons per square yard and shall conform to Section 93-1.03 of the Caltrans Standard Specifications for the distributor application of the grade of liquid asphalt being used.

B. Tack coat:

1. A tack coat of asphaltic emulsion shall be applied to all vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, or as otherwise specified in this Section.
2. Tack coat shall be applied in one application at a rate of 0.1 gallons per square yard of surface covered.

3.04 ASPHALT PAVEMENT

- A. Compacted thickness of asphalt pavement shall be the 4 inches or match existing, whichever is greater, unless otherwise indicated.
- B. Placing materials in a windrow, then picking it up and placing it in the asphalt paver with loading equipment, will be permitted provided that:
 1. The asphalt paver is of such design that the material will fall into a hopper that has a movable bottom conveyor to feed and screed.
 2. The loader is constructed and operated so that substantially all of the material deposited into windrows is picked up and deposited into the paving machine.
 3. The windrow is deposited only so far in advance of the paver to provide for continuous operation of the paver and not so far as to allow the temperature of the asphalt pavement in the windrow to fall below 260 degrees Fahrenheit.
- C. Unless lower temperatures are directed by the Engineer, asphalt concrete shall be spread, and the first coverage of initial or breakdown compaction shall be performed when the temperature of the mixture is not less than 250 degrees Fahrenheit, and

all breakdown compaction shall be completed before the temperature of the mixture drops below 205 degrees Fahrenheit.

- D. Asphalt pavement shall be spread and compacted in not more than 2 inch layers and of the thicknesses indicated in the following table:
 - 1. A thickness tolerance of within 0.1 inches is allowed for asphalt concrete.
 - 2. A total thickness tolerance of within 0.2 inches is allowed for asphalt concrete base.

- E. A layer shall not be placed over another layer until the temperature of the layer is less than 160 degrees Fahrenheit at mid depth:
 - 1. If the temperature of any layer drops below 140 degrees Fahrenheit, or if directed by the Engineer, apply tack coat before placing next layer.

- F. Unless otherwise indicated on the Drawings, asphalt mixtures shall not be handled, spread, or windrowed in a manner that will stain the finished surface of any pavement or other improvements.

- G. The completed mixture shall be deposited on the prepared subgrade at a uniform quantity per linear foot, as necessary to provide the required compacted thickness without resorting to spotting, picking up, or otherwise shifting the mixture.

- H. Spreading:
 - 1. All layers of asphalt pavement shall be spread with an asphalt paver and shall conform to Section 39-1.11 and all applicable referenced sections of the Caltrans Standard Specifications.
 - 2. At locations where the asphalt pavement is to be placed over areas inaccessible to spreading and rolling equipment, all layers of asphalt pavement shall be distributed directly out of the back of the dump truck and spread by hand:
 - a. Asphalt pavement spread by hand shall be compacted thoroughly to the required lines, grades, and cross-sections by means of pneumatic tampers, or by other methods that will produce the same degree of compaction as pneumatic tampers.

- I. Compaction:
 - 1. Compaction of asphalt pavement shall conform to Sections 39-1.11, 39-3.03, 39-3.04, and all applicable referenced sections of the Caltrans Standard Specifications.
 - 2. Minimum required density for each layer of asphalt pavement shall be 95 percent of that obtained in the laboratory in accordance with ASTM Test Method D1561.

- J. Segregation shall be avoided, and the surfacing shall be free of pockets of coarse or fine material. Asphalt pavement containing hardened lumps shall not be used:
 - 1. In areas inaccessible to paving and compacting equipment where spreading is done by hand, minimize the amount of segregation.

- K. Location of longitudinal joints in the top layer will be determined by the Engineer and shall not adversely affect the quality of the finished product.
- L. At all locations, or as directed by the Engineer, the asphalt concrete shall be square and at least 1-inch thick when conforming to existing surfacing. Tapering or feathering is not allowed.

3.05 FIELD QUALITY CONTROL

- A. Construction Manager shall pay for and perform all asphalt testing.
- B. Contractor shall control the quality of Work. Contractor shall anticipate the following testing will be performed:
 - 1. The type and size of the samples shall be suitable to determine conformance with stability, density, thickness, and other specified requirements. Use an approved power saw or core drill for cutting samples. Furnish all tools, labor, and materials for cutting samples, testing, and replacing the pavement where samples were removed. Take a minimum of 1 sample for every 4,000 square feet of asphalt pavement placed.
 - 2. In-place density and compaction tests of the completed pavement in accordance with California Test Method Number 375, to determine compliance with the specified requirements. Submit test results to Engineer for approval.
- C. Cracks, settling of surface, improper drainage, improper compaction, and sloppy connection to previously laid surfaces will be construed as improper workmanship and will not be accepted.

3.06 REQUIREMENTS OF AGENCIES HAVING JURISDICTION

- A. City of Marina:
 - 1. Per the City's Encroachment Permit Requirements.
 - 2. Final paving should occur after each segment of pipe is installed.
 - 3. Compaction testing results shall be provided to the City for review no later than the day after compaction testing takes place:
 - a. Compaction testing shall occur per ASTM (not Caltrans)
- B. City of Seaside:
 - 1. Per the City's Encroachment Permit Requirements.
 - 2. Temporary paving shall be flush with the existing street.
 - 3. Minimum of 2 inches of temporary paving shall be provided.
- C. Monterey County:
 - 1. Per the County's Encroachment Permit Requirements.

3.07 MAINTENANCE OF PAVEMENT

- A. Upon completion of final rolling, traffic shall not be permitted on the finished pavement for at least 6 hours, or until the asphalt pavement has cooled sufficiently to withstand traffic without being deformed.

3.08 WORKMANSHIP AND WARRANTY

- A. Contractor shall provide written warranty against defects in materials or workmanship for a period of not less than 1 year upon completion of Work.

END OF SECTION

SECTION 02762

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Paving markings shall comply with the pavement marking requirements of the local agency having jurisdiction, which shall take precedence over the requirements in this Section
- B. Replacement of removed pavement markings shall match the geometry, color, and type (ex. thermoplastic vs. paint) of pavement marking that was removed or the requirements of the local agency having jurisdiction.
- C. Where new pavement markings are required, this Section governs and includes: Pavement marking requirements for striping, text, and graphics; traffic signs.

1.02 SUBMITTALS

- A. Product data.
- B. Manufacturer's instructions.

1.03 QUALITY ASSURANCE

- A. Applicator qualifications: Minimum 5 years of experience of applying traffic markings with satisfactory performance record.
- B. Regulatory requirements: Comply with applicable requirements of governmental agencies having jurisdiction, including airborne emissions and industrial waste disposal requirements.

1.04 PROJECT CONDITIONS

- A. Apply pavement marking paint when:
 - 1. Pavement is clean and thoroughly dry.
 - 2. Ambient temperature is above 40 degrees Fahrenheit.
 - 3. Precipitation is not expected within 12 hours of completion of application.

PART 2 PRODUCTS

2.01 PAVEMENT MARKING PAINT

- A. Manufacturers: One of the following or equal:
 - 1. Dunn-Edwards Corp.
 - 2. Glidden Co.
 - 3. Sherwin Williams Co.

- B. Materials:
1. Pavement marking paint, latex based: One of the following or equal:
 - a. Dunn-Edwards: No. W 801, Vin-L-Stripe, epoxy-modified acrylic-latex based paint.
 - b. Glidden: 63240 Series, UltraHide Latex Traffic Paint.
 - c. Sherwin Williams: Set fast acrylic water borne traffic marking paint.
 2. Masonry conditioner: The following or equal:
 - a. Sherwin Williams: B46WZ1000, Masonry Conditioner.
 3. Colors:
 - a. Text: White.
 - b. Parking dividers: White.
 - c. No parking zone markings: Yellow.
 - d. No parking curb: Red.
 - e. Handicap zone markings: Blue and white:
 - 1) Blue paint: Match color No. 15090 in Federal Standard 595A as specified in Section 2-1720 of California Administrative Code Title 24 Handicap Regulations.
 - f. Accessible parking dividers and accessible route: Yellow.
 - g. Directional arrows: White.
 - h. Driving lane dividers: White.

2.02 TRAFFIC SIGNS

- A. Manufacturers: One of the following or equal:
1. Seton Name Plate Co.
 2. Emedco.
- B. Material, shapes, and graphics: Post mounted baked enamel on steel sheet, reflectorized to show the same shape and color both day and night, with mounting holes, in accordance with the Uniform Traffic Control Devices manual. Fasten sign to post with stainless steel bolts.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove dirt, oil, grease, and other materials which may affect paint adhesion.
- B. Apply masonry conditioner on weathered or sandblasted surfaces, brick, or stucco.

3.02 APPLICATION

- A. Apply paint at package consistency whenever possible. Thin paint as little as possible.
- B. Apply paint with specifically designed and manufactured equipment for pavement marking. Provide:
1. Uniform straight edges without overspray.
 2. 4 inch wide lines, unless indicated otherwise.
 3. Hatching in handicap parking areas.
- C. Apply paint to obtain thickness recommended by paint manufacturer.

- D. Paint traffic control markings, including striping, directional arrows, cross walks and lettering, and handicap striping and symbols as indicated on the Drawings and in accordance with local governing agency's standards. Use stencils for arrows, lettering, and symbols.
- E. Install traffic signs where indicated on the Drawings. Set post in concrete to depth to resist sign damage from wind speed of 100 miles per hour.

END OF SECTION

SECTION 02820

FENCES AND GATES

1.01 SUMMARY

- A. Section includes:
 - 1. Fence, framework, fabric, and accessories.
 - 2. Excavation for post bases and concrete foundation for posts.
 - 3. Manual gates and related hardware.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
 - 2. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. A385 - Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - 5. A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 6. A702 - Standard Specification for Steel Fence Posts and Assemblies, Hot-Wrought.
 - 7. F626 - Standard Specification for Fence Fittings.
 - 8. F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.
 - 9. F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.
 - 10. F1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.
- B. State of California Department of Transportation (Caltrans).

1.03 SUBMITTALS

- A. Product data: Submit data completely describing products.
- B. Shop drawings:
 - 1. Submit drawings showing details of fencing and gates. For gates, include methods and means of mounting, attaching, and installing locks to gates.
- C. Quality control submittals:
 - 1. Certificates of compliance: Provide certification that materials conform to referenced specifications.
 - 2. Qualifications: Provide installer's references and list of local references.

1.04 QUALITY ASSURANCE

- A. Pre-installation conference: Participate in conference, if required.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and handling: Unload, store, and protect materials such that they are not damaged.

1.06 PROJECT CONDITIONS

- A. Field measurements:
 - 1. Verify actual field distances so that post spacing can be made uniform.
 - 2. Verify and coordinate gate opening distances for driveway.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Chain link fence and gates: One of the following or equal:
 - 1. Allied Tube and Conduit.
 - 2. Master-Halco.

2.02 MATERIALS

- A. Chain link fence:
 - 1. Fabric:
 - a. Height: Match existing fencing height.
 - b. Mesh: 2 inches.
 - c. Size wire: 6 gauge or 9 gauge:
 - 1) Coating: Zinc coating, ASTM A392, Class 1.
 - 2) Tensile strength: 80,000 pounds per square inch minimum.
 - d. Top rail:
 - 1) Size: 1-5/8 inches outside diameter, galvanized.
 - 2) Tension wire: 7-gauge galvanized coil spring wire.
 - e. Bottom rail:
 - 1) Size: 1-5/8 inches outside diameter, galvanized.
 - 2) Tension wire: 7-gauge galvanized coil spring wire.
 - f. Line posts:
 - 1) Size: 2-3/8-inch outside diameter, galvanized.
 - g. Terminal, corner, and pull posts:
 - 1) Size: 2-7/8-inch outside diameter, galvanized.
 - 2. Accessories:
 - a. Fence fittings: In accordance with ASTM F626:
 - 1) Post top fittings:
 - a) Provide post caps that fit snugly over posts to exclude moisture. Provide dome style caps for terminal posts and loop style caps for line posts.
 - b) Extension arms, 45-degree angle type, capable of receiving 3 strands of barbed wire.
 - 2) Rail and brace ends: Provide pressed steel or malleable castings that are cup shaped to receive rail and brace ends.
 - b. Fabric accessories:
 - 1) Wire clips: Minimum 6 gauge hot-dip galvanized.
 - 2) Tension bars: 1/4 inch by 3/4 inch, galvanized.
 - 3) Steel bands: 11 gauge, 1 inch wide, hot-dip galvanized.

- 4) Bolts and nuts: 3/8-inch diameter.
- 5) Hog rings: 11 gauge.

B. Chain link and barbed wire gates:

1. Gate posts and concrete foundations for gate posts: Except where differently indicated on the Drawings, determine gate posts and concrete foundations for gate posts in accordance with following schedule:

Gate Leaf Widths (Feet)	Gate Posts	Foundations	
	Post O.D. ASTM F1043 Group IA or IC (Inches)	Diameter (Inches)	Depth (Feet)
0 TO 6	2-7/8	12	4
Over 6 to 13	4	18	4
Over 13 to 18	6-5/8 (Group IA)	18	4
Over 18 to 25	8-5/8 (Group IA)	18	4.5

2. Chain link gates:

- a. Frames and center supports: 1-7/8-inch outside diameter galvanized steel pipe that in accordance with ASTM F1043 Group IA or IC.
- b. Gate accessories:
 - 1) Post top fittings:
 - a) Provide post caps that fit snugly over posts to exclude moisture.
 - b) Provide dome style caps for terminal posts and loop style caps for line posts.
 - c) Post top fittings: Extension arms, 45-degree angle type, capable of receiving three strands of barbed wire
 - 2) Corner fittings: Heavy pressed steel or malleable castings.
 - 3) Gate tensioning:
 - a) Cross tensioning rods: 3/8 inch, galvanized.
 - b) Turnbuckles: Heavy duty.
 - 4) Tension rods for 4-foot gates: 3/8 inch, easily adjustable, galvanized.
 - 5) Gate frame corner fittings: Fitting designed for purpose, Manufacturer's standard.
 - 6) Horizontal gate stiffeners: 1-5/8-inch outside diameter galvanized steel pipe that in accordance with ASTM F1043 Group IA or IC.
 - 7) Gate hardware:
 - a) Catch and locking attachment: Combination steel or malleable iron catch and locking attachment of acceptable design.
 - b) Stops:
 - (1) Type 1: Capable of holding gates open.
 - (2) Type 2: Center rest with catch.
 - c) Color: Match color of fabric.

2.03 FABRICATION

A. Shop finishing:

1. Galvanizing: For items not fabricated of galvanized materials hot-dip galvanize products after fabrication in accordance with following as applicable:
 - a. ASTM A123.

- b. ASTM A153.
 - c. ASTM A385.
 - 2. Mark galvanized products with name of galvanize, applicable ASTM designation, and weight of zinc coating.
 - 3. Galvanize fabricated items complete, or in largest practicable sections.
 - 4. Provide galvanizing at rate of 2.0 ounces per square foot, minimum.
 - 5. Hardware:
 - a. Padlocks: Cadmium plated.
 - b. Chain: Galvanized.
- B. Finish schedule:
 - 1. Ferrous metal:
 - a. Typical: Clean, then hot-dip galvanize in accordance with galvanizing standards.
- C. Field finish touch-up painting:
 - 1. Galvanized repair paint: Apply paint having minimum dry film thickness of 2.0 to 3.5 mils.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Verify field conditions prior to construction.

3.02 PREPARATION

- A. Surface preparation:
 - 1. Before locating fence posts grade ground to permit grade of fence to remain constant over any local elevations or depressions in ground line.

3.03 INSTALLATION

- A. Chain link fences and gates:
 - 1. General:
 - a. Install chain link fence and gates as indicated on the Drawings and specified in this Section.
 - b. Provide fence systems that are plumb, taut, true to line and grade, and complete in all details.
 - c. Install fencing to generally follow finish grade of ground and provide pull posts at points where required to conform to change in grade.
 - d. Install fencing such that space between bottom of fence and finish ground line does not exceed 3 inches.
 - 2. Concrete foundation for fence posts:
 - a. Set fence posts in concrete foundations, that extend at least 3 feet into ground, and space posts not over 10 feet apart.
 - b. Provide concrete foundations having minimum of 10 inches in diameter for line posts and 12 inches in diameter for corners and gates.
 - c. Provide foundations that extend minimum of 1 inch above finish grade and have tops that are shaped to slope to drain away from posts.
 - d. Trowel finish tops of footings, and slope or dome to direct water away from posts.

- e. Set keepers, stops, sleeves, tracks, eye bolts, and other accessories into concrete as required.
- f. Wheel rolling area for sliding gates shall be steel-trowel smooth finish concrete.
- 3. Post bracing:
 - a. End corner, pull, and gate posts: Brace with same material as top rail and trussed to line posts with 3/8-inch rods and tighteners.
 - b. Bracing end, corner, slope, and gate posts:
 - 1) Brace to midpoint of nearest line post or posts with horizontal braces used as compression members.
 - 2) Then from such line posts truss from brace back to bottom of end, corner, slope, or gate post with 3/8-inch steel truss rods with turnbuckles or other suitable tightening devices used as tension members.
- 4. Top rail:
 - a. Unless otherwise specified or indicated on the Drawings, install fencing with top rail and bottom tension wire.
- 5. Fabric:
 - a. Place fabric on outward facing side of the posts and install so that top edge projects over top rail of fence.
 - b. Stretch fabric taut and securely fasten to posts, top rail, and bottom tension wire.
 - c. Install tension wire parallel to line of fabric.
 - d. Fabric: Connect fabric to:
 - 1) Line posts with wire clips minimum every 14 inches.
 - 2) Terminal, corner, and gate posts with tension bars tied to posts minimum 14 inches on center and with steel bands and bolts and nuts.
 - 3) Tension wires with hog rings minimum 24 inches on center.
- 6. Post top fittings: Provide post tops with extension arms.

3.04 CLEANING

- A. Clean up surplus dirt, concrete, and other waste material and dress grade up upon completion of the work.

3.05 PROTECTION

- A. Protect installed fences and gates against damage and, if damaged, repair prior to final acceptance.

END OF SECTION

SECTION 03055

ADHESIVE-BONDED REINFORCING BARS AND ALL THREAD RODS IN CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Bonding reinforcing bars and all thread rods in concrete using adhesives.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.
- B. American National Standards Institute (ANSI):
 - 1. Standard B212.15 - Carbide Tipped Masonry Drills and Blanks for Carbide Tipped Masonry Drills.
- C. ASTM international (ASTM):
 - 1. C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- D. Concrete Reinforcing Steel Institute (CRSI).
- E. ICC Evaluation Service, Inc. (ICC-ES):
 - 1. AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
- F. Society for Protective Coatings (SSPC):
 - 1. SP-1 - Solvent Cleaning.

1.03 DEFINITIONS

- A. Evaluation Service Report (ESR): Report prepared by ICC-ES, or other testing agency acceptable to Engineer and to the Building Official, that documents testing and review of a product to confirm that it complies with the requirements of designated ICC-ES Acceptance Criteria, and to document its acceptance for use under the Building Code.

1.04 SUBMITTALS

- A. Product data: Technical data for adhesives, including:
 - 1. Manufacturer's printed installation instructions (MPII).
 - 2. Independent laboratory test results indicating allowable loads in tension and shear for concrete of the types included in this Work, with load modification factors for temperature, spacing, edge distance, and other installation variables.
 - 3. Handling and storage instructions.

- B. Quality control submittals:
 - 1. Special inspection: Detailed step-by-step instructions for the special inspection procedures required by the building code.
 - 2. For each adhesive to be used, Evaluation Report confirming that the product complies with the requirements of AC308 for both un-cracked and cracked concrete and for use in Seismic Design Categories A through F.
 - 3. Installer qualifications:
 - a. Submit evidence of successful completion of adhesive manufacturer's installation training program.
 - b. Submit evidence of current certification for installation of inclined and overhead anchors under sustained tension loading.
- C. Inspection and testing reports:
 - 1. Inspections: Field quality control: Reports of inspections and tests:
 - a. Inspections: Field quality assurance: Reports of special inspections and tests.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installation requirements:
 - a. Have available at the site, and install anchors in accordance with, the adhesive manufacturer's printed installation instructions.
 - 2. Installer qualifications:
 - a. Demonstrating successful completion of adhesive manufacturer's on-site training program for installation of adhesive-bonded anchors.
 - b. Holding current certification for installation of adhesive-bonded anchors by a qualified organization acceptable to the Engineer and to the Building Official:
 - 1) Organizations/certification programs deemed to be qualified are:
 - a) ACI-CRSI Adhesive Anchor Installer Certification Program.
 - b) Adhesive anchor manufacturer's certification program, subject to acceptance by the Engineer and the Building Official.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products as follows, unless more restrictive requirements are recommended by the manufacturer:
 - 1. Store adhesives and adhesive components on pallets or shelving in a covered- storage area protected from weather.
 - 2. Control temperature to maintain storage within manufacturer's recommended temperature range:
 - a. If products have been stored at temperatures outside manufacturer's recommended range, test by methods acceptable to the Engineer to confirm acceptability before installing in the Work.
 - 3. Dispose of products that have passed their expiration date.

1.07 PROJECT CONDITIONS

- A. As specified in Section 01610 - Project Design Criteria and Section 01612 - Seismic Design Criteria.
- B. Seismic Design Category (SDC) for structures is indicated on the Drawings.

PART 2 PRODUCTS

2.01 GENERAL

- A. Like items of materials: Use end products of one manufacturer in order to achieve structural compatibility and singular responsibility.
- B. Adhesives shall have a current Evaluation Report documenting testing and compliance with the requirements of ACI 355.4 and of ICC-ES AC308 for use with un-cracked concrete and with cracked concrete in the Seismic Design Category specified.
- C. Bond reinforcing bars and all thread rods in concrete using epoxy adhesive unless other adhesives specified are specifically indicated on the Drawings or approved in writing by the Engineer.

2.02 EPOXY ADHESIVE

- A. Materials:
 - 1. Meeting the physical requirements of ASTM C881, Type IV, Grade 3, Class B or C depending on site conditions.
 - 2. 2-component, 100 percent solids, insensitive to moisture.
 - 3. Cure temperature, pot life, and workability: Compatible with intended use and environmental conditions.
- B. Packaging:
 - 1. Disposable, self-contained cartridge system furnished in side-by-side cartridges designed to fit into a manually or pneumatically operated caulking gun, and with resin and hardener components isolated until mixing through manufacturer's static mixing nozzle:
 - a. Nozzle designed to dispense components in the proper ratio and to thoroughly blend the components for injection from the nozzle directly into prepared hole.
 - b. Provide nozzle extensions as required to allow full-depth insertion and filing from the bottom of the hole.
 - 2. Container markings: Include manufacturer's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- C. Manufacturers: One of the following or equal:
 - 1. Hilti, Inc., HIT-RE 500-V3.
 - 2. Simpson Strong-Tie Co., Inc., SET-XP.

2.03 ACRYLIC AND HYBRID ADHESIVE

- A. Materials:
 - 1. 2-component, high-solids, acrylic-based or hybrid acrylic and epoxy-based adhesive.
 - 2. Approved by the manufacturer for installation at substrate temperatures of 0 degrees Fahrenheit and above.

- B. Packaging:
 - 1. Disposable, self-contained cartridge system furnished in side-by-side cartridges designed to fit into a manually or pneumatically operated caulking gun, and with resin and hardener components isolated until mixing through manufacturer's static mixing nozzle. Nozzle designed to dispense components in the proper ratio and to thoroughly blend the components for injection from the nozzle directly into prepared hole.
 - 2. Container markings: Include manufacturer's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- C. Manufacturers: One of the following or equal:
 - 1. Hilti, Inc., HIT-HY-200.
 - 2. Simpson Strong-Tie Co., Inc., AT-XP.

2.04 ALL THREAD RODS

- A. Materials: As specified in Section 05120 - Structural Steel for rods, nuts and washers.

2.05 REINFORCING BARS

- A. As specified in Section 03200 - Concrete Reinforcing.

PART 3 EXECUTION

3.01 GENERAL

- A. Execution of this work is restricted to installers who have personally completed the adhesive manufacturer's on-site training for the products to be installed, and who are personally certified through a qualified certification program described under Quality Assurance and accepted by the Engineer and the Building Official:
 - 1. Do not install holes or adhesive until training is complete.
- B. Perform work in strict compliance with the accepted MPII and the following instructions. Where the accepted MPII and the instructions conflict, the MPII shall prevail.
- C. Install reinforcing bars and all thread rods to embedment depth, and at spacing and locations indicated on the Drawings:
 - 1. If embedment depth is not indicated, contact Engineer for requirements.
 - 2. Do not install adhesive-bonded all thread rods or reinforcing bars in upwardly inclined or overhead applications unless accepted in advance by Engineer.

3.02 PREPARATION

- A. Do not begin installation of adhesive bonded anchors until:
 - 1. Concrete has achieved an age of at least 21 days after placement.
 - 2. On-site training in installation of adhesive bonded anchors by manufacturer's technical representative is complete. Do not drill holes in concrete or install adhesive and embeds in holes.

- B. Review manufacturer's printed installation instructions (MPII) and "conditions of use" stipulated in the Evaluation Report before beginning work:
 - 1. Bring to the attention of the adhesive manufacturer's technical representative any discrepancies between these documents, and resolve before proceeding with installation.
- C. Install adhesive bonded anchors in full compliance with manufacturer's printed installation instructions using personnel who have successfully completed manufacturer's on-site training for products to be used and who hold certifications specified in this Section.
- D. Confirm that adhesive and substrate receiving adhesive are within manufacturer's recommended range for temperature and moisture conditions, and will remain so during the curing time for the product.

3.03 HOLE SIZING AND INSTALLATION

- A. Drilling holes:
 - 1. Determine location of reinforcing bars or other obstructions with a nondestructive indicator device, and mark locations with construction crayon on the surface of the concrete.
 - 2. Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without prior acceptance by Engineer.
- B. Hole drilling equipment:
 - 1. Electric or pneumatic rotary impact type with medium or light impact:
 - a. Installation of anchors in cored holes is not permitted.
 - b. Set drill to "rotation only" mode, or to "rotation plus hammer" mode in accordance with the manufacturer's installation instructions and the requirements of the Evaluation Report.
 - c. Where edge distances are less than 2 inches and "rotation plus hammer" mode is permitted, use lighter impact equipment to prevent micro-cracking and concrete spalling during the drilling process.
 - 2. Drill bits: Carbide-tipped in accordance with ANSI B212-15 unless otherwise recommended by the manufacturer or required as a "condition of use" in the Evaluation Report:
 - a. Hollow drill bits with flushing air systems are preferred. Air supplied to hollow drill bits shall be free of oil, water, or other contaminants that will reduce bond.
- C. Hole diameter: As recommended in the manufacturer's installation instructions and the Evaluation Report.
- D. Hole depth: As recommended in the manufacturer's installation instructions to provide minimum effective embedment indicated on the Drawings.
- E. Obstructions in drill path:
 - 1. If an existing reinforcing bar or other obstruction is hit while drilling a hole, unless otherwise accepted by Engineer, stop drilling. Prepare and fill the hole with dry-pack mortar. Relocate the hole to miss the obstruction and drill another hole to the required depth:

- a. Obtain Engineer's acceptance of distance between abandoned and relocated holes before proceeding with the relocation.
 - b. Allow dry-pack mortar to cure to a strength equal to that of the surrounding concrete before resuming drilling in the area.
 - c. Epoxy grout may be substituted for dry-pack mortar when accepted by Engineer.
2. Avoid drilling an excessive number of holes in an area of a structural member, which would excessively weaken the member and endanger the stability of the structure.
 3. When existing reinforcing steel is encountered during drilling and when specifically accepted by Engineer, enlarge the hole by 1/8 inch, core through the existing reinforcing steel at the larger diameter, and resume drilling at original hole diameter using pneumatic rotary impact drill.
 4. Bent bar reinforcing bars: Where edge distances are critical, and interference with existing reinforcing steel is likely, if acceptable to Engineer, drill hole at 10 degree (or less) angle from axis of reinforcing bar or all thread rod being installed.
- F. Cleaning holes:
1. Insert air nozzle to bottom of hole and blow out loose dust:
 - a. Use compressed air that is free of oil, water, or other contaminants that will reduce bond.
 - b. Provide minimum air pressure of 90 pounds per square inch for not less than 4 seconds.
 2. Using a stiff bristle brush with diameter that provides contact around the full perimeter of the hole, vigorously brush hole to dislodge compacted drilling dust:
 - a. Insert brush to the bottom of the hole and withdraw using a simultaneous twisting motion.
 - b. Repeat at least 4 times.
 3. Repeat the preceding steps as required to remove drilling dust or other material that will reduce bond, and in the number of cycles required by the MPII and the Evaluation Report.
 4. Leave prepared holes clean and dry.
 5. Protect prepared and cleaned holes from contamination and moisture until adhesive is installed.
 6. Re-clean and dry previously prepared holes if, in the opinion of the Engineer, the hole has become contaminated after initial cleaning.

3.04 INSTALLATION OF ADHESIVE AND INSERTS

- A. Clean and prepare inserts reinforcing bars and all thread rods:
1. Prepare embedded length of reinforcing bars and all thread rods by cleaning to bare metal. Inserts shall be free of oil, grease, paint, dirt, mill scale, rust, or other coatings that will reduce bond.
 2. Solvent clean prepared reinforcing bars and all thread rods over the embedment length in accordance with SSPC SP-1. Provide an oil and grease free surface for bonding of adhesive to steel.
- B. Fill holes with adhesive:
1. Starting at the bottom of the hole, fill hole with adhesive inserting the reinforcing bar or all thread rod.

2. Fill hole as nozzle is withdrawn without creating air voids.
 3. Unless otherwise indicated on the Drawings, fill hole with sufficient adhesive so that excess adhesive is extruded out of the hole when the reinforcing bar or all thread rod is inserted.
 4. Where necessary, seal hole at surface of concrete to prevent loss of adhesive during curing.
- C. Installing reinforcing bars and all thread rods:
1. Unless otherwise indicated on the Drawings, install bars and rods perpendicular to the concrete surface.
 2. Insert reinforcing bars and all thread rods into adhesive in accordance with manufacturer's recommended procedures.
 3. Confirm that insert has reached the designated embedment in the concrete, and that adhesive completely surrounds the embedded portion.
 4. Securely brace bars and all thread rods in place to prevent displacement while the adhesive cures. Bars and rods displaced during curing will be considered damaged and replacement will be required.
 5. Clean excess adhesive from the mouth of the hole.
- D. Curing and loading:
1. Provide and maintain curing conditions recommended by the adhesive manufacturer for the period required to fully cure the adhesive at the temperature of the concrete.
 2. Do not disturb or load bonded embeds until manufacturer's recommended cure time, based on temperature of the concrete, has elapsed.

3.05 POST-INSTALLATION ACTIVITIES

- A. Do not bend bars or all-thread rods after bonding to the concrete, unless accepted in advance by the Engineer.
- B. Attachments to all thread rods:
1. After assemblies to be connected are placed, install nuts and washers for threaded rods as indicated on the Drawings.
 2. Draw nuts down tight, using practices specified for "snug tight" installation of bolts in steel to steel connections.

3.06 FIELD QUALITY CONTROL

- A. Provide field quality control over the Work of this Section as specified in Section 01450 - Quality Control.
- B. Do not allow work described in this Section to be performed by individuals who do not hold the specified certifications and who have not completed the specified job site training.
- C. Manufacturer's services:
1. Before beginning installation, furnish adhesive manufacturer's technical representative to conduct on-site training in proper storage and handling of adhesive, drilling and cleaning of holes, and preparation and installation of reinforcing bars and all thread rods:

- a. Provide notice of scheduled training to Engineer and to Special Inspector(s) not less than 10 working days before training occurs. Engineer and Special Inspector may attend training sessions.
2. Submit record, signed by the manufacturer's technical representative, listing Contractor's personnel who completed the training. Only qualified personnel who have completed manufacturer's on-site training shall perform installations.

D. Field inspections and testing:

1. Hole drilling and preparation.
2. Results: Submit records of inspections and testing to Engineer by electronic copies within 24 hours after completion.

3.07 FIELD QUALITY ASSURANCE

- A. Provide field quality assurance over the Work of this Section as specified in Section 01450 - Quality Control.
- B. Special inspections, special tests, and structural observation:
 1. Provide as specified in Section 01455A - Special Tests and Inspections.
 2. Frequency of inspections:
 - a. Unless otherwise indicated on the Drawings or in this Section, provide periodic special inspection as required by the Evaluation Report for the product installed.
 - b. Provide continuous inspection for the initial installation of each type and size of adhesive bonded reinforcing bar and all thread rod. Subsequent installations of the same anchor may be installed with periodic inspection as defined in subsequent paragraphs.
 - c. Provide continuous inspection of all drilling, cleaning and bonding activities for bars and rods installed in horizontal and upwardly inclined positions.
 3. Preparation:
 - a. Review Drawings and Specifications for the Work to be observed.
 - b. Review adhesive manufacturer's MPII and recommended installation procedures.
 - c. Review Evaluation Report "Conditions of Use" and "Special Inspection" requirements.
 4. Inspection: Periodic:
 - a. Initial inspection. Provide an initial inspection for each combination of concrete and reinforcing bar strength or concrete strength and all thread rod material being installed. During initial inspection, observe the following for compliance with the installation requirements:
 - 1) Concrete: Class (minimum specified compressive strength) and thickness.
 - 2) Environment: Temperature conditions at work area, and moisture conditions of concrete and drilled hole.
 - 3) Holes: Locations, spacing, and edge distances; verification of drill bit compliance with requirements; cleaning equipment and procedures; cleanliness of hole. Before adhesive is placed, confirm that depth and preparation of holes conforms to the requirements of the Contract Documents, the MPII, and the "conditions of use" listed in the Evaluation Report.

- 4) Adhesive: Product manufacturer and name; lot number and expiration date; temperature of product at installation; installation procedure. Note initial set times observed during installation.
- 5) Reinforcing bars and all thread rods: Material diameter and length; steel grade and/or strength; cleaning and preparation; cleanliness at insertion; minimum effective embedment provided.
- b. Subsequent inspections: Subsequent installations of the same reinforcing bars or all thread rods may be performed without the presence of the special inspector, provided that:
 - 1) There is no change in personnel performing the installation, the general strength and characteristics of the concrete receiving the inserts, or the reinforcing bars and all thread rods being used.
 - 2) For ongoing installations, the special inspector visits the site at least once for every 4 hours of work during each day of installation to observe the work for compliance with material requirements and installation procedures.
5. Inspection: Continuous:
 - a. Make observations as described under "Inspection - Periodic, Initial Inspection" during all drilling, cleaning, and bonding activities for all bars and rods installed.
6. Records of inspections:
 - a. Provide a written record of each inspection using forms acceptable to the Engineer and to the Building Official.
 - b. Submit electronic copies of inspection reports to Engineer within 24 hours after completion of inspection.

END OF SECTION

SECTION 03071

EPOXIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Epoxy.
 - 2. Epoxy gel.
 - 3. Epoxy bonding agent.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. C881 - Standard Specification for Epoxy-Resin-Base Systems for Concrete.
 - 2. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - 3. D638 - Standard Test Method for Tensile Properties of Plastics.
 - 4. D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

1.03 SYSTEM DESCRIPTION

- A. Performance requirements:
 - 1. Provide epoxy materials that are new.
 - 2. Store and use products within limitations set forth by manufacturer.
 - 3. Perform and conduct work of this Section in neat orderly manner.

1.04 SUBMITTALS

- A. General: Submit as specified in Section 01330 - Submittal Procedures.
- B. Product Data: Submit manufacturer's data completely describing epoxy materials:
 - 1. Submit evidence of conformance to ASTM C881. Include manufacturer's designations of Type Grade, Class, and Color.
 - 2. Submit documentation that materials meet or exceed the specified strength and performance characteristics. Indicate test methods and test results.
- C. Quality control submittals:
 - 1. Manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Moisture tolerant, water-insensitive, two-component epoxy resin adhesive material containing 100 percent solids, and meeting or exceeding the performance properties specified when tested in accordance with the standards specified.

- B. Epoxy: Low viscosity product in accordance with ASTM C881; Types I, II and IV; Grade 1; Class C:
 - 1. Manufacturers: One of the following or equal:
 - a. BASF, MasterInject 1500.
 - b. Dayton Superior, Sure Inject J56.
 - c. Sika Corporation, Sikadur 35 Hi-Mod LV.

- C. Epoxy gel: Non-sagging product in accordance with ASTM C881, Types I and IV, Grade 3, Class C:
 - 1. Manufacturers: One of the following or equal:
 - a. BASF, MasterEmaco ADH 327.
 - b. Dayton Superior, Sure Anchor J50.
 - c. Sika Corp., Sikadur 31, Hi-Mod Gel.

- D. Epoxy bonding agent: Non-sagging product in accordance with ASTM C881, Type II, Grade 2, Class C:
 - 1. Manufacturers: One of the following or equal:
 - a. BASF, MasterEmaco ADH 326.
 - b. Dayton Superior, Sure Bond J58.
 - c. Sika Chemical Corp., Sikadur 32 Hi-Mod LPL.
 - 2. Required properties:

Table 3 - Material Properties - Epoxy Bonding Agent		
Property	Test Method	Required Results
Tensile Strength (7-day)	ASTM D638	3,300 pounds per square inch, minimum.
Compressive Yield Strength (7-day)	ASTM D695	8,300 pounds per square inch, minimum.
Bond Strength (14-days)	ASTM C882	1,800 pounds per square inch, minimum. Concrete failure before failure of epoxy bonding agent.
Pot Life	-	Minimum 70 minutes at 77 degrees Fahrenheit or minimum 90 minutes at 73 degrees Fahrenheit.
Notes:	Testing results are for materials installed and cured at a temperature between 72 and 78 degrees Fahrenheit for 7 days, unless otherwise noted.	

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and cure epoxy materials in accordance with manufacturer's installation instructions.
- B. Epoxy:
 - 1. Apply in accordance with manufacturer's installation instructions.
- C. Epoxy gel:
 - 1. Apply in accordance with manufacturer's installation instructions.
 - 2. Use for vertical or overhead work, or where high viscosity epoxy is required.
 - 3. Epoxy gel used for vertical or overhead work may be used for horizontal work.
- D. Epoxy bonding agent:
 - 1. Apply in accordance with manufacturer's installation instructions.
 - 2. Bonding agent will not be required for filling form tie holes or for normal finishing and patching of similar sized small defects.

END OF SECTION

SECTION 03102
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Concrete formwork.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
1. 117 - Specifications for Tolerances for Concrete Construction and Materials and Commentary.
- B. Underwriters Laboratories (UL).

1.03 DEFINITIONS

- A. Green concrete: Concrete with less than 100 percent of the minimum specified compressive strength (f'_c).

1.04 SYSTEM DESCRIPTION

- A. Design requirements:
1. Design of concrete forms, falsework, and shoring in accordance with local, state, and federal regulations.
 2. Design forms and ties to withstand concrete pressures without bulging, spreading, or lifting of forms.
- B. Performance requirements:
1. Construct forms so that finished concrete conforms to shapes, lines, grades, and dimensions indicated on the Drawings.
 2. It is intended that surface of concrete after stripping presents smooth, hard, and dense finish that requires minimum amount of finishing.
 3. Provide sufficient number of forms so that the work may be performed rapidly and present uniform appearance in form patterns and finish.
 4. Use forms that are clean and free from dirt, concrete, and other debris:
 - a. Coat with form release agent if required, prior to use or reuse.

1.05 SUBMITTALS

- A. Information on proposed forming system:
1. Submit in such detail as the Engineer may require to assure himself that intent of the Specifications can be complied with by use of proposed system.
 2. Alternate combinations of plywood thickness and stud spacing may be submitted.

- B. Form release agent. NSF 61 certification prepared by NSF, Underwriters Laboratories (UL) or other, similar, nationally recognized testing laboratory acceptable to the Engineer.

1.06 QUALITY ASSURANCE

- A. Qualifications of formwork manufacturers: Use only forming systems by manufacturers having a minimum of 5 years' experience, except as otherwise specified, or accepted in writing by the Engineer.
- B. Regulatory requirements: Install work of this Section in accordance with local, state, and federal regulations.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Forms: Built-up plywood:
 - 1. Built-up plywood forms may be substituted for prefabricated forming system subject to following minimum requirements:
 - a. Size and material:
 - 1) Use full size 4-foot by 8-foot plywood sheets, except where smaller pieces are able to cover entire area.
 - 2) Sheet construction: 5-ply plywood sheets, 3/4-inch nominal, made with 100 percent waterproof adhesive, and having finish surface that is coated or overlaid with surface which is impervious to water and alkaline calcium and sodium hydroxide of cement.
 - b. Wales: Minimum 2-inch by 4-inch lumber.
 - c. Studding and wales: Contain no loose knots and be free of warps, cups, and bows.
- B. Forms: Steel or steel framed:
 - 1. Steel forms:
 - a. Rigidly constructed and capable of being braced for minimum deflection of finish surface.
 - b. Capable of providing finish surfaces that are flat without bows, cups, or dents.
 - 2. Steel framed plywood forms:
 - a. Provide forms that are rigidly constructed and capable of being braced.
 - b. Plywood paneling: 5-ply, 5/8-inch nominal or 3/4-inch nominal, made with 100 percent waterproof adhesive, and having finish surface that is coated or overlaid with surface which is impervious to water and alkaline calcium and sodium hydroxide of cement.
- C. Form release agent:
 - 1. Effective, non-staining, bond-breaking coating compatible with form surfaces and concrete mixes used.
- D. Form ties:
 - 1. General:
 - a. Provide form ties for forming system selected that are manufactured by recognized manufacturer of concrete forming equipment.

- b. Do not use wire ties or wood spreaders of any form.
 - c. Provide ties of type that accurately tie, lock, and spread forms.
 - d. Provide form ties of such design that when forms are removed, they locate no metal or other material within 1-1/2 inches of the surface of the concrete.
 - e. Do not allow holes in forms for ties to allow leakage during placement of concrete.
- 2. Cone-snap ties:
 - a. Cone-snap ties shall form a cone shaped depression in the concrete with minimum diameter of 1 inch at the surface of the concrete and minimum depth of 1-1/2 inches.
 - b. Provide neoprene waterseal washer that is located near the center of the concrete.
 - 3. Taper ties:
 - a. Neoprene plugs for taper tie holes: Size so that after they are driven, plugs are located in center third of wall thickness.
- E. Incidentals:
- 1. External angles:
 - a. Where not otherwise indicated on the Drawings, provide with 3/4-inch bevel, formed by utilizing true dimensioned wood or solid plastic chamfer strip on walkways, slabs, walls, beams, columns, and openings.
 - b. Provide 1/4-inch bevel formed by utilizing true dimensioned wood or solid plastic chamfer strip on walkways, walls, and slabs at expansion, and construction joints.
 - 2. Keyways: Steel, plastic, or lumber treated with form release agent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site verification of conditions:
 - 1. Do not place concrete until forms have been checked for alignment, level, and strength, and mechanical and electrical inserts or other embedded items for correct location.

3.02 INSTALLATION

- A. Forms: Built-up plywood:
 - 1. Studding:
 - a. Spaced at 16 inches or 24 inches on center.
 - b. Closer spacing may be required depending upon strength requirements of the forms, in order to prevent any bulging surfaces on faces of finished concrete work.
 - c. Install studs perpendicular to grain of exterior plys of plywood sheets.
 - 2. Wales: Form wales of double lumber material with minimum size as specified in this Section.
 - 3. Number of form reuses: Depends upon durability of surface coating or overlay used, and ability to maintain forms in condition such that they are capable of producing flat, smooth, hard, dense finish on concrete when stripped.

- B. Forms: Steel or steel framed:
 - 1. Steel forms:
 - a. Adequately brace forms for minimum deflection of finish surface.
 - 2. Steel framed plywood forms:
 - a. Rigidly construct and brace with joints fitting closely and smoothly.
 - b. Number of form reuses: Depends upon durability of surface coating or overlay used.
 - 3. Built-up plywood forms: As specified in this Section may be used in conjunction with steel forms or steel framed plywood forms for special forming conditions such as corbels and forming around items which will project through forms.

- C. Form bracing and alignment:
 - 1. Line and grade: Limit deviations to tolerances which will permit proper installation of structural embedded items or mechanical and electrical equipment and piping.
 - 2. Formwork:
 - a. Securely brace, support, tie down, or otherwise hold in place to prevent movement.
 - b. Make adequate provisions for uplift pressure, lateral pressure on forms, and deflection of forms.
 - 3. When second lift is placed on hardened concrete: Take special precautions in form work at top of old lift and bottom of new lift to prevent:
 - a. Spreading and vertical or horizontal displacement of forms.
 - b. Grout "bleeding" on finish concrete surfaces.
 - 4. Pipe stubs, anchor bolts, and other embedded items: Set in forms where required.
 - 5. Cracks, openings, or offsets at joints in formwork: Close those that are 1/16 inch or larger by tightening forms or by filling with acceptable crack filler.

- D. Forms: Incidentals:
 - 1. Keyways: Construct as indicated on the Drawings.
 - 2. Reentrant angles: May be left square.
 - 3. Level strips: Install at top of wall concrete placements to maintain true line at horizontal construction joints.
 - 4. Inserts:
 - a. Encase pipes, anchor bolts, steps, reglets, castings, and other inserts, as indicated on the Drawings or as required, in concrete.
 - 5. Pipe and conduit penetrations:
 - a. Install pipe and conduit in structures as indicated on the Drawings, and seal with materials as specified in Section 07900 - Joint Sealants.

- E. Form release agent:
 - 1. Apply in accordance with manufacturer's instructions.

- F. Form ties:
 - 1. Cone-snap ties: Tie forms together at not more than 2-foot centers vertically and horizontally.

3.03 FORM REMOVAL

- A. Keep forms in place for at least the periods indicated in the following paragraphs:
 - 1. Vertical forms:
 - a. Keep vertical forms in place for a minimum of 24 hours after concrete is placed.
 - b. If, after 24 hours, concrete has sufficient strength and hardness to resist surface or other damage, forms may be removed.
 - 2. Other forms and shoring: Keep in place:
 - a. Sides of footings: 24 hours minimum.
 - b. Vertical sides of beams, girders, and similar members: 48 hours minimum.
 - c. Bottom of slabs, beams, and girders: Until concrete strength reaches specified strength f'_c or until shoring is installed.
 - d. Shoring for slabs, beams, and girders: Shore until concrete strength reaches specified strength.
 - e. Wall bracing: Brace walls until concrete strength of beams and slabs laterally supporting wall reaches specified strength.
- B. Green concrete:
 - 1. No heavy loading on green concrete will be permitted.

3.04 SURFACE REPAIRS AND FINISHING

- A. Immediately after forms are removed, carefully examine concrete surfaces, and repair any irregularities in surfaces and finishes as specified in Section 03300 - Cast-in-Place Concrete.
- B. Form ties: Remove form ties from surfaces. Fill tie holes as follows:
 - 1. Remove form ties from surfaces.
 - 2. Roughen cone shaped tie holes by heavy sandblasting before repair.
 - 3. Dry pack cone shaped tie holes with dry-pack mortar as specified in Section 03600 - Grouting.
 - 4. Taper ties:
 - a. After forms and taper ties are removed from wall, plug tie holes with neoprene plug as follows:
 - 1) Heavy sandblast and then clean tie holes.
 - 2) After cleaning, drive neoprene plug into each of taper tie holes with steel rod. Final location of neoprene plug shall be in center third of wall thickness. Bond neoprene plug to concrete with epoxy.
 - 3) Locate steel rod in cylindrical recess and against middle of plug during driving:
 - a) At no time are plugs to be driven on flat area outside cylindrical recess.
 - b. Dry-pack of taper tie holes:
 - 1) After installing plugs in tie holes, coat tie hole surface with epoxy bonding agent and fill with dry-pack mortar as specified in Section 03600 - Grouting:
 - a) Place dry-pack mortar in holes in layers with thickness not exceeding tie hole diameter and heavily compact each layer.
 - b) Dry-pack the outside of the hole no sooner than 7 days after the inside of the hole has been dry packed.

- c) Wall surfaces in area of dry-packed tie holes: On the water side of water containing structures and the outside of below grade walls:
 - (1) Cover with minimum of 10 mils of epoxy gel.
 - (2) Provide epoxy gel coating on wall surfaces that extend minimum of 2 inches past dry-pack mortar filled tie holes.
 - (3) Provide finish surfaces that are free from sand streaks or other voids.

3.05 TOLERANCES:

- A. Finished concrete shall conform to shapes, lines, grades, and dimensions indicated on the Drawings.
- B. Construct work within the tolerances in accordance with ACI 117, except as modified in the following paragraphs or as indicated on the Drawings:
 - 1. General:
 - a. At certain locations in the Work, tolerances required for equipment placement and operation may be more restrictive than the general tolerance requirements of this Section.
 - b. Confirm equipment manufacturers' required tolerances for location and operation of equipment that will be installed, and construct concrete to satisfy those requirements.
 - 2. Slabs:
 - a. Slope: Uniformly sloped to drain when slope is indicated on the Drawings.
 - b. Slabs indicated to be level: Have maximum vertical deviation of 1/8-inch in 10-foot horizontal length without any apparent changes in grade.
 - 3. Circular tank walls:
 - a. The Contractor may deviate from finish line indicated on the Drawings by use of forms with chord lengths not to exceed 2 feet.
 - 4. Inserts and embedments:
 - a. Set inserts and embedments to tolerances required for proper installation and operation of equipment or systems to which insert pertains.
 - b. Maximum tolerances: As follows:

Item	Tolerance
Sleeves and inserts	Plus 1/8 Minus 1/8 inches.
Anchor bolts:	
Projected ends	Plus 1/4 Minus 0.0 inches.
Axial alignment	Not more than 2 degrees off the axis indicated on the Drawings.
Setting location	Plus 1/16 Minus 1/16 inches.

- C. Remove and replace work that does not conform to required tolerances. Procedures and products employed in and resulting from such re-work shall be acceptable to the Engineer.

END OF SECTION

SECTION 03150
CONCRETE ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Waterstops.
 - 2. Joint fillers.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D570 - Standard Test Method for Water Absorption of Plastics.
 - 2. D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - 3. D638 - Standard Test Method for Tensile Properties of Plastics.
 - 4. D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - 5. D747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
 - 6. D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 7. D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 8. D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - 9. D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
- B. American National Standards Institute (ANSI):
 - 1. A135.4 - Basic Hardboard.
- C. U. S. Army Corps of Engineers (USACE):
 - 1. CRD-C-572, Specification for Polyvinyl Chloride Waterstop.

1.03 SUBMITTALS

- A. Product data:
 - 1. Polyvinyl chloride waterstops: Complete physical characteristics.
 - 2. Preformed expansion joint material: Sufficient information on each type of material for review to determine conformance of material to requirements specified.
- B. Samples:
 - 1. Polyvinyl chloride waterstop.

- C. Laboratory test reports: Indicating that average properties of polyvinyl chloride waterstops material and finish conform to requirements specified in this Section.
- D. Quality control submittals:
 - 1. Certificates of Compliance:
 - a. Written certificates that polyvinyl chloride waterstops supplied on this Project meet or exceed physical property in accordance with USACE CRD-C-572 and the requirements of this Section.
 - 2. Manufacturer's instructions: For materials specified in this Section that are specified to be installed with such instructions.

1.04 QUALITY ASSURANCE

- A. Mock-ups:
 - 1. Welding demonstration:
 - a. Demonstrate ability to weld acceptable joints in polyvinyl chloride waterstops before installing waterstop in forms.
- B. Field joints:
 - 1. Polyvinyl chloride waterstops field joints: Free of misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects which would reduce the potential resistance of material to water pressure at any point. Replace defective joints. Remove faulty material from site and disposed of by Contractor at its own expense.
- C. Inspections:
 - 1. Quality of welded joints will be subject to acceptance of Engineer.
 - 2. Polyvinyl chloride waterstop: Following defects represent partial list that will be grounds for rejection:
 - a. Offsets at joints greater than 1/16 inch or 15 percent of the material thickness, at any point, whichever is less.
 - b. Exterior crack at joint due to incomplete bond, which is deeper than 1/16 inch or 15 percent of material thickness, at any point, whichever is less.
 - c. Any combination of offset or crack that will result in net reduction in cross section of waterstop in excess of 1/16 inch or 15 percent of material thickness, at any point, whichever is less.
 - d. Misalignment of joint that will result in misalignment of waterstop in excess of 1/2 inch in 10 feet.
 - e. Porosity in welded joint as evidenced by visual inspection.
 - f. Bubbles or inadequate bonding.

PART 2 PRODUCTS

2.01 JOINT FILLERS

- A. General:
 - 1. Use specific type in applications as indicated on the Drawings.
 - 2. Do not use scrap or recycled materials to manufacture joint fillers.

- B. Preformed expansion joint materials:
 - 1. Bituminous fiber expansion joint material:
 - a. Properties:
 - 1) Thickness: To match joint width indicated on the Drawings.
 - 2) Asphalt-impregnated fiber in accordance with ASTM D1751.
 - b. Manufacturers: One of the following or equal:
 - 1) Durajoint.
 - 2) W.R. Meadows, SealTight Fibre Expansion Joint.
 - 2. Synthetic sponge rubber expansion joint material:
 - a. Properties:
 - 1) Thickness: As recommended for width indicated on the Drawings.
 - 2) Material in accordance with ASTM D1752, Type I.
 - b. Manufacturers: One of the following or equal:
 - 1) Williams Products Inc., Everlastic 1300.
 - 2) W.R. Meadows, SealTight Sponge Rubber.

2.02 WATERSTOPS

- A. Waterstops - polyvinyl chloride (PVC):
 - 1. Manufactured from prime virgin polyvinyl chloride plastic compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements as specified in this Section.
 - 2. Manufacturers: One of the following or equal:
 - a. Vinylex Corp.
 - b. Sika Corp., Greenstreak PVC Waterstop.
 - 3. Type: Ribbed waterstop:
 - a. Construction joints: 6 inch wide ribbed type.
 - b. Expansion joint for wall penetrations for concrete encased electrical duct banks: 6 inch ribbed type with hollow center bulb.
 - c. Expansion joints: 9 inch wide ribbed type with hollow center bulb.
 - d. Dumbbell-type waterstop will not be allowed unless otherwise specified or indicated on the Drawings.
 - e. No scrap or reclaimed material shall be used.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Waterstops:
 - 1. General:
 - a. Store waterstops so as to permit free circulation of air around waterstop material and prevent direct exposure to sunlight.
 - b. Install waterstops in concrete joints where indicated on the Drawings.
 - c. Carry waterstops in walls into lower slabs and join to waterstops in slabs with appropriate types of fittings.
 - d. In waterbearing structures: Provide all joints with waterstops, whether indicated on the Drawings or not.
 - e. Provide waterstops that are continuous.
 - f. Set waterstops accurately to position and line as indicated on the Drawings.

- g. Hold and securely fix edges in position at intervals of not more than 24 inches so that they do not move during placing of concrete.
 - h. Position the waterstop so that symmetrical halves of waterstop are equally divided between concrete pours. Center axis of waterstop shall be coincident with centerline of the joint.
 - i. Do not drive nails, screws, or other fasteners through waterstops in vicinity of construction joints.
 - j. Use wires at not more than 24 inches on centers near outer edge of waterstop to tie waterstops into position.
 - k. Special clips may be used in lieu of wires, at Contractor's option.
 - l. Terminate waterstops 3 inches from top of finish surfaces of walls and slabs unless otherwise specified or indicated on the Drawings.
 - m. When any waterstop is installed in concrete on one side of joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than 2 days, take suitable precautions to shade and protect exposed waterstop from direct rays of sunlight during entire exposure and until exposed portion is embedded in concrete.
 - n. When placing concrete at waterstops in slabs, lift edge of waterstop while placing concrete below the waterstop. Manually force waterstop against and into concrete, and then cover waterstop with fresh concrete.
2. Polyvinyl chloride waterstop:
- a. Install waterstops so that joints are watertight.
 - b. Weld joints such as unions, crosses, ells, and tees, with thermostatically controlled equipment recommended by waterstop manufacturer:
 - 1) Do not damage material by heat sealing.
 - 2) Make joints by overlapping, then simultaneously cut ends of sections to be spliced so they will form smooth even joint. Heat cut ends with splicing tool until the plastic melts. Press 2 ends together until plastic cools.
 - 3) Maintain continuity of waterstop ribs and tubular center axis.
 - 4) The splices shall have tensile strength of not less than 60 percent of unspliced materials tensile strength.
 - c. Butt joints of ends of 2 identical waterstop sections may be made while material is in forms.
 - d. Manufacturer shall factory prefabricate joints for crosses and tees.
 - e. Split-type waterstops will not be permitted except where specifically indicated on the Drawings.
- B. Joints:
- 1. Construct construction and expansion joints as indicated on the Drawings.
 - 2. Preformed expansion joint material: Fasten expansion joint strips to concrete, masonry, or forms with adhesive. No nailing will be permitted, nor shall expansion joint strips be placed without fastening.

END OF SECTION

SECTION 03200
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Reinforcing bars:
 - a. Carbon steel.
 - 2. Thread bars.
 - 3. Bar supports.
 - 4. Tie wires.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 318 - Building Code Requirements for Structural Concrete and Commentary.
 - 2. SP-66 - ACI Detailing Manual.
- B. American Iron and Steel Institute (AISI).
- C. American Welding Society (AWS):
 - 1. D1.4 - Structural Welding Code - Reinforcing Steel.
- D. ASTM International (ASTM):
 - 1. A493 - Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.
 - 2. A615 - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
- E. Concrete Reinforcing Steel Institute (CRSI):
 - 1. Manual of Standard Practice.

1.03 DEFINITIONS

- A. Architectural concrete: Concrete surfaces that will be exposed to view in the finished work. For purposes of this Section, architectural concrete includes the following:
 - 1. Concrete surfaces specified to receive paints or coatings.
 - 2. Exposed concrete in open basins, channels, and similar liquid containing structures, that is located above a line 2 feet below the normal operating water surface elevation in that structure.
- B. Bars: Reinforcement or reinforcing bars as specified in this Section.
- C. Evaluation Report: Report prepared by ICC-ES , or by other testing agency acceptable to the Engineer and to the Building Official, that documents testing and review of a product to confirm that it complies with the requirements of designated

ICC-ES Acceptance Criteria, and its acceptance for use under the Building Code specified.

- D. Give away bars: Reinforcing bars that are not required by the Contract Documents, but are installed by the Contractor to provide support for the required reinforcing bars.
- E. Wire supports: Metal reinforcing supports constructed of steel wire as specified. Includes individual high chairs, continuous high chairs, bolsters and other similar configurations and shapes.

1.04 SYSTEM DESCRIPTION

- A. The drawings contain notes describing the size and spacing of reinforcement and its placement, details of reinforcement at wall corners and intersections, and details of extra reinforcement around openings in concrete, and other related information.

1.05 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Section 01330 - Submittal Procedures.
 - 2. Changes to reinforcement in Contract Documents:
 - a. Indicate in a separate letter submitted with shop drawings any changes to reinforcement indicated on the Drawings or specified.
 - b. Such changes will not be acceptable unless Engineer has accepted them in writing.
- B. Product data:
 - 1. Bar supports:
 - a. Wire bar supports:
 - 1) Schedule of support materials to be provided and locations of use.
 - b. Precast concrete bar supports ("dobies"):
 - 1) Manufacturer's data indicating compression strength of concrete and confirming dimensions and thickness(es).height(s) to be provided for each location where used.
- C. Shop drawings:
 - 1. Reinforcement shop drawings:
 - a. Submit drawings showing bending and placement of reinforcement required by the Contract Documents.
 - b. Clearly indicate structures or portions of structures covered by each submittal.
 - c. Shop drawings shall conform to the recommendations of the CRSI Manual of Standard Practice and ACI SP-66.
 - d. Use the same bar identification marks on bending detail drawings, placement drawings, and shipping tags.
 - e. Submittals consisting solely of reinforcing bar schedules, without accompanying placement drawings, will not be accepted unless accepted under prior written agreement with Engineer.
 - 2. Reinforcement placement drawings:
 - a. Clearly show placement of each bar listed in the bill of materials, including additional reinforcement at corners and openings, and other reinforcement required by details in the Contract Documents.

- b. Clearly identify locations of reinforcement with coatings (e.g., galvanized or epoxy) and with yield strength other than ASTM A615, Grade 60.
 - c. Show splice locations.
 - 3. Reinforcement fabrication drawings:
 - a. If bend types or nomenclature differs from that recommended in the CRSI Manual of Standard Practice, provide details showing bend types and dimensional designations.
Clearly identify reinforcement with coatings and with yield strength other than ASTM A615, Grade 60.
- D. Samples (when requested by Engineer):
 - 1. Bar supports/wire reinforcement supports: Samples of each type of chair and bolster proposed for use. Submit with letter stating where each type will be used.
 - 2. Precast concrete bar supports: Samples of each type of precast support proposed for use. Submit with letter stating where each will be used.
- E. Test reports:
 - 1. Certified copy of mill test for each steel used. Show physical properties and chemical analysis:
 - a. Mill test reports may be submitted as record documents at the time the reinforcement from that heat of steel is shipped to the site.
 - b. In such cases, submit certificates under the shop drawing submittal number with the letter "R" (for record date) appended to the end (e.g., of the reinforcement was submitted as 03200-002-1, deliver the associated mill certificate as submittal 03200-002-1R).
- F. Manufacturer's instructions.
- G. Special procedures:
 - 1. Welding procedures conforming to AWS D1.4 for reinforcement to be field welded:
 - a. Procedures qualification record.
- H. Qualifications statements:
 - 1. Welder qualifications.
- I. Closeout documents:
 - 1. Field quality control and inspection reports.
 - 2. Field quality assurance special inspection and testing reports.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
 - 1. Deliver bars bundled and tagged with identifying tags.
- B. Acceptance at site:
 - 1. Reinforcing bars: Deliver reinforcing bars lacking grade identification marks with letter containing manufacturer's guarantee of grade.

1.07 SEQUENCING AND SCHEDULING

- A. Bar supports:
 - 1. Do not place concrete until samples and product data for bar supports have been accepted by Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Reinforcing bars:
 - 1. Provide reinforcement of the grades and quality specified, fabricated from new stock, free from excessive rust or scale, and free from unintended bends or other defects affecting its usefulness.
 - 2. Reinforcing bars:
 - a. ASTM A615 Grade 60 deformed bars, including the following requirements, or ASTM A706 Grade 60 deformed bars:
 - 1) Actual yield strength based on mil tests of reinforcement provided shall not exceed the minimum yield strength specified in this Section by more than 18,000 pounds per square inch.
 - 2) Ratio of actual ultimate tensile strength to actual tensile yield strength shall not be less than 1.25.
 - 3. Reinforcing bars designated or required to be welded:
 - a. Low-alloy, ASTM A706 Grade 60, deformed bars.
- B. Bar supports:
 - 1. Wire supports:
 - a. All stainless steel bar supports:
 - 1) Conforming to CRSI Manual of Standard Practice recommendations for types and details, but custom fabricated entirely from stainless steel wire conforming to ASTM A493, AISI Type 316.
 - b. Stainless steel protected bar supports:
 - 1) Conforming to CRSI Manual of Standard Practice Class 2, Type B, and consisting of bright basic wire support fabricated from cold-drawn carbon steel wire with stainless steel ends attached at the bottom of each leg.
 - 2) Stainless steel wire ends shall conform to ASTM A493, AISI Type 316 and shall extend at least 3/4 inch inward from the formed surface of the concrete.
 - c. Bright basic wire bar supports:
 - 1) Conforming to CRSI Manual if Standard Practice, Class 3.
 - 2. Plastic supports:
 - a. Manufacturers: The following or equal:
 - 1) Aztec Concrete Accessories.
 - 3. Deformed steel reinforcing bar supports:
 - a. Fabricated of materials and to CRSI details recommended for typical reinforcement embedded in concrete and bent to dimensions required to provide specified clearances and concrete cover.
 - 4. Precast concrete bar supports ("dobies"):
 - a. Pre-manufactured, precast concrete blocks with cast-in annealed steel wires, 16-gauge or heavier.

- b. Compression strength of concrete: Equal to or exceeding the compression strength of the surrounding concrete.
 - c. Block dimensions:
 - 1) Height to provide specified concrete cover.
 - 2) Footprint not less than 3 inches by 3 inches, and adequate to support the weight of the reinforcement and maintain specified concrete cover without settling into the underlying surface.
- C. Tie wires:
- 1. General use: Black annealed steel wire, 16-gauge or heavier.
- D. Welded wire fabric reinforcement:
- 1. Material:
 - a. Carbon steel conforming to ASTM A1064.
 - 2. Provide welded wire reinforcement in flat sheet form. Rolled wire fabric is not permitted.
 - 3. Fabric may be used in place of reinforcing bars if accepted by Engineer:
 - a. Provide welded wire fabric having cross-sectional area per linear foot not less than the cross-sectional area per linear foot of reinforcing bars indicated on the Drawings.

2.02 FABRICATION

- A. Shop fabrication and assembly:
- 1. Cut and bend bars in accordance with provisions of ACI 318 and the CRSI Manual of Standard Practice.
 - 2. Bend bars cold. Use bending collars to develop the recommended bend radius.
 - 3. Provide bars free from defects and kinks and from bends not indicated on the Drawings.
 - 4. Circumferential and radiused reinforcement: Roll to the radius required for its location in the structure before installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions:
- 1. Reinforcing bars and welded wire reinforcement:
 - a. Verify that reinforcement is new stock, free from rust scale, loose mill scale, excessive rust, dirt, oil, and other coatings that will adversely affect bonding capacity when placed in the Work.
 - 2. Welded wire fabric:
 - a. Verify that sheets are not curled or kinked before or after installation.

3.02 PREPARATION

- A. Surface preparation:
- 1. Reinforcing bars - uncoated:
 - a. Clean reinforcement of concrete, dirt, oil and other coatings that will adversely affect bond before embedding bars in subsequent concrete placements.

- b. Thin coating of red rust resulting from short exposure will not be considered objectionable. Thoroughly clean bars having rust scale, loose mill scale, or thick rust coat.
- c. Partially embedded reinforcement: Remove concrete or other deleterious coatings from dowels and other projecting bars by wire brushing or sandblasting before bars are embedded in subsequent concrete placements.

3.03 INSTALLATION

- A. Reinforcing bars: General:
 - 1. Field-cutting of reinforcing bars is not permitted.
 - 2. Field-bending of reinforcing bars, including straightening and rebending, is not permitted.
- B. Placing reinforcing bars:
 - 1. Accurately place bars to meet position and cover requirements indicated on the Drawings and specified. Secure bars in position.
 - 2. Tolerances for placement and minimum concrete cover: As listed in Table 1.

Table 1 - Reinforcement Placing Tolerances		
Member	Tolerance on Reinforcement Location ⁽¹⁾	Tolerance on Minimum Concrete Cover ^(1,2)
Slabs, beams, walls and columns except as noted below:		
10 inches thick and less	$\pm 3/8$ inch	- 3/8 inch
More than 10 inches thick	$\pm 1/2$ inch	- 1/2 inch
Formed soffits:	As noted above	- 1/4 inch
Longitudinal location of bends and ends of reinforcement:		
Conditions not listed below:	± 2 inches	- 1/2 inch
At discontinuous ends of brackets and corbels	$\pm 1/2$ inch	- 1/4 inch
At discontinuous ends of other members:	± 1 inch	- 1/2 inch
Notes: (1) \pm indicates "plus or minus;" - indicates "minus;" + indicates "plus." (2) Tolerance on cover is limited as noted, but decrease in cover shall not exceed one third of the minimum cover indicated on the Drawings.		

- 3. Spacing between bars:
 - a. Minimum clear spacing between bars in a layer:
 - 1) As indicated on the Drawings, but not less than the larger of 1.5 times the bar diameter or 1-1/2 inches.
 - b. Minimum clear spacing between bars in 2 or more parallel layers:
 - 1) Place bars in upper layers directly above bars in lower layers.

- 2) Minimum spacing between layers: As indicated on the Drawings, but not less than the larger of 1.5 times the bar diameter or 1-1/2 inches.
- c. Limits on minimum clear spacing between bars also applies to the clear spacing between a lap splice and the adjacent bars and/or lap splices.
- 4. Lap splices for bars:
 - a. Lap splice locations and lap splice lengths: as indicated on the Drawings. Where lap lengths are not indicated, provide in accordance with ACI 318.
 - b. Unless otherwise specifically indicated on the Drawings (and noted as "non-contact lap splice"), install bars at lap splices in contact with each other and fasten together with tie wire.
 - c. Where bars are to be lap spliced at concrete joints, ensure that bars project from the first concrete placement a length equal to or greater than minimum lap splice length indicated on the Drawings.
 - d. Stagger lap splices where indicated on the Drawings.
 - e. Where lap splice lengths are not indicated on the Drawings, provide lap splice lengths in accordance with ACI 318.

C. Reinforcing supports:

- 1. Provide supports of sufficient numbers, sizes, and locations to maintain concrete cover, to prevent sagging and shifting, and to support loads during construction without displacement and without gouging or indentation into forming surfaces:
 - a. Quantities and locations of supports shall not be less than those indicated in ACI SP-66 and the CRSI Manual of Standard Practice.
- 2. Do not use brick, concrete masonry units, concrete spalls, rocks, wood, or similar materials for supporting reinforcement.
- 3. Do not use "give away bars" that have less cover than that required by the Contract Documents. Do not adjust the location of reinforcement required by the Contract Documents to provide cover for give away bars.
- 4. Provide bar supports of height required to maintain the clear concrete cover indicated on the Drawings.
- 5. Provide bar supports at formed vertical faces to maintain the clear concrete cover indicated on the Drawings.
- 6. Schedule of reinforcement support materials: Provide bar supports as indicated in Table 2.

Table 2 - Reinforcement Support Materials		
Case	Location	Material
a.	Concrete placed over earth and concrete seal slabs ("mud mats"):	Precast concrete bar supports.
b.	Concrete placed against forms and exposed to water or wastewater process liquids (whether or not such concrete received additional linings or coatings):	All stainless steel bar supports.
c.	Concrete placed against forms and exposed to earth, weather, frequent washdown, or groundwater in the finished work	All stainless steel bar supports.

Table 2 - Reinforcement Support Materials		
Case	Location	Material
d.	Concrete placed against forms and exposed to interior equipment/piping areas in the finished work	All stainless steel bar supports.
e.	Between mats of reinforcement, and fully embedded within a concrete member	Bright basic wire bars supports, or deformed steel reinforcing bars.

D. Tying of reinforcing:

1. Fasten reinforcement securely in place with wire ties.
2. Tie reinforcement at spacings sufficient to prevent shifting:
 - a. Provide at least 3 ties in each bar length. (Does not apply to dowel lap splices or to bars shorter than 4 feet, unless necessary for rigidity).
3. Tie slab bars at every intersection around perimeter of slab.
4. Tie wall bars and slab bar intersections other than around perimeter at not less than every fourth intersection, but at not more than the spacing indicated in Table 3:

Table 3 - Maximum Spacing of Tie Wires for Reinforcement		
Bar Size	Slab Bar Spacing (inches)	Wall Bar Spacing (inches)
Bars Number 5 and Smaller	60	48
Bars Number 6 through Number 9	96	60
Bars Number 10 and Number 11	120	96

5. After tying:
 - a. Bend ends of wires inward towards the center of the concrete section. Minimum concrete cover for tie wires shall be the same as cover requirements for reinforcement.
 - b. Remove tie wire clippings from inside forms before placing concrete.

E. Welded wire fabric reinforcement:

1. Install only where indicated on the Drawings or accepted in advance by Engineer.
2. Install necessary tie wires, spacing chairs, and supports to keep welded wire fabric at its designated position in the concrete section while concrete is being placed.
3. Straighten welded wire fabric to make sheets flat in the Work.
4. Do not allow wire fabric to drape between supports unless such a configuration is specifically indicated on the Drawings:
 - a. If fabric is displaced during placement of concrete, make provisions to restore it to the designated location using methods acceptable to Engineer.
5. Bend welded wire fabric as indicated on the Drawings or required to fit Work.
6. Lap splice welded wire fabric as indicated on the Drawings:
 - a. If lap splice length is not indicated, splice in accordance with ACI 318, but not less than 1 1/2 courses of fabric or 8 inches minimum. Tie laps at ends and at not more than 12 inches on center.

- F. Welding reinforcing bars:
 - 1. Weld reinforcing bars only where indicated on the Drawings or where acceptance is received from Engineer prior to welding.
 - 2. Perform welding in accordance with AWS D1.4 and welding procedures accepted by Engineer:
 - a. Conform to requirements for minimum preheat and interpass temperatures.
 - 3. Submit:
 - a. Welding procedures specification.
 - b. Procedures qualification record.
 - c. Welder qualification test record.
 - 4. Do not tack weld reinforcing bars except where specifically indicated on the Drawings.

3.04 FIELD QUALITY CONTROL

- A. Provide quality control for the Work of this Section as specified in Section 01450 - Quality Control.
- B. Field inspections and testing:
 - 1. Submit records of inspections and testing to Engineer in electronic format within 24 hours after completion.

3.05 FIELD QUALITY ASSURANCE

- A. Provide quality assurance as specified in Section 01450 - Quality Control.
- B. Special inspections and tests:
 - 1. Provide as specified in Section 01455A - Special Tests and Inspections.
 - 2. Frequency of inspections:
 - a. Unless otherwise indicated on the Drawings or in this Section, provide periodic special inspection as required by the Building Code specified in Section 01410 - Regulatory Requirements.
 - 3. Preparation:
 - a. Review Drawings and Specification for the Work to be observed.
 - b. Review approved submittal and shop drawings.
 - 4. Inspections: Special inspection shall include, but is not limited to, the following items:
 - a. Reinforcement: General:
 - 1) Type (material) and location of reinforcement supports.
 - 2) Bar material/steel grade and bar size.
 - 3) Location, placement, and spacing of bars.
 - 4) Clear concrete cover over reinforcement.
 - 5) Lap splice: Location and lap length. Bars within tolerances for contact (unless non-contact splice is indicated on the Drawings.)
 - 6) Bar hooks and development lengths embedded within concrete sections as indicated on the Drawings.
 - 7) Reinforcement tied in position and tie wire legs turned inward toward the center of the concrete section.
 - b. Reinforcement: Welding:
 - 1) Inspector qualification and inspections shall be in accordance with the requirements of AWS D1.4.

- 2) Provide periodic inspection for:
 - a) Weldability of reinforcement other than ASTM A706.
 - b) Single pass fillet welds with thickness less than or equal to 5/16 inch.
- 3) Provide continuous inspection for:
 - a) Other welds.
 - b) Welds at mechanical reinforcing bar couplers and end anchors.
- 4) In addition to visual inspection, Owner may inspect reinforcing bar welds by other methods, including radiographic inspection.
5. Records of inspections:
 - a. Provide a written record of each inspection using forms acceptable to the Engineer and to the Building Official.
 - b. Submit electronic copies of inspection reports to Engineer within 24 hours after completion of inspections.

3.06 NON-CONFORMING WORK

- A. Before placing concrete, adjust or remove and re-install reinforcement to conform to the requirements of the Contract Documents.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Cast-in-place concrete.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 1. 305 - Hot Weather Concreting Standard.
 2. 306 - Cold Weather Concreting Standard.
 3. 318 - Building Code Requirements for Structural Concrete and Commentary.
 4. 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
 5. Manual of Concrete Practice.
- B. ASTM International (ASTM):
 1. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 2. C33 - Standard Specification for Concrete Aggregates.
 3. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 4. C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
 5. C42 - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 6. C88 - Standard Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 7. C94 - Standard Specification for Ready-Mixed Concrete.
 8. C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement.
 9. C117 - Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 10. C123 - Standard Test Method for Lightweight Particles in Aggregate.
 11. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 12. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 13. C142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregate.
 14. C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 15. C150 - Standard Specification for Portland Cement.
 16. C156 - Standard Test Method for Water Loss from a Mortar Specimen Through Liquid Membrane-Forming Curing Compounds for Concrete.
 17. C171 - Standard Specifications for Sheet Materials for Curing Concrete.
 18. C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 19. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

20. C227 - Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
21. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
22. C295 - Standard Guide to Petrographic Examination of Aggregates for Concrete.
23. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
24. C311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.
25. C494 - Standard Specification for Chemical Admixtures for Concrete.
26. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
27. C856 - Standard Practice for Petrographic Examination of Hardened Concrete.
28. C1260 - Standard Test Method of Potential Alkali Reactivity of Aggregates (Mortar Bar Method).
29. C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
30. D75 - Standard Practice for Sampling Aggregates.
31. D2103 - Standard Specification for Polyethylene Film and Sheeting.

1.03 DEFINITIONS

- A. Alkali: Sum of sodium oxide and potassium oxide calculated as sodium oxide.
- B. Cementitious materials: Portland cement and fly ash.
- C. Cold weather: A period when for more than 3 consecutive days, the average daily outdoor temperature drops below 40 degrees Fahrenheit. The average daily temperature is the average of the highest and lowest temperatures during the period from midnight to midnight. When temperatures above 50 degrees Fahrenheit occur during more than half of any 24-hour duration, the period shall no longer be regarded as cold weather.
- D. Cold weather concreting: Operations for placing, finishing, curing, and protection of concrete during cold weather.
- E. Green concrete: Concrete with less than 100 percent of the specified strength.
- F. Hairline crack: Crack with a crack width of less than 4 thousandths of an inch.
- G. Hot weather: A period when project conditions such as low humidity, high temperature, solar radiation, and high winds, promote rapid drying of freshly placed concrete.
- H. Hot weather concreting: Operations for placing, finishing, curing, and protection of concrete during hot weather.

1.04 SYSTEM DESCRIPTION

A. Performance requirements:

1. General:
 - a. Except as otherwise specified, provide concrete composed of portland cement, fly ash, fine aggregate, coarse aggregate, admixtures and water so proportioned and mixed as to produce plastic, workable mixture in accordance with requirements as specified in this Section and suitable to specific conditions of placement.
 - b. Proportion materials in a manner that will secure lowest water-cementitious materials ratio that is consistent with good workability, plastic and cohesive mixture, and a mixture that is within specified slump range.
 - c. Proportion fine and coarse aggregates in manner such as not to produce harshness in placing or honeycombing.
2. It is the intent of this Section to secure for every part of the Work concrete with homogeneous mixture, which when hardened will have required strength, watertightness, and durability:
 - a. It is recognized that some surface hairline cracks and crazing will develop in the concrete surfaces.
 - b. Construction and expansion joints have been specified and positioned in structures as indicated on the Drawings, and curing methods specified, for purpose of reducing number and size of cracks, due to normal expansion and contraction expected from specified concrete mixes.
 - c. Repair cracks which develop in walls or slabs and repair cracks which show any signs of leakage until all leakage is stopped.
 - d. Pressure inject visible cracks, other than hairline cracks and crazing, in following areas with epoxy as specified in Section 03931 - Epoxy Injection System:
 - 1) Floors and walls of water bearing structures.
 - 2) Walls and overhead slabs of passageways or occupied spaces, outsides of which are exposed to weather or may be washed down and are not specified to receive separate waterproof membrane.
 - 3) Other items not specified to receive separate waterproof membrane: Slabs over water channels, wet wells, reservoirs, and other similar surfaces.
 - e. Walls or slabs, as specified above, that leak or sweat because of porosity or cracks too small for successful pressure injection with epoxy: Seal on water or weather side by coatings of surface sealant system, as specified in this Section.
 - f. Pressure injection and sealing: Continue as specified above until structure is watertight and remains watertight for not less than 1 year after final acceptance or date of final repair, whichever occurs later in time.
3. Workmanship and methods: Provide concrete work, including detailing of reinforcing, conforming with best standard practices and as set forth in ACI 318, ACI 350, Manual of Concrete Practices, and recommended practices.

1.05 SUBMITTALS

- A. Cement mill tests:
 - 1. Include alkali content representative of each shipment of cement for verification of compliance with specified requirements.
 - 2. Provide mill test reports dated not more than 90 days before the date of submittal.

- B. Cold weather concreting:
 - 1. Procedures for the production, transportation, placement, protection, curing, and temperature monitoring for concrete during cold weather.
 - 2. Procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

- C. Concrete mixes: Full details, including mix design calculations for concrete mixes proposed for use for each class of concrete:
 - 1. Include information on correction of batching for varying moisture contents of fine aggregate.
 - 2. Source quality test records with mix design submittal:
 - a. Include calculations for required compressive strength (f'_{cr}) based on source quality test records.

- D. Concrete aggregate tests: Certified copies in triplicate of commercial laboratory tests not more than 90 days old of all samples of concrete aggregates:
 - 1. Coarse aggregate:
 - a. Abrasion loss.
 - b. Clay lumps and friable particles.
 - c. Coal and lignite.
 - d. Materials finer than 200 sieve.
 - e. Reactivity.
 - f. Shale and chert.
 - g. Soundness.
 - 2. Fine aggregate:
 - a. Clay lumps.
 - b. Color.
 - c. Decantation.
 - d. Reactivity.
 - e. Shale and chert.
 - f. Soundness.

- E. Drying shrinkage test data.

- F. Fine or coarse aggregate batched from more than 1 bin: Analyses for each bin, and composite analysis made up from these, using proportions of materials to be used in mix.

- G. Fly ash Certificate of Compliance: Identify source of fly ash and certify compliance in accordance with ASTM C618.

- H. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Corrective measures for use prior to placing concrete.

- I. Hot weather concreting: Procedures for production, placement, finishing, curing, protection, and temperature monitoring for concrete during hot weather and appropriate corrective measures.
- J. Heating equipment for cold weather concreting: Information on type of equipment used for heating materials and new concrete in process of curing during excessively cold weather.
- K. Information on mixing equipment.
- L. Product data: Submit data completely describing products.
- M. Sequence of concrete placing: Submit proposed sequence of placing concrete showing proposed beginning and ending of individual placements.
- N. Sieve analysis: Submit sieve analyses of fine and coarse aggregates being used in triplicate at least every 3 weeks and at any time there is significant change in grading of materials.
- O. Trial batch test data:
 - 1. Submit data for each test cylinder.
 - 2. Submit data that identifies mix and slump for each test cylinder.
- P. Weather monitoring: Records of:
 - 1. Relative humidity.
 - 2. Site ambient temperature.
 - 3. Wind speed.
- Q. Temperature of freshly placed concrete.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
 - 1. Deliver, store, and handle concrete materials in manner that prevents damage and inclusion of foreign substances.
 - 2. Deliver and store packaged materials in original containers until ready for use.
 - 3. Deliver aggregate to mixing site and handle in such manner that variations in moisture content will not interfere with steady production of concrete of specified degree of uniformity and slump.
- B. Acceptance at site: Reject material containers or materials showing evidence of water or other damage.

1.07 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Monitoring weather conditions:
 - a. Install an outdoor weather station capable of measuring and recording ambient temperature, wind speed, and humidity. Furnish instruments accurate to within 2 degrees Fahrenheit, 5 percent relative humidity, and 1 mile per hour wind speed.

- b. Measure and record temperature of fresh concrete. Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature of concrete.
 - c. Monitor and keep records of the weather forecast starting at least 48 hours prior to placing concrete in order to allow enough time for taking appropriate measures pertaining to Hot or Cold weather concreting.
2. Hot weather concreting:
- a. Initiate evaporation control measures when concrete and air temperatures, relative humidity of the air, and the wind velocity have the capacity to evaporate water from a free surface at a rate that is equal to or greater than 0.2 pounds per square feet per hour. Determine evaporation rate using the Menzel Formula and monograph in ACI 305 3.1.3.
 - b. When ambient air temperature is above 85 degrees Fahrenheit: Prior to placing concrete, cool forms and reinforcing steel by water cooling to below 90 degrees Fahrenheit.
 - c. Monitor weather conditions at the site including air temperature, humidity, and wind speed, to assess the need for evaporation control measures begin monitoring site conditions no later than 1 hour before the start of concrete placement. Continue to monitor site conditions at intervals of 30 minutes until concrete curing has begun.
 - d. Temperature of concrete mix at time of placement: Keep temperature below 90 degrees Fahrenheit by methods which do not impair quality of concrete.
 - e. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Take corrective measures to minimize rapid water loss from concrete.
 - f. Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature around concrete.
3. Cold weather concreting:
- a. Concrete placed below ambient air temperature of 45 degrees Fahrenheit and falling or below 40 degrees Fahrenheit:
 - 1) Make provision for heating water.
 - b. Follow recommendations of ACI 306 for preparation, placement, and protection of concrete during cold weather.
 - c. If materials have been exposed to freezing temperatures to degree that any material is below 35 degrees Fahrenheit: Heat such materials.
 - d. Heating water, cement, or aggregate materials:
 - 1) Do not heat in excess of 160 degrees Fahrenheit.
 - e. Protection of concrete in forms:
 - 1) Do not remove forms from concrete when outside ambient air temperature is below 50 degrees Fahrenheit until concrete has attained its minimum specified compressive strength. Evidence of strength shall be based on by testing of cylinders stored in the field under equivalent conditions to those at the concrete structure.
 - 2) Protect by means of covering with tarpaulins, or other acceptable covering acceptable to Engineer.
 - 3) Provide means for circulating warm moist air around forms in manner to maintain temperature of 50 degrees Fahrenheit for at least 5 days.

1.08 SEQUENCING AND SCHEDULING

- A. Schedule placing of concrete in such manner as to complete any single placing operation to construction, or expansion joint.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Admixtures:
 - 1. General:
 - a. Do not use admixtures of any type, except as specified, unless written acceptance has been obtained from the Engineer.
 - b. Admixtures shall be compatible with concrete and other admixtures. Admixtures other than pozzolans shall be the products of a single manufacture to ensure compatibility.
 - c. Do not use admixtures containing chlorides calculated as chloride ion in excess of 0.5 percent by weight of cement.
 - d. Use in accordance with manufacturer's recommendations. Add each admixture to concrete mix separately.
 - 2. Air entraining admixture:
 - a. Provide concrete with 5 percent, within 1 percent, entrained air of evenly dispersed air bubbles at time of placement.
 - b. In accordance with ASTM C260.
 - 3. Water reducing admixture:
 - a. May be used at the Contractor's option.
 - b. In accordance with ASTM C494, Type A or Type D.
 - c. Not contain air-entraining agents.
 - d. Liquid form before adding to the concrete mix.
 - e. No decrease in cement is permitted as result of use of water reducing admixture.
 - 4. Super-plasticizers: Are not to be used without acceptance by Engineer.
- B. Aggregate:
 - 1. General:
 - a. Provide concrete aggregates that are sound, uniformly graded, and free of deleterious material in excess of allowable amounts specified.
 - b. Grade aggregate in accordance with ASTM C136 and D75.
 - c. Provide unit weight of fine and coarse aggregate that produces in place concrete with weight of not less than 140 pounds per cubic foot.
 - d. Do not use aggregate made from recycled materials such as crushed and screened hydraulic-cement concrete, brick, and other construction materials.
 - 2. Fine aggregate:
 - a. Provide fine aggregate for concrete or mortar consisting of clean, natural sand or of sand prepared from crushed stone or crushed gravel.
 - b. Do not provide aggregate having deleterious substances in excess of following percentages by weight of contaminating substances:
 - 1) In no case shall total exceed percent listed.

<u>Item</u>	<u>Test Method</u>	<u>Percent</u>
Removed by decantation (dirt, silt, etc.)	ASTM C117	3
Shale or Chert	ASTM C123 ASTM C295*	1 1
Clay Lumps	ASTM C142	1
* Test Method C123 is used to identify particles in the sample lighter than 2.40 Specific Gravity. Test Method C295 is used to identify which of the lightweight particles are shale or chert. If the results of Test Method C123 are less than 1 percent, Test Method C295 is not required.		

- c. Except as otherwise specified, grade fine aggregate from coarse to fine in accordance with ASTM C33.
- 3. Coarse aggregate:
 - a. Provide coarse aggregate consisting of gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter, or other foreign substances.
 - b. Not exceeding 15 percent by weight, of thin or elongated pieces having length greater than 5 times average thickness.
 - c. Deleterious substances: Not in excess of following percentages by weight, and in no case having total of all deleterious substances exceeding 2 percent.

<u>Item</u>	<u>Test Method</u>	<u>Percent</u>
Shale or chert	ASTM C123 ASTM C295*	1.25 1
Coal and lignite	ASTM C123	1/4
Clay lumps and friable particles	ASTM C142	1/4
Materials finer than Number 200 sieve	ASTM C117	1/2**
* Test Method C123 is used to identify particles in the sample lighter than 2.40 Specific Gravity. Test Method C295 is used to identify which of the lightweight particles are shale, chert, coal, or lignite. If the results of Test Method C123 are less than 1.25 percent (the minimum combined percentage of shale, chert, coal and lignite), Test Method C295 is not required.		
** Except when material finer than Number 200 sieve consists of crusher dust, maximum amount shall be 1 percent.		

- d. Grading:
 - 1) Aggregate for Class A, B, and C concrete: In accordance with ASTM C33, Size Number 57, except as otherwise specified or authorized in writing by the Engineer.
- C. Evaporation retardant:
 - 1. Manufacturers: One of the following or equal:
 - a. BASF, MasterKure ER 50.
 - b. Euclid Chemical Co., Eucobar.

- D. Fly ash:
 - 1. Fly ash in accordance with ASTM C618, Class F, may be used in concrete made with Type II portland cement.
 - 2. Maximum of 15 percent by weight of fly ash to total weight of cementitious materials:
 - a. The total weight of cementitious materials shall not be less than minimum cementitious materials listed in Table A.
 - 3. Do not use in concrete made with portland-pozzolan cement.
 - 4. Loss on ignition: Not exceed 4 percent.
- E. Keyway material: Steel, plastic, or lumber.
- F. Nonslip abrasive:
 - 1. Aluminum oxide abrasive size 8/16, having structure of hard aggregate that is, homogenous, nonglazing, rustproof, and unaffected by freezing, moisture, or cleaning compounds.
 - 2. Manufacturers: One of the following or equal:
 - a. Abrasive Materials, Inc.
 - b. Euclid Chemical Co., Flexolith Summer Grade.
- G. Portland cement:
 - 1. Conform to specifications and tests in accordance with ASTM C150, Types II or III, low alkali, except as specified otherwise.
 - 2. Have total alkali containing not more than 0.60 percent.
 - 3. Exposed concrete in any individual structure: Use only one brand of portland cement.
 - 4. Cement for finishes or repairs: Provide cement from same source and of same type as concrete to be finished or repaired.
- H. Sheet membrane for curing:
 - 1. Polyethylene film:
 - a. In accordance with ASTM C171.
 - b. Color: White.
 - c. Thickness: Nominal thickness of polyethylene film shall not be less than 0.0040 inches when measured in accordance with ASTM D2103. Thickness of polyethylene film at any point shall not be less than 0.0030 inches.
 - d. Loss of moisture: Not exceed 0.055 grams per square centimeter of surface when tested in accordance with ASTM C156.
- I. Sprayed membrane curing compound: Clear type with fugitive dye in accordance with ASTM C309, Type 1D.
- J. Water:
 - 1. Water for concrete, washing aggregate, and curing concrete: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.

2. Chlorides and sulfate ions:
 - a. Water for conventional reinforced concrete: Use water containing not more than 1,000 milligrams per liter of chlorides calculated as chloride ion, nor more than 1,000 milligrams per liter of sulfates calculated as sulfate ion.

2.02 EQUIPMENT

- A. Mixing concrete:
 1. Mixers may be of stationary plant, paver, or truck mixer type.
 2. Provide adequate equipment and facilities for accurate measurement and control of materials and for readily changing proportions of material.
 3. Mixing equipment:
 - a. Capable of combining aggregates, cementitious materials, and water within specified time into thoroughly mixed and uniform mass and discharging mixture without segregation.
 - b. Maintain concrete mixing plant and equipment in good working order and operated at loads, speeds, and timing recommended by manufacturer or as specified.
 - c. Proportion cementitious materials and aggregate by weight.
- B. Machine mixing:
 1. Batch plant shall be capable of controlling delivery of all material to mixer within 1 percent by weight of individual material.
 2. If bulk cementitious materials are used, weigh them on separate visible scale which will accurately register scale load at any stage of weighing operation from zero to full capacity.
 3. Prevent cementitious materials from coming into contact with aggregate or with water until materials are in mixer ready for complete mixing with all mixing water.
 4. Procedure of mixing cementitious materials with sand or with sand and coarse aggregate for delivery to project site, for final mixing and addition of mixing water will not be permitted.
 5. Retempering of concrete will not be permitted.
 6. Discharge entire batch before recharging.
 7. Volume of mixed material per batch: Not exceed manufacturer's rated capacity of mixer.
 8. Mixers:
 - a. Perform mixing in batch mixers of acceptable type.
 - b. Equip each mixer with device for accurately measuring and indicating quantity of water entering concrete, and operating mechanism such that leakage will not occur when valves are closed.
 - c. Equip each mixer with device for automatically measuring, indicating, and controlling time required for mixing:
 - 1) Interlock device to prevent discharge of concrete from mixer before expiration of mixing period.
- C. Transit-mixed concrete:
 1. Mix and deliver in accordance with ASTM C94.
 2. Total elapsed time between addition of water at batch plant and discharging completed mix:
 - a. Not to exceed 90 minutes.

- b. Elapsed time at project site shall not exceed 30 minutes.
 - 3. Under conditions contributing to quick setting, total elapsed time permitted may be reduced by the Engineer.
 - 4. Equip each truck mixer with device interlocked to prevent discharge of concrete from drum before required number of turns and furnish device that is capable of counting number of revolutions of drum.
 - 5. Continuously revolve drum after it is once started until it has completely discharged its batch:
 - a. Do not add water until drum has started revolving.
 - b. Right is reserved to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. The Contractor will not be entitled to additional compensation because of such increase or decrease.
- D. Other types of mixers: In case of other types of mixers, mixing shall be as follows:
- 1. Mix concrete until there is uniform distribution of materials, and discharge mixer completely before recharging.
 - 2. Neither speed nor volume loading of mixer shall exceed manufacturer's recommendations.
 - 3. Continue mixing for minimum of 1-1/2 minutes after all materials are in drum, and for batches larger than 1 cubic yard increase minimum mixing time 15 seconds for each additional cubic yard or fraction thereof.

2.03 MIXES

- A. Measurements of materials:
- 1. Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the Engineer.
 - 2. Furnish apparatus for weighing aggregates and cementitious materials that is suitably designed and constructed for this purpose.
 - 3. Accuracy of weighing devices: Furnish devices that have capability of providing successive quantities of individual material that can be measured to within 1 percent of desired amount of that material.
 - 4. Measuring or weighing devices: Subject to review by the Engineer. Shall bear valid seal of the Sealer of Weights and Measures having jurisdiction.
 - 5. Weighing cementitious materials:
 - a. Weigh cementitious materials separately.
 - b. Cement in unbroken standard packages (sacks): Need not be weighed.
 - c. Weigh bulk cementitious materials and fractional packages.
 - 6. Measure mixing water by volume or by weight.
- B. Concrete proportions and consistency:
- 1. Provide concrete that can be worked readily into corners and angles of forms and around reinforcement without excessive vibration and without permitting materials to segregate or free water to collect on surface.
 - 2. Prevent unnecessary or haphazard changes in consistency of concrete.
 - 3. Ratio of coarse aggregate to fine aggregate: Not less than 1.0 or more than 2.0 for all concrete Classes.
 - 4. Aggregate:
 - a. Obtain aggregate from source that is capable of providing uniform quality, moisture content, and grading during any single day's operation.

5. Maximum concrete mix water to cementitious materials ratio, minimum cementitious materials content, and slump range: Conform to values specified in Table A in this Section.
 6. Concrete batch weights: Control and adjust to secure maximum yield. At all times, maintain proportions of concrete mix within specified limits.
 7. Mix modification: If required, by the Engineer, modify mixture within limits set forth in this Section.
- C. Concrete mixes:
1. Proportioning of concrete mix: Proportion mixes based on required compressive strength f'_{cr} .
 2. Mixes:
 - a. Adjusting of water: After acceptance, do not change mixes without acceptance by Engineer, except that at all times adjust batching of water to compensate for free moisture content of fine aggregate.
 - b. Total water content of each concrete class: Not exceed those specified in Table A in this Section.
 - c. Checking moisture content of fine aggregate: Furnish satisfactory means at batching plant for checking moisture content of fine aggregate.
 3. Change in mixes: Submit new mix design and perform new trial batch and test program as specified in this Section.
- D. Classes of concrete:
1. Provide concrete consisting of 2 classes: Classes A and C. Use where specified or indicated on the Drawings.
 2. Weight of concrete classes: Provide classes of concrete having minimum weight of 140 pounds per cubic foot.
 3. Class C concrete: Class C concrete may be used for fill for unauthorized excavation, for thrust blocks and ground anchors for piping, for bedding of pipe, and where indicated on the Drawings.
 4. All other concrete, unless specified or otherwise indicated on the Drawings: Use Class A concrete.

TABLE A: CONCRETE				
Class	Minimum Specified Compressive Strength f'_c at 28 Days (Pounds per Square Inch)	Water-to-Cementitious Materials Ratio	Cementitious Materials per Cubic Yard of Concrete by Weight (Pounds)	Slump Range (Inches)
A	4,500	0.40 to 0.45	564 to 658	2 to 4
C	2,500	Maximum 0.62	Minimum 423	3 to 6

5. Pumped concrete: Provide pumped concrete that complies with all requirements of this Section.
 6. Do not place concrete with slump outside limits indicated in Table A.
 7. Classes:
 - a. Classes A and C concrete: Make with Type II low alkali portland cement.
 - b. Admixtures: Provide admixtures as specified in this Section.
- E. Air entraining admixture:
1. Add agent to batch in portion of mixing water.

2. Batch solution by means of mechanical batcher capable of accurate measurement.

2.04 SOURCE QUALITY CONTROL

A. Tests:

1. Trial batches:

- a. After concrete mix designs have been accepted by Engineer, have trial batches of the accepted Class A concrete mix design prepared by testing laboratory acceptable to the Engineer.
- b. Prepare trial batches using cementitious materials and aggregates proposed to be used for the Work.
- c. Prepare trial batches with sufficient quantity to determine slump, workability, consistency, and finishing characteristics, and to provide sufficient test cylinders.
- d. Test cylinders: Provide cylinders having 6-inch diameter by 12-inch length and that are prepared in accordance with ASTM C31 for tests specified in this Section.
- e. Determine slump in accordance with ASTM C143.
- f. Test cylinders from trial batch:
 - 1) Test 8 cylinders for compressive strength in accordance with ASTM C39:
 - a) Test 4 cylinders at 7 days and 4 at 28 days.
 - b) Establish ratio between 7 day and 28 day strength for mix. 7-day strength may be taken as satisfactory indication of 28-day strength provided effects on concrete of temperature and humidity between 7 day and 28 day are taken into account.
 - 2) Average compressive strength of 4 test cylinders tested at 28 days: Equal to or greater than required average compressive strength (f'_{cr}) on which concrete mix design is based.
- g. Drying shrinkage:
 - 1) Prepare 5 drying shrinkage specimens in accordance with ASTM C157, except as modified in this Section.
 - 2) Remove drying shrinkage specimens from molds at age of 23 hours within 1 hour after trial batching, then immediately place them in water at 73 degrees Fahrenheit within 3 degrees for at least 30 minutes and then measure specimens within 30 minutes thereafter to determine original length:
 - a) Then submerge specimens in saturated limewater at 73 degrees Fahrenheit within 3 degrees for moist curing.
 - 3) Make measurement to determine expansion expressed as percentage of original length at age 7 days:
 - a) Use length at age 7 days as base length for drying shrinkage calculations.
 - 4) Immediately store specimens in humidity controlled room maintained at 73 degrees Fahrenheit within 3 degrees and 50 percent within 4 percent relative humidity for remainder of test.
 - 5) Make and report measurements to determine shrinkage expressed as percentage of base length separately for 7, 14, 21, and 28 days of drying after 7 days of moist curing.
 - 6) Drying shrinkage deformation:

- a) Measure drying shrinkage deformation of each specimen as difference between base length and length after drying at each test age.
 - b) Measure average drying shrinkage deformation of specimens to nearest 0.0001 inch at each test age.
 - c) If drying shrinkage of any specimen departs from average of test age by more than 0.0004 inch, disregard results obtained from that specimen and test another specimen.
 - d) Shrinkage of trial batch concrete at 28 days drying age shall not exceed 0.045 percent maximum.
 - h. If trial batch tests do not meet specified requirements for slump, strength, workability, consistency, drying shrinkage, and finishing, change concrete mix design proportions and, if necessary, source of aggregate:
 - 1) Perform additional trial batches and tests until an acceptable trial batch is produced that meets requirements of this Section.
 - i. Perform test batches and tests required to establish trial batches and acceptability of materials without change in Contract Price.
 - j. Do not place concrete until the concrete mix design and trial batch have been accepted by Engineer.
2. Required average compressive strength:
- a. Determine required average compressive strength (f'_{cr}) for selection of concrete proportions for mix design, for each class of concrete, using calculated standard deviation for its corresponding specified compressive strength (f'_c) in accordance with ACI 318 and ACI 350.
 - b. When test records of at least 30 consecutive tests that span period of not less than 45 calendar days are available, establish standard deviation as in accordance with ACI 318 and ACI 350 and as modified in this Section.
 - c. Provide test records from which to calculate standard deviation that represent materials, quality control procedures, and conditions similar to materials, quality control procedures, and conditions expected to apply in preparation of concrete for the Work.
 - d. Provide test records with materials and proportions that are more restricted than those for the Work.
 - e. Specified compressive strength (f'_c) of concrete used in test records: Within 1,000 pounds per square inch of that specified for the Work.
 - f. When lacking adequate test records for calculation of standard deviation meeting requirements, determine required average compressive strength f'_{cr} from following Table B.

TABLE B	
REQUIRED AVERAGE COMPRESSION STRENGTH	
Specified Compressive Strength f'_c (pounds per square inch)	Required Average Compressive Strength f'_{cr} (pounds per square inch)
Less than 3,000	$f'_c + 1,000$
3,000 to 5,000	$f'_c + 1,200$
Over 5,000	$1.10f'_c + 700$

- 3. Aggregate:
 - a. Testing of concrete aggregate is at Contractor's expense.

- b. Provide test reports representing samples of materials taken and tested at the following times:
 - 1) Not more than 60 days prior to the date on the proposed materials for concrete mixes.
 - 2) Not more than 60 days prior to any change in the source of aggregates, including suppliers and/or quarries.
 - 3) Whenever there is a significant change in aggregate quality or gradation from a previously submitted and accepted source.
- c. Sample aggregate in accordance with ASTM D75.
- d. Fine and coarse aggregates:
 - 1) Gradation: Test in accordance with ASTM C136. Use sieves with square openings for testing grading of aggregates.
 - 2) Alkali-silica reactivity:
 - a) Provide fine and coarse aggregate with expansion not greater than 0.10 percent at 14 days when tested in accordance with ASTM C1260, unless the aggregate has been determined to be not deleteriously reactive based on testing in accordance with one of the following:
 - (1) ASTM C227: Expansion not greater than 0.05 percent and 3 months, and not greater than 0.10 percent at 6 months.
 - (2) ASTM C1293: Expansion not greater than 0.04 percent at 1 year.
- e. Fine aggregate:
 - 1) Provide fine aggregate that does not contain strong alkali nor organic matter which gives color darker than standard color when tested in accordance with ASTM C40.
 - 2) Provide aggregate having soundness in accordance with ASTM C33 when tested in accordance with ASTM C88.
- f. Coarse aggregate:
 - 1) Soundness when tested in accordance with ASTM C88: Have loss not greater than 10 percent when tested with sodium sulfate.
 - 2) Abrasion Loss: Not exceed 45 percent after 500 revolutions when tested in accordance with ASTM C131.
- g. Fly ash:
 - 1) Sampling and testing: Sample and test fly ash in accordance with ASTM C311.
- h. Portland cement:
 - 1) Determination of alkali content: In accordance with ASTM C114.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Liquid evaporation retardant:
 - 1. Under conditions that result in rapid evaporation of moisture from the surface of the concrete, immediately after the concrete has been screeded, coat the surface of the concrete with a liquid evaporation retardant.
 - 2. Apply the evaporation retardant again after each work operation as necessary to prevent drying shrinkage cracks.
 - 3. Conditions which result in rapid evaporation of moisture may include one or more of the following:

- a. Low humidity.
 - b. Windy conditions.
 - c. High temperature.
- B. Joints and bonding:
1. As far as practicable construct concrete work as monolith.
 2. Locations of construction, expansion, and other joints are indicated on the Drawings or as specified in this Section.
 3. Time between placement of adjacent concrete separated by joints:
 - a. Provide not less than 3 days (72 hours) between placement of adjacent sections for the following:
 - 1) Slabs.
 - 2) Walls.
 - b. Provide not less than 7 days (168 hours) between placement of upper and lower pours for the following:
 - 1) Walls over slabs.
 - 2) Slabs over walls.
 - 3) Slabs keyed into the sides of walls.
 4. Construction joints:
 - a. Where construction joints are not indicated on the Drawings, provide construction joints in slabs and walls at intervals not greater than 35 feet.
 - b. In order to preserve strength and watertightness of structures, make no other joints, except as authorized the Engineer.
 - c. At construction joints, thoroughly clean concrete of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter by means of heavy sandblasting.
 - d. Cleaning of construction joints:
 - 1) Wash construction joints free of sawdust, chips, and other debris after forms are built and immediately before concrete or grout placement.
 - 2) Should formwork confine sawdust, chips, or other loose matter in such manner that it is impossible to remove them by flushing with water, use vacuum cleaner for their removal, after which flush cleaned surfaces with water.
 - 3) Provide cleanout hole at base of each wall and column for inspection and cleaning.
 - e. At horizontal joints: As initial placement over cold joints, thoroughly spread bed of cement grout as specified in Section 03600 - Grouting with a thickness of not less than 1/2 inch nor more than 1 inch.
 5. Take special care to ensure that concrete is well consolidated around and against waterstops and waterstops are secured in proper position.
 6. Construction and expansion Joints:
 - a. Constructed where and as indicated on the Drawings.
 - b. Waterstops, expansion joint material, synthetic rubber sealing compound, and other similar materials: As specified in Sections 03150 - Concrete Accessories and 07900 - Joint Sealants.
 7. Repair of concrete: Where it is necessary to repair concrete by bonding mortar or new concrete to concrete which has reached its initial set, first coat surface of set concrete with epoxy bonding agent as specified in Section 03071 - Epoxies.
- C. Conveying and placing concrete:

1. Convey concrete from mixer to place of final deposit by methods that prevent separation or loss of materials.
2. Use equipment for chuting, pumping, and conveying concrete of such size and design as to ensure practically continuous flow of concrete at delivery end without segregation of materials.
3. Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from chute or conveying device.
4. Keep equipment for conveying concrete thoroughly clean by washing and scraping upon completion of day's placement.

D. Placing concrete:

1. Place no concrete without prior authorization of the Engineer.
2. Do not place concrete until:
 - a. Reinforcement is secure and properly fastened in its correct position and loose form ties at construction joints have been retightened.
 - b. Dowels, bucks, sleeves, hangers, pipes, conduits, anchor bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored.
 - c. Forms have been cleaned and oiled as specified.
3. Do not place concrete in which initial set has occurred, or that has been retempered.
4. Do not place concrete during rainstorms or high velocity winds.
5. Protect concrete placed immediately before rain to prevent water from coming in contact with such concrete or winds causing excessive drying.
6. Keep sufficient protective covering on hand at all times for protection of concrete.
7. After acceptance, adhere to proposed sequence of placing concrete, except when specific changes are requested and accepted by the Engineer.
8. Notify the Engineer in writing of readiness, not just intention, to place concrete in any portion of the work:
 - a. Provide this notification in such time in advance of operations, as the Engineer deems necessary to make final inspection of preparations at location of proposed concrete placing.
 - b. Place forms, reinforcement, screeds, anchors, ties, and inserts in place before notification of readiness is given to the Engineer.
 - c. Depositing concrete:
 - 1) Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.
 - 2) Do not deposit concrete in large quantities in one place and work along forms with vibrator or by other methods.
 - 3) Do not drop concrete freely into place from height greater than 5 feet.
 - 4) Use tremies for placing concrete where drop is over 5 feet.
 - 5) Commence placement of concrete on slopes, starting at bottom of slope.
9. Place concrete in approximately horizontal layers not to exceed 24 inches in depth and bring up evenly in all parts of forms.
10. Continue concrete placement without avoidable interruption, in continuous operation, until end of placement is reached.
11. After concrete placement begins, continue concrete placement without significant interruption. Plan and implement precautions to prevent any delay, between layers being placed, from exceeding 20 minutes.

12. If concrete is to be placed over previously placed concrete and more than 20 minutes has elapsed, spread layer of cement grout not less than 1/2 inch in thickness nor more than 1 inch in thickness over surface before placing additional concrete.
13. Placement of concrete for slabs, beams, or walkways:
 - a. If cast monolithically with walls or columns, do not commence until concrete in walls or columns has been allowed to set and shrink.
 - b. Allow set time of not less than 1 hour for shrinkage.

E. Consolidating concrete:

1. Place concrete with aid of acceptable mechanical vibrators.
2. Thoroughly consolidate concrete around reinforcement, pipes, or other shapes built into the work.
3. Provide sufficiently intense vibration to cause concrete to flow and settle readily into place and to visibly affect concrete over radius of at least 18 inches.
4. Vibrators:
 - a. Keep sufficient vibrators on hand at all times to vibrate concrete as placed.
 - b. In addition to vibrators in actual use while concrete is being placed, have on hand minimum 1 spare vibrator in serviceable condition.
 - c. Do not place concrete until it has been ascertained that all vibrating equipment, including spares, are in serviceable condition.
5. Take special care to place concrete solidly against forms to leave no voids.
6. Take every precaution to make concrete solid, compact, and smooth. If for any reason surfaces or interiors have voids or are in any way defective, repair such concrete in manner acceptable to the Engineer.

F. Footings and slabs on grade:

1. Do not place concrete on ground or compacted fill until subgrade is in moist condition acceptable to the Engineer.
2. If necessary, sprinkle subgrade with water not less than 6 or more than 20 hours in advance of placing concrete.
3. If subgrade becomes dry prior to concrete placement, sprinkle again, without forming pools of water.
4. Do not place concrete if subgrade is muddy or soft. Loading concrete:
5. Green concrete:
 - a. No heavy loading of green concrete will be permitted.
6. No backfill shall be placed against concrete walls, connecting slabs, or beams until the concrete has reached the specified strength.
7. Use construction methods, sequencing, and allow time for concrete to reach adequate strength to prevent overstress of the concrete structure during construction.

G. Curing concrete:

1. General:
 - a. Cure concrete by methods specified in this Section.
 - b. Keep concrete continuously moist and at a temperature of at least 50 degrees Fahrenheit for minimum of 7 days after placement.
 - c. Cure concrete to be painted with water or sheet membrane.

- d. Do not use sprayed membrane curing or sealing compounds on concrete surfaces that are to receive paint or upon which any material is to be bonded.
 - e. Cure other concrete by water curing or sprayed membrane curing compound at the Contractor's option.
 - f. Floor slabs may be cured using sheet membrane curing.
2. Water curing:
- a. Keep surfaces of concrete being water cured constantly and visibly moist day and night for period of not less than 7 days.
 - b. Each day forms remain in place count as 1 day of water curing.
 - c. No further curing credit will be allowed for forms in place after contact has once been broken between concrete surface and forms.
 - d. Do not loosen form ties during period when concrete is being cured by leaving forms in place.
 - e. Flood top of walls with water at least 3 times per day, and keep concrete surfaces moist at all times during 7 day curing period.
3. Sprayed membrane curing compound:
- a. Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.
 - b. If more than 1 hour elapses after removal of forms, do not use curing compound, but use water curing for full curing period.
 - c. If surface requires repairing or painting, water cure such concrete surfaces.
 - d. Do not remove curing compound from concrete in less than 7 days.
 - e. Curing compound may be removed only upon written request by Contractor and acceptance by Engineer, stating what measures are to be performed to adequately cure concrete.
 - f. Take care to apply curing compound to construction joints. Apply to all surfaces along full profile of joints.
 - g. After curing period is complete, remove curing compound placed within construction joint profile by heavy sandblasting prior to placing any new concrete.
 - h. Contractor's Option: Instead of using curing compound for curing of construction joints, such joints may be water cured.
 - i. Apply curing compound by mechanical, power operated sprayer and mechanical agitator that will uniformly mix all pigment and compound.
 - j. Apply curing compound in at least 2 coats.
 - k. Apply each coat in direction 90 degrees to preceding coat.
 - l. Apply curing compound in sufficient quantity so that concrete has uniform appearance and that natural color is effectively and completely concealed at time of spraying.
 - m. Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.
 - n. Thickness and coverage of curing compound: Provide curing compound having film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.
 - o. The Contractor is cautioned that method of applying curing compound specified in this Section may require more curing compound than normally suggested by manufacturer of curing compound and also more than is customary in the trade.
 - p. Apply amounts specified in this Section, regardless of manufacturer's recommendations or customary practice.

- q. If the Contractor desires to use curing compound other than specified curing compound, coat sample areas of concrete wall with proposed curing compound and also similar adjacent area with specified compound in specified manner for comparison:
 - 1) If proposed sample is not equal or better, in opinion of the Engineer, in all features, proposed substitution will not be allowed.
 - r. Prior to final acceptance of the work, remove, by sandblasting or other acceptable method, any curing compound on surfaces exposed to view, so that only natural color of finished concrete is visible uniformly over entire surface.
4. Sheet membrane curing:
- a. Install sheet membrane as soon as concrete is finished and can be walked on without damage.
 - b. Seal joints and edges with small sand berm.
 - c. Keep concrete moist under sheet membrane.

3.02 CONCRETE FINISHING

- A. Provide concrete finishes as specified in Section 03366 - Tooled Concrete Finishing.
- B. Edges of joints:
 - 1. Provide joints having edges as indicated on the Drawings.
 - 2. Protect wall and slab surfaces at edges against concrete spatter and thoroughly clean upon completion of each placement.

3.03 FIELD QUALITY CONTROL

- A. Testing of concrete:
 - 1. During progress of construction, the Owner will have tests made to determine whether the concrete, as being produced, complies with requirements specified.
 - 2. Tests will be performed in accordance with ASTM C31, ASTM C39, and ASTM C172.
 - 3. Engineer will make and deliver test cylinders to the laboratory and testing expense will be borne by the Owner.
 - 4. Furnish test equipment.
 - 5. Make provisions for and furnish concrete for test specimens, and provide manual assistance to the Engineer in preparing said specimens.
 - 6. Assume responsibility for care of and providing of curing conditions for test specimens in accordance with ASTM C31.
 - 7. Sampling frequency:
 - a. 1 set of test cylinders for each 150 cubic yards of each class of concrete.
 - b. Minimum of 1 set of test cylinders for each class of concrete placed.
 - c. Not less than 1 set of test cylinders for each half-day's placement.
 - d. At least 2 sets of test cylinders for each structure.

- B. Compressive strength tests:
 - 1. Set of 3 cylinder specimens, 6-inch diameter by 12 inch long.
 - 2. Information: Test 1 cylinder at 7 days.
 - 3. Acceptance: Test 2 cylinders at 28 days.

- C. Slump tests:
 - 1. Test slump of concrete using slump cone in accordance with ASTM C143.
 - 2. Do not use concrete that does not meet specification requirements in regards to slump:
 - a. Remove such concrete from project site.
 - b. Test slump at the beginning of each placement, as often as necessary to keep slump within the specified range, and when requested to do so by the Engineer.

- D. Air entrainment tests:
 - 1. Test percent of entrained air in concrete at beginning of each placement, as often as necessary to keep entrained air within specified range, and when requested to do so by the Engineer.
 - 2. Do not use concrete that does not meet Specification requirements for air entrainment:
 - a. Remove such concrete from project site.
 - 3. Test air entrainment in concrete in accordance with ASTM C173.
 - 4. The Engineer may at any time test percent of entrained air in concrete received on project site.

- E. Enforcement of strength requirement:
 - 1. Concrete is expected to reach a compressive strength (f'_c) equal to or greater than that the minimum specified in Table A.
 - 2. Strength level of concrete will be considered acceptable if following conditions are satisfied:
 - a. Averages of all sets of 3 consecutive strength test results is greater or equal to specified compressive strength(f'_c).
 - b. No individual strength test (average of 2 cylinders) falls below specified compressive strength (f'_c) by more than 500 pounds per square inch.
 - 3. Non-compliant strength tests:
 - a. Mark non-compliant strength test reports to highlight that they contain non-complying results and immediately forward copies of test reports to all parties on the test report distribution list.
 - b. Provide treatment of non-compliant concrete at no additional cost to Owner and with no additional time added to project schedule.
 - c. Initial treatment may consist of additional curing and testing of the affected concrete:
 - 1) Provide additional curing of concrete using means and duration acceptable to the Engineer.
 - 2) Upon completion of the additional curing, provide additional testing designated by the Engineer:
 - a) Obtain and test core samples for compression strength in accordance with ASTM C42, ACI 318, and ACI 350.

- b) Provide not less than 3 cores for each affected area. Obtain Engineer's acceptance of proposed coring locations before proceeding with that work.
 - c) Submit report of compression strength testing for Engineer's review.
 - d) If required by the Engineer, provide additional cores and obtain petrographic examination in accordance with ASTM C856. Submit report of petrographic analysis for Engineer's review.
- 3) If additional curing does not bring average of 3 cores taken in affected area to at least the minimum specified compressive strength (f_c), designate such concrete in affected area as defective.

3.04 ADJUSTING

- A. Provide repair of defective concrete at no additional cost to Owner and with no additional time added to the project schedule.
- B. Make repairs using approach and means acceptable to the Engineer:
 - 1. Provide repairs having strength equal to or greater than specified concrete for areas involved.
 - 2. Do not patch, repair, or cover defective work without inspection by the Engineer.
 - 3. Acceptable means may include, but are not limited to strengthening, repair, or removal and replacement.
- C. Strengthening of defective concrete:
 - 1. By addition of concrete.
 - 2. By addition of reinforcing.
 - 3. By addition of both concrete and reinforcing.
- D. Repairs:
 - 1. Methods of repair:
 - a. Dry pack method:
 - 1) Use for holes having depth nearly equal to or greater than least surface dimension of hole, for cone-bolt holes, and for narrow slots cut for repair.
 - 2) Smooth holes: Clean and roughen by heavy sandblasting before repair.
 - b. Mortar replacement method:
 - 1) Use for holes too wide to dry pack and too shallow for concrete replacement.
 - 2) Comparatively shallow depressions, large or small, which extend no deeper than nearest surface reinforcement.
 - c. Concrete replacement method:
 - 1) Use when holes extend entirely through concrete section or when holes are more than 1 square foot in area and extend halfway or more through the section.
 - 2. Preparation of concrete for repair:
 - a. Chip out and key imperfections in the work and make them ready for repair.
 - b. Obtain Engineer's acceptance of surface preparation methods and of prepared surfaces prior to repair.

c. Surfaces of set concrete to be repaired: First coat with epoxy bonding agent as specified in Section 03071 - Epoxies.

E. Remove and replace defective concrete.

END OF SECTION

SECTION 03360

CONTACT GROUTING

PART 1 GENERAL

1.01 SUMMARY

- A. The Work specified in this Section includes requirements for contact grouting the annular space outside the reinforced concrete pipe after microtunneling installations are complete.
- B. Related section:
 - 1. Section 02224 - Guided Auger Boring.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Commercial standards:
 - 1. ASTM C 31 - Practice for Making and Curing Concrete Test Specimens in the Field.
 - 2. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 3. ASTM C 94 - Specifications for Ready Mix Concrete.
 - 4. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using two-inch or 50-mm cube specimens).
 - 5. ASTM C 144 - Specification for Aggregate for Masonry Mortar.
 - 6. ASTM C 150 - Specification for Portland Cement.
 - 7. ASTM C 937 - Standard Specification for Grout Fluidifier for Preplaced-Aggregate Concrete.

1.03 DESIGN CRITERIA

- A. All voids between the outside of the microtunneled pipe and the excavation surface and between the outside of the pipe and the inside of the tunnel lining shall be completely filled with grout.
- B. Grout composition: Grout shall consist of Portland cement, not more than 2 percent bentonite by weight of cement, fluidifier as necessary, and water in the proportions specified herein or as approved by the Engineer. Sand may be added to the grout mix in instances of very high grout takes as approved by the Engineer, but in no case shall the grout mix contain less than 6 sacks of cement per cubic yard of grout. The addition of sand may require additional water or fluidifier to be added to the grout mix:
 - 1. Grout mix (water/cement) ratios shall be expressed in cubic feet of water per cubic foot of cement (94-pound bag). The water-cement ratio by volume shall be varied as needed to fill the voids outside the pipe. The range of water-cement ratios shall be between 1:1 and 2:1 by volume.
 - 2. Recirculate grout mixes when any new mix is batched or after adding water, fluidifier, or sand to mix. Recirculate mix for at least 2 minutes prior to pumping grout into grout hole.

1.04 CONTRACTOR SUBMITTALS

- A. Submit the following in accordance with the requirements of Section 01330 - Submittal Procedures:
1. Work plan and methods:
 - a. Work plan including contact grouting methods and details of equipment and grouting procedures and sequences including injection pressures, monitoring and recording equipment, pressure gauge calibration data, methods of controlling grout pressure, method of transporting grouting equipment and materials within the pipe, and provisions to protect pipe lining, for each type of contact grouting required.
 - b. Details of grout mix proportions; admixtures, including manufacturers literature, and laboratory test data verifying the strength of the proposed grout mix.
 2. Reports and records:
 - a. Maintain and submit daily logs of grouting operations, including pressures, volumes, and grout mix pumped, and time of pumping.

1.05 QUALITY ASSURANCE

- A. Grout Strength Tests. Prepare samples for 24 hour and 28 day compressive strength tests according to ASTM C31 for cylinders or ASTM C109 for cubes. Cylinder molds shall be at least 2 inches in diameter and 4 inches long. Grout cubes shall be either 2 inches or 50 millimeters square. Test samples according to ASTM C39 or C109 as applicable. Grout for the cylinders or cubes shall be taken from the nozzle of the grout injection line. Provide at least 1 set of 4 samples for each 100 cubic feet that grout is injected but not less than 1 set for each grouting shift, unless directed otherwise by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement. Cement shall be Type II or Type V Portland cement conforming to ASTM C150. Type II cement shall meet Table 4 false set requirements of ASTM C150.
- B. Bentonite. Bentonite shall be a commercially processed powdered bentonite, Wyoming type, such as Baroid Quick Gel, Imacco-gel, Black Hills, or equal.
- C. Sand. Conform to ASTM C144 except where modified in the following subparagraphs:
1. Fineness modulus: Between 1.50 and 2.00.
 2. Grading requirements:

<u>Sieve Sizes</u>	<u>Percentage Passing by Weight</u>
No. 8	100
No. 16	95 - 100
No. 30	60 - 85
No. 50	20 - 50
No. 100	10 - 30
No. 200	0 - 5

- D. Fluidifier:
 - 1. Fluidifiers shall hold the solid constituents of the grout in colloidal suspension, be compatible with the cement and water used in the grouting work, contain an expansive shrinkage compensator, and comply with the requirements of ASTM C937.
 - 2. Use CELBEX 209X manufactured by CELTITE, Inc., or approved equal.
- E. Admixtures: Other admixtures may be used subject to the approval of the Engineer to improve the pumpability, to control set time, to hold sand in suspension, and to prevent segregation and bleeding.
- F. Compressive Strength: Minimum strength of 10 pounds per square inch in 24 hours, 50 pounds per square inch in 28 days.

2.02 EQUIPMENT

- A. Equipment for mixing and injecting grout shall be adequate to satisfactorily mix and agitate the grout and force it into the grout holes, in a continuous flow at the desired pressure. Pumps shall be capable of continuously developing a sustained pressure of 15 pounds per square inch in excess of existing earth and groundwater pressures, at the grout hole connection.
- B. Two pressure gauges shall be provided, 1 at the grout pump and 1 at the collar of each hole being grouted. The accuracy of the gauges shall be periodically checked with an accurately calibrated pressure gauge. An adequate supply of spare pressure gauges shall be available on site at all times.
- C. Suitable stop valves shall be provided at the collar of each hole for use in maintaining pressure as required until the grout has set.
- D. The grouting equipment shall be provided with a meter to determine the volume of grout injected. The meter shall be calibrated in cubic feet to the nearest 1/10 of a cubic foot.
- E. The grouting equipment shall be maintained in satisfactory operating condition throughout the course of the work to ensure continuous and efficient performance during grouting operations.
- F. Grout hoses shall have an inside diameter not less than 1-1/2 inches nor greater than 2 inches and capable of withstanding the maximum water and grout pressures to be used.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Commence contact grouting immediately following completion of microtunneling installations performed in accordance with Section 02224 - Guided Auger Boring.

- B. Unless otherwise indicated on the Drawings, grout ports shall be provided in jacking, pipes at intervals no greater than 10 feet. Contact grouting ports shall be installed by the pipe manufacturer in the pipe before the pipe is jacked into place. Field drilling grout ports through the pipe shall not be permitted. Grout ports shall be threaded to accept valve fittings and plugs.
- C. Contact grout shall be used to fill any voids outside the pipe and between the tunnel initial supports and the ground. Contact grouting shall be performed as shown on the Drawings and as specified herein. An attempt shall be made to pump grout at every grout hole or coupling unless approval is granted by the Engineer to skip selected holes.
- D. Inject grout through the grout connections in such a manner as to completely fill all voids outside the pipe resulting from microtunneling operations. Grout pressure shall be controlled so as to avoid damaging the pipe, and to avoid movement of the surrounding ground or improvements.
- E. Grout Mixes: Develop 1 or more grout mixes designed to completely fill the voids outside the pipe and to provide acceptable strength. Make 4 samples of each proposed grout mix and determine 24 hour and 28 day strength in accordance with ASTM C39 or C109. All grout mix proportions shall be subject to review and acceptance by the Engineer.

3.02 MIXING AND INJECTION OF GROUT

- A. All materials shall be free of lumps when put into the mixer and the grout mix shall be constantly agitated. Grout shall flow unimpeded and shall completely fill all voids. Grout not injected 90 minutes after mixing shall be wasted.
- B. The locations of contact grout holes in the pipe are shown on the Drawings. Field drilling grout holes through pipe will not be permitted.
- C. The grouting process shall be operated and controlled so that the grout will be delivered uniformly and consistently.
- D. Grouting shall generally progress sequentially in a constant upgradient direction from 1 grout hole to the next grout hole in the sequence indicated in the approved submittals.
- E. At any time during the grouting operations, sufficient contact grout holes ahead of the hole to be grouted shall be cleaned and valves or other suitable devices attached.
- F. In general, grouting will be considered completed when less than 1 cubic foot of grout of the accepted mix and consistency can be pumped in 15 minutes under the specified maximum pressure. After the grouting is finished, the valve shall be closed before the grout header is removed and until grout has set. For any hole ahead of the grouting operation, with a valve attached, and the valve in the open position; such hole shall be considered grouted if grout issues forth of the same consistency, and at the same rate as that being pumped, and the valve closed. Replace grout plugs in pipe at the completion of grouting.

- G. The maximum sustained grouting pressure shall be 15 pounds per square inch in excess of existing earth and groundwater pressures, at the grout hole collar connection, unless otherwise approved by the Engineer.
- H. All grouting operations are to be performed in the presence of the Engineer. Notify the Engineer at least 24 hours in advance of starting contact grouting operations.
- I. Pipe grout fittings shall be sealed with screw type plugs upon completion of grouting. Dry pack mortar shall be used to fill any recesses.

3.03 CLEANUP

- A. Take all the necessary precautions to protect and preserve the interior surfaces of the pipe from damage. Grout spills shall be minimized and clean-up shall proceed immediately after grouting. Any damage to the pipe caused by or occurring during the grouting operations shall be repaired by a method approved by the Engineer at no additional cost to the City.
- B. During grouting work, provide for adequate disposal of all waste and wastewater. Remove and properly dispose of all waste grout resulting from grouting operations. Grout spills shall be minimized and all cleanup of grout and waste materials shall be performed immediately to avoid damage to the pipe or lining. The contents of grout lines shall not be discharged into the tunnel.

END OF SECTION

SECTION 03366

TOOLED CONCRETE FINISHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Tooled concrete finishes.

1.02 QUALITY ASSURANCE

- A. Mock-ups:
 - 1. Test panels for concrete finishes:
 - a. Prepare test panels for F4 and F5 finishes and tie-hole repairs for review by Engineer.
 - b. Accepted test panels serve as standard of quality and workmanship for project.
 - 2. Prepare test panel showing horizontal and vertical joints proposed for project for review by the Engineer. Refer to finishes specified in this Section.
 - 3. Test panels indicating methods for making concrete repairs: Prepare test panels for proposed repairs at beginning of project for review by Engineer:
 - a. Accepted test panels serve as standard for repairs during the project.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping:
 - 1. Deliver and store packaged materials in original containers until ready for use.

PART 2 PRODUCTS

2.01 MIXES

- A. Mortar mix for F4 finish: Consist of 1 part cement and 1-1/2 parts of fine sand passing Number 100 screen. Mix with enough water and emulsified bonding agent to have consistency of thick cream.
- B. Mortar mix for F5 finish: Consist of 1 part cement to 1-1/2 parts of sand which passes Number 16 screen.

PART 3 EXECUTION

3.01 CONCRETE FINISHES

- A. Cement for finishes:
 - 1. Addition of white cement may be required to produce finish which matches color of concrete to be finished.

- B. Finish vertical concrete surfaces with one of the following finishes as indicated in the Finish Schedule:
1. F1 finish: No special treatment other than repair defective work and fill depressions 1 inch or deeper and tie holes with mortar after removal of curing compound.
 2. F2 finish: No special treatment other than repair defective work, remove fins, fill depressions 1/2 inch or deeper and tie holes with mortar after removal of curing compound.
 3. F3 finish: Repair defective work, remove fins, offsets, and grind projections smooth. Fill depressions 1/4 inch or larger in depth or width and tie holes with mortar after removal of curing compound.
 4. F4 finish: Receive same finish as specified for F3 finish, and, in addition fill depressions and holes 1/16 inch or larger in width with mortar:
 - a. "Brush-Off" sandblast surfaces prior to filling holes to expose all holes near surface of the concrete.
 - b. Thoroughly wet surfaces and commence filling of pits, holes, and depressions while surfaces are still damp.
 - c. Perform filling by rubbing mortar over entire area with clean burlap, sponge rubber floats, or trowels.
 - d. Do not let any material remain on surfaces, except that within pits and depressions.
 - e. Wipe surfaces clean and moist cure.
 5. F5 finish: Receive same finish as specified for F3 finish, and, in addition, receive special stoned finish, in accordance with following requirements:
 - a. Remove forms and perform required repairs, patching, and pointing as specified in this Section.
 - b. Wet surfaces thoroughly with brush and rub with hard wood float dipped in water containing 2 pounds of portland cement per gallon.
 - c. Rub surfaces until form marks and projections have been removed.
 - d. Spread grindings from rubbing operations uniformly over surface with brush in such manner as to fill pits and small voids.
 - e. Moist cure brushed surfaces and allow to harden for 3 days:
 - 1) After curing, obtain final finish by rubbing with carborundum stone of approximately Number 50 grit until entire surfaces have smooth texture and are uniform in color.
 - 2) Continue curing for remainder of specified time.
 - f. If any concrete surface is allowed to become too hard to finish in above specified manner, sandblast and wash related surfaces exposed to view, whether finished or not:
 - 1) While still damp, rub over surface, plastic mortar, as specified for brushed surfaces and handstoned with Number 60 grit carborundum stone, using additional mortar for brushed surfaces until surface is evenly filled without an excess of mortar.
 - 2) Continue stoning until surface is hard.
 - 3) After moist curing for 3 days, make surface smooth in texture and uniform in color by use of Number 50 or Number 60 grit carborundum stone.
 - 4) After stoning, continue curing until 7 day curing period is completed.
- C. Finish horizontal concrete surfaces with one of the following finishes as indicated in the Finish Schedule after proper and adequate vibration and tamping:
1. S1 finish: Screeded to grade and leave without special finish.

2. S2 finish: Smooth steel trowel finish.
 3. S3 finish: Steel trowel finish free from trowel marks. Provide smooth finish free of all irregularities.
 4. S4 finish: Steel trowel finish, without local depressions or high points, followed by light hairbroom finish. Do not use stiff bristle brooms or brushes. Perform brooming parallel to slab-drainage. Provide resulting finish that is rough enough to provide nonskid finish. Finish is subject to review and acceptance by the Engineer.
 5. S5 finish: Nonslip abrasive: After concrete has been screeded level and hardened enough to support man standing on a board, sprinkle abrasive from shake screen into surface at uniform rate of 25 pounds for each 100 square feet of surface area, wood float into finish, then trowel abrasive into surface with steel trowel properly exposing abrasive in surface as required to provide nonslip surface.
 6. S6 finish: Roughened finish: After concrete has been screeded to grade, apply a roughened finish by use of a jitterbug roller or similar device.
- D. Finish concrete floor surfaces to which surfacing material is applied: Finish smooth with tolerance within 1/8 inch in 10 feet in any direction from lines indicated on the Drawings.

3.02 CONCRETE FINISH SCHEDULE

- A. Finish concrete surfaces as follows:
1. F4 finish for following vertical surfaces:
 - a. Concrete surfaces specified or indicated to be painted.
 - b. Concrete surfaces, interior or exterior, exposed to view.
 2. S1 finish for following surfaces:
 - a. Projecting footings which are to be covered with dirt.
 - b. Slab surfaces which are to be covered with concrete fill.
 3. S2 finish for following surfaces:
 - a. Tops of corbels.
 - b. Tops of walls and beams not covered above in this Section.
 - c. Tops of slabs not covered above in this Section.
 - d. All other surfaces not specified to be finished otherwise.
 4. S3 finish for following surfaces:
 - a. Building and machine room floors which are not covered with surfacing material: Provide floors that are free from trowel marks.
 5. S4 finish for following surfaces:
 - a. Exterior walkways.
 - b. Tops of exterior walls or beams which are to serve as walkways.
 - c. Tops of exterior walls or beams which are to support gratings.
 - d. Top surface of slabs for valve vaults and similar structures.

END OF SECTION

SECTION 03600

GROUTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Cement grout.
 - 2. Cement mortar.
 - 3. Dry-pack mortar.
 - 4. Epoxy grout.
 - 5. Grout.
 - 6. Non-shrink epoxy grout.
 - 7. Non-shrink grout.
 - 8. Cellular Grout.

1.02 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. 523.1R - Guide for Cast-in-Place Low-Density Cellular Concrete
 - 2. 523.3R - Guide for Cellular Concretes above 50 lb/ft³
- B. ASTM International (ASTM):
 - 1. C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-inch or cube specimens).
 - 2. C150 - Specifications for Portland Cement
 - 3. C230 - Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - 4. C494 - Standard Specification for Chemical Admixtures for Concrete
 - 5. C495 - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete
 - 6. C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - 7. C567 - Standard Test Method for Unit Weight of Structural Lightweight Concrete
 - 8. C579 - Standard Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
 - 9. C796 - Standard Method of Testing Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam
 - 10. C869 - Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete
 - 11. C939 - Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - 12. C942 - Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - 13. C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).

14. C1181 - Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

C. International Concrete Repair Institute (ICRI):

1. 310.2R - Selecting and specifying Concrete Surface Preparations for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.03 SUBMITTALS

A. Cement grout:

1. Mix design.
2. Material submittals.

B. Cement mortar:

1. Mix design.
2. Material submittals.

C. Non-shrink epoxy grout:

1. Manufacturer's literature.

D. Non-shrink grout:

1. Manufacturer's literature.

E. Cellular grout:

1. Mix design.
a. Type, brand, source, and amounts of cement, pozzolans, admixtures, and other additives.
b. Amount of water.
c. Combined grading of aggregates
d. Provide material specifications and manufacturer's mixing instructions for each design mix ingredient
2. Material submittals.
a. Include the specific gravity of all materials.
3. Manufacturer's literature.
a. Foaming agent manufacturer shall have at least five (5) years of experience manufacturing for similar types of installations.
4. Provide results of all pre-construction tests.
5. Calculate estimated volume
6. Provide records of injected volume and maximum injection pressure

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to jobsite in their original, unopened packages or containers, clearly labeled with manufacturer's product identification and printed instructions.

B. Store materials in cool dry place and in accordance with manufacturer's recommendations.

C. Handle materials in accordance with the manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Non-shrink epoxy grout:
1. Manufacturers: One of the following or equal:
 - a. Five Star Products, Inc., Five Star Epoxy Grout.
 - b. BASF Construction Chemicals, Masterflow 648 CP Plus.
 - c. L&M Construction Chemicals, Inc., EPOGROUT.
 2. Non-shrink epoxy grout shall be 100 percent solid, premeasured, prepackaged system containing 2-component thermosetting epoxy resin and inert aggregate.
 3. Maintain flowable consistency for at least 45 minutes at 70 degrees Fahrenheit.
 4. Shrinkage or expansion: Less than 0.0006 inches per inch when tested in accordance with ASTM C531.
 5. Minimum compressive strength: 10,000 pounds per square inch at 24 hours and 14,000 pounds per square inch at 7 days when tested in accordance with ASTM C579, Method B.
 6. Compressive creep: Not exceed 0.0027 inches/per inch when tested under 400 pounds per square inch constant load at 140 degrees Fahrenheit in accordance with ASTM C1181.
 7. Coefficient of thermal expansion: Not exceed 0.000018 inches per inch per degree Fahrenheit when tested in accordance with ASTM C531, Method B.
- B. Non-shrink grout:
1. Manufacturers: One of the following or equal:
 - a. Five Star Products, Inc., Five Star Grout.
 - b. BASF Construction Chemicals, Masterflow 928.
 - c. L&M Construction Chemicals, Inc., CRYSTEX.
 2. In accordance with ASTM C1107.
 3. Preportioned and prepackaged cement-based mixture.
 4. Contain no metallic particles such as aluminum powder and no metallic aggregate such as iron filings.
 5. Require only addition of potable water.
 6. Water for pre-soaking, mixing, and curing: Potable water.
 7. Free from emergence of mixing water from within or presence of water on its surface.
 8. Remain at minimum flowable consistency for at least 45 minutes after mixing at 45 degrees Fahrenheit to 90 degrees Fahrenheit when tested in accordance with ASTM C230:
 - a. If at fluid consistency, verify consistency in accordance with ASTM C939.
 9. Dimensional stability (height change):
 - a. In accordance with ASTM C1107, volume-adjusting Grade B or C at 45 degrees Fahrenheit to 90 degrees Fahrenheit.
 - b. Have 90 percent or greater bearing area under bases.
 10. Have minimum compressive strengths at 45 degrees Fahrenheit to 90 degrees Fahrenheit in accordance with ASTM C1107 for various periods from time of placement, including 5,000 pounds per square inch at 28 days when tested in accordance with ASTM C109 as modified by ASTM C1107.

2.02 MIXES

- A. Cement grout:
 - 1. Use same sand-to-cementitious materials ratio for cement grout mix that is used for concrete mix.
 - 2. Use same materials for cement grout that are used for concrete.
 - 3. Use water-to-cementitious materials ratio that is no more than that specified for concrete.
 - 4. For spreading over surfaces of construction or cold joints.

- B. Cement mortar:
 - 1. Use same sand-to-cementitious materials ratio for cement mortar mix that is used for concrete mix.
 - 2. Use same materials for cement mortar that are used for concrete.
 - 3. Use water-to-cementitious materials ratio that is no more than that specified for concrete being repaired.
 - 4. At exposed concrete surfaces not to be painted or submerged in water: Use sufficient white cement to make color of finished patch match that of surrounding concrete.

- C. Dry-pack mortar:
 - 1. Proportions by weight: 1 part portland cement to 2 parts concrete sand:
 - a. Portland cement: As specified in Section 03300 - Cast-in-Place Concrete.
 - b. Concrete sand: As specified in Section 03300 - Cast-in-Place Concrete.

- D. Epoxy grout:
 - 1. Consist of mixture of epoxy or epoxy gel and sand:
 - a. Epoxy: As specified in Section 03071 - Epoxies.
 - b. Epoxy gel: As specified in Section 03071 - Epoxies.
 - c. Sand: Clean, bagged, graded, and kiln-dried silica sand.
 - 2. Proportioning:
 - a. For horizontal work: Consist of mixture of 1 part epoxy with not more than 2 parts sand.
 - b. For vertical or overhead work: Consist of 1 part epoxy gel with not more than 2 parts sand.

- E. Grout:
 - 1. Mix in proportions by weight: 1 part portland cement to 4 parts concrete sand:
 - a. Portland cement: As specified in Section 03300 - Cast-in-Place Concrete.
 - b. Concrete sand: As specified in Section 03300 - Cast-in-Place Concrete.

- F. Non-shrink epoxy grout:
 - 1. Mix in accordance with manufacturer's installation instructions.

- G. Non-shrink grout:
 - 1. Mix in accordance with manufacturer's installation instructions such that resulting mix has flowable consistency and is suitable for placing by pouring.

- H. Cellular grout:
 - 1. Cellular grout mix shall be designed in accordance with the requirements of ACI 523.1R, ACI 523.3R, and as specified herein. If the event of conflict between the requirements of the listed documents and those specified herein, the requirements of this Section shall prevail.

2. Provide Portland Cement conforming ASTM C 150, Type II or V.
3. Concrete Admixtures:
 - a. Shall not contain chlorides that promote corrosion.
 - b. Retarder/Water Reducer: Conforming to ASTM C 494, Type D.
 - c. Plasticizer/Water Reducer: Conforming to ASTM C 494, Type A.
 - d. Admixtures shall only be used with foaming agent when specifically approved in writing by foam agent manufacturer.
 - e. Foaming Agent shall comply with ASTM C 869 when tested in accordance with ASTM C 796
4. Mixes shall be adjusted in the field as necessary to meet the requirements of these specifications.
 - a. The foaming agent manufacturer's field services representative shall approve all changes to the proposed mix designs in the field.
5. 7- and 28-day compressive strength range per ASTM C 495 of the cellular grout shall be:
 - a. 7 days: 300 psi minimum
 - b. 28 days: 500 psi minimum
 - c. Dry density shall be between 50 and 55 pounds per cubic foot (pcf), unless a higher density is required to achieve strength requirements
 - d. Preformed foam shall be generated by combining controlled quantities of air, water, and foaming agent under pressure. Foam shall retain its stability until the cement sets to form a self-supporting matrix. The concentration of foam agent shall be in accordance with the foaming agent material manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect concrete surfaces to receive grout or mortar and verify that they are free of ice, frost, dirt, grease, oil, curing compounds, paints, impregnations, and loose material or foreign matter likely to reduce bond or performance of grout or mortar.

3.02 PREPARATION

- A. Surface preparation for grouting other baseplates:
 1. Remove grease, oil, dirt, dust, curing compounds, laitance, and other deleterious materials that may affect bond to concrete and bottoms of baseplates.
 2. Roughen concrete surfaces in contact with grout to ICRI CSP-6 surface profile or rougher:
 - a. Remove loose or broken concrete.
 3. Metal surfaces in contact with grout: Grit blast to white metal surface.

3.03 INSTALLATION

- A. Mixing:
 1. Cement grout:
 - a. Use mortar mixer with moving paddles.
 - b. Pre-wet mixer and empty out excess water before beginning mixing.
 2. Cement mortar:
 - a. Use mortar mixer with moving paddles.

- b. Pre-wet mixer and empty out excess water before beginning mixing.
- 3. Dry-patch mortar:
 - a. Use only enough water so that resulting mortar will crumble to touch after being formed into ball by hand.
- 4. Non-shrink epoxy grout:
 - a. Keep temperature of non-shrink epoxy grout from exceeding manufacturer's recommendations.
- 5. Non-shrink grout:
 - a. May be drypacked, flowed, or pumped into place. Do not overwork grout.
 - b. Do not retemper by adding more water after grout stiffens.
- 6. Cellular grout:
 - a. Cellular grout shall be mechanically mixed to produce a uniform distribution of materials.
 - b. Follow the manufacturer's recommendations concerning the order of charging the mixer with the various ingredients.
 - c. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's written recommendations for minimum shrinkage and for compliance with these specifications.

B. Placement:

- 1. Cement grout:
 - a. Exercise care in placing cement grout because it is required to furnish structural strength, impermeable water seal, or both.
 - b. Do not use cement grout that has not been placed within 30 minutes after mixing.
- 2. Cement mortar:
 - a. Use mortar mixer with moving paddles.
 - b. Pre-wet mixer and empty out excess water before beginning mixing.
- 3. Epoxy grouts:
 - a. Wet surfaces with epoxy for horizontal work or epoxy gel for vertical or overhead work prior to placing epoxy grout.
- 4. Non-shrink epoxy grout:
 - a. Mix in complete units. Do not vary ratio of components or add solvent to change consistency of mix.
 - b. Pour hardener into resin and mix for at least 1 minute and until mixture is uniform in color. Pour epoxy into mortar mixer wheelbarrow and add aggregate. Mix until aggregate is uniformly wetted. Over mixing will cause air entrapment in mix.
- 5. Non-shrink grout:
 - a. Add non-shrink cement grout to premeasured amount of water that does not exceed the manufacturer's maximum recommended water content.
 - b. Mix in accordance with manufacturer's instructions to uniform consistency.

C. Curing:

- 1. Cement based grouts and mortars:
 - a. Keep continuously wet for minimum of 7 days. Use wet burlap, soaker hose, sun shading, ponding, and in extreme conditions, combination of methods.
 - b. Maintain above 40 degrees Fahrenheit until it has attained compressive strength of 3,000 pounds per square inch, or above 70 degrees

Fahrenheit for minimum of 24 hours to avoid damage from subsequent freezing.

2. Epoxy based grouts:
 - a. Cure grouts in accordance with manufacturers' recommendations:
 - 1) Do not water cure epoxy grouts.
 - b. Do not allow any surface in contact with epoxy grout to fall below 50 degrees Fahrenheit for minimum of 48 hours after placement.

D. Grouting equipment bases, baseplates, soleplates, and skids: As specified in Section 15050 - Common Work Results for Mechanical Equipment.

E. Grouting other baseplates:

1. General:
 - a. Use non-shrink grout as specified in this Section.
 - b. Baseplate grouting shall take place from one side of baseplate to other in continuous flow of grout to avoid trapping air in grout.
 - c. Maintain hydrostatic head pressure by keeping level of grout in headbox above bottom of baseplate. Fill headbox to maximum level and work grout down.
 - d. Vibrate, rod, or chain non-shrink grout to facilitate grout flow, consolidate grout, and remove trapped air.
2. Forms and headboxes:
 - a. Build forms using material with adequate strength to withstand placement of grouts.
 - b. Use forms that are rigid and liquidtight. Caulk cracks and joints with elastomeric sealant.
 - c. Line forms with polyethylene for easy grout release. Coating forms with 2 coats of heavy-duty paste wax is also acceptable.
 - d. Headbox shall be 4 to 6 inches higher than baseplate and shall be located on one side of baseplate.
 - e. After grout sets, remove forms and trim back grout at 45 degree angle from bottom edges of baseplate.

3.04 FIELD QUALITY CONTROL

A. Non-shrink epoxy grout:

1. Test for 24-hour compressive strength in accordance with ASTM C579, Method B.

B. Non-shrink grout:

1. Test for 24-hour compressive strength in accordance with ASTM C942.

C. Cellular grout:

1. Each proposed mix shall be tested in accordance with ASTM C 796.
2. Test specimens shall be made, cured, stored, and tested in conformity with ASTM C 495.
3. Sample testing performed and paid by the Contractor, or cellular grout supplier:
 - a. Each proposed mix design shall include the following:
 - 1) Two (2) sets of compression test cylinders (3.0 inches by 6.0 inches), three (3) cylinders per set.

- 2) One set of two (2) cylinders shall be tested at an age of 7 days, another other set shall be tested at an age of 28 days, and the last set shall be tested at an age of 56 days.
- 3) Determine the total air content in accordance with ASTM C 796
- 4) Determine the unit weight in accordance with ASTM C 567
- b. In lieu of the above testing, Contractor may provide the same testing results from within the last 2 years of the same mix as proposed.
4. Sample testing of each specimen collected on the field shall be performed and paid by the Construction Manager and include:
 - a. One (1) set of four (4) test samples for each shift when cellular grout is placed.
 - b. Two (2) samples from each set shall be tested at an age of 28 days.
 - c. The other two (2) samples shall be tested at an age of 56 days.
 - d. Measure as-cast unit weight (wet density) at point of injection.
 - e. Measure as-cast unit weight (wet density) at point of overflow after excess water and approximately one (1) cubic yard of cellular grout has been wasted.

END OF SECTION

SECTION 03931
EPOXY INJECTION SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Epoxy injection system.

1.02 REFERENCES

- A. ASTM International (ASTM):
1. C881 - Standard Test Method for Epoxy-Resin-Base Bonding Systems for Concrete.
 2. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete by Slant Shear.
 3. D638 - Standard Test Method for Tensile Properties of Plastics.
 4. D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 5. D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
 6. D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.03 SUBMITTALS

- A. General: Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data:
1. Manufacturer's data completely describing epoxy injection system materials, and including test methods and results for strength in tension, flexure, compression and bond; flexural modulus of elasticity; coefficient of thermal expansion; and elongation.
- C. Quality control submittals:
1. Certificates of Compliance.
 2. Manufacturer's Instructions.
- D. Special procedure submittals:
1. Protection plan for surrounding areas and non-cementitious surfaces.

1.04 QUALITY ASSURANCE

- A. Products:
1. Provide materials that are new and use them within shelf life limitations set forth by manufacturer.
- B. Qualifications:
1. Installer:
 - a. Minimum 5 years' experience in concrete repair, with focus on application of similar systems and products to projects of similar size and scope.

- C. Pre-installation meeting:
 - 1. At least 1 week prior to commencing work of this Section, convene a meeting at the project site to review and discuss the following:
 - a. Surface preparation.
 - b. Substrate conditioning and pre-treatment.
 - c. Installation procedures.
 - d. Environmental conditions (including weather forecast) and curing requirements.
 - e. Testing and inspection procedures.
 - f. Protection of surrounding surfaces and equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Labels shall include product identification, batch numbers, and shelf life information.
- B. Store materials off the ground and away from moisture and direct sunlight, and at temperatures within manufacturer's recommended range.
- C. Pre-condition materials to manufacturers recommended temperatures before mixing and using.

1.06 PROJECT CONDITIONS

- A. Take precautions to protect surfaces and equipment in the work area from damage and staining.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Repair materials shall be free of chlorides or alkalis (except for those attributed to water).
 - 2. To ensure compatibility of materials and methods, a single manufacturer shall produce and provide all products used together in a single area of concrete repair.
- B. Manufacturers: One of the following or equal:
 - 1. BASF Building Systems, MasterInject 1500 (formerly Concessive Standard LVI).
 - 2. Sika Chemical Corp., Sikadur 35 Hi-Mod LV.
- C. Epoxy:
 - 1. In accordance with ASTM C881, Types I, II and IV, Grade 1, Class C.

2. Water-insensitive 2-component low viscosity, epoxy adhesive material containing 100 percent solids and meeting or exceeding following characteristics when tested in accordance with standards specified:

Table 1 - Epoxy, Physical Properties		
Characteristic	Test Method	Required Results, minimum ^(1,2)
Viscosity (mixed)	--	250 - 375 centipoise
Tensile Strength	ASTM D638	7,500 pounds per square inch
Tensile Elongation at Break	ASTM D638	1 percent
Compressive Strength	ASTM D695	11,000 pounds per square inch
Compressive Modulus	ASTM D695	2.5 x 10 ⁵ pounds per square inch.
Bond Strength, slant shear, hardened concrete to hardened concrete	ASTM C882	1500 pounds per square inch at 2 days at minimum 73 degrees Fahrenheit. Concrete shall fail before failure of epoxy.
Heat Deflection Temperature	ASTM D648	124 degrees Fahrenheit
Notes:		
1)	Properties for mixes with neat epoxy.	
2)	Results after 7-day cure at temperature between 72 and 78 degrees Fahrenheit, unless otherwise noted.	

2.02 EQUIPMENT

- A. Injection pump:
 1. Use positive displacement injection pump with interlock to provide in-line mixing and metering system for 2 component epoxy.
 2. Use pressure hoses and injection nozzle designed to properly mix of 2 components of epoxy.
 3. Standby injection unit may be required.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surface preparation:
 1. Confirm that surface temperature and moisture conditions are within manufacturer's recommended limits. Condition surfaces to within those limits before commencing epoxy injection.
 2. Sweep or clean area in vicinity of cracks that will be injected with epoxy. Leave area in generally clean condition after epoxy injection is complete.
 3. Clean cracks so they are free from dirt, laitance, and other loose matter.

3.02 INSTALLATION

- A. Install and cure epoxy materials in accordance with manufacturer's installation instructions.
- B. Mixing:
 - 1. Mix epoxy in accordance with manufacturer's installation instructions.
 - 2. Do not use solvents to thin epoxy system materials introduced into cracks or joints.
- C. Injection:
 - 1. Apply adequate surface seal to crack to prevent leakage of epoxy.
 - 2. Establish injection points at distance along crack not less than thickness of cracked member.
 - 3. Crack injection sequence:
 - a. Inject epoxy into crack or joint at first port with sufficient pressure to advance epoxy to adjacent port. Start at lowest port along the injection line and work upwards.
 - b. Seal original port and shift injection to next adjacent port where epoxy appears.
 - c. Continue port-to-port injection until crack has been injected for its entire length.
 - d. For small amounts of epoxy, or where excessive pressure developed by injection pump might further damage structure, premixed epoxy and use hand caulking gun to inject epoxy if acceptable to the Engineer.
 - e. Seal ports, including adjacent locations where epoxy seepage occurs, as necessary to prevent drips or run out.
 - f. After epoxy injection is complete, remove surface seal material, and refinish concrete in area where epoxy was injected to match existing concrete. Leave finished work and work area in a neat, clean condition.

3.03 FIELD QUALITY ASSURANCE

- A. Provide Contractor quality control as specified in Section 01450 - Quality Control.
- B. Field inspections and testing:
 - 1. Submit records of inspections and tests to Engineer within 24 hours after completion.
- C. Manufacturer's services:
 - 1. Pre-installation meeting: Provide manufacturer's technical representative to attend pre-installation meeting specified in this Section.

3.04 FIELD QUALITY CONTROL

- A. Provide Owner's quality assurance for the Work of this Section as specified in Section 01450 - Quality Control.
- B. Special inspections special tests, and structural observation:
 - 1. Not required.

- C. Field inspections:
 - 1. Preparation:
 - a. Review manufacturer's product data and installation instructions.
 - 2. Required inspections:
 - a. Observe surfaces to be injected for temperature and moisture conditions and for surface preparation.
 - b. Observe conditioning and mixing of epoxy resin components.
 - c. Observe injection procedures for filling cracks.
 - 3. Records of inspections:
 - a. Provide record of each inspection.
 - b. Submit to Engineer upon request.

3.05 NON-CONFORMING WORK

- A. Rework surface finishes that do not match surrounding concrete to the satisfaction of Engineer at no additional cost to Owner.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Structural steel shapes and plate.
 - 2. Fasteners and structural hardware:
 - a. All thread rods.
 - b. High-strength bolts.
 - 3. Welding.
 - 4. Bolting.

1.02 REFERENCES

- A. American Institute of Steel Construction (AISC):
 - 1. 303 - Code of Standard Practice for Steel Buildings and Bridges.
 - 2. 360 - Specification for Structural Steel Buildings.
- B. American Iron and Steel Institute (AISI):
 - 1. Steel and stainless steel alloys (“types”) as indicated.
- C. American Welding Society (AWS):
 - 1. A5.1 - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - 2. A5.17 - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
 - 3. A5.20 - Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.
 - 4. D1.1 - Structural Welding Code - Steel.
 - 5. D1.6 - Structural Welding Code - Stainless Steel.
- D. ASTM International (ASTM):
 - 1. A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - 2. A36 - Standard Specification for Carbon Structural Steel.
 - 3. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 6. A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 7. A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - 8. A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.

9. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 10. A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 11. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 12. A992 - Standard Specification for Structural Steel Shapes.
 13. F436 - Standard Specification for Hardened Steel Washers.
 14. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 15. F594 - Standard Specification for Stainless Steel Nuts.
 16. F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 17. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
 18. F3125 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength.
- E. Research Council on Structural Connections (RCSC):
1. Specification for Structural Joints Using High-Strength Bolts (RCSC Specification).

1.03 DEFINITIONS

- A. Snug-tight: At bolted joints, the tightness attained with a few impacts of an impact wrench, or by the full effort of an ironworker using a spud wrench to bring the connected plies into firm contact.
- B. Stainless steel related terms:
1. Descaling: Removal of heavy, tightly adherent oxide films resulting from hot-forming, heat-treatment, welding, and other high-temperature operations.
 2. Pickling: Chemical descaling of stainless steel using aqueous solutions of nitric and hydrofluoric acid, or various proprietary formulations as specified.
 3. Passivation: Chemical treatment of stainless steel with a mild oxidant for the purpose of enhancing the spontaneous formation of the steel's protective passive film.

1.04 SUBMITTALS

- A. Product data:
1. Stainless steel: Fabricator name and qualifications, member dimensions and structural section properties, and specifications and procedures used for pickling and passivating members.
- B. Shop drawings:
1. Fabrication and erection drawings.
- C. Quality control submittals:
1. Welding procedure specifications (WPS) in accordance with AWS D1.1 and D1.6:
 - a. Submit WPS for each type of welded joint used, whether prequalified or qualified by testing:
 - 1) State electrode manufacturer and specific electrodes used.

- 2) Indicate required AWS qualification for joint.
 - b. Submit WPS with shop drawings that indicate those welds.
 - c. Submit Procedure Qualification Record (PQR) in accordance with AWS D1.1 and D1.6 for welding procedures qualified by testing.
2. Welder qualifications: For each welding process and position:
 - a. Welder's qualification certificates.
 - b. Contractor's statement that certificate will be "in effect" at the time(s) welding will be performed based on the "Period of Effectiveness" provisions of AWS D1.1 and D1.6.
3. Test reports.
4. Certified copies of mill tests and analyses made in accordance with applicable ASTM standards, or reports from a recognized commercial laboratory, including chemical and tensile properties of each shipment of structural steel or part thereof having common properties.

1.05 QUALITY ASSURANCE

- A. Welding:
 1. Perform welding of structural metals in accordance with AWS D1.1 and D1.6 using welders who have current AWS qualification certificate for the process, position, and joint configuration to be welded.
 2. Make Welding Procedure Specifications available at the locations where welding is performed.
 3. Notify Engineer at least 24 hours before starting shop or field welding.
 4. Engineer may check materials, equipment, and qualifications of welders.
 5. Remove welders performing unsatisfactory Work, or require requalification.
 6. Engineer may use gamma ray, magnetic particle, dye penetrant, trepanning, or other aids to visual inspection to examine any part of welds or all welds.
 7. Contractor shall bear costs of retests on defective welds.
 8. Contractor shall also bear costs in connection with qualifying welders.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and shipping: Deliver structural steel free from mill scale, rust, and pitting.
- B. Storage and protection: Until erection and painting, protect from weather items not galvanized or protected by a shop coat of paint.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Unless otherwise specified or indicated on the Drawings, materials shall conform to the following:

Item	ASTM Standard	Class, Grade, Type, or Alloy Number
Carbon Steel		
Plate, bars, rolled shapes (except W and WT shapes), and miscellaneous items	A36	--
Rolled W and WT shapes	A992	Grade 50

Item	ASTM Standard	Class, Grade, Type, or Alloy Number
Hollow structural sections/HSS: Round, square, or rectangular (including "pipe" where indicated for structural members and supports)	A500	Grade C

2.02 FASTENERS AND STRUCTURAL HARDWARE

A. General:

1. Materials: Of domestic manufacture.
2. Where fasteners and hardware are specified to be galvanized, hot-dip galvanize in accordance with ASTM A153 or ASTM F2329, unless otherwise specified.

B. All thread rods:

1. Carbon steel:
 - a. In accordance with ASTM A36 unless otherwise indicated on the Drawings.
 - b. Nuts: ASTM A194.
 - c. Washers: ASTM F436.
2. Galvanized carbon steel:
 - a. In accordance with ASTM A36 unless otherwise indicated on the Drawings, and hot dip galvanized in accordance with ASTM A153.
 - b. Nuts: ASTM A194, hot-dip galvanized in accordance with ASTM A153.
 - c. Washers: ASTM F436, hot-dip galvanized in accordance with ASTM A153.
3. Stainless steel:
 - a. Units descaled, pickled, and passivated as specified in "Fabrication" in this Section.
 - b. Threaded rods and nuts to be the products of a single manufacturer/fabricator to ensure proper fit without galling. Ship all thread rods with properly fitting nuts attached.
 - c. Alloy Type 304 or Type 316 as indicated on the Drawings.
 - d. Type 304:
 - 1) Rod: ASTM F593, Group 1, Condition CW, coarse threads.
 - 2) Nuts: ASTM F594. Match alloy of rod (group and UNS designation).
 - 3) Washers: Type 304 stainless steel.
 - e. Type 316:
 - 1) Rod: ASTM F593, Group 2, Condition CW, coarse threads.
 - 2) Nuts: ASTM F594. Match alloy of rod (group and UNS designation).
 - 3) Washers: Type 316 stainless steel.

C. Anchor bolts, anchor rods, and post-installed steel anchors: As indicated on the Drawings and as specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.

D. High-strength bolts:

1. Provide high-strength bolt assembly, with nuts, hardened flat washers, and compressible-washer-type direct tension indicators. Carbon steel - Uncoated:

- a. Bolts: Plain heavy hex structural bolts in accordance with ASTM F3125, Grade A325, Type 1.
 - b. Nuts: Heavy hex nuts in accordance with ASTM A563, Grade C.
 - c. Washers:
 - 1) Adjacent to normal, oversized, and short-slotted holes: Circular, square or rectangular beveled, clipped, or extra thick washers in accordance with ASTM F436, Type 1. Flat circular washers unless otherwise indicated on the Drawings.
 - 2) Adjacent to long slotted holes: Fabricated from 5/16-inch thick plate conforming to ASTM A36.
 - d. Load indicator devices: At slip critical connections, provide one of the following devices at each bolt:
 - 1) Compressible washer type direct tension indicators ("DTI"): In accordance with ASTM F959, Type 325-1.
 - 2) Twist-off type tension-control bolt assemblies: ASTM F3125, Grade F1852.
- E. Stainless steel bolts (for use in stainless steel structures):
- 1. General:
 - a. Bolts and nuts shall be the products of a single manufacturer/fabricator to ensure proper fit without galling. Ship bolts with properly fitting nuts attached.
 - b. Units descaled, pickled and passivated as specified in "Fabrication."
 - 2. Alloy: Type 304 or Type 316 to match alloy of structural members being connected.
 - 3. Type 304:
 - a. Bolts: ASTM F593, Group 1, Condition CW, coarse threads.
 - b. Nuts: ASTM F594. Match alloy (group and UNS designation) and threads of bolts.
 - c. Washers: Type 304 stainless steel.
 - 4. Type 316:
 - a. Bolts: ASTM F593, Group 2, Condition CW, coarse threads.
 - b. Nuts: ASTM F594. Match alloy (group and UNS designation) and threads of bolts.
 - c. Washers: Type 316 stainless steel.
 - 5. Welded studs: As indicated on the Drawings and as specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.

2.03 ISOLATING SLEEVES AND WASHERS

- A. As indicated on the Drawings and as specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.

2.04 THREAD COATING

- A. Manufacturers: One of the following or equal:
 - 1. Bostik, Never-Seez.
 - 2. Oil Research, Inc., WLR No. 111.

2.05 SUPPLEMENTARY PARTS

- A. Furnish as required for complete structural steel erection, whether or not such parts and Work are specified or indicated on the Drawings.

2.06 FABRICATION

- A. Shop assembly:
 - 1. Fabricate structural steel in accordance with AISC 360 and AISC 303 unless otherwise specified or modified by applicable regulatory requirements.
 - 2. Where anchors, connections, or other details of structural steel are not specifically indicated on the Drawings or specified, their material, size and form shall be equivalent in quality and workmanship to items specified.
 - 3. Round off sharp and hazardous projections and grind smooth.
 - 4. Take measurements necessary to properly fit work in the field. Take responsibility for and be governed by the measurements and proper working out of all the details.
 - 5. Take responsibility for correct fitting of metalwork.
 - 6. Welded connections:
 - a. Comply with AWS requirements for the metals to be welded.
 - b. Weld only in accordance with approved Welding Procedure Specifications.
 - c. Keep Welding Procedure Specifications readily available for welders and inspectors during fabrication processes.

- B. Stainless steel shapes and assemblies:
 - 1. For structural members such as W shapes, S shapes, channels, angles, and similar rolled shapes not available in quantity, size, and type of stainless steel specified or indicated on the Drawings:
 - a. Fabricate shapes using laser-fused, full penetration welds between pieces of plate to attain same or higher section modulus and moment of inertia as that of members indicated on the Drawings.
 - b. Fabricate shapes from dual grade stainless steel.
 - c. Fabricate beams and channels to ASTM A6 tolerances.
 - d. Manufacturers: The following or equal:
 - 1) Stainless Structural, LLC.
 - 2. Cleaning and passivation:
 - a. Following shop fabrication of stainless steel members and bolts, clean and passivate fabrications at point of manufacture.
 - b. Finish requirements: Remove free iron, heat tint oxides, weld scale and other impurities, and obtain a bright passive finished surface with no etching, pitting, frosting, or discoloration.
 - c. Provide quality control testing to verify effectiveness of cleaning agents and procedures and to confirm that finished surfaces are clean and passivated:
 - 1) Conduct sample runs using test specimens with proposed cleaning agents and procedures as required to avoid adverse effects on surface finishes and base materials.

- d. Pre-clean, chemically de-scale (“pickle”), passivate, and final-clean fabrications in accordance with the requirements of ASTM A380:
 - 1) If degreasing is required before cleaning (pickling) to remove scale or iron oxide, cleaning with citric acid treatments is permissible; however, such treatments shall be followed inorganic cleaners.
 - 2) Pickle and passivate stainless steel using a nitric acid solution in accordance with ASTM A380, Annex A2, Table A2.1, Part II.
 - 3) Pickling by citric acid treatment or sulfuric acid treatment is not considered to satisfy the requirements of this Section.
- e. Inspect after cleaning using methods specified for “gross inspection” in ASTM A380.
- f. Improperly or poorly cleaned and passivated materials shall not be shipped and will not be accepted at the site.

C. Galvanized carbon steel:

- 1. Where galvanizing is required, hot-dip structural steel after fabrication in accordance with ASTM A123.
- 2. Do not electro-galvanize or mechanically-galvanize unless specified or accepted by Engineer.
- 3. Re-straighten galvanized items that bend or twist during galvanizing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine Work in place to verify that it is satisfactory to receive the Work of this Section. If unsatisfactory conditions exist, do not begin this Work until such conditions have been corrected.

3.02 ERECTION

A. General:

- 1. Fabricate structural and foundry items to true dimensions without warp or twist.
- 2. Form welded closures neatly, and grind off smooth where weld material interferes with fit or is unsightly.
- 3. Install structural items accurately and securely, true to level, plumb, in correct alignment and grade, with all parts bearing or fitting structure or equipment for which intended.
- 4. Do not shift out of alignment, re-drill, re-shape, or force fit fabricated items.
- 5. Place anchor bolts or other anchoring devices accurately and make surfaces that bear against structural items smooth and level.
- 6. Rigidly support and brace structural items needing special alignment to preserve straight, level, even, and smooth lines. Keep structural items braced until concrete, grout, or dry pack mortar has hardened for 48 hours minimum.
- 7. Erect structural steel in accordance with AISC 303 unless otherwise specified or modified by applicable regulatory requirements.
- 8. Where anchors, connections, and other details of structural steel erection are not specifically indicated on the Drawings or specified, form, locate, and attach with equivalent in quality and workmanship to items specified.
- 9. Round off sharp or hazardous projections and grind smooth.
- 10. Coat steel items as specified in Section 09960 - High-Performance Coatings.

- B. Stainless steel. Take all necessary precautions to avoid iron contamination of stainless steel during delivery, storage, and handling.
 - 1. Segregate stainless steel from iron.
 - 2. Tools and handling devices.
 - a. Do not use iron tools clamps, chokes, working surfaces, or brushes when fabricating, handling, and erecting stainless steel.
 - b. Do not use tools that have been contaminated by contact with iron.
 - c. Use stainless steel, polymer coated, or wood tools and handling equipment. Do not use tools that have been contaminated by contact with iron or steel.

- C. Welding: General:
 - 1. Make welds full penetration type, unless otherwise indicated on the Drawings.
 - 2. Remove backing bars and weld tabs after completion of weld. Repair defective welds observed after removal of backing bars and weld tabs.

- D. Welding: Carbon steel:
 - 1. General: In accordance with AWS D1.1:
 - a. Weld ASTM A36 and A992 structural steel, and ASTM A500 and A501 structural tubing with electrodes in accordance with AWS A5.1, using E70XX electrodes; AWS A5.17, using F7X-EXXX electrodes; or AWS A5.20, using E7XT-X electrodes:

- E. Welding - stainless steel:
 - 1. General: In accordance with AWS D1.6.
 - 2. Field welding of stainless steel will not be permitted.
 - 3. Passivation of field-welded surfaces:
 - a. Provide cleaning, pickling and passivating as specified under "Fabrications" of this Section. Clean using Derustit Stainless Steel Cleaner, or equal.

- F. Interface with other products:
 - 1. Where steel members and fasteners come in contact with dissimilar metals (aluminum, stainless steel, etc.), separate or isolate the dissimilar metals with isolating sleeves and washers as specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.

- G. Fasteners: General:
 - 1. Install bolts to project 2 threads minimum, but 1/2 inch maximum beyond nut.
 - 2. Anchor bolts and anchor rods: Install as specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry:
 - a. Unless otherwise specified, tighten nuts on anchor bolts and anchor rods specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry to the "snug-tight" condition.
 - 3. All thread rods in drilled holes bonded to concrete with adhesive: Install as specified in Section 03055 - Adhesive-Bonded Reinforcing Bars and All Thread Rods in Concrete.

- H. Fasteners: High-strength carbon steel bolts:
 - 1. Connections with high-strength bolts shall in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts.

2. Provide pre-tensioned joints at bolted connections, except where slip-critical or snug-tight connections are indicated on the Drawings.
 3. Joints: Slip-critical:
 - a. Confirm that faying surfaces at connections are free of dirt and other foreign material, have been blast cleaned, and are free of coatings and inadvertent overspray in accordance with RCSC Specification.
 - b. Furnish hardened flat washers in accordance with ASTM F436:
 - 1) On outer plies with slotted holes.
 - 2) When 1 or more plies of the connected material has a yield strength less than 40 ksi.
 - 3) Under element, nut, or bolt head, turned in tightening.
 - c. Install tension indicator washers, placed in accordance with ASTM F959 Figure X1, to confirm adequate tightening of bolts.
 - d. Tighten bolts to full pretension.
 4. Joints: Pre-tensioned:
 - a. Joint preparation, assembly, and tightening shall be as specified for slip-critical connections, except that the requirements for un-coated faying surfaces shall not apply.
 5. Joints: Snug-tight:
 - a. Install bolts with washers where required in accordance with RCSC Specification.
 - b. Tighten bolts to bring the connected plies into firm contact. Tightening shall progress systematically beginning with the most rigid part of the joint. More than 1 cycle through the bolt pattern may be required to achieve this condition.
 - c. Verify adequate tightening of bolts by visual observation to confirm that washers have been installed at locations required in accordance with RCSC Specification, and that the plies of the connected parts have been brought into firm contact.
- I. Fasteners: Stainless steel bolts:
1. Connections shall be snug-tight joints unless otherwise indicated on the Drawings.
 2. Prior to installing nuts, coat threads of stainless steel fasteners with thread coating to prevent galling of threads.
 3. Rotate nuts using a slow, smooth action without interruptions. Avoid over-tightening.

3.03 FIELD QUALITY CONTROL

- A. Provide quality control as specified in Section 01450 - Quality Control.

3.04 FIELD QUALITY ASSURANCE

- A. Provide quality assurance as specified in Section 01450 - Quality Control.
- B. Special inspections, special tests, and structural observation:
 1. Provide as specified in Section 01455A - Special Tests and Inspections.

END OF SECTION

SECTION 05190

MECHANICAL ANCHORING AND FASTENING TO CONCRETE AND MASONRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Cast-in anchors and fasteners:
 - a. Anchor bolts.
 - b. Anchor rods.
 - c. Welded studs.
 - 2. Post-installed steel anchors and fasteners:
 - a. Concrete anchors.
 - b. Undercut concrete anchors.
 - 3. Appurtenances for anchoring and fastening:
 - a. Anchor bolt sleeves.
 - b. Isolating sleeves and washers.
 - c. Thread coating for threaded stainless steel fasteners.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary.
- B. American National Standards Institute (ANSI):
 - 1. B212.15 - Cutting Tools - Carbide-tipped Masonry Drills and Blanks for Carbide-tipped Masonry Drills.
- C. American Welding Society (AWS):
 - 1. D1.1 - Structural Welding Code - Steel.
 - 2. D1.6 - Structural Welding Code - Stainless Steel.
- D. ASTM International (ASTM):
 - 1. A36 - Standard Specification for Carbon Structural Steel.
 - 2. A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. A108 - Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.
 - 4. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 6. A240 - Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 7. A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - 8. A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.

9. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 10. B633 - Standard Specification for *Electrodeposited* Coatings of Zinc on Iron and Steel.
 11. B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 12. E488 - Standard Test Methods for Strength of Anchors in Concrete Elements.
 13. F436 - Standard Specification for Hardened Steel Washers.
 14. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
 15. F594 - Standard Specification for Stainless Steel Nuts.
 16. F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.
 17. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- E. International Code Council Evaluation Service, Inc. (ICC-ES):
1. AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.

1.03 DEFINITIONS

- A. Built-in anchor: Headed bolt or assembly installed in position before filling surrounding masonry units with grout.
- B. Cast-in anchor: Headed bolt or assembly installed in position before placing plastic concrete around.
- C. Overhead installations: Fasteners installed on overhead surfaces where the longitudinal axis of the fastener is more than 60 degrees above a horizontal line so that the fastener resists sustained tension loads.
- D. Passivation: Chemical treatment of stainless steel with a mild oxidant for the purpose of enhancing the spontaneous formation of the steel's protective passive film.
- E. Post-installed anchor: Fastener or assembly installed in hardened concrete or finished masonry construction, typically by drilling into the structure and inserting a steel anchor assembly.
- F. Terms relating to structures or building environments as used with reference to anchors and fasteners:
 1. Wet and moist locations: Describes locations, other than "corrosive locations," that are submerged, are immediately above liquid containment structures, or are subject to frequent wetting, splashing, or wash down. Includes:
 - a. Exterior portions of buildings and structures.
 - b. Liquid-containing structures:
 - 1) Locations at and below the maximum operating liquid surface elevation.
 - 2) Locations above the maximum operating liquid surface elevation and:
 - a) Below the top of the walls containing the liquid.

- b) At the inside faces and underside surfaces of a structure enclosing or spanning over the liquid (including walls, roofs, slabs, beams, or walkways enclosing the open top of the structure).
- c. Liquid handling equipment:
 - 1) Bases of pumps and other equipment that handles liquids.
- d. Indoor locations exposed to moisture, splashing, or routine wash down during normal operations, including floors with slopes toward drains or gutters.
- e. Other locations indicated on the Drawings.
- 2. Other locations:
 - a. Interior dry areas where the surfaces are not exposed to moisture or humidity in excess of typical local environmental conditions.

1.04 SUBMITTALS

- A. General:
 - 1. Submit as specified in Section 01330 - Submittal Procedures.
 - 2. Submit information listed for each type of anchor or fastener to be used.
- B. Action submittals:
 - 1. Product data:
 - a. Cast-in anchors:
 - 1) Manufacturer's data including catalog cuts showing anchor sizes and configuration, materials, and finishes.
 - b. Post-installed anchors:
 - 1) For each anchor type, manufacturer's data including catalog cuts showing anchor sizes and construction, materials and finishes, and load ratings.
 - 2. Samples:
 - a. Samples of each type of anchor, including representative diameters and lengths, if requested by the Engineer.
 - 3. Certificates:
 - a. Cast-in anchors:
 - 1) Mill certificates for steel anchors that will be supplied to the site.
 - b. Post-installed anchors:
 - 1) Manufacturer's statement or certified test reports demonstrating that anchors that will be supplied to the site comply with the materials properties specified.
 - 4. Test reports:
 - a. Post-installed anchors: For each anchor type used for the Work:
 - 1) Current ICC-ES Report (ESR) demonstrating:
 - a) Acceptance of that anchor for use under the building code.
 - b) That testing of the concrete anchor included the simulated seismic tension and shear tests of AC193, and that the anchor is accepted for use in Seismic Design Categories C, D, E, or F and with cracked concrete.
 - 5. Manufacturer's instructions:
 - a. Requirements for storage and handling.
 - b. Recommended installation procedures including details on drilling, hole size (diameter and depth), hole cleaning and preparation procedures, anchor insertion, and anchor tightening.

- c. Requirements for inspection or observation during installation.
- 6. Qualification statements:
 - a. Post-installed anchors: Installer qualifications:
 - 1) Submit list of personnel performing installations and include date of manufacturer's training for each.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Post installed anchors shall be in accordance with building code.
 - 2. Installers: Post-installed mechanical anchors:
 - a. Conduct a training session with the manufacturer's authorized technical representative for the project on-site:
 - 1) Training shall cover the complete installation process for each type of anchor to be used and shall include, but not be limited to, hole drilling procedures and techniques, hole preparation and cleaning, bolt installation, and bolt proof loading and torquing.
 - 2) Use only trained and qualified personnel for anchor installation.
 - b. Installations shall be performed by trained installers having at least 3 years of experience performing similar installations with similar types of anchors.
- B. Special inspection:
 - 1. Provide special inspection of post-installed anchors as specified in Section 01455A - Special Tests and Inspections and this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver post-installed anchors in manufacturer's standard packaging with labels visible and intact. Include manufacturer's installation instructions.
- B. Handle and store anchors and fasteners in accordance with manufacturer's recommendations and as required to prevent damage.
- C. Protect anchors from weather and moisture until installation.

1.07 PROJECT CONDITIONS

- A. As specified in Section 01610 - Project Design Criteria.
- B. Seismic Design Category (SDC) for structures is indicated on the Drawings.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. General:
 - 1. Furnish threaded fasteners with flat washers and hex nuts fabricated from materials corresponding to the material used for threaded portion of the anchor:
 - a. Cast-in anchors: Provide flat washers and nuts as listed in the ASTM standard for the anchor materials specified.

- b. Post-installed anchors: Provide flat washers and nuts supplied for that product by the manufacturer of each anchor.
2. Size of anchors and fasteners, including diameter and length or minimum effective embedment depth: As indicated on the Drawings or as specified in this Section. In the event of conflicts, contact Engineer for clarification.
3. Where anchors and connections are not specifically indicated on the Drawings or specified, their material, size and form shall be equivalent in quality and workmanship to items specified.

B. Materials:

1. Provide and install anchors of materials as in this Section.

2.02 CAST-IN ANCHORS AND FASTENERS

A. Anchor bolts:

1. Description:

- a. Straight steel rod having one end with an integrally forged head, and one threaded end. Embedded into concrete with the headed end cast into concrete at the effective embedment depth indicated on the Drawings or specified, and with the threaded end left to project clear of concrete face as required for the connection to be made.
- b. Furnish anchor bolts with heavy hex forged head or equivalent acceptable to Engineer:
 - 1) Rods or bars with angle bend for embedment in concrete (i.e., "L" or "J" shaped anchor bolts) are not permitted in the Work.

2. Materials:

- a. Ship anchor bolts with properly fitting nuts attached.
- b. Type 316 stainless steel:
 - 1) Surfaces descaled, pickled, and passivated in accordance with ASTM A380.
 - 2) Bolts: ASTM F593, Group 2, Condition CW, coarse threads.
 - 3) Nuts: ASTM F594. Match alloy (group and UNS designation) and threads of bolts.
 - 4) Washers: Type 316 stainless steel.
- c. Type 304 stainless steel:
 - 1) Surfaces descaled, pickled, and passivated in accordance with ASTM A380.
 - 2) Bolts: ASTM F593, Group 1, Condition CW, coarse threads.
 - 3) Nuts: ASTM F594. Match alloy (group and UNS designation) and threads of bolts.
 - 4) Washers: Type 304 stainless steel.

B. Anchor rods:

1. Description: Straight steel rod having threads on each end or continuously threaded from end to end. One threaded end is fitted with nuts or plates and embedded in concrete to the effective depth indicated on the Drawings, leaving the opposite threaded end to project clear of the concrete face as required for the connection to be made at that location.
2. Materials:
 - a. Stainless steel: Type 316:
 - 1) Surfaces descaled, pickled, and passivated in accordance with ASTM A380.

- 2) Rod: ASTM F593, Group 2, Condition CW, coarse threads.
 - 3) Nuts: ASTM F594. Match alloy (group and UNS designation) and threads of rods.
 - 4) Washers: Type 316 stainless steel.
 - 5) Plates (embedded): ASTM A240.
- b. Stainless steel: Type 304:
- 1) Surfaces descaled, pickled, and passivated in accordance with ASTM A380.
 - 2) Rod: ASTM F593, Group 1, Condition CW, coarse threads.
 - 3) Nuts: ASTM F594. Match alloy (group and UNS designation) and threads or rods.
 - 4) Washers: Type 304 stainless steel.
 - 5) Plates (embedded): ASTM A240.

C. Welded studs:

1. Description: Anchor with forged head for embedment into concrete on one end, and welding ferrule for attachment to steel on the other. Welded to steel members or plates to provide anchorage for steel connections to concrete.
2. Acceptance criteria:
 - a. Welded studs in accordance with AWS D1.1, Type B.
3. Manufacturers: One of the following or equal:
 - a. Nelson Stud Welding Co., H4L Concrete Anchors or S3L Shear Connectors as indicated on the Drawings.
 - b. Stud Welding Products, Headed Concrete Anchors (HCA) or Headed Shear Connectors (HSC) as indicated on the Drawings.
4. Materials:
 - a. Stainless steel: Type 316L.

D. Steel plates or shapes for fabrications including assemblies with welded studs or deformed bar anchors:

1. Stainless steel: Type 316L or Type 304L:
 - a. Plates (embedded): ASTM A240.

2.03 POST-INSTALLED ANCHORS AND FASTENERS - ADHESIVE

- A. Epoxy bonding of reinforcing bars, all thread rods, and threaded inserts in concrete: As specified in Section 03055 - Adhesive-Bonded Reinforcing Bars and All Thread Rods in Concrete.

2.04 POST-INSTALLED ANCHORS AND FASTENERS - MECHANICAL

A. General:

1. Post-installed anchors used for the Work shall hold a current ICC Evaluation Service Report demonstrating acceptance for use under the building code. Conditions of use: The acceptance report shall indicate acceptance of the product for use under the following conditions:
 - 1) In regions of concrete where cracking has occurred or may occur.
 - 2) To resist short-term loads due to wind forces.
 - 3) To resist short-term loading due to seismic forces for the Seismic Design Category of the structure where the product will be used.

2. Substitutions: When requesting product substitutions, submit calculations, indicating the diameter, effective embedment depth and spacing of the proposed anchors, and demonstrating that the substituted product will provide load resistance that is equal to or greater than that provided by the anchors listed in this Section:
 - a. Calculations shall be prepared by and shall bear the signature and seal of a Professional Engineer licensed in the State of California.
 - b. Decisions regarding the acceptability of proposed substitutions shall be at the discretion of the Engineer.

B. Concrete anchors:

1. Description. Post-installed anchor assembly consisting of a threaded stud and a surrounding wedge expansion sleeve that is forced outward by torquing the center stud to transfer loads from the stud to the concrete through bearing, friction, or both. (Sometimes referred to as “expansion anchors” or “wedge anchors.”):
 - a. Do not use slug-in, lead cinch, and similar systems relying on deformation of lead alloy or similar materials to develop holding power.
2. Concrete anchors for anchorage to concrete:
 - a. Acceptance criteria:
 - 1) Concrete anchors shall have a current ICC-ES Report demonstrating that the anchors have been tested and qualified for performance in both cracked and un-cracked concrete, and for short-term loading due to wind and seismic forces for Seismic Design Categories A through F in accordance with ACI 355.2 and with ICC-ES AC193 (including all mandatory tests and optional tests for seismic tension and shear in cracked concrete).
 - 2) Concrete anchor performance in the current ICC-ES Report shall be “Category 1” as defined in ACI 355.2.
 - b. Manufacturers: One of the following or equal:
 - 1) Hilti, Kwik Bolt TZ Expansion Anchor.
 - 2) DEWALT/Powers, PowerStud+ SD2.
 - 3) Simpson Strong-Tie, Strong Bolt 2 Wedge Anchor.
 - c. Materials. Integrally threaded stud, wedge, washer, and nut:
 - 1) Stainless steel: Type 316:
 - a) Type 304 stainless steel acceptable for use at wet and moist locations when accepted in writing by the Engineer.
 - 2) Galvanized: Carbon steel, zinc plated in accordance with ASTM B633, minimum 5 microns (Fe/Zn 5).

C. Flush shells:

1. Description: Post-installed anchor assembly consisting of an internally threaded mandrel that is forced into a pre-drilled concrete hole with a setting tool until the top of the anchor is flush with the face of the concrete. Once installed, a removable threaded bolt is installed in the mandrel.
2. Flush shell anchors are not permitted in the Work.

D. Undercut concrete anchors:

1. Description: Post-installed concrete anchor that develops tensile strength from mechanical interlock provided by creation of an undercut “key” at the embedded end of the anchor. The undercut may be achieved with a special drill before anchor installation, or by the anchor itself during installation.

2. Acceptance criteria:
 - a. Acceptance criteria:
 - 1) Undercut concrete anchors shall have a current ICC-ES Report demonstrating that the anchors have been tested and qualified for performance in both cracked and un-cracked concrete, and for short- term loading due to wind and seismic forces for Seismic Design Categories A through F in accordance with ACI 355.2 and ICC ES AC193 (including all mandatory tests and optional tests for seismic tension and shear in cracked concrete).
 - 2) Undercut anchor performance in the current ICC-ES Report shall be "Category 1" as defined in ACI 355.2.
 - b. Use pre-setting units. Through-setting units are not allowed unless prior written acceptance for specific locations is obtained from the Engineer.
3. Manufacturers: One of the following or equal:
 - a. Hilti, HDA (carbon steel) or HDA-R (stainless steel) Undercut Anchor.
 - b. Powers Fasteners, Atomic+ Undercut Anchor.
 - c. Simpson Strong-Tie, Torq-Cut Anchor.
 - d. USP Structural Connectors, DUC-L Undercut Anchors.
4. Materials:
 - a. Stainless steel: Corrosive, wet, and moist and locations: Type 316.

2.05 APPURTENANCES FOR ANCHORING AND FASTENING

- A. Anchor bolt sleeves:
 1. Having inside diameter approximately 2 inches greater than bolt diameter and minimum 10-bolt diameters long.
 2. Plastic sleeves:
 - a. High-density polyethylene, corrugated sleeve, threaded to provide adjustment of location on the anchor bolt.
 - b. Manufacturers: The following or equal:
 - 1) Portland Bolt & Manufacturing Co.
 3. Fabricated steel sleeves:
 - a. Fabricate to the following dimensions unless otherwise indicated on the Drawings:
 - 1) Inside diameter: At least 2 inches greater than bolt diameter.
 - 2) Inside length: Not less than 10 bolt diameters.
 - 3) Bottom plate:
 - a) Square plate with dimensions equal to the outside diameter of the sleeve plus 1/2 inch each side.
 - b) Thickness equal to or greater than one-half of the anchor bolt diameter.
 - b. Carbon steel anchor bolts:
 - 1) Fabricated from ASTM A36 plate and ASTM A53, Grade B pipe.
 - 2) Welded connections: Conform to requirements of AWS D1.1.
 - 3) Hot dip galvanized in accordance with ASTM A153.
 - c. Stainless steel anchor bolts:
 - 1) Fabricated from ASTM A240 plate and pipe. Type 304L or Type 316L to match Type of the anchor bolt.
 - 2) Welded connections: In accordance with AWS D1.6.

- B. Isolating sleeves and washers:
 - 1. Manufacturers: One of the following or equal:
 - a. Central Plastics Co.
 - b. Allied Corrosion Industries.
 - 2. Sleeves: Mylar, 1/32-inch thick, 4,000 volts per mil dielectric strength, of proper size to fit bolts and extending half way into both steel washers.
 - 3. One sleeve required for each bolt.
 - 4. Washers: The inside diameter of all washers shall fit over the isolating sleeve, and both the steel and isolating washers shall have the same inside diameter and outside diameter:
 - a. Proper size to fit bolts.
 - b. Two 1/8 inch thick steel washers for each bolt.
 - c. G3 Phenolic: 2 insulating washers are required for each bolt:
 - 1) Thickness: 1/8 inch.
 - 2) Base material: Glass.
 - 3) Resin: Phenolic.
 - 4) Water absorption: 2 percent.
 - 5) Hardness (Rockwell): 100.
 - 6) Dielectric strength: 450 volts per mil.
 - 7) Compression strength: 50,000 pounds per square inch.
 - 8) Tensile strength: 20,000 pounds per square inch.
 - 9) Maximum operating temperature: 350 degrees Fahrenheit.
- C. Thread coating: For use with threaded stainless steel fasteners:
 - 1. Manufacturers: One of the following or equal:
 - a. Bostik, Never-Seez.
 - b. Oil Research, Inc., WLR No. 111.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine Work in place to verify that it is satisfactory to receive the Work of this Section. If unsatisfactory conditions exist, do not begin this Work until such conditions have been corrected.

3.02 INSTALLATION: GENERAL

- A. Where anchors and fasteners are not specifically indicated on the Drawings or specified, make attachments with materials specified in this Section.
- B. Substitution of anchor types:
 - 1. Post-installed anchors may not be used as an alternative to cast-in/built-in anchors at locations where the latter are indicated on the Drawings.
 - 2. Cast-in/built-in anchors may be used as an alternative to post-installed mechanical anchors at locations where the latter are indicated on the Drawings.
- C. Protect products from damage during installation. Take special care to protect threads and threaded ends.

- D. Accurately locate and position anchors and fasteners:
 - 1. Unless otherwise indicated on the Drawings, install anchors perpendicular to the surfaces from which they project.
 - 2. Install anchors so that at least 2 threads, but not more than 1/2 inch of threaded rod, projects past the top nut.
- E. Interface with other products:
 - 1. Where steel anchors come in contact with dissimilar metals (aluminum, stainless steel, etc.), use stainless steel anchors and separate or isolate dissimilar metals using isolating sleeves and washers.
 - 2. Prior to installing nuts, coat threads of stainless steel fasteners with thread coating to prevent galling of threads.

3.03 INSTALLATION: CAST-IN ANCHORS

- A. General:
 - 1. Accurately locate cast-in and built-in anchors:
 - a. Provide anchor setting templates to locate anchor bolts and anchor rods. Secure templates to formwork.
 - b. Brace or tie off embedments as necessary to prevent displacement during placement of plastic concrete or of surrounding masonry construction.
 - c. Position and tie cast-in and built-in anchors in place before beginning placement of concrete or grout. Do not “stab” anchors into plastic concrete, mortar, or grout.
 - d. Do not allow cast-in anchors to touch reinforcing steel. Where cast-in anchors are within 1/4 inch of reinforcing steel, isolate the metals by wrapping the anchors with a minimum of 4 wraps of 10-mil polyvinyl chloride tape in area adjacent to reinforcing steel.
 - 2. For anchoring at machinery bases subject to vibration, use 2 nuts, with 1 serving as a locknut.
 - 3. Where anchor bolts or anchor rods are indicated on the Drawings as being for future use, thoroughly coat exposed surfaces that project from concrete or masonry with non-oxidizing wax. Turn nuts down full length of the threads, and neatly wrap the exposed thread and nut with a minimum of 4 wraps of 10-mil waterproof polyvinyl tape.
- B. Anchor bolts:
 - 1. Minimum effective embedment: 10-bolt diameters, unless a longer embedment is indicated on the Drawings.
 - 2. Where indicated on the Drawings, set anchor bolts in plastic, galvanized steel or stainless steel sleeves to allow for adjustment. Seal top of sleeve to prevent grout from filling sleeve. Anchor rods.
 - 3. Install as specified for anchor bolts.
- C. Welded studs:
 - 1. Butt weld to steel fabrications with automatic stud welding gun as recommended by the manufacturer.
 - 2. Ensure that butt weld develops full strength of the stud.

3.04 INSTALLATION: POST-INSTALLED ADHESIVE ANCHORS

- A. Epoxy and acrylic adhesive bonding of reinforcing bars, all thread rods, and internally threaded inserts in concrete: As specified in

3.05 INSTALLATION: POST-INSTALLED MECHANICAL ANCHORS

- A. General:
1. Install anchors in accordance with the manufacturer's instructions, ACI 355.2, the anchor's ICC-ES Report. Where conflict exists between the ICC-ES Report and the requirements in this Section, the requirements of the ICC-ES Report shall control.
 2. Where anchor manufacturer recommends the use of special tools and/or specific drill bits for installation, provide and use such tools.
 3. After anchors have been positioned and inserted into concrete or masonry, do not:
 - a. Remove and reuse/reinstall anchors.
 - b. Loosen or remove bolts or studs.
- B. Holes drilled into concrete and masonry:
1. Do not drill holes in concrete or masonry until the material has achieved its minimum specified compression strength (f'_c or f'_m).
 2. Accurately locate holes:
 - a. Before drilling holes, use a reinforcing bar locator to identify the position of all reinforcing steel, conduit, and other embedded items within a 6-inch radius of each proposed hole.
 - b. If the hole depth exceeds the range of detection for the rebar locator, the Engineer may require radiographs of the area designated for investigation before drilling commences.
 3. Exercise care to avoid damaging existing reinforcement and other items embedded in concrete and masonry:
 - a. If embedments are encountered during drilling, immediately stop work and notify the Engineer. Await Engineer's instructions before proceeding.
 4. Unless otherwise indicated on the Drawings, drill holes perpendicular to the concrete surface into which they are placed.
 5. Drill using anchor manufacturer's recommended equipment and procedures:
 - a. Unless otherwise recommended by the manufacturer, drill in accordance with the following:
 - 1) Drilling equipment: Electric or pneumatic rotary type with light or medium impact. Where edge distances are less than 2 inches, use lighter impact equipment to prevent micro-cracking and concrete spalling during drilling process.
 - 2) Drill bits: Carbide-tipped in accordance with ANSI B212-15. Hollow drills with flushing air systems are preferred.
 6. Drill holes at manufacturer's recommended diameter and to depth required to provide the effective embedment indicated.
 7. Clean and prepare holes as recommended by the manufacturer and as required by the ICC-ES Report for that anchor:
 - a. Unless otherwise recommended by anchor manufacturer, remove dust and debris using brushes and clean compressed air.
 - b. Repeat cleaning process as required by the manufacturer's installation instructions.
 - c. When cleaning holes for stainless steel anchors, use only stainless steel or non-metallic brushes.

- C. Insert and tighten (or torque) anchors in full compliance with the manufacturer's installation instructions:
- Once anchor is tightened (torque), do not attempt to loosen or remove its bolt or stud.
- D. Concrete anchors: Minimum effective embedment lengths unless otherwise indicated on the Drawings:

Concrete Anchors			
Nominal Diameter	Minimum Effective Embedment Length		Minimum Member Thickness
	In Concrete	In Grouted Masonry	
3/8 inch	2 1/2 inch	2 5/8 inch	8 inch
1/2 inch	3 1/2 inch	3 1/2 inch	8 inch
5/8 inch	4 1/2 inch	4 1/2 inch	10 inch
3/4 inch	5 inch	5 1/4 inch	12 inch

- E. Flush shell anchors:
- Flush shell anchors are not permitted in the Work.
 - If equipment manufacturer's installation instructions recommend the use of flush shell anchors, contact Engineer for instructions before proceeding.
- F. Undercut concrete anchors:
- Minimum effective embedment lengths unless otherwise indicated on the Drawings:

Undercut Anchors			
Nominal Diameter (bolt)	Minimum Effective Embedment Length		Minimum Member Thickness⁽¹⁾
	In Concrete	In Grouted Masonry	
M10 (3/8 inch)	100 mm (4 inch)	Not accepted	200 mm (8 inch)
M12 (1/2 inch)	125 mm (5 inch)	Not accepted	350 mm (14 inch)
M16 (5/8 inch)	190 mm (7 1/2 inch)	Not accepted	460 mm (18 inch)
M20 (7/8 inch)	250 mm (10 inch)	Not accepted	510 mm (20 inch)

Notes:

(1) Thickness indicated is for pre-set units. If through-set units are accepted, obtain minimum member thickness requirements from the Engineer.

- Installations of undercut anchors shall not be allowed where edge distances are less than 12 times the nominal diameter of the anchor stud.
- Undercut bottom of hole using cutting tools manufactured for this purpose by the manufacturer of the undercut anchors being placed.

3.06 FIELD QUALITY CONTROL

- A. Contractor shall provide quality control over the Work of this Section as specified in Section 01450 - Quality Control:
 - 1. Expenses associated with work described by the following paragraphs shall be paid by the Contractor.

- B. Post-installed anchors:
 - 1. Review anchor manufacturer's installation instructions and requirements of the Evaluation Service Report (hereafter referred to as "installation documents") for each anchor type and material.
 - 2. Observe hole-drilling and cleaning operations for conformance with the installation documents.
 - 3. Certify in writing to the Engineer that the depth and location of anchor holes, and the torque applied for setting the anchors conforms to the requirements of the installation documents.

3.07 FIELD QUALITY ASSURANCE

- A. Owner will provide on-site observation and field quality assurance for the Work of this Section:
 - 1. Expenses associated with work described by the following paragraphs shall be paid by the Owner.

- B. Field inspections and special inspections:
 - 1. Required inspections: Observe construction for conformance to the approved Contract Documents, the accepted submittals, and manufacturer's installation instructions for the products used.
 - 2. Record of inspections:
 - a. Maintain record of each inspection.
 - b. Submit copies to Engineer upon request.
 - 3. Statement of special inspections: At the end of the project, prepare and submit to the Engineer and the authority having jurisdiction inspector's statement that the Work was constructed in general conformance with the approved Contract Documents, and that deficiencies observed during construction were resolved.

- C. Special inspections: Anchors cast into concrete and built into masonry:
 - 1. Provide special inspection during positioning of anchors and placement of concrete or masonry (including mortar and grout) around the following anchors:
 - a. Anchor bolts.
 - b. Anchor rods.
 - c. Welded studs.
 - 2. During placement, provide continuous special inspection at each anchor location to verify that the following elements of the installation conform to the requirements of the Contract Documents:
 - a. Anchor:
 - 1) Type and dimensions.
 - 2) Material: Galvanized steel, Type 304 stainless steel, or Type 316 stainless steel as specified in this Section or indicated on the Drawings.

- 3) Positioning: Spacing, edge distances, effective embedment, and projection beyond the surface of the construction.
 - 4) Reinforcement at anchor: Presence, positioning, and size of additional reinforcement at anchors indicated on the Drawings.
3. Following hardening and curing of the concrete or masonry surrounding the anchors, provide periodic special inspection to observe and confirm the following:
 - a. Base material (concrete or grouted masonry):
 - 1) Solid and dense concrete or grouted masonry material within required distances surrounding anchor.
 - 2) Material encapsulating embedment is dense and well-consolidated.
- D. Special Inspections: Post-installed mechanical anchors placed in hardened concrete and in grouted masonry:
1. Provide special inspection during installation of the following anchors:
 - a. Concrete anchors.
 - b. Undercut concrete anchors.
 2. Unless otherwise noted, provide periodic special inspection during positioning, drilling, placing, and torqueing of anchors:
 - a. Provide continuous special inspection for post-installed anchors in “overhead installations” as defined in this Section.
 3. Requirements for periodic special inspection:
 - a. Verify items listed in the following paragraphs for conformance to the requirements of the Contract Documents and the Evaluation Report for the anchor being used. Observe the initial installation of each type and size of anchor, and subsequent installation of the same anchor at intervals of not more than 4 hours:
 - 1) Any change in the anchors used, in the personnel performing the installation, or in procedures used to install a given type of anchor shall require a new “initial inspection.”
 - b. Substrate: Concrete or masonry surfaces receiving the anchor are sound and of a condition that will develop the anchor’s rated strength.
 - c. Anchor:
 - 1) Manufacturer, type, and dimensions (diameter and length).
 - 2) Material (galvanized, Type 304 stainless steel, or Type 316 stainless steel).
 - d. Hole:
 - 1) Positioning: Spacing and edge distances.
 - 2) Drill bit type and diameter.
 - 3) Diameter, and depth.
 - 4) Hole cleaned in accordance with manufacturer’s required procedures. Confirm multiple repetitions of cleaning when recommended by the manufacturer.
 - 5) Anchor’s minimum effective embedment.
 - 6) Anchor tightening/installation torque.
 4. Requirements for continuous special inspection:
 - a. The special inspector shall observe all aspects of anchor installation, except that holes may be drilled in his/her absence provided that he/she confirms the use of acceptable drill bits before drilling, and later confirms the diameter, depth, and cleaning of drilled holes.

- E. Field tests:
 - 1. Owner may, at any time, request testing to confirm that materials being delivered and installed conform to the requirements of the Specifications:
 - a. If such additional testing shows that the materials do not conform to the specified requirements, the Contractor shall pay the costs of these tests.
 - b. If such additional testing shows that the materials do conform to the specified requirements, the Owner shall pay the costs of these tests.

3.08 NON-CONFORMING WORK

- A. Remove misaligned or non-performing anchors.
- B. Fill empty anchor holes and repair failed anchor locations as specified in Section 03600 - Grouting using high-strength, non-shrink, non-metallic grout.
- C. If more than 10 percent of all tested anchors of a given diameter and type fail to achieve their specified torque or proof load, the Engineer will provide directions for required modifications. Make such modifications, up to and including replacement of all anchors, at no additional cost to the Owner.

3.09 SCHEDULES

- A. Stainless steel. Provide and install stainless steel anchors at the following locations:
 - 1. "Wet and moist locations" as defined in this Section: Type 316 stainless steel.
 - 2. "Other locations:"
 - a. For connecting stainless steel members to concrete: Type 304 stainless steel.
 - b. For connecting aluminum members to concrete.
 - c. For connecting fiber-reinforced plastic (FRP) members to .
 - 3. At locations indicated on the Drawings.

END OF SECTION

SECTION 07900

JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Acrylic-Latex sealant.
 - 2. Precast concrete joint sealant.
 - 3. Silicone sealant.
 - 4. Synthetic rubber sealing compound.
 - 5. Synthetic sponge rubber filler.
 - 6. Related materials.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. M198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
- B. ASTM International (ASTM):
 - 1. C920 - Standard Specification for Elastomeric Joint Sealants.
 - 2. C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 - 3. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
 - 4. C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
 - 5. D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - 6. D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

1.03 SUBMITTALS

- A. Product data.
- B. Samples, include color selections.
- C. Manufacturer's Installation Instructions.
- D. Warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer qualifications: Manufacturer of proposed product for minimum 5 years with satisfactory performance record.

- B. Installer qualifications: Manufacturer approved installer of products similar to specified products on minimum 5 projects of similar scope as Project with satisfactory performance record.

1.05 PROJECT/SITE CONDITIONS

- A. Environmental requirements: Do not apply sealant on wet or frosty surfaces or when surface temperature is higher than 100 degrees Fahrenheit or lower than recommended by the manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products in accordance with manufacturer's recommendations.
- B. Code date packages. Do not use material older than manufacturer's published shelf life. Store materials at temperatures lower than 80 degrees Fahrenheit. Condition materials in accordance with manufacturer's instructions prior to installation.

1.07 SEQUENCING AND SCHEDULING

- A. Caulk joints prior to painting.

1.08 WARRANTY

- A. Warrant to correct defective products for minimum 1 year in accordance with manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 SEALANTS

- A. General:
 1. Provide colors matching materials being sealed.
 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
 3. Nonsagging sealant for vertical and overhead horizontal joints.
 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
 5. Joint cleaner, primer, bond breaker: As recommended by sealant manufacturer.
 6. Sealant backer rod and/or compressible filler made from closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, non-bituminous material recommended by sealant manufacturer to:
 - a. Control joint depth.
 - b. Break bond of sealant at bottom of joint.
 - c. Provide proper shape of sealant bead.
 - d. Serve as expansion joint filler.

2.02 ACRYLIC-LATEX SEALANT

- A. Permanently flexible, nonstaining, and nonbleeding latex modified acrylic sealant compound, colors as selected by Engineer from manufacturer's standard options:
 - 1. Manufacturers: One of the following or equal:
 - a. Tremco, Tremflex 834.
 - b. Pecora Corp., Number AC-20.
 - c. Sonneborn, Sonolac.

2.03 PRECAST CONCRETE JOINT SEALANT

- A. Preformed, cold-applied, ready-to-use, flexible joint sealant in accordance with ASTM C990 and AASHTO M 198:
 - 1. Manufacturers: One of the following or equal:
 - a. Henry Corp., Ram-Nek.
 - b. Concrete Sealants Division, ConSeal.

2.04 SILICONE SEALANT

- A. ASTM C920, Type S, Grade NS, Class 25, single component silicone sealant:
 - 1. Manufacturers: One of the following or equal:
 - a. Tremco, Proglaze.
 - b. Pecora Corp., Number 864.
 - c. Dow Corning, Number 795.
 - d. General Electric, Number 1200 Series.

2.05 SYNTHETIC RUBBER SEALING COMPOUND

- A. Manufacturer: One of the following or equal:
 - 1. Sika Corporation, Sikaflex 2c NS or SL.
 - 2. Pacific Polymers, Elastothane 227R.
- B. Material: In accordance with ASTM C920 Type M, Grade P (pourable), Class 25 and Type M, Grade NS (non-sag), Class 25; multi-part polyurethane; able to cure at room temperature to firm, highly resilient polymer; able to perform satisfactory when continuously submerged in water or sewage and exposed to direct sunlight in dry condition; with the following properties determined at 75 degrees Fahrenheit and 50 percent relative humidity:
 - 1. Base: Polyurethane rubber.
 - 2. Application time: Minimum 2 hours.
 - 3. Cure time: Maximum 3 days.
 - 4. Tack free time: Maximum 24 hours.
 - 5. Ultimate hardness: Non-sag 25, Pourable/SL 40, within 5 Shore A.
 - 6. Tensile strength: Non-sag 95 pounds per square inch minimum and self-leveling minimum 170 pounds per square inch when tested in accordance with ASTM D412.
 - 7. Ultimate elongation: Minimum 340 percent when tested in accordance with ASTM D412.
 - 8. Tear resistance: Non-sag 45 pounds per inch minimum and self-leveling minimum 85 pounds per inch when tested in accordance with ASTM D624, Die C.
 - 9. Service temperature range: Minus 25 degrees to 158 degrees Fahrenheit.

- C. Color: Gray to match concrete, unless indicated on the Drawings.

2.06 SYNTHETIC SPONGE RUBBER FILLER

- A. Closed-cell expanded sponge rubber manufactured from synthetic polymer neoprene base, or resilient polyethylene foam backer rod. In accordance with ASTM C1330, Type C:
 - 1. Manufacturers: The following or equal:
 - a. Presstite, No. 750.3 Ropax Rod Stock.
- B. Characteristics:
 - 1. Suitable for application intended.
 - 2. Strength: As necessary for supporting sealing compound during application.
 - 3. Resiliency: Resistance to environmental conditions of installation.
 - 4. Bonding: No bonding to the sealing compound.
 - 5. Structure: Cellular, prevents absorption of water.
 - 6. Compatibility with other materials in joint and acceptance by manufacturer of sealing compound.
 - 7. Size: Minimum 25 percent greater than nominal joint width.

2.07 RELATED MATERIALS

- A. Primer: Nonstaining type, recommended by sealant manufacturer to suit application.
- B. Joint cleaner: Noncorrosive, nonstaining, compatible with joint forming materials and as recommended by sealant manufacturer.
- C. Bond breaker tape: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify acceptability of joint dimensions, physical, and environmental conditions.
- B. Verify that surfaces are dry, clean, and free of dirt, grease, curing compound, and other residue which might interfere with adhesion of sealants.

3.02 PREPARATION

- A. Allow concrete to cure thoroughly before caulking.
- B. Synthetic sponge rubber filler:
 - 1. Prepare surfaces designated to receive filler in accordance with manufacturer's installation instructions.
 - 2. Do not stretch filler beyond its normal length during installation.

- C. Caulking:
 1. Verify that surfaces are dry, clean, and free of dirt, grease, curing compounds, and other residue that might interfere with adhesion of sealant.
 2. Concrete, masonry, wood, and steel surfaces: Clean and prime in accordance with manufacturer's instructions prior to caulking.
- D. Synthetic rubber sealing compound:
 1. Ensure surfaces to which synthetic rubber must bond are dry and free of dust, dirt, and other foreign residue.
 2. Heavy sandblasted caulking groove to sound surface, and prime with manufacturer's recommended primer for particular surface.
- E. For sidewalks, pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to depth equal to 75 percent of joint width, but neither more than 5/8 inches deep nor less than 3/8 inches deep.
- F. For normal moving building joints sealed with elastomeric sealants not subject to traffic, fill joints to depth equal to 50 percent of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.
- G. For joints sealed with acrylic-latex sealants, fill joints to depth in range of 75 percent to 125 percent of joint width.
- H. Use joint filler to achieve required joint depths, to allow sealants to perform properly.
- I. Prepare surfaces and install synthetic sponge rubber filler in accordance with manufacturer's recommendations.
- J. Do not stretch filler beyond normal length during installation.
- K. Apply bond breaker when recommended by joint sealer manufacturer.

3.03 INSTALLATION

- A. Synthetic sponge rubber filler: Install filler in accordance with manufacturer's installation instructions.
- B. Caulking, joints, and sealing:
 1. Construct expansion, contraction, and construction joints as indicated on the Drawings.
 2. Install pipe and conduit in structures as indicated on the Drawings.
 3. Caulk doors, windows, louvers, and other items installed in or over concrete openings inside and out.
 4. Use synthetic rubber sealing compound for caulking where indicated on the Drawings or as specified, except for masonry construction and where specified otherwise.
 5. Complete caulking prior to painting.
 6. Verify that concrete is thoroughly cured prior to caulking.
 7. When filler compressible material is used, use untreated type.
 8. Apply caulking with pneumatic caulking gun.
 9. Use nozzles of proper shape and size for application intended.

10. Maintain continuous bond between caulking and sides of joint to eliminate gaps, bubbles, or voids and fill joint in continuous operation without layering of compound.
11. Employ experienced applicators to caulk joints and seams in neat workmanlike manner.
12. To hasten curing of compound when used on wide joints subject to movement, apply heat with infrared lamps or other convenient means.
13. Apply synthetic rubber sealing compound with pneumatic caulking tool or other acceptable method.

3.04 CLEANING

- A. Clean surfaces adjacent to sealant as work progresses.
- B. Remove excess uncured sealant by soaking and scrubbing with sealant cleaning solvent.
- C. Remove excess cured sealant by sanding with Number 80 grit sandpaper.
- D. Leave finished work in neat, clean condition.

3.05 SCHEDULE

- A. Acrylic latex:
 1. Use where indicated on the Drawings.
 2. Interior joints with movement less than 7.5 percent and not subject to wet conditions.
- B. Silicone:
 1. Use where indicated on the Drawings.
 2. Joints and recesses formed where window, door, louver and vent frames, and sill adjoin masonry, concrete, stucco, or metal surfaces.
 3. Door threshold bedding.
 4. Moist or wet locations, including joints around plumbing fixtures.
 5. Stainless steel doors and frames, including joints between applied stops and frames, and around anchor bolts.
 6. Plenum joints.
- C. Synthetic rubber sealing compound, non-sag Type II:
 1. Use where indicated on the Drawings.
 2. Water-bearing and earth-bearing concrete structures.
 3. Joints in masonry, concrete vertical surfaces, and metal-faced panels in vertical surfaces.
 4. Joints between sheet metal flashing and trim.
 5. Joints between sheet metal flashing and trim, and vertical wall surfaces.
 6. Small voids between materials requiring filling for weathertight performance in vertical surfaces.
 7. Perimeters of frames of doors, windows, louvers, and other openings where bonding is critical to airtight performance.
 8. Expansion and control joints in masonry vertical surfaces.
- D. Synthetic rubber sealing compound, self-leveling Type I:
 1. Use where indicated on the Drawings.

2. Expansion and control joints in masonry, concrete horizontal surfaces, and metal panels in horizontal surfaces.
3. Small voids between materials requiring filling for weathertight performance in horizontal surfaces.
4. Pavement joints.
5. Perimeters of frames of doors, windows, louvers, and other openings in horizontal surfaces where bonding is critical to airtight performance.

3.06 FIELD QUALITY CONTROL

A. Adhesion testing:

1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
 - a. Water bearing structures: 1 test per every 1,000 linear feet of joint sealed.
 - b. Exterior precast concrete wall panels: 1 test per every 2,000 linear feet of joint sealed.
 - c. Chemical containment areas: 1 test per every 1,000 linear feet of joint sealed.
 - d. Building expansion joints: 1 test per every 500 linear feet of joint sealed.
 - e. All other type of joints except butt glazing joints: 1 test per every 3,000 linear feet of joint sealed.
 - f. Manufacturer's authorized factory representative provide written recommendations for remedial measures on failing tests.

END OF SECTION

SECTION 08320
FLOOR ACCESS DOORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Non-fire-rated floor access doors.

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. Standard Specifications for Highway Bridges.
- B. Occupational Safety and Health Administration (OSHA):
 - 1. 29 CFR 1910 - Occupational Safety and Health Standards.

1.03 SUBMITTALS

- A. Product data.
- B. Shop drawings: Show the following:
 - 1. Floor access door installation recommendations.
 - 2. Locations of floor access doors.
 - 3. Door size and configuration.
 - 4. Live load capacity.
 - 5. Materials of construction and finishes provided.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Identify type and size of each floor access door in way not to damage finish prior to delivery.
- B. Deliver products only after proper facilities are available.
- C. Deliver and store packaged products in original containers with seals unbroken and labels intact until time of use.
- D. Handle carefully to prevent damage and store on clean concrete surface or raised platform in safe, dry area:
 - 1. Do not dump onto ground.
- E. Protect floor access doors during shipment and storage to prevent warping, bending, and corrosion.

1.05 WARRANTY

- A. Provide manufacturer's warranty against defects in material and workmanship for a period of 5 years.

1.06 MAINTENANCE

- A. Deliver 2 keys for each cylinder lock to Owner.

PART 2 PRODUCTS

2.01 HEAVY-DUTY OFF-STREET FLOOR ACCESS DOORS

- A. Manufacturers: One of the following or equal:
 - 1. The Bilco Co., Model JH-20 or JDH-20 (double leaf).
 - 2. Babcock Davis Associates, Inc., Model BFDDH-SAL or BFDDH-DAL (double leaf).
- B. Style: Single leaf or double leaf as indicated on the Drawings, aluminum, capable of withstanding minimum Standard Specifications for Highway Bridges, H-20 wheel load with a maximum deflection of 1/150 of the span, live load channel frame, with drainage couplings.
- C. Door leaf: Minimum 1/4 inch, diamond-pattern plate reinforced with stiffeners as required to meet specified live load.
- D. Frame: 1/4 inch channel with anchor flange around perimeter.
- E. Hardware:
 - 1. Hinges: Each leaf equipped with a minimum of 2 heavy forged-brass hinges with stainless steel pins.
 - 2. Lock: Snap lock with removable handle mounted on door leaf.
 - 3. Grip handle: Provide vinyl grip handle designed to release cover for closing.
 - 4. Operating mechanism: Spring operators designed for ease of operation and automatic hold-open arm with release handle.
 - 5. Drainage assembly: Provide 1-1/2 inch drainage coupling located in corner of the channel frame.

2.02 FINISHES

- A. Floor access door finishes:
 - 1. Aluminum: Manufacturer's standard mill finish.
 - 2. Aluminum in contact with dissimilar metals and concrete: Manufacturer's standard bituminous coating.
 - 3. Steel: Manufacturer's standard red oxide primer. Provide field top coat - coordinate finish color with Owner and submit paint sample for approval.
- B. Hardware finishes:
 - 1. Provide optional Type 316 stainless steel hardware throughout, including parts of the latch and lifting mechanism assemblies, hold-open arms, and all brackets, hinges, pins, and fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive floor access door and verify correctness of dimensions and other supporting or adjoining conditions.

3.02 PREPARATION

- A. Coordinate details with other work supporting, adjoining, or requiring floor access doors.
- B. Verify dimensions and profiles for each opening.
- C. Verify that location will serve portion of work to which access is required:
 - 1. Where proposed functional location conflicts with other work, notify the Engineer before installation.
- D. Apply coating to aluminum surfaces that will be in contact with dissimilar metals or concrete when there is none.

3.03 INSTALLATION

- A. Install floor access doors in accordance with manufacturer's instructions.
- B. Ensure correct types and adequate sizes at proper locations.
- C. Securely attach frames to supporting work and ensure doors, frames, and hardware operate smoothly and are free from warp, twist, and distortion.

3.04 ADJUSTING

- A. Adjust doors, frames, and hardware to operate smoothly, freely, and properly without binding.

3.05 CLEANING

- A. Thoroughly clean surfaces of grease, oil, or other impurities; touch up abraded prime coat where applicable.

END OF SECTION

SECTION 09960

HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Field-applied coatings.
- B. Related sections:
 - 1. Section 01140 - Work Restrictions.
 - 2. Section 01312 - Project Meetings.
 - 3. Section 01330 - Submittal Procedures.
 - 4. Section 01601 - Product Requirements.
 - 5. Section 01770 - Closeout Procedures.
 - 6. Section 15076 - Pipe Identification.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 - 2. D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- B. International Concrete Repair Institute (ICRI):
 - 1. Guideline 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
- C. NACE International (NACE):
 - 1. SP0178 - Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service.
 - 2. SP0188 - Discontinuity (Holiday) Testing of Protective Coatings.
- D. National Association of Pipe Fabricators (NAPF):
 - 1. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.
- E. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.
- F. Society for Protective Coatings (SSPC):
 - 1. SP COM - Surface Preparation Commentary for Steel and Concrete Substrates.
 - 2. SP 1 - Solvent Cleaning.
 - 3. SP 2 - Hand Tool Cleaning.
 - 4. SP 3 - Power Tool Cleaning.
 - 5. SP 5 - White Metal Blast Cleaning.
 - 6. SP 6 - Commercial Blast Cleaning.
 - 7. SP 7 - Brush-Off Blast Cleaning.

8. SP 10 - Near-White Blast Cleaning.
 9. SP 13 - Surface Preparation of Concrete.
- G. United States Environmental Protection Agency (EPA):
1. Method 24 - Surface Coatings.

1.03 DEFINITIONS

- A. Submerged metal: Steel or iron surfaces below tops of channel or structure walls that will contain water even when above expected water level.
- B. Submerged concrete and masonry surfaces: Surfaces that are or will be:
1. Underwater.
 2. In structures that normally contain water.
 3. Below tops of walls of water-containing structures.
- C. Exposed surface: Any metal or concrete surface, indoors or outdoors, that is exposed to view.
- D. Dry film thickness (DFT): Thickness of fully cured coating, measured in mils.
- E. Volatile organic compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon, as determined by EPA Method 24.
- F. Ferrous: Cast iron, ductile iron, wrought iron, and all steel alloys except stainless steel.
- G. Where SSPC surface preparation standards are specified or implied for ductile iron pipe or fittings, the equivalent NAPF surface preparation standard shall be substituted for the SSPC standard.

1.04 PERFORMANCE REQUIREMENTS

- A. Coating materials shall be especially adapted for use in water and recycled water facilities.
- B. Coating materials used in contact with potable water supply systems shall be certified to NSF 61.

1.05 SUBMITTALS

- A. General: Submit as specified in Section 01330.
- B. Shop drawings:
1. Schedule of proposed coating materials.
 2. Schedule of surfaces to be coated with each coating material.
- C. Product data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips:
1. Regulatory requirements: Submit data concerning the following:
 - a. VOC limitations.

- b. Coatings containing lead compounds and polychlorinated biphenyls.
 - c. Abrasives and abrasive blast cleaning techniques, and disposal.
 - d. NSF certification of coatings for use in potable water supply systems.
- D. Samples: Include 8-inch square drawdowns or brush-outs of topcoat finish when requested. Identify each sample as to finish, formula, color name and number, sheen name, and gloss units.
- E. Certificates: Submit in accordance with requirements for Product Data.
- F. Manufacturer's instructions: Include the following:
 - 1. Special requirements for transportation and storage.
 - 2. Mixing instructions.
 - 3. Shelf life.
 - 4. Pot life of material.
 - 5. Precautions for applications free of defects.
 - 6. Surface preparation.
 - 7. Method of application.
 - 8. Recommended number of coats.
 - 9. Recommended DFT of each coat.
 - 10. Recommended total DFT.
 - 11. Drying time of each coat, including prime coat.
 - 12. Required prime coat.
 - 13. Compatible and non-compatible prime coats.
 - 14. Recommended thinners, when recommended.
 - 15. Limits of ambient conditions during and after application.
 - 16. Time allowed between coats (minimum and maximum).
 - 17. Required protection from sun, wind, and other conditions.
 - 18. Touch-up requirements and limitations.
 - 19. Minimum adhesion of each system submitted in accordance with ASTM D4541.
- G. Manufacturer's Representative's Field Reports.
- H. Operations and Maintenance Data: Submit as specified in Section 01770.
 - 1. Reports on visits to project site to view and approve surface preparation of structures to be coated.
 - 2. Reports on visits to project site to observe and approve coating application procedures.
 - 3. Reports on visits to coating plants to observe and approve surface preparation and coating application on items that are "shop coated."
- I. Quality Assurance Submittals:
 - 1. Quality assurance plan.
 - 2. Qualifications of coating applicator including List of Similar Projects.
- J. Certifications:
 - 1. Submit notarized certificate that:
 - a. All paints and coatings to be used on this project comply with current federal, state, and local VOC regulations.

2. California certifications:
 - a. All paints and coatings to be used on this project comply with the current VOC regulations of the State of California Air Management District in which the coatings will be used.

1.06 QUALITY ASSURANCE

- A. Applicator qualifications:
 1. Minimum of 5 years of experience applying specified type or types of coatings under conditions similar to those of the Work:
 - a. Provide qualifications of applicator and references listing 5 similar projects completed in the past 2 years.
 2. Manufacturer-approved applicator when manufacturer has approved applicator program.
- B. Regulatory requirements: Comply with governing agencies regulations by using coatings that do not exceed permissible VOC limits and do not contain lead:
 1. Do not use coal-tar epoxy in contact with drinking water or exposed to ultraviolet radiation.
- C. Field samples:
 1. Prepare and coat a minimum 100-square-foot area between corners or limits such as control or construction joints of each system.
 2. Approved field sample may be part of the Work.
 3. Obtain approval before painting other surfaces.
- D. Pre-installation conference: Conduct as specified in Section 01312.
- E. Compatibility of coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.
- F. Services of coating manufacturer's representative: Arrange for coating manufacturer's representative to attend pre-installation conferences. Make periodic visits to the project site to provide consultation and inspection services during surface preparation and application of coatings, and to make visits to coating plants to observe and approve surface preparation procedures and coating application of items to be "shop-primed and coated."

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products as specified in Section 01601.
- B. Remove unspecified and unapproved paints from Project site immediately.
- C. Deliver new unopened containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.
 1. Do not deliver materials aged more than 12 months from manufacturing date.
- D. Store coatings in well-ventilated facility that provides protection from the sun weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.

- E. Take precautions to prevent fire and spontaneous combustion.

1.08 PROJECT CONDITIONS

- A. Surface moisture contents: Do not coat surfaces that exceed manufacturer-specified moisture contents, or when not specified by the manufacturer, with the following moisture contents:
 - 1. Concrete: 12 percent.
 - 2. Concrete floors: 7 percent.
- B. Do not apply coatings:
 - 1. Under dusty conditions or adverse environmental conditions, unless tenting, covers, or other such protection is provided for structures to be coated.
 - 2. When light on surfaces measures less than 15 foot-candles.
 - 3. When ambient or surface temperature is less than 55 degrees Fahrenheit unless manufacturer allows a lower temperature.
 - 4. When relative humidity is higher than 85 percent.
 - 5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
 - 6. When surface temperature exceeds the manufacturer's recommendation.
 - 7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
 - 8. Apply clear finishes at minimum 65 degrees Fahrenheit.
- C. Provide fans, heating devices, dehumidifiers, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
- D. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 55 degrees Fahrenheit for 24 hours before, during, and 48 hours after application of finishes.

1.09 SEQUENCING AND SCHEDULING

- A. Sequence and Schedule: As specified in Section 01140.

1.10 MAINTENANCE

- A. Extra materials: Deliver as specified in Section 01770. Include minimum 1 gallon of each type and color of coating applied:
 - 1. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory.
 - 2. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type, and color.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Special coatings: One of the following or equal:
 - 1. Carboline: Carboline, St. Louis, MO.

2. Ceilcote: International Protective Coatings, Berea, OH.
3. Dampney: The Dampney Company, Everett, MA.
4. Devoe: International Protective Coatings, Louisville, KY.
5. Dudick: Dudick, Inc., Streetsboro, OH.
6. GET: Global Eco Technologies, Pittsburg, CA.
7. Henkel: Henkel North America, Madison Heights, MI.
8. IET: Integrated Environmental Technologies, Santa Barbara, CA.
9. PPC: Polymorphic Polymers Corp., North Miami, FL.
10. PPG Amercoat: PPG Protective & Marine Coatings, Brea, CA.
11. Rustoleum: Rustoleum Corp., Sommerset, NJ.
12. Sanchem: Sanchem, Chicago, IL.
13. Superior: Superior Environmental Products, Inc., Addison, TX.
14. S-W: Sherwin-Williams Co., Cleveland, OH.
15. Tnemec: Tnemec Co., Kansas City, MO.
16. Wasser: Wasser High Tech Coatings, Kent, WA.
17. ZRC: ZRC Worldwide Innovative Zinc Technologies, Marshfield, MA.

2.02 PREPARATION AND PRETREATMENT MATERIALS

- A. Metal pretreatment: As manufactured by one of the following or equal:
 1. Henkel: Galvaprep 5.
 2. International: AWLGrip Alumiprep 33.
- B. Surface cleaner and degreaser: As manufactured by one of the following or equal:
 1. Carboline Surface Cleaner No. 3.
 2. Devoe: Devprep 88.
 3. S-W: Clean and Etch.

2.03 COATING MATERIALS

- A. Alkali-resistant bitumastic: As manufactured by one of the following or equal:
 1. Carboline: Bitumastic No. 50.
 2. S-W: Targuard.
 3. Wasser: MC-Tar.
- B. High solids epoxy (self-priming) not less than 72 percent solids by volume: As manufactured by one of the following or equal:
 1. Carboline: Carboguard 891.
 2. Devoe: Bar Rust 233H.
 3. PPG Amercoat: Amerlock 2.
 4. S-W: Macropoxy 646.
- C. Aliphatic or aliphatic-acrylic polyurethane: As manufactured by one of the following or equal:
 1. Carboline: Carbothane 134 VOC.
 2. Devoe: Devthane 379.
 3. PPG Amercoat: Amershield VOC.
 4. Non-submerged: S-W High Solids Polyurethane **[CA]**.
 5. Tnemec: Endura-Shield II Series 1075 (U).
- D. Protective coal tar: As manufactured by one of the following or equal:
 1. Carboline: Bitumastic No. 50.
 2. PPG Amercoat: 78HB

- E. Concrete floor coatings: As manufactured by one of the following or equal:
 - 1. Carboline: Semstone 140SL.
 - 2. Devoe: Devran 124.
 - 3. Dudick: Polymer Alloy 1000.
 - 4. Tnemec: Tneme-Glaze Series 282.
- F. Galvanizing zinc compound: As manufactured by one of the following or equal:
 - 1. ZRC: Cold Galvanizing Compound.

2.04 MIXES

- A. Mix in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 GENERAL PROTECTION

- A. Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection.
- B. Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings:
 - 1. Mask off surfaces of items not to be coated or remove items from area.
- C. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being coated and, in particular, surfaces within storage and preparation areas.
- D. Place cotton waste, cloths, and material that may constitute a fire hazard in closed metal containers and remove daily from site.
- E. Remove electrical plates, surface hardware, fittings, and fastenings prior to application of coating operations. Carefully store, clean, and replace on completion of coating in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

3.02 GENERAL PREPARATION

- A. Prepare surfaces in accordance with coating manufacturer's instructions, unless more stringent requirements are specified in this Section.
- B. Protect the following surfaces from abrasive blasting by masking or other means:
 - 1. Threaded portions of valve and gate stems, grease fittings, and identification plates.
 - 2. Machined surfaces for sliding contact.
 - 3. Surfaces to be assembled against gaskets.
 - 4. Surfaces of shafting on which sprockets are to fit.
 - 5. Surfaces of shafting on which bearings are to fit.
 - 6. Machined surfaces of bronze trim, including slide gates.
 - 7. Cadmium-plated items except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
 - 8. Galvanized items, unless scheduled to be coated.

- C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.
- D. Concrete:
 - 1. Allow new concrete to cure for minimum of 28 days before coating.
 - 2. Clean concrete surfaces of dust, mortar, fins, loose concrete particles, form release materials, oil, and grease. Fill voids so that surface is smooth. Prepare concrete surface for coating in accordance with SSPC SP 13. Provide ICRI 310.2 CSP-3 surface profile, or as recommended by coating manufacturer. All concrete surfaces shall be vacuumed clean prior to coating application.
- E. Ferrous metal surfaces:
 - 1. Remove grease and oil in accordance with SSPC SP 1.
 - 2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with appropriate SSPC standard as specified.
 - 3. Abrasive blast surfaces prior to coating.
 - a. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
 - b. When metal surfaces are exposed because of coating damage, abrasive blast surfaces and feather in to a smooth transition before touching up.
 - c. Ferrous metal surfaces not to be submerged: Abrasive blast in accordance with SSPC SP 10, unless blasting may damage adjacent surfaces, prohibited, or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP 3.
 - d. Ferrous metal surfaces to be submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP 5 to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.
 - 4. All abrasive blast cleaned surfaces shall be blown down with clean dry air and/or vacuumed.
- F. Ductile iron pipe and fittings to be lined or coated: Prepare in accordance with the manufacturer's recommendation.
- G. Sherardized, aluminum, copper, and bronze surfaces: Prepare in accordance with coating manufacturer's instructions.
- H. Galvanized surface:
 - 1. Degrease or solvent clean (SSPC SP 1) to remove oily residue.
 - 2. Power tool or hand tool clean or whip abrasive blast.
 - 3. Test surface for contaminants using copper sulfate solution.
 - 4. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.
- I. Shop-primed metal:
 - 1. Certify that primers applied to metal surfaces in the shop are compatible with coatings to be applied over such primers in the field.
 - 2. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP 10, unless greater degree of surface preparation is required by coating manufacturer's representative.

3. Correct abraded, scratched, or otherwise damaged areas of prime coat by sanding or abrasive blasting to bare metal in accordance with SSPC SP 2, SP 3, or SP 6, as directed by the Engineer. When entire shop priming fails or has weathered excessively (more than 25 percent of the item), or when recommended by coating manufacturer's representative, abrasive blast shop prime coat to remove entire coat and prepare surface in accordance with SSPC SP 10.
 4. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP 10.
 5. When prime coat not authorized by Engineer is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP 10.
 6. Shop applied bituminous paint or asphalt varnish: Abrasive blast clean shop applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.
- J. Cadmium-plated, zinc-plated, or sherardized fasteners:
1. Abrasive blast in the same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting.
- K. Abrasive blast components that are to be attached to surfaces that cannot be abrasive blasted before components are attached.
- L. Grind sharp edges to approximately 1/16-inch radius before abrasive blast cleaning.
- M. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning in accordance with NACE SP0178.
- N. Cleaning of previously coated surfaces:
1. Utilize cleaning agent to remove soluble salts such as chlorides and sulfates from concrete and metal surfaces:
 - a. Cleaning agent: Biodegradable non-flammable and containing no VOC.
 - b. Manufacturer: The following or equal:
 - 1) CHLOR*RID International, Inc.
 2. Cleaning of surfaces utilizing the decontamination cleaning agent may be accomplished in conjunction with abrasive blast cleaning, steam cleaning, high-pressure washing, or hand washing as approved by the coating manufacturer's representative and the Engineer.
 3. Test cleaned surfaces in accordance with the cleaning agent manufacturer's instructions to ensure all soluble salts have been removed. Additional cleaning shall be carried out as necessary.
 4. Final surface preparation prior to application of new coating system shall be made in strict accordance with coating manufacturer's printed instructions.

3.03 MECHANICAL AND ELECTRICAL EQUIPMENT PREPARATION

- A. Remove grilles, covers, and access panels for mechanical and electrical system from location and coat separately.
- B. Prepare and finish coat primed equipment with color selected by the Engineer.
- C. Prepare and prime and coat insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars, and supports, except where items are covered with prefinished coating.

- D. Replace identification markings on mechanical or electrical equipment when coated over or spattered.
- E. Prepare and coat interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with 1 coat of flat black paint, to limit of sight line.
- F. Prepare and coat dampers exposed immediately behind louvers, grilles, and convector and baseboard heating cabinets to match face panels.
- G. Prepare and coat exposed conduit and electrical equipment occurring in finished areas with color and texture to match adjacent surfaces.
- H. Prepare and coat both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
- I. Color code equipment, piping, conduit, and exposed ductwork and apply color banding and identification, such as flow arrows, naming, and numbering, in accordance with the Contract Documents.

3.04 GENERAL APPLICATION REQUIREMENTS

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Coat metal unless specified otherwise:
 - 1. Aboveground piping to be coated shall be empty of contents during application of coatings.
- C. Verify metal surface preparation immediately before applying coating in accordance with SSPC SP COM.
- D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.
- E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturer's recommended special primer.
- F. Prime shop-primed metal surfaces. Spot prime exposed metal of shop-primed surfaces before applying primer over entire surface.
- G. Multiple coats:
 - 1. Apply minimum number of specified coats.
 - 2. Apply additional coats when necessary to achieve specified thicknesses.
 - 3. Apply coats to thicknesses specified, especially at edges and corners.
 - 4. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.
 - 5. Lightly sand and dust surfaces to receive high-gloss finishes, unless instructed otherwise by coating manufacturer.
 - 6. Dust coatings between coats.
- H. Coat surfaces without drops, overspray, dry spray, runs, ridges, waves, holidays, laps, or brush marks.

- I. Remove spatter and droppings after completion of coating.
- J. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.
- K. Plural component application: Drums shall be premixed each day. All gauges shall be in working order prior to the start of application. Ratio checks shall be completed prior to each application. A spray sample shall be sprayed on plastic sheeting to ensure set time is complete prior to each application. Hardness testing shall be performed after each application.
- L. Spray application:
 - 1. Stripe coat edges, welds, nuts, bolts, and difficult-to-reach areas by brush before beginning spray application, as necessary, to ensure specified coating thickness along edges.
 - 2. When using spray application, apply coating to thickness not greater than that recommended in coating manufacturer's instructions for spray application.
 - 3. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.
 - 4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist, fumes, or overspray.
- M. Drying and recoating:
 - 1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
 - 2. For submerged service, the Contractor shall provide a letter to the Engineer that the lining system is fully cured and ready to be placed into service.
 - 3. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
 - 4. Do not allow excessive drying time or exposure, which may impair bond between coats.
 - 5. Recoat epoxies within time limits recommended by coating manufacturer.
 - 6. When time limits are exceeded, abrasive blast clean and de-gloss clean prior to applying another coat.
 - 7. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces that cannot be abrasive blasted, coat components before attachment.
 - 8. Ensure primer and intermediate coats of coating are unscarred and completely integral at time of application of each succeeding coat.
 - 9. Touch-up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
 - 10. Leave no holidays.
 - 11. Sand and feather in to a smooth transition and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to the naked eye.
- N. Concrete:
 - 1. Apply first coat (primer) only when surface temperature of concrete is decreasing in order to eliminate effects of off-gassing on coating.

3.05 ALKALI-RESISTANT BITUMASTIC

- A. Preparation:
 - 1. Prepare surfaces in accordance with general preparation requirements.
- B. Application:
 - 1. Apply in accordance with general application requirements and as follows:
 - a. Apply at least 2 coats, 8 to 14 mils DFT each.

3.06 HIGH SOLIDS EPOXY SYSTEM

- A. Preparation:
 - 1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP 5 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP 10.
 - b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP 10, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP 6.
 - c. Abrasive blast clean ductile iron surfaces at jobsite in accordance with SSPC SP 7.
- B. Application:
 - 1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 2-coat system with minimum total DFT of 12 mils.
 - b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.
 - c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish, and to prevent damage to other surfaces.
 - d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.
 - e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

3.07 HIGH SOLIDS EPOXY AND POLYURETHANE COATING SYSTEM

- A. Preparation:
 - 1. Prepare surfaces in accordance with general preparation requirements and as follows:
 - a. Prepare concrete surfaces in accordance with general preparation requirements.
 - b. Touch up shop-primed steel and miscellaneous iron.
 - c. Abrasive blast ferrous metal surfaces at jobsite prior to coating. Abrasive blast clean rust and discoloration from surfaces.
 - d. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.
 - e. Abrasive blast clean ductile iron surfaces.

- B. Application:
 - 1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply a 3-coat system consisting of:
 - 1) Primer: 4 to 5 mils DFT high solids epoxy.
 - 2) Intermediate coat: 4 to 5 mils DFT high solids epoxy.
 - 3) Topcoat: 2.5 to 3.5 mils DFT aliphatic or aliphatic-acrylic polyurethane topcoat.
 - 2. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.

3.08 ASPHALT VARNISH

- A. Preparation:
 - 1. Prepare surfaces in accordance with general preparation requirements.
- B. Application:
 - 1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 2 coats.

3.09 PROTECTIVE COAL TAR

- A. Preparation:
 - 1. Prepare surfaces in accordance with general preparation of coal-tar requirements.
- B. Application:
 - 1. Apply coatings in accordance with general application requirements and as follows:
 - a. Apply minimum 20 mils DFT coating.

3.10 CONCRETE FLOOR COATINGS

- A. Preparation:
 - 1. Prepare surfaces in accordance with general application requirements and in strict accordance with coating manufacturer's instructions.
- B. If concrete floors are not constructed with a non-skid surface, install a non-skid surface, applied in strict accordance with coating manufacturer's instructions. A rough broom finish will be considered non-skid.

3.11 FIELD QUALITY CONTROL

- A. Each coat will be inspected. Strip and remove defective coats, prepare surfaces, and recoat. When approved, apply next coat.
- B. Control and check DFT and integrity of coatings.
- C. Measure DFT with calibrated thickness gauge.

- D. DFT on ferrous-based substrates may be checked with Elcometer Type 1 Magnetic Pull-Off Gauge or PosiTector® 6000.
- E. Verify coat integrity with low-voltage sponge or high-voltage spark holiday detector, in accordance with NACE SP0188. Allow Engineer to use detector for additional checking.
- F. Arrange for services of coating manufacturer's field representative to provide periodic field consultation and inspection services to ensure proper surface preparation of facilities and items to be coated, and to ensure proper application and curing:
 - 1. Notify Engineer 24 hours in advance of each visit by coating manufacturer's representative.
 - 2. Provide Engineer with a written report by coating manufacturer's representative within 48 hours following each visit.

3.12 SCHEDULE OF ITEMS NOT REQUIRING COATING

- A. General: Unless specified otherwise, the following items do not require coating:
 - 1. Items that have received final coat at factory and are not listed to receive coating in field.
 - 2. Aluminum, brass, bronze, copper, plastic (except PVC pipe), rubber, stainless steel, chrome, Everdur, or lead.
 - 3. Buried or encased piping or conduit.
 - 4. Exterior concrete.
 - 5. Galvanized steel wall framing, galvanized electrical conduits, galvanized pipe trays, galvanized cable trays, and other galvanized items:
 - a. Areas on galvanized items or parts where galvanizing has been damaged during handling or construction shall be repaired as follows:
 - 1) Clean damaged areas by SSPC SP 1, SP 2, SP 3, or SP 7 as required.
 - 2) Apply 2 coats of a galvanizing zinc compound in strict accordance with manufacturer's instructions.
 - b. If coating of galvanized steel has been specified, prepare surface prior to coating by removing all oils and waxes from post-galvanizing treatment.
 - 6. Grease fittings.
 - 7. Steel to be encased in concrete or masonry.

3.13 SCHEDULE OF SURFACES TO BE COATED IN THE FIELD

- A. In general, apply coatings to steel, iron, galvanized surfaces, and wood surfaces unless specified or otherwise indicated on the Drawings.
- B. Coat unlisted surfaces with same coating system as similar listed surfaces.
- C. Coat concrete surfaces and anodized aluminum only when specified or indicated on the Drawings.
- D. Coat unlisted surfaces with same coating system as similar listed surfaces.
- E. Color coat all exposed piping as specified in Section 15076.
- F. Color coat all exposed valves with color to match pipe.

- G. Concrete:
 - 1. Concrete floors without a non-skid surface.

- H. Metals:
 - 1. Alkali-resistant bitumastic:
 - a. Aluminum surfaces to be placed in contact with wood, concrete, or masonry.
 - 2. High solids epoxy and polyurethane system: exterior non immersed ferrous metal surfaces including:
 - a. Pipe, valves, pipe hangers, supports and saddles, conduit, cable tray hangers, and supports.
 - b. Motors and motor accessory equipment.
 - c. Drive gear, drive housing, coupling housings, and miscellaneous gear drive equipment.
 - d. Valve and gate operators and stands.
 - e. Structural steel including galvanized structural steel.
 - f. Mechanical equipment supports, drive units, and accessories.
 - g. Other miscellaneous metals.
 - 3. High solids epoxy system:
 - a. Field priming of ferrous metal surfaces with defective shop-prime coat where no other prime coat is specified; for non-submerged service.
 - b. Bell rings, underside of manhole covers and frames.
 - c. Sump pumps and grit pumps, including underside of base plates and submerged suction and discharge piping.
 - d. Exterior of submerged piping and valves other than stainless steel or PVC piping.
 - e. Submerged pipe supports and hangers.
 - f. Stem guides.
 - g. Other submerged iron and steel metal unless specified otherwise.
 - h. Interior surface of suction inlet and volute of submersible influent pumps. Apply coating prior to pump testing.
 - i. Submerged piping.
 - j. Exterior of influent pumps and influent pump submerged discharge piping.
 - 4. Asphalt varnish:
 - a. Underground valve boxes.
 - 5. Protective coal tar:
 - a. Underground pipe flanges, excluding pipe, corrugated metal pipe couplings, flexible pipe couplings and all other underground metals not otherwise specified to receive another protective coating.

END OF SECTION

SECTION 15050

COMMON WORK RESULTS FOR MECHANICAL EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Basic design and performance requirements for building mechanical equipment and process mechanical equipment.

1.02 REFERENCES

- A. American Gear Manufacturer's Association (AGMA) Standards:
 - 1. 6001-E08 - Design and Selection of Components for Enclosed Gear Drives.
- B. American Bearing Manufacturers Association (ABMA) Standards:
 - 1. 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - 2. 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. American Petroleum Institute (API):
 - 1. 682 - Shaft Sealing Systems for Centrifugal and Rotary Pumps.
- D. ASTM International (ASTM):
 - 1. A36 - Standard Specification for Carbon Structural Steel.
 - 2. A48 - Standard Specification for Gray Iron Castings.
 - 3. A125 - Standard Specification for Steel Springs, Helical, Heat-Treated.
 - 4. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 5. A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 6. A320 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
 - 7. A536 - Standard Specification for Ductile Iron Castings.
 - 8. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 9. B61 - Standard Specification for Steam or Valve Bronze Castings.
 - 10. B62 - Standard specification for Composition Bronze or Ounce Metal Castings.
 - 11. B505 - Standard Specification for Copper Alloy Continuous Castings.
 - 12. B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
 - 13. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - 14. F594 - Standard Specification for Stainless Steel Nuts.
- E. Hydraulic Institute (HI).
- F. Occupational Safety and Health Administration (OSHA).
- G. Unified Numbering System (UNS).

1.03 DEFINITIONS

- A. Resonant frequency: That frequency at which a small driving force produces an ever-larger vibration if no dampening exists.
- B. Rotational frequency: The revolutions per unit of time usually expressed as revolutions per minute.
- C. Critical frequency: Same as resonant frequency for the rotating elements or the installed machine and base.
- D. Peak vibration velocity: The root mean square average of the peak velocity of the vibrational movement times the square root of 2 in inches per second.
- E. Rotational speed: Same as rotational frequency.
- F. Maximum excitation frequency: The excitation frequency with the highest vibration velocity of several excitation frequencies that are a function of the design of a particular machine.
- G. Critical speed: Same as critical frequency.
- H. Free field noise level: Noise measured without any reflective surfaces (an idealized situation); sound pressure levels at 3 feet from the source unless specified otherwise.
- I. Operating weight: The weight of unit plus weight of fluids or solids normally contained in unit during operation.

1.04 DESIGN REQUIREMENTS

- A. General:
 - 1. Product requirements as specified in Section 01601 - Product Requirements.
 - 2. Project conditions as specified in Section 01610 - Project Design Criteria.
 - 3. Provisions specified under each technical equipment specification prevail over and supersede conflicting provisions specified in this Section.
 - 4. Equipment manufacturer's responsibility extends to selection and mounting of gear drive units, motors or other prime movers, accessories, and auxiliaries required for proper operation.
 - 5. Vibration considerations:
 - a. Resonant frequency:
 - 1) For single-speed equipment, ensure there are no natural resonant frequencies within 25 percent above or below the operating rotational frequencies or multiples of the operating rotational frequencies that may be excited by the equipment design.
 - 2) For variable-speed equipment, ensure there are no natural resonant frequencies within 25 percent above or below the range of operating frequencies.
 - 6. Equipment units weighing 50 pounds or more: Provide with lifting lugs or eyes to allow removal with hoist or other lifting device.

- B. Equipment mounting and anchoring:
 - 1. Mount equipment on cast-iron or welded-steel bases with structural steel support frames:
 - a. Utilize continuous welds to seal seams and contact edges between steel members.
 - b. Grind welds smooth.
 - 2. Provide bases and supports with machined support pads, dowels for alignment of mating of adjacent items, adequate openings to facilitate grouting, and openings for electrical conduits.
 - 3. Provide jacking screws in bases and supports for equipment weighing over 1,000 pounds.
 - 4. Design equipment anchorage, supports, and connections for dead load, running loads, loads during start-up, seismic load specified in Section 01612 - Seismic Design Criteria, and other loads as required for proper operation of equipment:
 - a. For equipment with an operating weight of 400 pounds or greater and all equipment that is supported higher than 4 feet above the floor, provide calculations for:
 - 1) The operating weight and location of the centroid of mass for the equipment.
 - 2) Forces and overturning moments.
 - 3) Shear and tension forces in equipment anchorages, supports, and connections.
 - 4) The design of equipment anchorage, supports, and connections based on calculated shear and tension forces.
 - 5. Anchorage of equipment to concrete or masonry:
 - a. Perform calculations and determine number, size, type, strength, and location of anchor bolts or other connections.
 - b. Unless otherwise indicated on the Drawings, select and provide anchors from the types specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.
 - c. Provide bolt sleeves around cast-in anchor bolts for 400 pounds or greater equipment:
 - 1) Adjust bolts to final location and secure the sleeve.
 - 6. Anchorage of equipment to metal supports:
 - a. Perform calculations and determine number, size, type, strength, and location of bolts used to connect equipment to metal supports.
 - 7. Unless otherwise indicated on the Drawings, install equipment supported on concrete over non-shrink grout pads as specified in this Section.

1.05 SUBMITTALS

- A. As specified in Section 01601 - Product Requirements.
- B. Product data:
 - 1. For each item of equipment:
 - a. Design features.
 - b. Load capacities.
 - c. Efficiency ratings.
 - d. Material designations by UNS alloy number or ASTM Specification and Grade.
 - e. Data needed to verify compliance with the Specifications.

- f. Catalog data.
 - g. Nameplate data.
 - h. Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.
2. Gear reduction units:
 - a. Engineering information in accordance with applicable AGMA standards.
 - b. Gear mesh frequencies.
- C. Shop drawings:
1. Drawings for equipment:
 - a. Drawings that include cut-away drawings, parts lists, material specification lists, and other information required to substantiate that proposed equipment complies with specified requirements.
 2. Outline drawings showing equipment, driver, driven equipment, pumps, seal, motor(s) or other specified drivers, variable frequency drive, shafting, U-joints, couplings, drive arrangement, gears, base plate or support dimensions, anchor bolt sizes and locations, bearings, and other furnished components.
 3. Installation instructions including leveling and alignment tolerances, grouting, lubrication requirements, and initial Installation Testing procedures.
 4. Wiring, control schematics, control logic diagrams and ladder logic or similar for computer-based controls.
 5. Recommended or normal operating parameters such as temperatures and pressures.
 6. Alarm and shutdown setpoints for all controls furnished.
- D. Calculations:
1. Structural:
 - a. Substantiate equipment base plates, supports, bolts, anchor bolts, and other connections meet minimum design requirements specified and seismic design criteria as specified in Section 01612 - Seismic Design Criteria.
 2. Mechanical:
 - a. ABMA 9 or ABMA 11 L10 life for bearings calculation methods for drivers, pumps, gears, shafts, motors, and other driveline components with bearings.
 - b. Substantiate that operating rotational frequencies meet the requirements of this Section.
 - c. Torsional analysis of power transmission systems: When torsional analysis specified in the equipment sections, provide:
 - 1) Sketch of system components identifying physical characteristics including mass, diameter, thickness, and stiffness.
 - 2) Results of analysis including first and second critical frequencies of system components and complete system.
 - d. Calculations shall be signed and stamped by a licensed engineer.
 3. Drinking water:
 - a. If applicable, conform to the requirements of Section 01601 - Product Requirements for materials in contact with drinking water.

- E. Operation and maintenance manuals:
 - 1. As specified in Section 01782 - Operating and Maintenance Data.
 - 2. Equipment with bearings:
 - a. Include manufacturer and model number of every bearing.
- F. Project closeout documents: As specified in Section 01770 - Closeout Procedures.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials as specified in Section 01601 - Product Requirements including special requirements for materials in contact with drinking water.
- B. Ferrous materials:
 - 1. Steel for members used in fabrication of assemblies: ASTM A36.
 - 2. Iron castings: ASTM A48, tough, close-grained gray iron, free from blowholes, flaws, and other imperfections.
 - 3. Ductile iron castings: ASTM A536, Grade 65-45-12, free from flaws and imperfections.
 - 4. Galvanized steel sheet: ASTM A653, minimum 0.0635-inch (16-gauge).
 - 5. Expanded metal: ASTM A36, 13-gauge, 1/2-inch flat pattern expanded metal.
 - 6. Stainless steel:
 - a. As specified in Section 05120 - Structural Steel.
 - b. In contact or within 36 inches of water: Type 316 or 316L.
 - c. In sea air environment: Type 316 or 316L.
 - d. Other locations: Type 304 or 304L.
 - e. Source cleaning and passivation as specified in Section 05120 - Structural Steel.
- C. Non-ferrous materials:
 - 1. Bronze in contact with drinking water: Composition of not more than 2 percent aluminum nor more than 6 percent zinc; UNS Alloy C92200 in accordance with ASTM B61, B62, B505, or B584, when not specified otherwise.
 - 2. Bronze in contact with wastewater: Composition of not more than 2 percent aluminum nor more than 6 percent zinc; UNS Alloy C83600, C92200, or C93700 in accordance with ASTM B61, B62, B505, or B584, when not specified otherwise.
- D. Dielectric materials for separation of dissimilar metals:
 - 1. Neoprene, bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other materials as specified.
- E. Non-shrink grout and epoxy non-shrink grout: As specified in Section 03600 - Grouting.

2.02 ANCHORS AND FASTENERS

- A. Mechanical anchoring to concrete and masonry:
 - 1. As specified in Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry:
 - a. Type 316 stainless steel.

2. Design as specified in Section 01612 - Seismic Design Criteria.
- B. High-strength fasteners:
1. As specified in Section 05120 - Structural Steel.
- C. Flange bolts:
1. As specified in Section 15052 - Common Work Results for General Piping.
- D. Mechanical assembly fasteners:
1. Stainless steel:
 - a. High-temperature service or high-pressure service:
 - 1) Bolts: ASTM A193, Grade B8M (Type 316), Class 1, heavy hex.
 - 2) Nuts: ASTM A194, Grade 8, heavy hex.
 - 3) Washers: Alloy group matching bolts and nuts.
 - b. Low-temperature service:
 - 1) Bolts: ASTM A320, Grade B8M (Type 316), Class 1, heavy hex.
 - 2) Nuts: ASTM A194, Grade B8M (Type 316), heavy hex.
 - 3) Washers: Alloy group matching bolts and nuts.
 - c. General service:
 - 1) Bolts: ASTM F593, Alloy Group 2 (Type 316).
 - 2) Nuts: ASTM F594, Alloy Group 2 (Type 316).
 - 3) Washers: Alloy group matching bolts and nuts.

2.03 EQUIPMENT SUPPORT FRAMES

- A. Bolt holes shall not exceed bolt diameter by more than 25 percent, up to a limiting maximum diameter oversize of 1/4-inch.

2.04 PIPING AND VALVES

- A. Piping as specified in Section 15052 - Common Work Results for General Piping.
- B. Valves as specified in Section 15110 - Common Work Results for Valves.

2.05 SAFETY EQUIPMENT

- A. Safety guards:
1. Provide guards that protect personnel from rotating shafts or components within 7.5 feet of floors or operating platforms.
 2. Requirements:
 - a. Allow visual inspection of moving parts without removal.
 - b. Allow access to lubrication fittings.
 - c. Prevent entrance of rain or dripping water for outdoor locations.
 - d. Size belt and sheave guards to allow for installation of sheaves 15 percent larger and addition of 1 belt.
 3. Materials:
 - a. Sheet metal: Carbon steel, 12-gauge minimum thickness, hot-dip galvanized after fabrication.
 - b. Fasteners: Type 304 stainless steel.

- B. Insulation:
 - 1. Insulate all surfaces with normal operating temperatures above 120 degrees Fahrenheit when surface is within 7.5 feet height from any operating floor or level.
 - 2. Insulation thickness such that temperature is below 120 degrees Fahrenheit.
 - 3. Insulation Type 3 and cover Type 5.
- C. Warning signs:
 - 1. Provide warning signs in accordance with OSHA requirements for equipment that starts automatically or remotely.
 - 2. Mount warning signs with stainless steel fasteners at equipment.

2.06 NAMEPLATES

- A. Fastened to equipment at factory in an accessible and visible location.
- B. Stainless steel sheet engraved or stamped with text, holes drilled or punched for fasteners.
- C. Fasteners: Number 4 or larger oval head stainless steel screws or drive pins.
- D. Text:
 - 1. Manufacturer's name, equipment model number and serial number, motor horsepower when appropriate, and identification tag number.
 - 2. Indicate the following additional information as applicable:
 - a. Maximum and normal rotating speed.
 - b. Service class per applicable standards.
 - 3. Include for pumps:
 - a. Rated total dynamic head in feet of fluid.
 - b. Rated flow in gallons per minute.
 - c. Impeller, gear, screw, diaphragm, or piston size.
 - 4. Include for gear reduction units:
 - a. AGMA class of service.
 - b. Service factor.
 - c. Input and output speeds.

2.07 SHOP FINISHES

- A. Provide appropriate factory coatings as specified in Section 09960 - High-Performance Coatings:
 - 1. Motors and gear reducers: Shop finish paint with manufacturer's standard coating, unless otherwise specified in the individual equipment specification.

2.08 SPECIAL TOOLS

- A. Supply 1 set of special tools as specified in Section 01601 - Product Requirements.

2.09 SHIPPING

- A. As specified in Section 01601 - Product Requirements.

- B. Prior to shipment of equipment:
 - 1. Bearings (and similar items):
 - a. Pack separately or provide other protection during transport.
 - b. Greased and lubricated.
 - 2. Gear boxes:
 - a. Oil filled or sprayed with rust preventive protective coating.
 - 3. Fasteners:
 - a. Inspect for proper torques and tightness.

PART 3 EXECUTION

3.01 DELIVERY, HANDLING, STORAGE, AND PROTECTION

- A. As specified in Section 01601 - Product Requirements.
- B. Inspect fasteners for proper torques and tightness.
- C. Storage:
 - 1. Bearings:
 - a. Rotate units at least once per month or more often as recommended by the manufacturer to protect rotating elements and bearings.
 - 2. Gear boxes:
 - a. Inspect to verify integrity of protection from rust.
- D. Protection:
 - 1. Equipment Log shall include description of rotation performed as part of maintenance activities.

3.02 INSTALLATION

- A. Field measurements:
 - 1. Prior to shop drawings preparation, take measurements and verify dimensions indicated on the Drawings.
 - 2. Ensure equipment and ancillary appurtenances fit within available space.
- B. Sequencing and scheduling:
 - 1. Equipment anchoring: Obtain anchoring material and templates or setting drawings from equipment manufacturers in adequate time for anchors to be cast-in-place.
 - 2. Coordinate details of equipment with other related parts of the Work, including verification that structures, piping, wiring, and equipment components are compatible.
- C. Metal work embedded in concrete:
 - 1. Accurately place and hold in correct position while concrete is being placed.
 - 2. Clean surface of metal in contact with concrete immediately before concrete is placed.
- D. Concrete surfaces designated to receive non-shrink grout:
 - 1. Heavy sandblast concrete surface in contact with non-shrink grout.

2. Clean concrete surfaces of sandblasting sand, grease, oil, dirt, and other foreign material that may reduce bond to non-shrink grout.
 3. Saturate concrete with water. Concrete shall be saturated surface damp at time non-shrink grout is placed.
- E. Install equipment in accordance with manufacturer's installation instructions and recommendations.
- F. Lubrication lines and fittings:
1. Support and protect lines from source to point of use.
 2. Fittings:
 - a. Bring fittings to outside of equipment in manner such that they are readily accessible from outside without necessity of removing covers, plates, housings, or guards.
 - b. Mount fittings together wherever possible using factory-mounted multiple fitting assemblies securely mounted, parallel with equipment lines, and protected from damage.
 - c. Fittings for underwater bearings: Bring fittings above water surface and mount on edge of structure above.
- G. Grouting under equipment bases, baseplates, soleplates, and skids:
1. Unless otherwise indicated on the Drawings, grout with non-shrink grout as specified in Section 03600 - Grouting:
 - a. Non-shrink epoxy grout required only when indicated on the Drawings.
 2. Comply with equipment manufacturer's installation instructions for grouting spaces, and tolerances for level and vertical and horizontal alignment.
 3. Install grout only after:
 - a. Equipment is leveled and in proper alignment.
 - b. Piping connections are complete and in alignment with no strain transmitted to equipment.
 4. Do not use leveling nuts on equipment anchors for supporting and leveling equipment bases, baseplates, soleplates, and skids for grouting.
 5. Use jack screws for supporting and leveling equipment bases, baseplates, soleplates, and skids for grouting following the procedure defined below:
 - a. Drill and tap equipment base plates, sole plates, and skids for jack screws.
 - b. Use suitable number and size of jack screws.
 - c. End of jack screws shall bear on circular steel plates epoxy bonded to equipment foundation.
 - d. Jack screw threads that will be in contact with grout: Wrap with multiple layers of tape or other material, acceptable to Engineer, to prevent grout from bonding to threads.
 - e. Place and cure grout as specified in Section 03600 - Grouting.
 - f. After grout is cured, remove jack screws and material used to prevent bonding to grout:
 - 1) Provide jack screws to Owner for future use.
 - g. Tighten equipment anchors in accordance with equipment manufacturer requirements.
 - h. Fill holes where jack screws have been removed with grout.
 - i. Cure as specified in Section 03600 - Grouting.

6. For equipment bases, baseplates, soleplates, and skids where it is not practical to use jack screws, use steel wedges and shims:
 - a. Wrap wedges and shims that contact grout with multiple layers of tape or other material, acceptable to Engineer, to prevent grout from bonding.
 - b. Place and cure grout as specified in Section 03600 - Grouting.
 - c. Remove wedges or shims.
 - d. Tighten equipment anchors to in accordance with equipment manufacturer requirements.
 - e. Fill voids where wedges and shims have been removed with grout.
 - f. Cure as specified in Section 03600 - Grouting.
7. Preparation of equipment bases, baseplates, soleplates, and skids for grouting:
 - a. Metal in contact with grout: Grit blast to white metal finish.
 - b. Clean surfaces of equipment bases, baseplates, soleplates, and skids in contact with grout of dirt, dust, oil, grease, paint, and other material that will reduce bond.
8. Preparation of concrete equipment foundation for grouting:
 - a. Rough concrete surfaces in contact with grout.
 - b. Concrete contact surface shall be free of dirt, dust, laitance, particles, loose concrete, or other material or coatings that will reduce bond.
 - c. Saturate concrete contact surface area with water for minimum of 24 hours prior to grouting.
 - d. Remove standing water just prior to grout placement, using clean rags or oil-free compressed air.
9. Forms and header boxes:
 - a. Build forms for grouting of material with adequate strength to withstand placement of grouts.
 - b. Use forms that are rigid and liquid tight. Caulk cracks and joints with an elastomeric sealant.
 - c. Line forms with polyethylene film for easy grout release. Forms carefully waxed with 2 coats of heavy-duty paste wax will also be acceptable.
10. Grout placement requirements:
 - a. Minimum ambient and substrate temperature: 45 degrees Fahrenheit and rising:
 - 1) Conform to grout manufacturer's temperature requirements.
 - b. Pour grout using header box.
 - c. Keep level of grout in header box above bottom of equipment bases, baseplates, soleplates, and skids at all times to prevent air entrapment.
 - d. Grout shall flow continuously from header box to other side of forms without trapping air or forming voids.
 - e. Vibrate, rod, or chain grout to facilitate grout flow, consolidate grout, and remove entrapped air.
 - f. After grout sets, remove forms and trim grout at 45-degree angle from bottom edge of equipment bases, baseplates, soleplates, and skids.
 - g. Cure as specified in Section 03600 - Grouting.

H. Field welding:

1. Use welding procedures, welders, and welding operators qualified and certified in accordance with AWS D1.1.
2. Shielded arc welding.

- I. Field finishes:
 - 1. Protect motors.
 - 2. Clean equipment.
 - 3. Apply primer and coating systems as specified in Section 09960 - High- Performance Coatings requirements.

- J. Special techniques:
 - 1. Use applicable special tools and equipment, including precision machinist levels, dial indicators, and gauges as required in equipment installations.

- K. Tolerances:
 - 1. Completed equipment installations: Comply with requirements for intended use and specified vibration and noise tolerances.

- L. Warning signs:
 - 1. Mount securely with stainless fasteners at equipment that can be started automatically or from remote locations.

END OF SECTION

SECTION 15052

COMMON WORK RESULTS FOR GENERAL PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Basic materials and methods for metallic and plastic piping systems.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.
 - 2. B16.47 - Large Diameter Steel Flanges: NPS 26 Through NPS 60 Metric/Inch Standard.
- B. American Water Work Association (AWWA):
 - 1. C207 - Standard for Steel Pipe Flanges for Waterworks Services-Size 4 In. Through 144 In.
- C. ASTM International (ASTM):
 - 1. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 2. A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 3. A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 4. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 5. F37 - Standard Test Methods for Sealability of Gasket Materials.
 - 6. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements of Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- D. California Health and Safety Code.
- E. NSF International (NSF).

1.03 DEFINITIONS

- A. Buried pipes: Pipes that are buried in the soil with or without a concrete pipe encasement.
- B. Exposed pipe: Pipes that are located above ground, or located inside a structure, supported by a structure, or cast into a concrete structure.
- C. Underground pipes: Buried pipes - see A. above.

- D. Underwater pipes: Pipes below the top of walls in basins or tanks containing water.
- E. Wet wall: A wall with water on at least 1 side.

PART 2 PRODUCTS

2.01 GENERAL

- A. Materials as specified in Section 01601 - Product Requirements including special requirements for materials in contact with drinking water.

2.02 ESCUTCHEONS

- A. Material: Chrome-plated steel plate.
- B. Manufacturers: One of the following or equal:
 - 1. Dearborn Brass Co., Model Number 5358.
 - 2. Keeney Manufacturing Co., Model Number 102 or Number 105.

2.03 LINK TYPE SEALS

- A. Characteristics:
 - 1. Modular mechanical type, consisting of interlocking neoprene or synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
 - 2. Links to form a continuous rubber belt around the pipe.
 - 3. Provide a nylon polymer pressure plate with Type 316 stainless steel hardware. Isolate pressure plate from contact with wall sleeve.
 - 4. Hardware to be Type 316 stainless steel:
 - a. Provide anti-galling lubricant for threads.
- B. One of the following or equal:
 - 1. Link-Seal.
 - 2. Pipe Linx.

2.04 BOLTS AND NUTS

- A. General:
 - 1. Washer:
 - a. Provide a washer for each nut.
 - b. Washer shall be of the same material as the nut.
 - 2. Nuts: Heavy hex-head.
 - 3. Cut and finish flange bolts to project a maximum of 1/4-inch beyond outside face of nut after assembly.
 - 4. Tap holes for cap screws or stud bolts when used.
 - 5. Lubricant for stainless steel bolts and nuts:
 - a. Chloride-free.
 - b. Manufacturers: One of the following or equal:
 - 1) Huskey FG-1800 Anti-Seize.
 - 2) Weicon Anti-Seize High-Tech.

- B. For ductile iron pipe:
 - 1. On exposed pipes:
 - a. Bolts: ASTM A193, Grade B7 with the same coating as exposed ductile iron pipe.
 - b. Nuts: ASTM A194, Grade 2H.
 - c. Bolts and nuts: Hot-dip galvanized in accordance with ASTM F2329.
 - 2. On underwater pipes and pipes adjacent to wet walls:
 - a. Bolts: ASTM A193, Grade B7 with a petroleum wax tape coating.
 - b. Nuts: ASTM A194, Grade 2H. with a petroleum wax tape coating.
 - 3. On buried pipes:
 - a. Bolts: ASTM A193, Grade B7 with a petroleum wax tape coating.
 - b. Nuts: ASTM A194, Grade 2h for nuts with a petroleum wax tape coating.
- C. Plastic pipe:
 - 1. On exposed pipes:
 - a. Bolts: ASTM A307, Grade B.
 - b. Nuts: ASTM A563, Grade A.
 - c. Bolts and Nuts: Hot-dip galvanized in accordance with ASTM F2329.
 - 2. On underwater pipes and pipes adjacent to wet walls:
 - a. Bolts: ASTM A193, Grade B8M.
 - b. Nuts: ASTM A194, Grade 8M.

2.05 GASKETS

- A. General.
 - 1. Gaskets shall be suitable for the specific fluids, pressure, and temperature conditions.
- B. Gaskets for ductile iron piping:
 - 1. Suitable for pressures equal to and less than 350 pounds per square inch gauge, temperatures equal to and less than 100 degrees Fahrenheit, and raw sewage service.
 - 2. Gasket material:
 - a. Styrene Butadiene (SBR) rated to not less than the pressure rating of the pipeline pressure rating.
 - b. Reinforcement: Cloth or synthetic fiber.
 - c. Thickness: Minimum 3/32-inch thick for less than 10-inch pipe; minimum 1/8-inch thick for 10-inch and larger pipe.
 - 3. Manufacturers: One of the following or equal:
 - a. Pipe less than 48 inches in diameter:
 - 1) Toruseal Flange Gaskets.
 - 2) Or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Piping drawings:
 - a. Except in details, piping is indicated diagrammatically. Not every offset and fitting, or structural difficulty that may be encountered has been

- indicated on the Drawings. Sizes and locations are indicated on the Drawings.
- b. Perform minor modifications to piping alignment where necessary to avoid structural, mechanical, or other type of obstructions that cannot be removed or changed:
 - 1) Modifications are intended to be of minor scope, not involving a change to the design concept or a change to the Contract Price or Contract Times.
2. Piping alternatives:
 - a. Provide piping as specified in this Section, unless indicated on the Drawings or specified otherwise.
 - b. Alternative pipe ratings:
 - 1) Piping with greater pressure rating than specified may be substituted in lieu of specified piping without changes to the Contract Price.
 - 2) Piping of different material may not be substituted in lieu of specified piping.
 - c. Valves in piping sections: Capable of withstanding specified test pressures for piping sections and fabricated with ends to fit piping.
 - d. Grooved joints: Use couplings, flange adapters, and fittings of the same manufacturer:
 - 1) Manufacturer's factory trained representative:
 - a) Provide on-site training for Contractor's field personnel.
 - b) Periodically visit the jobsite to verify Contractor is following best recommended practices.
 - 2) Distributor's representative is not considered qualified to conduct the training or jobsite visits.
 - e. Flanged joints: where 1 of the joining flanges is raised face type, provide a matching raised face type flange for the other joining flange.
 3. Unless otherwise indicated on the Drawings, piping at pipe joints, fittings, couplings, and equipment shall be installed without rotation, angular deflection, vertical offset, or horizontal offset.
- B. Wall and slab penetrations:
1. Provide flexibility in piping connecting to structures to accommodate movement due to soil settlement and earthquakes. Provide flexibility using details indicated on the Drawings.
- C. Exposed piping:
1. Install exposed piping in straight runs parallel to the axes of structures, unless otherwise indicated on the Drawings:
 - a. Install piping runs plumb and level, unless otherwise indicated on the Drawings:
 - 1) Slope plumbing drain piping with a minimum of 1/4-inch per foot downward in the direction of flow.
 2. Install exposed piping after installing equipment and after piping and fitting locations have been determined.
 3. Support piping: As specified in Sections 15061 - Pipe Supports:
 - a. Do not transfer pipe loads and strain to equipment.
 4. In addition to the joints indicated on the Drawings, provide unions, flexible couplings, flanged joints, flanged coupling adapters, and other types of joints or means which are compatible with and suitable for the piping system, and necessary to allow ready assembly and disassembly of the piping.

5. Assemble piping without distortion or stresses caused by misalignment:
 - a. Match and properly orient flanges, unions, flexible couplings, and other connections.
 - b. Do not subject piping to bending or other undue stresses when fitting piping.
 - c. Do not correct defective orientation or alignment by distorting flanged joints or subjecting flange bolts to bending or other undue stresses.
 - d. Flange bolts, union halves, flexible connectors, and other connection elements shall slip freely into place.
 - e. Alter piping assembly to fit, when proper fit is not obtained.
 - f. Install eccentric reducers or increasers with the top horizontal for pump suction piping.

- D. Buried piping:
 1. Bury piping with minimum 4-foot cover without air traps, unless otherwise indicated on the Drawings.
 2. Where 2 similar services run parallel to each other, piping for such services may be laid in the same trench:
 - a. Lay piping with sufficient room for assembly and disassembly of joints, for thrust blocks, for other structures, and to meet separation requirements of public health authorities having jurisdiction.
 3. Laying piping:
 - a. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.
 - b. Place piping with top or bottom markings with markings in proper position.
 - c. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.
 - d. Where joints require external grouting, banding, or pointing, provide space under and immediately in front of the bell end of each section laid with sufficient shape and size for grouting, banding, or pointing of joints.
 - e. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris or animals.

- E. Venting piping under pressure:
 1. Lay piping under pressure flat or at a continuous slope without air traps, unless otherwise indicated on the Drawings.
 2. Install plug valves as air bleeder cocks at high points in piping:
 - a. Provide 1-inch plug valves for water lines, and 2-inch plug valves for sewage and sludge lines, unless otherwise indicated on the Drawings.
 3. Provide additional pipe taps with plug cocks and riser pipes along piping as required for venting during initial filling, disinfecting, and sampling.
 4. Before piping is placed into service, close plug valves and install plugs. Protect plugs and plug valves from corrosion in as specified in Section 09960 - High-Performance Coatings.

- A. Restraining buried piping:
 1. Restrain piping at valves and at fittings where piping changes direction, changes sizes, and at ends:
 - a. When piping is underground, use concrete thrust blocks, mechanical restraints, or push-on restraints.
 - b. Determine thrust forces by multiplying the nominal cross-sectional area of the piping by design test pressure of the piping.

2. Provide restraints with ample size to withstand thrust forces resulting from test pressures:
 - a. During testing, provide suitable temporary restraints where piping does not require permanent restraints.
 3. Place concrete thrust blocks against undisturbed soil.
 4. Place concrete so piping joints, fittings, and other appurtenances are accessible for assembly and disassembly.
 5. Provide underground mechanical restraints where specified in the Piping Schedule.
- B. Restraining above ground piping:
1. Restrain piping at valves and at fittings where piping changes direction, changes sizes, and at ends:
 - a. When piping is aboveground or underwater, use mechanical or structural restraints.
 - b. Determine thrust forces by multiplying the nominal cross-sectional area of the piping by design test pressure of the piping.
 2. Provide restraints with ample size to withstand thrust forces resulting from test pressures:
 - a. During testing, provide suitable temporary restraints where piping does not require permanent restraints.
- C. Connections to existing piping:
1. Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings:
 - a. Protect domestic water/potable water supplies from contamination:
 - 1) Make connections between domestic water supply and other water systems in accordance with requirements of public health authorities.
 - 2) Provide devices approved by Owner of domestic water supply system to prevent flow from other sources into the domestic supply system.
 2. Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.
 3. Provide sleeves, flanges, nipples, couplings, adapters, and other fittings needed to install or attach new fittings to existing piping and to make connections to existing piping.
 4. For flanged connections, provide stainless steel bolts with isolation bushings and washers, and full-face flange gaskets.
- D. Connections to in-service piping:
1. As specified in Section 01140 - Work Restrictions.
- E. Connections between ferrous and nonferrous metals:
1. Connect ferrous and nonferrous metal piping, tubing, and fittings with dielectric couplings especially designed for the prevention of chemical reactions between dissimilar metals.
 2. Nonferrous metals include aluminum, copper, and copper alloys.
- F. Flanged connections between dissimilar metals such as ductile iron pipe and steel pipe:
1. Provide stainless steel bolts with isolation bushings and washers, and full-face flange gaskets.

3.02 CLEANING

- A. Piping cleaning:
 - 1. Upon completion of installation, clean piping interior of foreign matter and debris.
 - 2. Perform special cleaning when required by the Contract Documents.

- B. Cleaning potable water piping:
 - 1. Flush and disinfect potable water piping as specified in Section 01757 - Disinfection.

- C. Conduct pressure and leak test, as specified.

3.03 PIPING SCHEDULE

PIPING SCHEDULE

Process Abbrev.	Service	Nominal Diameter (inches)	Material	Pressure Class Special Thickness Class Schedule Wall Thickness	Pipe Spec. Section	Joints/ Fittings	Test Pressure/ Method	Lining	Coating	Service Conditions	Comments
3W	Reclaimed Water										
	Underground	4-16	PVC	C900 DR-14	15244 - Polyvinyl Chloride Pipe: AWWA C900	IRJ	200 v/HH	None	None		
		4-16	DIP	Class 350	15211 - Ductile Iron Pipe: AWWA C151	IRJ	Upstream of PRV 250 psig/HH Downstream of PRV 200 psig/HH 175 psig /HH	CM	Zinc		
	Aboveground or in Vault	3-16	DIP	CL 53	15211 - Ductile Iron Pipe: AWWA C151	FL		CM	EPP		
	Aboveground or in Vault	2	Brass	ASTM B43 extra strong wall thickness		Conform to ANSI B2.1 w/ teflon tape		None	None		

PIPING SCHEDULE											
Process Abbrev.	Service	Nominal Diameter (inches)	Material	Pressure Class Special Thickness Class Schedule Wall Thickness	Pipe Spec. Section	Joints/ Fittings	Test Pressure/ Method	Lining	Coating	Service Conditions	Comments
Abbreviations: 1. The following abbreviations used in the column of test method refer to the respective methods as specified in Section 15956 - Piping Systems Testing. AM Air method GR Gravity method HH High head method LH Low head method SC Special case 2. Abbreviations to designate piping include the following: B&SP Bell and spigot CI Cast iron CISP Cast iron soil pipe CL Class, followed by the designation CM Cement mortar CTP Coal tar pitch DIP Ductile iron piping EPP Epoxy polyurethane coating FLFlange GA Gauge, preceded by the designation						GE Grooved end joint GL Glass lined GSP Galvanized steel pipe IRJ Integrally restrained joint MJ Mechanical joint NPS Nominal pipe size, followed by the number in inches psi pounds per square inch psig pounds per square inch gauge PE Polyethylene PEE Polyethylene encasement PTW Polyethylene tape wrap PVC Polyvinyl Chloride SCH Schedule, followed by the designation SCRD Screwed-On SST Stainless steel SW Solvent welded VCP Vitrified clay piping WLD Weld					

END OF SECTION

SECTION 15061

PIPE SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Supports for pipe, fittings, valves, and appurtenances.

1.02 REFERENCES

- A. ASTM International (ASTM):
 1. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 2. A380 - Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 3. A967 - Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- B. Manufacturer's Standardization Society (MSS):
 1. SP-58 - Pipe Hangers and Supports - Materials, Design, and Manufacture.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data.
 1. Design features.
 2. Load capacities.
 3. Material designations by UNS alloy number or ASTM Specification and Grade.
 4. Data needed to verify compliance with the Specifications.
 5. Catalog data.
 6. Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.
- C. Shop drawings in accordance with 01330 - Submittal Procedures.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 GENERAL

- A. As specified in Section 01601 - Product Requirements.

2.02 PIPE SUPPORTS

- A. Floor stand or stanchion saddles: MSS SP-58, Type 37. Provided with U-bolt hold down yokes:
 - 1. Manufacturers: One of the following or equal:
 - a. For all piping, unless indicated on the Drawings.
 - b. Anvil International, Figure 259.
 - c. Bergen-Power, Figure 125.
 - d. Cooper B-Line Systems, Inc., Figure B3090.
 - e. Threaded pipe stand support stanchion. Match pipe support material:
 - 1) Anvil International, Figure 63T.
 - 2) Bergen-Power, Figure 138.
 - 3) Cooper B-Line Systems Inc., Figure B3088ST.
- B. Anchor bolts, concrete anchors, concrete inserts, powder-actuated fasteners, and sleeve anchors: As specified in Section 05120 - Structural Steel.
- C. Fasteners:
 - 1. As specified in Section 05120 - Structural Steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Support, suspend, or anchor exposed pipe, fittings, valves, and appurtenances to prevent sagging, overstressing, or movement of piping; and to prevent thrusts or loads on or against connected pumps, blowers, and other equipment.
- B. Field verify support location, orientation, and configuration to eliminate interferences prior to fabrication of supports.
- C. Carefully determine locations of inserts. Anchor to formwork prior to placing concrete.
- D. Do not use anchors relying on deformation of lead alloy.
- E. Do not use powder-actuated fasteners for securing metallic conduit or steel pipe larger than 1-inch to concrete, masonry, or wood.
- F. Suspend pipe hangers from hanger rods and secure with double nuts.
- G. Install continuously threaded hanger rods only where indicated on the Drawings.
- H. Use adjustable ring hangers or adjustable clevis hangers for 4-inch and smaller diameter pipe.
- I. Use adjustable clevis hangers for pipe larger than 4 inches in diameter.
- J. Secure pipes with double nutted U-bolts or suspend pipes from hanger rods and hangers:
 - 1. For stainless steel piping, use stainless steel U-bolts.
 - 2. For all other piping, use galvanized U-bolts.

- K. Support spacing:
 - 1. Support 2-inch and smaller piping on horizontal and vertical runs at maximum 5 feet on center, unless otherwise specified.
 - 2. Support larger than 2-inch piping on horizontal and vertical runs at maximum 10 feet on center, unless otherwise specified.
 - 3. Support exposed polyvinyl chloride and other plastic pipes at maximum 5 feet on center, regardless of size.
 - 4. Support tubing, PVC pipe 1-inch and smaller, copper pipe and tubing, fiber-reinforced plastic pipe or duct, and rubber hose and tubing at intervals close enough to prevent sagging greater than 1/4-inch between supports.
 - 5. Do not suspend or support valves, pipe and fittings from another pipe or conduit.

- L. Install supports at:
 - 1. Any change in direction.
 - 2. Both sides of flexible pipe connections.
 - 3. Base of risers.
 - 4. Floor penetrations.
 - 5. Connections to pumps, blowers, and other equipment.
 - 6. Valves and appurtenances.

- M. Securely anchor plastic pipe, valves, and headers to prevent movement during operation of valves.

- N. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

- O. Provide elbows or tees supported from floors with base fittings where indicated on the Drawings.

- P. Support base fittings with metal supports or when indicated on the Drawings support on concrete piers.

- Q. Do not use chains, plumbers' straps, wire, or similar devices for permanently suspending, supporting, or restraining pipes.

- R. Supports, clamps, brackets, and portions of support system bearing against copper pipe: Copper plated, copper throughout, or isolated with neoprene or polyvinyl chloride tape.

- S. Where pipe is insulated, install over-sized supports and hangers.

- T. Install insulation shield in accordance with MSS SP-58, Type 40. Shield shall be galvanized steel unless otherwise specified or indicated on the Drawings.

- U. Install riser clamps at floor penetrations and where indicated on the Drawings.

END OF SECTION

SECTION 15076

PIPE IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Pipe identification including the following:
 - 1. Pipe identification by color and legend.
 - 2. Underground warning tape.
 - 3. Tracer wire.
 - 4. Witness markers.
 - 5. Valve identification.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Submit following:
 - 1. Product data.
 - 2. Samples.
 - 3. Manufacturer's installation instructions.
 - 4. Submit following as specified in Section 01770 - Closeout Procedures:
 - a. Operation and maintenance data.
 - b. Warranty.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with OSHA.

PART 2 PRODUCTS

2.01 RECYCLED WATER FACILITIES IDENTIFICATION

- A. Manufacturers:
 - 1. Warning Tape and Pipe Sleeves:
 - a. Terra Tape, Division of Reef Industries.
 - b. T. Christy Enterprises, Inc.
 - c. Seaton Name Plate Co.
 - 2. Warning Labels and Signs: In all cases the warning labels or signs must be approved prior to installation. Failure to receive prior approval may result in the owner, applicant, or customer removing such sign(s) and providing approved replacement(s). All costs will be at the applicant's, owner's or customer's expense. Failure to comply with these requirements, as set forth herein will

result in termination of service as provided for in the District's Rules and Regulations, Section 600.

3. Witness Markers:
 - a. Carsonite Water line Markers - Carsonite International.

- B. Identification:
 1. The use of stenciled pipe will be accepted as an alternative to the use of warning tape.
 2. Exposed DIP carrying recycled water shall have purple coatings with the words "RECYCLED WATER" stenciled with 2-inch black letters. Lettering shall be on both sides of the pipe each section of pipe.
 3. Exposed PVC or DIP carrying potable water, and located in the vicinity of recycled water piping, shall have the words "POTABLE WATER" stenciled with 2-inch blue letters. Lettering shall be on both sides of the pipe in at least three places in an 18-foot section of pipe (total six places per section of pipe).
 4. PVC pipe carrying recycled water shall be purple in color with black letters. The stenciling shall appear on both sides of the pipe with the marking "RECYCLED WATER" in 5/8-inch letters repeated every 12 inches. PVC pipe carrying potable water shall be blue in color with black letters. The stenciling shall appear on both sides of the pipe with the marking "POTABLE WATER" in 5/8-inch letters repeated every 12 inches.

- C. Valve boxes:
 1. All valve boxes shall be traffic rated.
 2. Boxes for potable water and recycled water facilities are shown in MCWD Detail W-7.
 3. Potable water boxes shall be Christy G05T or equal.
 4. Recycled water boxes shall be Christy G04T or equal.
 5. Blow-off Valve Boxes shall be Christy B1730 or similar.
 6. All valve boxes installed in unpaved areas (open space areas) shall be marked with a witness pole; in addition to the above referenced markings.

- D. Color and painting schedule:
 1. Recycled water facilities shall be painted purple.
 2. Domestic water facilities shall be blue.
 3. Witness poles for recycled water lines, valves and appurtenances shall be purple.
 4. Witness poles for domestic water lines, valves and appurtenances shall be blue.

- E. Warning signs and labels:
 1. Recycled water warning signs shall read "CAUTION: RECYCLED WATER, DO NOT DRINK" in both English and Spanish shall be installed on recycled water facilities. The sign size and wording shall be submitted and approved by the Engineer. Signs shall be 1/8" thick, approximately 12" x 12", purple in color, and designed not to fade, degrade, or crack and intended for outdoor exposure.
 2. Recycled water warning signs shall be epoxy glued to all recycled water vault access hatches and hung on chains on all recycled water above ground piping and backflow devices.

3. Warning labels to be installed on all appurtenances in vaults, such as, but not limited to, air release valves, blow offs, and meters.
4. Each pump and every pipe shall be identified with a painted label. In the fenced pump station area, at least one sign shall be posted on the fence that can be readily seen by all operations personnel utilizing the facilities.

F. Materials:

1. Buried piping warning tape:
 - a. The plastic warning tape shall be an inert plastic film specifically formulated for prolonged underground use and shall be prepared with black printing on a purple field having the words, "CAUTION: RECYCLED WATER-LINE". Warning tape for domestic water pipeline shall be blue with black printing having the words, "CAUTION: DOMESTIC WATERLINE BURIED BELOW". The minimum thickness shall be 4 mils and the overall width of the tape shall be 6 inches for 8-inch pipe and larger, and 3 inches for 6-inch and smaller pipe.
2. Warning labels:
 - a. Labels shall be inert plastic film specifically formulated for prolonged exposure and shall be prepared with black printing on a purple field having the words: "CAUTION: RECYCLED WATER FACILITY". The minimum thickness shall be 4 mils for adhesive backed labels and 10 mils for tag type labels. Tag type labels shall have reinforced tie holes and shall be attached with heavy-duty nylon fasteners. The size, type of label, and location will be dictated by each individual application, and subject to acceptance by the District's representative. The minimum size shall be 1/2-inch letters.

2.02 EQUIPMENT NAMEPLATES

- A. Material and fabrication:
 1. Stainless steel sheet engraved or stamped with text, holes drilled, or punch for fasteners.
- B. Fasteners:
 1. Number 4 or larger oval head stainless steel screws or drive pins.
- C. Text:
 1. Manufacturers name, equipment model number and serial number, identification tag number, and when appropriate, drive speed, motor horsepower with rated capacity, pump rated total dynamic head and impeller size.

2.03 SPECIAL ITEMS

- A. In addition, special coating of following items will be required:

Item	Color
Valve handwheels and levers	Red
Hoist hooks and blocks	Yellow and black stripes
Steel guard posts	In accordance with standard details

- B. Paint minimum 2 inches high numbers on or adjacent to accessible valves, pumps, flowmeters, and other items of equipment which are identified on Drawings or in Specifications by number.
- C. Tracer wire:
 - 1. Manufacturers: One of the following or equal:
 - a. Kris-Tech Wire.
 - b. Corpro.
 - 2. Materials: One of the following or equal:
 - a. Solid copper conductor.
 - b. Thickness minimum: 10 gauge.
 - c. Insulation:
 - 1) Match insulation color to the color of the pipe being installed.
 - 2) UF type, direct bury.
 - 3) 30 mil HMWPE.
 - 3. Splicing kit:
 - a. Manufacturers: One of the following or equal:
 - 1) Ryall Electric Co., 3M Kit#82-A1.
 - 4. Station box:
 - a. Lid and collar materials: Cast iron.
 - b. Able to withstand heavy traffic loading.
 - c. Manufacturers: One of the following or equal:
 - 1) Farwest Corrosion Control Co, Glenn 4 Test Station.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify satisfactory conditions of substrate for applying identification.
- B. Verify that conditions are satisfactory for installation and application of products as specified in Section 01601 - Product Requirements.

3.02 PREPARATION

- A. Prepare and coat surfaces as specified in Section 09960 - High-Performance Coatings.
- B. Prepare surface in accordance with product manufacturer's instructions.

3.03 ABOVE GROUND AND IN-CHASE PIPING IDENTIFICATION

- A. Identify exposed piping, valves, and accessories, and piping, in accessible chases with lettering or tags designating service of each piping system with flow directional arrows and color code.
- B. Color code:
 - 1. Paint piping with colors as selected by Owner.

- C. Lettering and flow direction arrows:
 - 1. Stencil lettering on painted bands or use Snap-On markers on pipe to identify pipe. When stenciling, stencil 3/4-inch high letters on 3/4 through 4-inch pipe or coverings, or 5-inch high letters on 5-inch and larger pipe or coverings.
 - 2. Provide lettering and flow direction arrows near equipment served, adjacent to valves, both sides of walls and floors where pipe passes through, at each branch or tee, and at intervals of not more than 50 feet in straight runs of pipe.
- D. Where scheduled, space 6-inch wide bands along stainless steel pipe at 10-foot intervals and other pipe at 5-foot intervals.
- E. Label chemical tank fill pipelines at locations which are visible from chemical fill stations.
- F. Metal tags:
 - 1. Where outside diameter of pipe or pipe covering is 5/8-inch or smaller, provide metal pipe identification tags instead of lettering.
 - 2. Fasten pipe identification tags to pipe with chain.
 - 3. Where tags are used, color code pipe as scheduled.

3.04 BURIED PIPING IDENTIFICATION

- A. Underground warning tape:
 - 1. Place continuous run of warning tape in pipe trench, 12 inches above the pipe.
- B. Tracer wire:
 - 1. Install on all non-metallic pipe.
 - 2. Install an electrically continuous run of tracer wire along the entire length of the pipe with wire terminations in valve boxes, vaults, or structures.
 - 3. Install tracer wire on top of the pipe and secure to pipe with tape a minimum of every 10 feet.
 - 4. Where approved by the Engineer, splice sections of wire together using approved direct bury wire nuts:
 - a. Twisting the wires together is not acceptable.
- C. Witness markers:
 - 1. Install over pipe in unpaved open-space areas at intervals not greater than 200 feet.
 - 2. Place markers at appurtenances located in unpaved areas.
 - 3. Embed markers at least 18 inches into the soil.

3.05 APPLICATION

- A. Identify piping with legend markers, directional arrow markers, and number markers; use self-adhesive arrow roll tape to secure ends of piping markers and indicate flow direction.
- B. Provide legend markers, directional arrow markers, and number markers where piping passes through walls or floors, at piping intersections and at maximum 15-foot spacing on piping runs.

- C. Provide piping marker letters and colors as scheduled.
- D. Place markers on piping so they are visible from operator's position in walkway or working platform near piping. Locate markers along horizontal centerline of pipe, unless better visibility is achieved elsewhere.

END OF SECTION

SECTION 15110

COMMON WORK RESULTS FOR VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Basic requirements for valves.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C111/A21.11 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe Fittings.
- B. ASTM International (ASTM):
 - 1. A126 - Standard Specification for Gray Iron Casting for Valves, Flanges, and Pipe Fittings.
 - 2. A167 - Standard Specification for Stainless and Heat-Resisting Chromium- Nickel Steel Plate, Sheet, and Strip.
 - 3. A536 - Standard Specification for Ductile Iron Castings.
- C. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.
- D. Society for Protective Coatings (SSPC):
 - 1. SP7 - Brush-Off Blast Cleaning.
 - 2. SP10 - Near-White Blast Cleaning.

1.03 DESIGN REQUIREMENTS

- A. Pressure rating:
 - 1. Everything upstream and including the pressure reducing vaults is designed for a minimum working pressure of 300 pounds per square inch gauge. Everything downstream of the pressure reducing vault is designed for a minimum working pressure of 200 pounds per square inch gauge.
- B. Valve to piping connections:
 - 1. Valves 3 inches nominal size and larger: Flanged ends.
 - 2. Valves less than 3 inches nominal size: Screwed ends.
 - 3. Plastic valves in plastic piping:
 - a. Up to 2.5 inches: Provide solvent or heat welded unions.
 - b. 3 inches and above: Provide solvent or heat-welded flanges.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.

- B. Product data:
 - 1. Submit the following information for each valve:
 - a. Valve type, size, pressure rating, Cv factor.
 - b. Coatings.
 - c. Manual valve actuators:
 - 1) Information on valve actuator including size, manufacturer, model number.
 - d. Certified drawings with description of component parts, dimensions, weights, and materials of construction.
 - e. Certifications of reference standard compliance:
 - 1) Submit certification that the valves and coatings are suitable in potable water applications in accordance with NSF 61.
 - f. Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.
- C. Provide vendor operation and maintenance manual as specified in Section 01782 - Operation and Maintenance Data:
 - 1. Furnish bound sets of installation, operation, and maintenance instructions for each type of manual valve 4 inches in nominal size and larger, and all non-manual valves. Include information on valve operators.
- D. Provide Manufacturer's Certificate of Source Testing.
- E. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

1.05 QUALITY ASSURANCE

- A. Manufacturer qualifications:
 - 1. Valves manufactured by manufacturers whose valves have had successful operational experience in comparable service.

1.06 DELIVERY STORAGE AND HANDLING

- A. Protect valves and protective coatings from damage during handling and installation; repair coating where damaged.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Stainless steel: In accordance with ASTM A167, Type 316, or Type 304, UNS Alloy S31600 or S30400.
- B. Valve and operator bolts and nuts:
 - 1. Fabricated of stainless steel for the following installation conditions:
 - a. Submerged in sewage or water.
 - b. In an enclosed space above sewage or water.
 - c. In structures containing sewage or water, below top of walls.
 - d. At openings in concrete or metal decks.
 - 2. Where dissimilar metals are being bolted, use stainless steel bolts with isolation bushings and washers.
 - 3. Underground bolts: Low-alloy steel in accordance with AWWA C111/A21.11.

- C. Bronze and brass alloys: Use bronze and brass alloys with not more than 6 percent zinc and not more than 2 percent aluminum in the manufacture of valve parts; UNS Alloy C83600 or C92200 unless specified otherwise.
- D. Valve bodies: Cast iron in accordance with ASTM A126, Class 30 minimum or ductile iron in accordance with ASTM A536, Grade 65-45-12 minimum unless specified otherwise.

2.02 INTERIOR PROTECTIVE LINING

- A. When specified in the particular valve specification, provide valves with type of protective lining specified in the particular valve Specification.
- B. Apply protective lining to interior, non-working surfaces, except stainless steel surfaces.
- C. Lining types:
 - 1. Fusion bonded epoxy:
 - a. Manufacturers: The following or equal:
 - 1) 3-M Company, ScotchKote 134; certified to NSF 61 for drinking water use.
 - b. Clean surfaces in accordance with SSPC SP 7 or SP 10, as recommended by epoxy manufacturer.
 - c. Apply in accordance with manufacturer's published instructions.
 - d. Lining thickness: 0.010 to 0.012-inch, except that:
 - 1) Lining thickness in grooves for gaskets: 0.005-inch.
 - 2) Do not coat seat grooves in valves with bonded seat.
 - e. Quality control:
 - 1) Lining thickness: Measured with a non-destructive magnetic type thickness gauge.
 - 2) Verify lining integrity with a wet sponge-testing unit operating at approximately 60 volts, or as recommended by the lining manufacturer.
 - 3) Consider tests successful when lining thickness meets specified requirements and when no pinholes are found.
 - 4) Correct defective lining disclosed by unsuccessful tests, and repeat test.
 - 5) Repair pinholes with liquid epoxy recommended by manufacturer of the epoxy used for lining.
 - 2. High solids epoxy:
 - a. Product equivalent to high solids epoxy specified in Section 09960 - High- Performance Coatings:
 - 1) Certified in accordance with NSF 61 for drinking water use.
 - 2) Interior: Coat valve interior with manufacturer's equivalent high performance high solids epoxy coating system with a certifiable performance history for the service conditions and as approved by the Engineer. Manufacturer shall provide for approval, coating information sufficient to allow Engineer to assess equivalence to the specified high solids epoxy coating specified in Section 09960 - High- Performance Coatings.
 - b. Clean surfaces to meet SP-7 or SP-10, or as recommended by coating manufacturer.

- c. Quality control: After coating is cured, check coated surface for porosity with a holiday detector set at 1,800 volts, or as recommended by coating manufacturer:
 - 1) Repair holidays and other irregularities and retest coating.
 - 2) Repeat procedure until holidays and other irregularities are corrected.

2.03 UNDERGROUND VALVES

- A. Provide underground valves with flanged, mechanical, or other type of joint required for the type of pipe to which the valve is to be connected.
- B. Coating and wrapping:
 - 1. After installation, field repair any damage to the valve exterior coating per manufacturer's recommendations.

2.04 VALVE BOXES

- A. Provide cast-iron valve boxes at each buried valve to access valve and valve operators.
- B. Do not support boxes on valve, valve operator, or pipe.
- C. Boxes:
 - 1. 2-piece, fabricated of cast iron; provide cover, with asphalt varnish or enamel protective coating.
 - 2. Adjustable to grade, install centered around the upper portions of the valve and valve operator.
- D. Manufacturers: One of the following or equal:
 - 1. Tyler Pipe Industries, Inc.
 - 2. Neenah Foundry Co.

2.05 VALVE OPERATORS

- A. Valve operator "Open" direction: Open counterclockwise.
- B. Provide valves located below operating level or deck with extensions for key operation or floor stands and handwheels.
- C. Provide manually operated valves located not more than 6 feet above the operating level with tee handles, wrenches, or handwheels:
 - 1. Make the valve operator more conveniently accessible by rolling valves, located more than 5 feet but less than 6 feet above the operating level, toward the operating side.
 - 2. Secure tee handles and wrenches to the valve head or stem, except where a handle or wrench so secured constitutes a hazard to personnel; in which case, stow handle or wrench immediately adjacent to the valve on or in a suitable hanger, bracket, or receptacle.

- D. Fit valves located more than 6 feet above operating level with chain operated handles or valve wheels:
 - 1. Chains: Sufficient length to reach approximately 4 feet above the operating level.
 - 2. Where chains constitute a nuisance or hazard to operating personnel, provide holdbacks or other means for keeping the chains out of the way.
- E. Provide an operator shaft extension from valve or valve operator to finished grade or deck level when buried valves, and other valves located below the operating deck or level, are specified or indicated on the Drawings to be key operated; provide 2 inches square AWWA operating nut, and box and cover as specified, or a cover where a box is not required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Preparation prior to installation:
 - 1. Install valves after the required submittal on installation has been accepted.
 - 2. Determine after flanged valves and flanged check valves are selected, the face-to-face dimensions of flanged valves and flanged check valves.
- B. Fabricate piping to lengths taking into account the dimensions of flanged valves and flanged check valves.

3.02 INSTALLATION

- A. Provide incidental work and materials necessary for installation of valves including flange gaskets, flange bolts and nuts, valve boxes and covers, concrete bases, blocking, and protective coating.
- B. Where needed, furnish and install additional valves for proper operation and maintenance of equipment and plant facilities under the following circumstances:
 - 1. Where such additional valves are required for operation and maintenance of the particular equipment furnished by Contractor.
 - 2. Where such additional valves are required as a result of a substitution or change initiated by Contractor.
- C. Install valves with their stems in vertical position above the pipe, except as follows:
 - 1. Butterfly valves, gate valves aboveground, globe valves, ball valves, and angle valves may be installed with their stems in the horizontal position.
 - 2. Install buried plug valves with geared operators with their stems in a horizontal position.
- D. Install valves so that handles clear obstructions when the valves are operated from fully open to fully closed.
- E. Place top of valve boxes flush with finished grade or as otherwise indicated on the Drawings.

- F. Valves with threaded connections:
 - 1. Install valves by applying wrench on end of valve nearest the joint to prevent distortion of the valve body.
 - 2. Apply pipe joint compound or Teflon tape on external (male) threads to prevent forcing compound into valve seat area.

- G. Valves with flanged connections:
 - 1. Align flanges and gasket carefully before tightening flange bolts.
 - 2. When flanges are aligned, install bolts and hand tighten.
 - 3. Tighten nuts opposite each other with equal tension before moving to next pair of nuts.

- H. Valves with soldered connections:
 - 1. Do not overheat connection to prevent damage to resilient seats and metal seat rings.
 - 2. Position valves in full open position before starting soldering procedure.
 - 3. Apply heat to piping rather than to valve body.

3.03 FIELD APPLIED COATING OF VALVE EXTERIOR

- A. Match color and be compatible with manufacturer's coating system and as specified in Section 09960 - High-Performance Coatings:
 - 1. When shop applied finish coating matches field applied coating on adjacent piping, touch up shop coating in damaged areas in accordance with instructions recommended by the paint manufacturer.
 - 2. When shop applied coating does not match field coating on adjacent piping, or when damage has occurred to the shop applied coating that requires more than touchup, blast clean valve surfaces or utilize other surface preparation recommended by the manufacturer of the coating material and apply the coating system used for coating adjacent piping.

3.04 COMMISSIONING

- A. Manufacturer services from each manufacturer for all valves supplied:
 - 1. Provide Manufacturer's Certificate of Source Testing.
 - 2. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

- B. As specified elsewhere for specific valve types, sizes or actuators:
 - 1. Source testing.
 - 2. Manufacturers on site services for Owner Training, Installation Testing, Functional Testing, and during the Process Operational Period.

END OF SECTION

SECTION 15114

CHECK VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Check valves.
- B. As specified in Section 15110 - Common Work Results for Valves.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Inch Standard.
- B. American Water Works Association (AWWA):
 - 1. C508 - Standard for Swing-Check Valves for Waterworks Service 2 Inch Through 24 Inch NPS.
- C. ASTM International (ASTM):
 - 1. A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 2. A313 - Standard Specification for Stainless Steel Spring Wire.
 - 3. A536 - Standard Specification for Ductile Iron Castings.
 - 4. B582 - Standard Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip.
 - 5. B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

1.03 SYSTEM DESCRIPTION

- A. Design requirements:
 - 1. Check valves: When not otherwise specified as indicated on the Drawings, provide check valves suitable for service as follows:
 - a. In either horizontal or vertical position.
 - b. Suitable for service working pressures up to 175 pounds per square inch gauge.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15110 - Common Work Results for Valves.

- C. Commissioning submittals:
 - 1. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

1.05 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 DOUBLE CHECK VALVE ASSEMBLY

- A. The Double Check Backflow Prevention Assembly shall be certified to NSF/ANSI 61, ASSE® Listed 1015, and supplied with full port gate valves.
- B. The main body and access cover shall be epoxy coated ductile iron (ASTM A536).
- C. The seat ring and check valve shall be NORYL™.
- D. The stem shall be stainless steel (ASTM A276).
- E. The seat disc elastomers shall be EPDM.
- F. The checks shall be accessible for maintenance without removing the device from the line.
- G. The gate valves shall be OS & Y gate valves.
- H. Include a repair kit accessory with each double check detector assembly.
- I. Manufacturers, or equal:
 - 1. ZURN WILKINS Model 350.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Check valves:
 - 1. Install with proper orientation of flow direction arrow on valve body.

3.02 FIELD APPLIED COATING OF VALVE EXTERIOR

- A. Match color and be compatible with manufacturer's coating system and as specified in Section 09960 - High-Performance Coatings:
 - 1. When shop applied finish coating matches field applied coating on adjacent piping, touch up shop coating in damaged areas in accordance with instructions recommended by the paint manufacturer.
 - 2. When shop applied coating does not match field coating on adjacent piping, or when damage has occurred to the shop applied coating that requires more than touchup, blast clean valve surfaces or utilize other surface preparation

recommended by the manufacturer of the coating material and apply the coating system used for coating adjacent piping.

3.03 COMMISSIONING

- A. Manufacturer services:
 - 1. Provide certificates:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance.

- B. Functional testing:
 - 1. Valves:
 - a. Test witnessing: Non-Witnessed.
 - b. Conduct pressure and leak test, as specified in Section 15110 - Common Work Results for Valves.

END OF SECTION

SECTION 15115

GATE VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Gate valves.
- B. As specified in Section 15110 - Common Work Results for Valves.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C515 - Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Services.
 - 2. C 550 - Protective Interior Coatings for Valves and Hydrants.
- B. ASTM International (ASTM):
 - 1. B98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15110 - Common Work Results for Valves.
- C. Commissioning submittals: For valves larger than 16 inches:
 - 1. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.
- B. Interior epoxy coatings: Affidavit of compliance attesting that epoxy coatings applied to interior surfaces of valves comply in accordance with all provisions of AWWA C550.

PART 2 PRODUCTS

2.01 GATE VALVES

- A. Gate valves aboveground:
 - 1. Valves 3 inches in size and larger:
 - a. Manufacturers: One of the following or equal:
 - 1) M&H/Kennedy Valve Co.

- 2) Mueller.
- 3) American Flow Control, Series 2500.
- b. Design:
 - 1) Size, material, configuration: Indicated on the Drawings.
 - 2) Resilient wedge type in accordance with AWWA C509 or C515.
 - 3) Flange, iron body, and bonnet rated for 350 pound working pressure:
 - a) Provide O-ring seal between valve body and bonnet.
 - 4) Ductile or cast iron wedge encapsulated in nitrile rubber and capable of sealing in either flow direction.
 - 5) Bronze stem with double or triple O-ring or braided packing stem seals.
 - 6) Non-Rising stem or Rising Stem configuration as indicated on the drawings with handwheel diameter sized to allow opening of valve with no more than a 40-pound pull.
 - 7) Coat interior and exterior surfaces of valve body and bonnet with fusion-bonded epoxy in accordance with AWWA C550.
- B. Gate valves underground:
 - 1. Manufacturers: One of the following or equal:
 - a. Mueller Co.
 - b. American Flow Control.
 - 2. Design:
 - a. Size, material, configuration: Indicated on the Drawings.
 - b. Resilient wedge type in accordance with AWWA C509 or C515.
 - c. Stem:
 - 1) Iron body, resilient seat, non-rising stem, double O-ring stem seal.
 - 2) Rising stem configuration with handwheel diameter sized to allow opening of valve with no more than a 40-pound pull.
 - d. Ductile or cast iron wedge encapsulated in nitrile rubber and capable of sealing in either flow direction.
 - e. Bronze stem with double or triple O-ring or braided packing stem seals.
 - f. Coat interior and exterior surfaces of valve body and bonnet with fusion-bonded epoxy in accordance with AWWA C550.
 - g. Valve operator: Provide standard AWWA 2-inch operating nut, matching valve key, and valve box for operating stem.
 - h. Valves shall be rated for 350 pounds per square inch working pressure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install valves in accordance with Section 15110 - Common Work Results for Valves and manufacturer's instructions.

3.02 FIELD APPLIED COATING OF VALVE EXTERIOR

- A. Match color and be compatible with manufacturer's coating system and as specified in Section 09960 - High-Performance Coatings:
 - 1. When shop applied finish coating matches field applied coating on adjacent piping, touch up shop coating in damaged areas in accordance with instructions recommended by the paint manufacturer.

2. When shop applied coating does not match field coating on adjacent piping, or when damage has occurred to the shop applied coating that requires more than touchup, blast clean valve surfaces or utilize other surface preparation recommended by the manufacturer of the coating material and apply the coating system used for coating adjacent piping.

3.03 COMMISSIONING

- A. Manufacturer services: For valves larger than 16 inches:
 1. Provide certificates:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance.
- B. Functional testing:
 1. Valves:
 - a. Test witnessing: Witnessed.
 - b. Conduct pressure and leak test as specified in Section 15110 - Common Work Results for Valves.

END OF SECTION

SECTION 15118

PRESSURE REDUCING AND PRESSURE RELIEF VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Pressure reducing and pressure relief valves for water, air, sludge and chemical service.
- B. As specified in Section 15110 - Common Work Results for Valves.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.
- B. ASTM International (ASTM):
 - 1. A48 - Standard Specification for Gray Iron Castings.
 - 2. A536 - Standard Specification for Ductile Iron Castings.
- C. Underwriters Laboratories, Inc. (UL).

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15110 - Common Work Results for Valves.
- C. Commissioning submittals:
 - 1. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 WATER PRESSURE REDUCING VALVES

- A. Water pressure reducing valves:
 - 1. Manufacturers: No equal:
 - a. Cla-Val Model 692-01 and 92-01 where smaller than 3 inches.
 - 2. Design:
 - a. Pilot controlled, hydraulically operated, diaphragm actuated, globe patterned valve.

- b. Include the following optional features:
 - 1) X46A Flow Clean Strainer.
 - 2) CK2 Isolation Valve.
 - 3) CV Flow Control (Closing).
 - 4) Check Valves with Isolation Valve.
 - 5) X144 e-FlowMeter.
 - 6) X141 Pressure Gauge.
 - 7) CV Flow Control (Opening).
 - 8) X101 Valve Position Indicator.
 - 9) X43 "Y" Strainer.
- 3. Materials:
 - a. Body and cover: Ductile Iron ASTM A536.
 - b. Flange: ANSI 16.42 Class 150.
 - c. Valve trim: Stainless steel.
 - d. Pilot control: Cast bronze with stainless steel trim.
 - e. Diaphragm: Nylon reinforced Buna N.
 - f. Stem, Nut & Spring: Stainless Steel.
 - g. Isolation Valves: 316SS Ball Valves.
 - h. Adjustment Ranges: 20 to 105 pounds per square inch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as specified in Section 15110 - Common Work Results for Valves.

3.02 TESTING

- A. Factory Testing:
 - 1. The pressure reducing valves shall be factory tested at the following flow rates and pressures:
 - a. Beach Road:
 - 1) 6-inch Valve:
 - a) Upstream Pressure: 215 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 350 gpm
 - 2) 3-inch Valve:
 - a) Upstream Pressure: 215 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 125 gpm
 - b. Carmel Avenue:
 - 1) 4-inch Valve: 225 psi:
 - a) Upstream Pressure
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 75 gpm
 - 2) 2-inch Valve:
 - a) Upstream Pressure: 225 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 25 gpm

- c. Marina Heights Drive:
 - 1) 12-inch Valve:
 - a) Upstream Pressure: 215 psi
 - b) Downstream Pressure: 80 psi
 - c) Flow Rate: 1,350 gpm
 - 2) 4-inch Valve:
 - a) Upstream Pressure: 215 psi
 - b) Downstream Pressure: 80 psi
 - c) Flow Rate: 450 gpm
 - d. 9th Street:
 - 1) 4-inch Valve:
 - a) Upstream Pressure: 200 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 200 gpm
 - 2) 2-inch Valve:
 - a) Upstream Pressure: 200 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 70 gpm
 - e. Coe Ave:
 - 1) 6-inch Valve:
 - a) Upstream Pressure: 190 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 650 gpm
 - 2) 3-inch Valve:
 - a) Upstream Pressure: 190 psi
 - b) Downstream Pressure: 65 psi
 - c) Flow Rate: 215
2. Contractor shall notify Engineer 2 weeks in advance of factory testing and allow Engineer to witness test.
 3. Manufacturer shall provide written proof (report printout) of testing and testing results.

B. Field Testing:

1. Contractor shall test each pressure reducing station (both pressure reducing valves at the same time), for not less than 1 hour, in the field under larger flow and pressure conditions specified in that location for the factory testing. For example, if the pressure reducing station has a 6-inch and 3-inch valve, test at the flow and pressure conditions of the 6-inch valve:
 - a. Contractor shall develop a test plan with a description, schedule, and sketches for field testing each pressure reducing station. Test plans shall identify the source of water, disposal of water, and method of obtaining upstream pressure. Test plans can include use of hydrant meter, water truck, baker tank, etc. Test plans shall be submitted to the Engineer for review and approval prior to testing. Testing can be done with a tank and tested in circular pumping operation, at the Contractor's option.
2. Testing each pressure reducing station shall be completed after disinfection, but before connection to the existing recycled water system.

3.03 FIELD APPLIED COATING OF VALVE EXTERIOR

- A. Match color and be compatible with manufacturer's coating system and as specified in Section 09960 - High-Performance Coatings:
 - 1. When shop applied finish coating matches field applied coating on adjacent piping, touch up shop coating in damaged areas in accordance with instructions recommended by the paint manufacturer.
 - 2. When shop applied coating does not match field coating on adjacent piping, or when damage has occurred to the shop applied coating that requires more than touchup, blast clean valve surfaces or utilize other surface preparation recommended by the manufacturer of the coating material and apply the coating system used for coating adjacent piping.

3.04 COMMISSIONING

- A. Manufacturer services:
 - 1. Provide certificates:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance.
 - b. Manufacturers Field Services: Contractor shall pay for and coordinate manufacturer representative to field verify settings and perform recommended field start-up and testing to confirm settings.
 - c. Training: Contractor shall pay for and coordinate manufacturer representative to provide training to Owner's operations and maintenance staff at Owners facilities.
 - 2. Manufacturer's Representative onsite requirements:
 - a. Installation: 1 trip, 1 day minimum.
 - b. Functional Testing: 1 trips, 1 day minimum each.
 - 3. Training for Owner's Operation and Maintenance Staff:
 - a. Maintenance and Operation: 2 hours per session, 1 sessions.
- B. Functional testing:
 - 1. Valves:
 - a. Test witnessing: Witnessed.
 - b. Conduct pressure and leak test as specified in Section 15110 - Common Work Results for Valves.

END OF SECTION

SECTION 15119

AUTOMATIC AIR AND VACUUM VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Combination air valves.
- B. As specified in Section 15110 - Common Work Results for Valves.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through 24.
- B. American Water Works Association (AWWA).
- C. ASTM International (ASTM):
 - 1. A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 2. A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 3. A270 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing.
 - 4. B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15110 - Common Work Results for Valves.
- C. Commissioning submittals:
 - 1. Provide Manufacturer's Certificate of Installation and Functionality Compliance.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 COMBINATION AIR VALVES, WATER SERVICE

- A. Pipeline Valves (1-Inch):
 - 1. Manufacturers: One of the following or equal:
 - a. Valve and Primer Corporation, DeZurik/APCO, Series 140C.
 - b. Multiplex Manufacturing Company, Crispin UL Series.

- B. Design:
 - 1. Operation: Automatic exhaust of large quantities of air from pipelines during filling and draining and release of accumulated air while pipeline is under pressure.
 - 2. Utilize compound level system in conjunction with large and small orifices.
 - 3. Internal parts removable through top cover without removing valve from pipeline.
 - 4. Pressure Rating: 300 pounds per square inch.
 - 5. Inlet:
 - a. Screwed, 2-inch size and smaller.
 - b. Flanged, 3-inch size and larger.

- C. Materials:
 - 1. Body: Ductile or Cast iron.
 - 2. Float: Type 316 stainless steel.
 - 3. Seat: Buna-N.
 - 4. Lever frame: Cast iron or Delrin.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as specified in Section 15110 - Common Work Results for Valves and manufacturer's instructions.

- B. Install air release valves and air and vacuum valves with suitable discharge lines to nearest equipment drain.

3.02 FIELD APPLIED COATING OF VALVE EXTERIOR

- A. Match color and be compatible with manufacturer's coating system and as specified in Section 09960 - High-Performance Coating:
 - 1. When shop applied finish coating matches field applied coating on adjacent piping, touch up shop coating in damaged areas in accordance with instructions recommended by the manufacturer.
 - 2. When shop applied coating does not match field coating on adjacent piping, or when damage has occurred to the shop applied coating that requires more than touchup, remove existing coating by abrasive blast cleaning and apply the coating system used for coating adjacent piping in accordance with Section 09960 - High-Performance Coating:
 - a. Submerged valves: SP-5 White Metal Blast cleaning.
 - b. Other valves: SP-10 Near-white blast cleaning.

3.03 COMMISSIONING

- A. Manufacturer services:
 - 1. Provide certificates:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance.

- B. Functional testing:
 - 1. Valves:
 - a. Test witnessing: Non-Witnessed.
 - b. Conduct pressure and leak test as specified in Section 15110 - Common Work Results for Valves.

END OF SECTION

SECTION 15120

PIPING SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Piping specialties including:
 - 1. Flexible Couplings
 - 2. Pipe saddles.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24.
- B. American Water Works Association (AWWA):
 - 1. C110 - Standard for Ductile-Iron and Gray-Iron Fittings.
 - 2. C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast.
- C. ASTM International (ASTM):
 - 1. A148 - Standard Specification for Steel Castings, High-Strength, for Structural Purposes.
 - 2. A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 3. A194 - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - 4. A536 - Standard Specification for Ductile Iron Castings.
- D. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects, Includes Errata.
 - 2. 372 - Drinking Water System Components - Lead Content.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data:
 - 1. For each piping product in this Section as applicable:
 - a. Design features.
 - b. Load capacities.
 - c. Material designations by UNS alloy number or ASTM Specification and Grade.
 - d. Data needed to verify compliance with the Specifications.
 - e. Catalog data.
 - f. Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.

- C. Calculations:
 - 1. Provide calculations in accordance with NSF 372 for materials in contact with drinking water.
- D. Manufacturer's Certificate of Installation and Functionality Compliance:
 - 1. Provide as specified in this Section.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 GENERAL

- A. As specified in Section 01601 - Product Requirements.
- B. Materials in contact with drinking waters: In accordance with NSF 61 and NSF 372.

2.02 FLEXIBLE COUPLINGS

- A. Manufacturers: One of the following:
 - 1. EBAA Iron Series 3800 Restrained Coupling.
 - 2. MJ x MJ long solid sleeve with mechanical wedge action joint restraint.

2.03 PIPE SADDLES

- A. Service saddles shall be rated for 300 pounds per square inch working pressure.
- B. Manufacturers: Or equal:
 - 1. Romac Industries, Inc.
- C. Materials:
 - 1. Pipe saddles: Ductile iron.
 - 2. Straps, bolts, and nuts: Type 304 stainless steel with Teflon coating on nuts.
 - 3. Gaskets: EPDM.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pipe saddles:
 - 1. Coat threads on bolts with anti-gall coating prior to installation.

END OF SECTION

SECTION 15121

PIPE COUPLINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Pipe couplings for ductile iron piping.

1.02 REFERENCES

- A. American National Standards Institute (ANSI).
- B. American Society of Mechanical Engineers (ASME):
 - 1. B31.1 - Power Piping.
 - 2. B31.9 - Building Services Piping.
- C. American Water Works Association (AWWA):
 - 1. C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 2. C207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In.
 - 3. C606 - Standard for Grooved and Shouldered Joints.
- D. ASTM International (ASTM):
 - 1. A36 - Standard Specification for Carbon Structural Steel.
 - 2. A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. A193 - Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - 4. A351 - Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - 5. A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/9 ksi Minimum Tensile Strength, General Use.
 - 6. A536 - Standard Specification for Ductile Iron Castings.
 - 7. A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 8. A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - 9. D2000 - Standard Classification System for Rubber Products in Automotive Applications.
 - 10. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- E. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.
 - 2. 372 - Drinking Water System Components - Lead Content.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data:
 - 1. For each product in this Section as applicable:
 - a. Design features.
 - b. Load capacities.
 - c. Material designations by UNS alloy number or ASTM Specification and Grade.
 - d. Data needed to verify compliance with the Specifications.
 - e. Catalog data.
 - f. Clearly mark submittal information to show specific items, materials, and accessories or options being furnished.
- C. Calculations:
 - 1. Provide calculations in accordance with NSF 372 for materials in contact with drinking water.

1.04 WARRANTY

- A. Provide warranty as specified in Section 00 72 00 - Standard General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.01 PIPE COUPLINGS FOR DUCTILE IRON PIPING

- A. Dismantling joints:
 - 1. Manufacturers: One of the following or equal:
 - a. Romac Ind., Inc., Style DJ400.
 - b. Smith-Blair, Inc., Series 975.
 - 2. Materials:
 - a. Flanged spool: AWWA C207 steel pipe:
 - 1) ASTM A53 for sizes 3 inches to 12 inches.
 - 2) ASTM A36 for sizes 14 inches to 72 inches.
 - b. End ring and body:
 - 1) For sizes 3 inches to 12 inches, ductile iron in accordance with ASTM A536.
 - 2) For sizes 14 inches to 72 inches, steel in accordance with ASTM A36 or A53.
 - c. Follower ring: Ductile iron in accordance with ASTM A536.
 - d. Bolts and hex nuts:
 - 1) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM F593.
 - e. Tie rods: High tensile steel in accordance with ASTM A193 Grade B7.

3. Flange design: Class E steel ring flange in accordance with AWWA C207, compatible with ANSI Class 125 and 150 bolt circles. Flanges to be compatible with adjacent flanges.
 4. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
- B. Flanged coupling adapters: 12-inch size and smaller:
1. Manufacturers: One of the following or equal:
 - a. Dresser, Inc., Style 227.
 - b. Romac Ind., Inc., Style FCA501.
 - c. Smith-Blair, Inc., Series 912.
 2. Materials:
 - a. Flanged body: Ductile iron in accordance with ASTM A536.
 - b. Follower ring: Ductile iron in accordance with ASTM A536.
 - c. Bolts and hex nuts:
 - 1) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM A 193 (Grade B 8M) for bolts and ASTM A194 (Grade 8M) for nuts.
 3. Flange design: Class E steel ring flange in accordance with AWWA C207 compatible with ANSI Class 125 and 150 bolt circles.
 4. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
- C. Flanged coupling adapters: Greater than 12-inch size:
1. Manufacturers: One of the following or equal:
 - a. Dresser, Inc., Style 128-W.
 - b. Baker Series, 601.
 - c. Smith-Blair, Inc., Series 913.
 2. Materials:
 - a. Flange and flanged body: Ductile iron or low carbon steel having a minimum yield strength of 30,000 pounds per square inch.
 - b. Follower ring: Low carbon steel having a minimum yield strength of 30,000 pounds per square inch.
 - c. Bolts and hex nuts:
 - 1) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM A 193 (Grade B 8M) for bolts and ASTM A 194 (Grade 8M) for nuts.
 3. Flange design: Class E steel ring flange in accordance with AWWA C207 compatible with ANSI Class 125 and 150 bolt circles.
 4. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
- D. Flexible couplings:
1. Manufacturers: One of the following or equal:
 - a. Dresser, Inc., Style 253.
 - b. Baker Series 200.
 - c. Smith-Blair, Inc., Series 441.

2. Materials:
 - a. Center rings: Ductile iron in accordance with ASTM A536.
 - b. Follower rings: Ductile iron in accordance with ASTM A536.
 - c. Bolts and hex nuts:
 - 1) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel in accordance with ASTM F593.
3. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
4. Center sleeve dimensions: Provide center sleeves with lengths in accordance with following table:

Nominal Pipe Size	Sleeve Length
3 inch and smaller	Manufacturer's standard
4 inch through 8 inch	7 inches
10 inch through 14 inch	12 inches
Greater than 16 inch	Use steel flexible coupling per Pipe Couplings for Steel Piping

- E. Restrained flange coupling adapter:
 1. Manufacturers: One of the following or equal:
 - a. Romac Ind., Inc., Style RFCA.
 - b. EBAA Iron Inc., Series 2100.
 2. Materials:
 - a. Flange and flanged body: Ductile iron in accordance with ASTM A536.
 - b. Follower ring: Lug type restraint system:
 - 1) Follower ring: Ductile iron in accordance with ASTM A536.
 - 2) Restraining lugs: Ductile iron in accordance with ASTM A536:
 - a) Designed to contact the pipe and apply forces evenly.
 - 3) Restraining bolts:
 - a) Ductile iron in accordance with ASTM A536.
 - b) Bolt heads shall be designed to twist off when the proper torque has been applied.
 - c. Bolts and hex nuts:
 - 1) Aboveground: High strength, low alloy steel in accordance with AWWA C111.
 - 2) Buried and underwater: Type 316 stainless steel bolts in accordance with ASTM F593.
 3. Flange design: Class E steel ring flange in accordance with AWWA C207 compatible with ANSI Class 125 and 150 bolt circles.
 4. Coating and lining: Manufacturer's standard fusion bonded epoxy, NSF 61 certified.
 5. Angular deflection: Restrained flange coupling adapter must allow angular deflection after assembly.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In underground and underwater installations, coat the exterior of coupling with a protective coating in accordance with manufacturer's instructions.
- B. Joints and flexible connections shall be installed centered with no angular deflection unless otherwise indicated on the Drawings.
- C. Flexible couplings and flange coupling adapters: Install with gap between pipe ends in accordance with the following table unless a greater gap is indicated on the Drawings. Maximum gap tolerance shall be within 1/8 inch:
 - 1. Install flexible coupling with pipe gap located in middle of center sleeve.
 - 2. Install flanged coupling adapter with end of plain end pipe in middle of flanged coupling body.

Center Ring Length	Gap Dimension and Tolerance
4 inch through 6 inch	3/8 inch
7 inch	5/8 inch
10 inch and greater	7/8 inch

- D. Provide harnesses (tie-downs) for flexible couplings unless otherwise indicated on the Drawings with a written note:
 - 1. Design harnesses (tie-downs) for the test pressures as specified in the Piping Schedule in Section 15052 - Common Work Results for General Piping.

END OF SECTION

SECTION 15125

STRAINERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Strainers.

1.02 REFERENCES

- A. ASTM International (ASTM):
 1. A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 2. A420 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service.
- B. Society of Automotive Engineers (SAE).

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15052 - Common Work Results for General Piping.

PART 2 PRODUCTS

2.01 H-STYLE STRAINER

- A. H-style strainers 4 inches and larger in diameter:
 1. Materials:
 - a. Body and Cover: Ductile Iron ANSI B16.42; Fusion Bonded Epoxy: Coating Standard.
 - b. Cover Seal: Buna-N Synthetic Rubber.
 - c. Strainer: 316 Stainless Steel.
 2. Strainer Mesh Sizes:
 - a. Openings: 0.078 inch.
 - b. 2000 Micron.
 - c. Standard 10 mesh.
 3. Maximum Pressure Rating:
 - a. 150# - 250 psi.
 4. Manufacturers: No equal:
 - a. Cla-Val, Model X43H.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with the manufacturer's recommendations.

3.02 COMMISSIONING

- A. As specified in this Section.
- B. Manufacturer services:
 - 1. Provide certificates:
 - a. Manufacturer's Certificate of Installation and Functionality Compliance.
 - 2. Manufacturer's Representative onsite requirements:
 - a. Installation: 1 trip, 1 day minimum.
 - b. Functional Testing: 1 trips, 1 day minimum each.
 - 3. Training:
 - a. Maintenance and Operation: 2 hours per session, 2 sessions.
- C. Functional testing:
 - 1. Mechanically cleaned strainers only:
 - a. Test witnessing: Witnessed.
 - b. Conduct pressure and leak test as specified in Section 15110 - Common Work Results for Valves.

END OF SECTION

SECTION 15211

DUCTILE IRON PIPE: AWWA C151

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Ductile iron pipe, joints, fittings, gaskets, and pipe linings and coatings.

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- B. American Water Works Association (AWWA):
 - 1. C104 - Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - 2. C110 - Standard for Ductile-Iron and Gray-Iron Fittings.
 - 3. C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 4. C115 - Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - 5. C150 - Standard for Thickness Design of Ductile-Iron Pipe.
 - 6. C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast.
 - 7. C153 - Standard for Ductile-Iron Compact Fittings for Water Service.
 - 8. C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.
 - 9. C606 - Standard for Grooved and Shouldered Joints.
- C. American Welding Society (AWS):
 - 1. D11.2 - Guide for Welding Iron Castings.
- D. ASTM International (ASTM):
 - 1. A47 - Standard Specifications for Ferritic Malleable Iron Castings.
 - 2. A183 - Standard Specifications for Carbon Steel Track Bolts and Nuts.
 - 3. A536 - Standard Specifications for Ductile Iron Castings.
 - 4. C283 - Standard Test Methods for Resistance of Porcelain Enamelled Utensils to Boiling Acid.
 - 5. D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- E. Ductile Iron Pipe Research Association (DIPRA):
 - 1. Thrust Restraint Design Manual.
- F. NACE International (NACE):
 - 1. SP0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

- G. National Association of Pipe Fabricators, Inc. (NAPF):
 - 1. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings.
- H. Society for Protective Coatings (SSPC):
 - 1. PA-2 - Measurement of Dry Coating Thickness With Magnetic Gages.

1.03 SYSTEM DESCRIPTION

- A. Thrust restraint system design:
 - 1. The pipe shall be restrained at all locations.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15052 - Common Work Results for General Piping.
- C. Shop drawings:
 - 1. Photographs, drawings, and descriptions of fittings, gaskets, couplings, grooving of pipe and fittings, pipe linings, and coatings.
- D. Manufacturer's statement:
 - 1. Manufacturer shall provide a sworn statement that the materials provided complies with the requirements and standards of these specifications. The statement shall also confirm that the inspection and specified tests have been made and that the results thereof comply with the requirements and standards of this specification.
- E. Manufacturer's test reports:
 - 1. On regular measurements of zinc coating masses that are required by ISO 8179 Part 4.4.
 - 2. Include Coating Manufacturer's Technical Representative's reports.

1.05 QUALITY ASSURANCE

- A. Pre-installation meeting:
 - 1. Arrange for pipeline manufacturer's representative to provide instruction to pipeline installation crew members who have not previously installed integrally restrained push-on joints.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Block piping and associated fittings for shipment to prevent damage to coatings and linings.
- B. Carefully handle piping and associated fittings during loading, unloading, and installation:
 - 1. Do not drop piping material from cars or trucks.
 - 2. Lower piping by mechanical means.
 - 3. Do not drop or pound pipe to fit grade.

- C. Protect gaskets from long-term exposure to sunlight.
- D. Store piping, fittings, and other accessories such that they do not accumulate and hold rainwater, dirt, and debris.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Ductile iron piping:
 - 1. Manufacturers meeting qualifications as specified in this Section.
 - 2. Typical type:
 - a. In accordance with AWWA C150 and AWWA C151.
 - b. Pressure class 350 pounds per square inch.
 - c. Manufactured from greater than 90 percent recycled material.
 - 3. Type with screw-on flanges:
 - a. In accordance with AWWA C115 with minimum special thickness Class 53 wall thickness as required for screw-on flanges.
- B. Joints:
 - 1. Flanged joints:
 - a. Screw-on flanges: Comply with the diameter, thickness, drilling, and other characteristics in accordance with ASME B16.1. In addition, comply with the following requirements:
 - 1) Ductile iron.
 - 2) Long hub, threaded, and specially designed for ductile iron pipe.
 - 3) After attaching to pipe, machine flange face to make pipe end and flange even and perpendicular to the axis of the pipe.
 - b. Bolt holes on flanges: 2-holed and aligned at both ends of pipe.
 - c. Cap screw or stud bolt holes: Tapped.
 - d. Bolts and nuts: As specified in Section 15052 - Common Work Results for General Piping.
 - e. Gaskets: Standard styrene butadiene copolymer (SBR) rated to 350 pounds per square inch.
 - f. Flanged unit connections: Flanged to grooved joint adapters or a long enough spool with one end flanged and the other end grooved to prevent interference with the operation of adjacent valves, pumps, or other items.
 - 2. Mechanical joints: In accordance with AWWA C111.
 - 3. Push-on rubber gasket joints: In accordance with AWWA C111.
 - 4. Mechanical wedge action joint restraints:
 - a. Manufacturers, one of the following, or equal rated at least 350 pounds per square inch working pressure:
 - 1) EBAA Iron, Inc., Megalug Series 1100TDM.
 - 2) Star Pipe Products, Tandem Stargrip Series 3000T.
 - b. Materials:
 - 1) Gland body: Ductile iron in accordance with ASTM A536.
 - 2) Wedges and wedge actuating components: Ductile iron in accordance with ASTM A536.
 - a) Wedges shall be heat treated to a minimum of 370 BHN.

- 3) Actuating bolts and nuts: Ductile iron in accordance with ASTM A536:
 - a) Provide torque-limiting twist off components to ensure proper installation.
 - c. Coatings:
 - 1) Provide manufacturer applied coating system.
 - 2) Manufacturers: One of the following or equal:
 - a) EBAA Iron Inc., Mega-Bond.
 - b) Star Pipe Products, Star-Bond.
 - c) Sigma Corp., Corrsafe™ Electro-deposition coating.
 - d. Working pressure:
 - 1) Shall include a minimum safety factor of 2:1.
 - 2) 350 pounds per square inch.
 - e. Restraint shall consist of multiple gripping wedges incorporated into a follower gland meeting the requirements of AWWA C111.
 - f. Restraint shall allow post assembly angular deflection that is a minimum of 50 percent of the angular deflection allowed by the mechanical joint.
 - g. Restraint must be in accordance with applicable requirements of AWWA C110 and AWWA C111 for mechanical joints.
5. Integrally restrained push-on joints:
- a. Application:
 - 1) Where designation restrained push-on is specified in the Piping Schedule provided in Section 15052 - Common Work Results for General Piping, supply a restrained push-on joint piping system, which includes restrained push-on joints where necessary based upon thrust calculations.
 - 2) Standard push-on rubber gasket joints as specified above can be used where thrust calculations demonstrate restraint is not required.
 - b. Design:
 - 1) Restrained push-on joints of the configuration which utilizes a gripping or friction force for restraint will not be acceptable.
 - 2) Suitable for the following working pressures:
 - a) 350 pounds per square inch gauge.
 - c. Manufacturers: One of the following or equal:
 - 1) U.S. Pipe, TR Flex:
 - a) Local Representative: Collin Bryant (530) 521-8081.
 - 2) McWane Ductile, TR Flex:
 - a) Local Representative: John Johnson (951)813-9589.
 - 3) American Cast Iron Pipe Co., Flex Ring or Lok-Ring:
 - a) Local Representative: Rosemary Smud (678) 770-6575.
 - d. Limit buried joints to the manufacturer's published allowable angular joint deflection for purposes of pipeline alignment and elimination of fittings.

C. Fittings:

- 1. Ductile iron in accordance with AWWA C110.
- 2. Joint type: Same as that of the associated piping as specified in Section 15052 - Common Work Results for General Piping.
- 3. Plain end-to-flanged joint connectors using setscrews are not acceptable.
- 4. Where fittings are located adjacent to other fittings or valves, the connection shall be a flange by flange connection.

- D. Pipe and Fitting linings:
 - 1. Cement-mortar lining:
 - a. In accordance with AWWA C104, apply cement-mortar on clean bare metal surfaces. Extend to faces of flanges, ends of spigots, and shoulders of hubs.
 - b. Minimum lining thickness: Standard in accordance with AWWA C104.
 - c. Type of cement: Type II.
 - 2. Asphaltic seal coat:
 - a. Apply over cement mortar linings and to outside surface of pipes that will not receive another coating. Apply in accordance with AWWA C151.

- E. Pipe coatings:
 - 1. Zinc coating:
 - a. The exterior shall be coated with a layer of arc-sprayed zinc per ISO 8179.
 - b. The mean mass of zinc based coating measured in accordance with ISO 8179 shall not be less than 200g/m² of pipe surface area with a local minimum of 180 g/m².
 - c. Manufacturer shall carry out regular measurements of zinc coating masses in accordance with ISO 8179.
 - d. Pipe markings shall include the word "zinc" or a similar designation clearly identifying the pipe has a zinc coating.
 - 2. Topcoat:
 - a. The finishing layer shall be bituminous paint compatible with the zinc based layer. The mean dry film thickness shall be per AWWA C151.

- F. Fitting coatings:
 - 1. Zinc coating:
 - a. The exterior shall be coated with a zinc rich paint conforming to 8179- 2. Dry film thickness shall be as recommended by the paint manufacturer, but not less than 2.0 mils.
 - b. Fitting markings shall include the word "zinc".
 - 2. Topcoat: Same as Pipe coatings.

2.02 POLYETHYLENE ENCASEMENT

- A. Do not encase in polyethylene.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install ductile iron piping in accordance with AWWA C600, modified as specified in Section 15052 - Common Work Results for General Piping.
 - 2. For underground piping, the trenching, backfill, and compaction: As specified in Section 02318 - Trenching.

- B. Joints:
 - 1. Install types of joints as specified in the piping schedule provided in Section 15052 - Common Work Results for General Piping.
 - 2. Mechanical joints are not acceptable in above ground applications.

3.02 FIELD QUALITY CONTROL

- A. Testing ductile iron piping:
 - 1. Test as specified in Section 15052 - Common Work Results for General Piping and Section 15956 - Piping Systems Testing.
 - 2. Do not test sections longer than 1/2 mile in total pipe length.

- B. Repair damaged pipe and fitting coating in accordance with ISO 8179:
 - 1. Zinc rich paint shall conform to ISO 8179 - 2, or per Manufacturer's recommended zinc rich paint if the Contractor can demonstrate a field applied coating that conform to ISO 8179 - 2 is not available.

- C. Repair damaged cement mortar lining to match quality, thickness, and bonding of original lining in accordance with AWWA C104:
 - 1. When lining cannot be repaired or repairs are defective, replace defective piping with undamaged piping.

3.03 SPARE PARTS

- A. Spare Pipe:
 - 1. Supply and deliver one (1) standard length piece of ductile iron pipe with associated gasket materials of each diameter used on the project to the Owner's corporation yard. Coordinate delivery time and location with Owner.

END OF SECTION

SECTION 15244

POLYVINYL CHLORIDE (PVC) PIPE: AWWA C900

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. AWWA C900 PVC pipe and fittings.
 - 2. AWWA C900 compliant fusible PVC (FPVC).

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 2. C605 - Standard for Underground Installation of PVC and PVCO Pressure Pipe and Fittings for Water.
 - 3. C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches to 12 Inches, for Water Transmission Distribution.
 - 4. C905 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In.
 - 5. M23 - PVC Pipe - Design and Installation Manual.
- B. ASTM International (ASTM):
 - 1. A536 - Standard Specification for Ductile Iron Castings.
 - 2. D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - 3. D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - 4. F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - 5. F645 - Standard Guide for Selection, Design and Installation of Thermoplastic Water-Pressure Piping Systems.
- C. NSF International (NSF):
 - 1. 61 - Drinking Water System Components - Health Effects.

1.03 ABBREVIATIONS

- A. DR: Dimension ratio.
- B. NPS: Nominal pipe size followed by the size designation.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15052 - Common Work Results for General Piping.

- C. Shop drawings: As specified in Section 15052 - Common Work Results for General Piping:
 - 1. Describe materials, pipe, fittings, and gaskets.
 - 2. Manufacturer's product handling and installation instructions.

- D. If FPVC is used for this project, submittals shall also include:
 - 1. Fusion technician qualifications.
 - 2. The following AS-RECORDED DATA is required from the Contractor and/or fusion provider:
 - a. Fusion report for each fusion joint performed on the project, including joints that were rejected and the following information:
 - 1) Pipe size and dimensions.
 - 2) Machine size.
 - 3) Fusion technician identification.
 - 4) Job identification.
 - 5) Fusion joint identification.
 - 6) Fusion, heating and drag pressure settings.
 - 7) Heat plate temperature.
 - 8) Pipe extrusion time stamp.
 - 9) Heating and cool down time of fusion.
 - 10) Ambient temperature.

1.05 QUALITY ASSURANCE

- A. Mark plastic pipe with date of extrusion, nominal size, class, manufacturer and all markings required in accordance with ASTM and AWWA standards.

- B. Pre-installation meeting:
 - a. Arrange for pipeline manufacturer's representative to provide instruction to pipeline installation crew members who have not previously installed integrally restrained push-on joints or fusible PVC pipe.

- C. Fusion technician requirements:
 - 1. If FPVC is used for this project:
 - a. Fusion technician shall be qualified by the pipe supplier to fuse FPVC of the type(s) and size(s) being used.
 - b. Current qualification as of the actual date of fusion performance on the project.
 - c. Training records for qualified fusion technicians available to Owner or Engineer upon request.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect from sunlight, scoring, and distortion.

- B. Do not allow surface temperatures to exceed 120 degrees Fahrenheit.

- C. Deliver, offload, handle, and store pipe in accordance with manufacturer's or pipe supplier's recommendations and best practices provided by AWWA M23 and AWWA C605, including compliance with minimum recommended bending radius and maximum safe pulling forces for each specific pipe.

PART 2 PRODUCTS

2.01 PIPE

- A. General:
 - 1. Extruding and molding material: 100 percent virgin material containing no scrap, regrind, or rework material except where permitted in the referenced standards.
 - 2. In accordance with AWWA C900.
 - 3. Pipe for use in potable water systems shall also bear the NSF 61 mark.
 - 4. Potable water pipe shall be blue in color and recycled water pipe shall be purple in color.

- B. AWWA C900:
 - 1. Meets or exceeds AWWA C900.
 - 2. Dimension ratio of 14 respectively as scheduled in Section 15052 - Common Work Results for General Piping.

- C. Fusible:
 - 1. Extruded with plain ends square to the pipe and free of any bevel or chamfer.
 - 2. Pressure class as scheduled in Section 15052 - Common Work Results for General Piping.
 - 3. Manufacturers: One of the following or equal:
 - a. Underground Solutions, Inc. Fusible C-900.
 - 4. Extruder Manufacturers: One of the following or equal:
 - a. Northern Pipe Products.
 - b. CertainTeed.
 - c. North America Pipe Co.

2.02 FITTINGS

- A. Material:
 - 1. Cast or ductile iron fittings as specified in Section 15211 - Ductile Iron Pipe: AWWA C151, sized for the dimensions of the pipe being used.

- B. Equal to or greater pressure rating than the pipe.

- C. If FPVC is used for this project, fusible sweeps may be used. Fusible sweeps:
 - 1. Conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being jointed by the fitting.
 - 2. Manufactured from the same FPVC being used for the installation.
 - 3. Include sufficient length of straight pipe on either side of the sweep to allow for fusion of the sweep to the pipe and/or other sweeps when thermal fusion jointing is used.

2.03 JOINTS

- A. Integrally restrained push-on joints:
 - 1. Application:
 - a. All pipe shall be supplied with self-restrained push-on joint piping system.
 - 2. Design:
 - a. Restrained push-on Rieber style joints meeting the requirements of ASTM D3139 with gaskets meeting the requirements of ASTM F477.

- b. Suitable for the following working pressures:
 - 1) 305 pounds per square inch gauge.
 - 3. Manufacturers: One of the following or equal:
 - a. JM Eagle, Eagle Loc900.
 - b. Diamond Plastics, Lok-21.
 - 4. Limit buried joints to half the manufacturer's published allowable angular joint deflection for purposes of pipeline alignment and elimination of fittings.
 - 5. Factory installed gaskets: Styrene Butadiene (SBR) rated to not less than the pressure rating of the pipeline pressure rating.
 - 6. Mechanical thrust restraint:
 - a. The restraint system shall be rated in accordance with the performance requirements of ANSI/AWWA C111/A21.11.
 - b. The restraining system for PVC shall be rated at a 2:1 safety factor.
 - c. Manufacturers: The following or approved equal.
 - d. EBAA Iron: 2000PV Megalug Mechanical Joint Restraint.
- B. Fusion joints:
 - 1. Unless otherwise specified, assemble FPV lengths in the field using butt-fusion joining methodology as recommended by the pipe supplier.

2.04 TRACER WIRE

- A. All piping shall be installed with a continuous insulated tracer wire.

2.05 SOURCE QUALITY CONTROL

- A. Bell and spigot piping:
 - 1. Hydrostatic proof testing in accordance with AWWA C900: Test pipe and integral bell to withstand, without failure, 2 times the pressure class of the pipe for a minimum of 5 seconds.
 - 2. Hydrostatic proof testing in accordance with AWWA C905: Test pipe and integral bell to withstand, without failure, 2 times the pressure class of the pipe for a minimum of 5 seconds.
- B. Fusible:
 - 1. Test at the extrusion facility for properties required to meet applicable parameters as outlined in AWWA C900.
 - 2. Conduct hydrostatic proof testing in accordance with the provisions of AWWA C900 for pipes manufactured to non-standard lengths (i.e., lengths other than 20-foot)

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install piping in accordance with ASTM F645, AWWA C605, the Appendix of AWWA C900 and AWWA C905 and manufacturer's or pipe supplier's published installation instructions.
 - 2. For open cut installations, install underground warning tape as specified in Section 15076 - Pipe Identification.
 - 3. Install pipe with tracer wire as specified in Section 15076 - Pipe Identification.

- B. Pipe Deflections:
1. Deflecting the joint shall not exceed half the manufacturers recommended deflection, or 0.5 percent, whichever is more restrictive. Pipe bends and deflections greater than this shall be made by bending one or more adjacent pipe barrels. The pipeline may be assembled above ground, in a straight line, and then curved at the barrel when laid in the trench. The trench may be curved to change direction or avoid obstructions within the limits of the curvature of the pipe as published by the pipeline manufacturer. Mechanical means should not be employed to accomplish bending the pipe barrel. It is the intent that the workers should accomplish this manually in the trench as recommended by the manufacturer.
- C. Tapping Pipe:
1. Tapping shall be performed per AWWA recommendations.
 2. Tapping shall not be performed on deflected pipe barrels. Where the drawings call for a tap at a location that had a deflected pipe barrel, Contractor shall locate tap on adjacent pipe barrel that is not deflected and adjust piping from tap to appurtenance at no additional cost.
- D. Fusible PVC
1. Layout:
 - a. Perform fusion of the pipe at surface level:
 - 1) No fusion will be completed in the excavated area or trench without prior special approval.
 - b. Fuse pipe lengths in their entirety and stage prior to installation in the trench.
 - c. Handle and install the FPVC pipe in a manner so as not to exceed the recommended bend radius.
 2. Installation:
 - a. Install fused lengths of pipe by lowering into the trench or excavation using manufacturer approved methods:
 - 1) Once the lowering operation is initiated, proceed until the entire length of the fused section of pipe is installed.
 - b. Coordinate lifting equipment to ensure the fused pipe does not exceed the bending and buckling limitations of the pipe, in accordance with manufacturer's or pipe supplier's recommendations:
 - 1) Do not "drop" or "roll" pipe into the trench or excavation.
 - 2) Support pipe at all times, including placement in final alignment.
 - c. Bed and remove lengths of FPVC from direct sunlight for a period of at least 2 minutes per inch-diameter before any connections are made.
 - d. Do not exceed the manufacturer's recommended safe pulling force for the specific pipe size and DR being installed by pulling in tension.
 3. Fusion process:
 - a. FPVC will be fused by qualified fusion technicians certified and experienced in the type and size of FPVC pipe being used:
 - 1) Pipe supplier submit technician's documented qualifications valid for date of project welding.
 - b. Use only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier for the fusion process.
 - c. Fusion machines must meet the following requirements:
 - 1) Heat plates:
 - a) Appropriately sized.

- b) In good condition with no deep gouges or scratches within the pipe circle being fused.
 - c) Clean and free of any contamination.
 - d) Capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused in accordance with pipe manufacturer's recommendations.
 - 2) Verify heater controls properly function.
 - 3) Smooth traveling carriage with no binding at less than 50 pounds per square inch.
 - 4) Jaws: Good condition with proper inserts for the pipe size being fused.
 - 5) Install insert pins with no interference to carriage travel.
 - 6) Machine body: No obvious defects, missing parts, or potential safety issues during fusion.
- d. Use pipe rollers for support of pipe on either side of the machine.
- e. Provide a weather protection canopy that allows full machine motion of the heat plate, fusion assembly, and carriage for fusion in inclement and/or windy weather.
- f. Use facing blades specifically designed for cutting FPVC.
- g. Record and log each fusion joint using an electronic monitoring device (data logger) connected to the fusion machine:
 - 1) Generate the fusion data logging and joint report using software developed specifically for the fusion of FPVC.
 - 2) Use the current version of the pipe manufacturer's recommended data logger software.
 - 3) Manually log data not logged by the data logger and include in the fusion technician's joint report.
- 4. Tapping FPVC:
 - a. Direct tapping of FPVC is not allowed.
 - b. Saddle tapping:
 - 1) Saddle taps are allowable on all sizes and classes of AWWA C900 FPVCP.
 - c. Tapping sleeves:
 - 1) Tapping sleeves are allowable on all sizes and classes of AWWA C900 FPVC.
 - d. Use only allowable tap sizing and recommended tapping procedures provided by the pipe supplier for all tapping operations on FPVC.

3.02 FIELD QUALITY CONTROL

- A. Leakage test for piping:
 - 1. Subject to visible leak test and pressure test with maximum leakage allowance, as specified in Section 15956 - Piping Systems Testing.
 - 2. Pressure test with maximum leakage allowance:
 - a. Perform test after placing sufficient backfill.
 - b. In areas requiring immediate backfill, test prior to placement of permanent surfacing.
 - c. Test pressure: As specified in the Piping Schedule in Section 15052 - Common Work Results for General Piping.
 - d. FPVC fusion joints: No leakage allowed.
 - e. Maximum leakage allowance for bell and spigot pipe is as follows, where the value for leakage is in gallons per 50 joints per hour.

Test Pressure (psi)	Nominal Pipe Size (inches)									
	4	6	8	10	12	14	16	18	20	24
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15
75	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62
125	0.3	0.45	0.6	0.76	0.91	1.06	1.21	1.36	1.51	1.81
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56
275	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69
300	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81

END OF SECTION

SECTION 15281

COPPER WATER TUBE: SEAMLESS, ASTM B88

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Copper water tube-seamless, ASTM B88.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. B32 - Standard Specification for Solder Metal.
 - 2. B88 - Standard Specification for Seamless Copper Water Tube.
 - 3. B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
 - 4. B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fitting.
- B. International Association of Plumbing and Mechanical Officials (IAPMO):
 - 1. IS 3 - Installation Standard for Copper Plumbing Tube, Pipe and Fittings.

1.03 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Product data: As specified in Section 15052 - Common Work Results for General Piping.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Seamless copper water tube:
 - 1. Type: ASTM B88:
 - a. Exposed copper piping or tubing: Type L hard-drawn, rigid.
 - b. Copper tubing buried in the ground or in plastic conduit: Type K soft-annealed.
 - 2. Fittings: Solder type forged, or wrought copper:
 - a. Manufacturers: One of the following or equal:
 - 1) Hoke, Gyrolok.
 - 2) Crawford Fitting Co., Swagelok.
 - 3) Parker.
 - 3. Solder: ASTM B32, Alloy Grade Sb5.
 - 4. Flux: ASTM B813.

5. Dielectric insulating unions or fittings:
 - a. Manufacturers: One of the following or equal:
 - 1) Mueller Co.
 - 2) Watts Series 3001A.
6. Special thread to tube adapters:
 - a. Manufacturers: One of the following or equal:
 - 1) Crawford Fitting Co., Swagelok.
 - 2) Hoke, Gyrolok.
 - 3) Parker.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 1. Support copper piping and tubing as specified in Section 15061 - Pipe Supports.
 2. Clean copper lines with high-pressure air after first disconnecting piping at instruments, filters, pressure reducers, valve operators, and other special devices.
 3. Install copper pipe in accordance with IAPMO IS 3.
- B. Installation of copper piping:
 1. Connect copper pipe connected to ferrous pipe or valves, or other non-copper items, by means of dielectric insulating unions or fittings.
 2. Where connections are made to meters or other devices having iron pipe size threaded fittings, provide special thread to tube adapters.
- C. Installation of copper tubing:
 1. Install copper tubing in accordance with ASTM B828 and IAPMO IS 3.
 2. Install copper tubing in straight runs, supported at intervals close enough to avoid sagging.
 3. Make cuts square with a tubing cutter or with a 32-tooth hacksaw:
 - a. Provide a sizing tool to correct distortions.
 4. Ream the inside of the tubing and remove burrs from the outside, holding the end of the tubing downward and preventing chips and fillings from entering the tubing.
 5. Perform flaring with a flare block and yoke type screw feed flaring tool:
 - a. After removing the tubing from the flare block, inspect both surfaces of the flare for splits, cracks, or other imperfections.
 - b. Where there are imperfections, cut off the imperfect flare, and prepare a new flare.

3.02 FIELD QUALITY CONTROL

- A. Testing: Test copper lines in the same manner as the piping system to which they connect.

END OF SECTION

SECTION 15956
PIPING SYSTEMS TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Test requirements for piping systems.

1.02 REFERENCES

- A. National Fuel Gas Code (NFGC).
- B. American Society of Mechanical Engineers (ASME):
 - 1. B31.1 - Power Piping.
 - 2. B31.3 - Process Piping.
 - 3. B31.8 - Gas Transmission and Distribution Piping Systems.
- C. Underwriters Laboratories Inc. (UL).

1.03 TESTING REQUIREMENTS

- A. See Section 01140 for testing requirements prior to connecting to existing water and/or recycled water pipelines.
- B. General requirements:
 - 1. Testing requirements are stipulated in Laws and Regulations; are included in the Piping Schedule in Section 15052 - Common Work Results for General Piping; are specified in the specifications covering the various types of piping; and are specified in this Section.
 - 2. Requirements in Laws and Regulations supersede other requirements of Contract Documents, except where requirements of Contract Documents are more stringent, including higher test pressures, longer test times, and lower leakage allowances.
 - 3. When testing with water, the specified test pressure is considered to be the pressure at the lowest point of the piping section under test:
 - a. Lower test pressure as necessary (based on elevation) if testing is performed at higher point of the pipe section.
- C. Furnish necessary personnel, materials, and equipment, including bulkheads, restraints, anchors, temporary connections, pumps, water, pressure gauges, and other means and facilities required to perform tests.
- D. Water for testing, cleaning, and disinfecting:
 - 1. Water for testing, cleaning, and disinfecting will be provided as specified in Section 01500 - Temporary Facilities and Controls.
 - 2. Water for testing, cleaning, and disinfecting shall be potable.

- E. Pipes to be tested: Test only those portions of pipes that have been installed as part of this Contract. Test new pipe sections prior to making final connections to existing piping. Furnish and install test plugs, bulkheads, and restraints required to isolate new pipe sections. Do not use existing valves as test plug or bulkhead.
- F. Unsuccessful tests:
 - 1. Where tests are not successful, correct defects or remove defective piping and appurtenances and install piping and appurtenances that comply with the specified requirements.
 - 2. Repeat testing until tests are successful.
- G. Test completion: Drain and leave piping clean after successful testing.
- H. Test water disposal: Dispose of testing water to nearest sanitary sewer in accordance with requirements of federal, state, county, and city regulations governing disposal of wastes in the location of the Project and disposal site.

1.04 SUBMITTALS

- A. Submit as specified in Section 01330 - Submittal Procedures.
- B. Schedule and notification of tests:
 - 1. Submit a list of scheduled piping tests by noon of the working day preceding the date of the scheduled tests.
 - 2. Notification of readiness to test: Immediately before testing, notify Engineer in writing of readiness, not just intention, to test piping.
 - 3. Have personnel, materials, and equipment specified in place before submitting notification of readiness.

1.05 SEQUENCE

- A. Clean piping before pressure or leak tests.
- B. Test gravity piping underground, including sanitary sewers, for visible leaks before backfilling and compacting.
- C. Underground pressure piping may be tested before or after backfilling when not indicated or specified otherwise.
- D. Backfill and compact trench, or provide blocking that prevents pipe movement before testing underground piping with a maximum leakage allowance.
- E. Test underground piping before encasing piping in concrete or covering piping with slab, structure, or permanent improvement.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 TESTING ALIGNMENT, GRADE, AND DEFLECTION

- A. Alignment and grade:
 - 1. Visually inspect the interior of gravity piping with artificial light, reflected light, or laser beam.
 - 2. Consider inspection complete when no broken or collapsed piping, no open or poorly made joints, no grade changes that affect the piping capacity, or no other defects are observed.

- B. Deflection test:
 - 1. Pull a mandrel through the clean piping section under test.
 - 2. Perform the test not sooner than 30 days after installation and not later than 60 days after installation.
 - 3. Use a 9-rod mandrel with a contact length of not less than the nominal diameter of the pipe within 1 percent plus or minus.
 - 4. Consider test complete when the mandrel can be pulled through the piping with reasonable effort by 1 person, without the aid of mechanical equipment.

3.02 TESTING HIGH-HEAD PRESSURE PIPING

- A. Test piping for which the specified test pressure in the Piping Schedule is 20 pounds per square inch gauge or greater, by the high head pressure test method, indicated "HH" in the Piping Schedule.

- B. General:
 - 1. Test connections, hydrants, valves, blowoffs, and closure pieces with the piping.
 - 2. Do not use installed valves for shutoff when the specified test pressure exceeds the valve's maximum allowable seat differential pressure. Provide blinds or other means to isolate test sections.
 - 3. Do not include valves, equipment, or piping specialties in test sections if test pressure exceeds the valve, equipment, or piping specialty safe test pressure allowed by the item's manufacturer.
 - 4. During the performance of the tests, test pressure shall not vary more than plus or minus 5 pounds per square inch gauge with respect to the specified test pressure.
 - 5. Select the limits of testing to sections of piping. Select sections that have the same piping material and test pressure.
 - 6. When test results indicate failure of selected sections, limit tests to piping:
 - a. Between valves.
 - b. Between a valve and the end of the piping.
 - c. Less than 500 feet long.
 - 7. Test piping for minimum 2 hours for visible leaks test and minimum 2 hours for the pressure test with maximum leakage allowance.

- C. Testing procedures:
 - 1. Fill piping section under test slowly with water while venting air:
 - a. Use potable water for all potable waterlines and where noted on the Piping Schedule.
 - 2. Before pressurizing for the tests, retain water in piping under slight pressure for a water absorption period of minimum 24 hours.

3. Raise pressure to the specified test pressure and inspect piping visually for leaks:
 - a. Consider visible leakage testing complete when no visible leaks are observed.
- D. Pressure test with maximum leakage allowance:
 1. Leakage allowance is zero for piping systems using flanged, National Pipe Thread threaded and welded joints.
 2. Pressure test piping after completion of visible leaks test.
 3. For piping systems using joint designs other than flanged, threaded, or welded joints, accurately measure the makeup water necessary to maintain the pressure in the piping section under test during the pressure test period:
 - a. Consider the pressure test to be complete when makeup water added is less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - b. Successful completion of the pressure test with maximum leakage allowance shall have been achieved when the observed leakage during the test period is equal or less than the allowable leakage and no damage to piping and appurtenances has occurred.
 - c. When leakage is allowed, calculate the allowable leakage by the following formula:

$$L = S \times D \times P^{1/2} \times 133,200^{-1}$$

wherein the terms shall mean:

L = Allowable leakage in gallons per hour.

S = Length of the test section in feet.

D = Nominal diameter of the piping in inches.

P = Average observed test pressure in pounds per square inches gauge, at the lowest point of the test section, corrected for elevation of the pressure gauge.

x = The multiplication symbol.

END OF SECTION

SECTION 17050

COMMON WORK RESULTS FOR PROCESS CONTROL AND INSTRUMENTATION SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. General requirements applicable to all Process Control and Instrumentation Work.
 - 2. General requirements for process control and instrumentation submittals.
- B. Contract Documents:
 - 1. General:
 - a. The drawings and specifications are complementary and are to be used together in order to fully describe the Work.
 - 2. Specifications:
 - a. Documents 00 72 00 - Standard General Conditions of the Construction Contract and 00 73 00 - Supplementary Conditions govern the Work.
 - b. These requirements are in addition to all General Requirements.
- C. Compliance with Laws and Regulations:
 - 1. As specified in Document 00 72 00 - Standard General Conditions of the Construction Contract.

1.02 DEFINITIONS

- A. Definitions of terms and other electrical and instrumentation considerations in accordance with:
 - 1. Factory Mutual (FM).
 - 2. International Electrotechnical Commission (IEC).
 - 3. Institute of Electrical and Electronics Engineers (IEEE).
 - 4. International Society of Automation (ISA).
 - 5. International Organization for Standardization (ISO).
 - 6. National Electrical Code (NEC).
 - 7. National Electrical Manufacturers Association (NEMA).
 - 8. InterNational Electrical Testing Association (NETA).
 - 9. National Fire Protection Association (NFPA).
 - 10. National Institute of Standards and Technology (NIST).
 - 11. Underwriters Laboratories (UL).

1.03 SYSTEM DESCRIPTION

- A. General requirements:
 - 1. The Work includes everything necessary for and incidental to executing and completing the instrumentation work indicated on the Drawings and specified in the Specifications.

1.04 SUBMITTALS

- A. Furnish submittals as specified in Section 01330 - Submittal Procedures and this Section.

1.05 QUALITY ASSURANCE

- A. Manufacture instruments at facilities certified to the quality standards of ISO 9001.
- B. Furnish all equipment listed by and bearing the label of UL or of an independent testing laboratory acceptable to the Engineer and the Authority Having Jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. As recommended by manufacturer.
- B. Delivery and inspection:
 - 1. Deliver products in undamaged condition, in manufacturer's original container or packaging with identifying labels intact and legible. Include date of manufacture on label.

1.07 WARRANTY

- A. Provide additional warranty as specified in the individual Instrumentation and Control Specifications that extends beyond the Correction Period, as specified in Documents 00 72 00 - Standard General Conditions of the Construction Contract and 00 73 00 - Supplementary Conditions.

1.08 MAINTENANCE

- A. Before Substantial Completion, perform all maintenance activities required by the Contract Documents including any calibrations, final adjustments, component replacements or other routine service required before placing equipment or systems in service.
- B. Furnish all spare parts as required by the Contract Documents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Allowable manufacturers are specified in individual instrument and equipment specifications.

2.02 EXISTING PRODUCTS (NOT USED)

2.03 MATERIALS

- A. Furnish all materials under this Contract that are new, free from defects, and standard products produced by manufacturers regularly engaged in the production

of these devices and that bear all approvals and labels as required by the Specifications.

- B. Provide materials complying with the applicable industrial standard as specified in the Contract Documents.

2.04 MANUFACTURED UNITS (NOT USED)

2.05 EQUIPMENT (NOT USED)

2.06 COMPONENTS

- A. Furnish all meters, instruments, and other components that are the most recent field proven models marketed by their manufacturers at the time of submittal of the shop drawings unless otherwise specified to match existing equipment.

2.07 ACCESSORIES

- A. Provide flow conditioning devices or other required accessories if necessary to meet the accuracy requirements in the Contract Documents.
- B. Nameplates:
 - 1. Provide a nameplate for each controller, instrument transducer, instrument power supply, solenoid, or any other control device located either in the field or within panels.
 - 2. All nameplates shall be of identical style, color, and material throughout the facility.
 - 3. Device nameplates shall include:
 - a. Designations as indicated on the Drawings and identified on the Process and Instrumentation Drawings:
 - 1) Device tag and loop number ID (e.g., FIT-60.011).
 - b. White lettering on a black background, laminated plastic.
 - 4. All instruments shall be equipped with Type 316 stainless steel nameplate with the instrument tag stamped in 3/8-inch letters and connected to the instrument using Type 316 stainless steel wire.

2.08 MIXES (NOT USED)

2.09 FABRICATION (NOT USED)

2.10 FINISHES (NOT USED)

2.11 SOURCE QUALITY CONTROL

- A. Provide all equipment that is new, free from defects, and standard products produced by manufacturers regularly engaged in the production of these products that bear all approvals and labels as required by the Specifications.
- B. Arrange with all manufacturers of the equipment and fabricators of panels and cabinets, to allow the Owner and Engineer to inspect and witness the testing of the equipment at the site of fabrication:
 - 1. Equipment includes the cabinets, special control systems, flow measuring devices, and other pertinent systems and devices.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Review the existing Site conditions and examine all shop drawings for the various items of equipment in order to determine exact layout

3.02 PREPARATION (NOT USED)

3.03 INSTALLATION

- A. Equipment locations indicated on the Drawings may change due to variations in equipment size or minor changes made by others during construction:
 - 1. Verify all dimensions as indicated on the Drawings:
 - a. Actual field conditions govern all final installed locations, distances, and levels.
- B. Field instruments installation:
 - 1. Install field instruments as specified in the Contract Documents, API RP 550 and RP 551, and the manufacturer's instructions.
 - 2. Mount field instruments so that they can be easily read, readily approached, and easily serviced, and so they do not restrict access to mechanical equipment:
 - a. Mount field instruments on a pipe stand or local panel, if they are not directly mounted, unless otherwise indicated on the Drawings.
 - b. Provide sun shields for all field electronic instruments exposed to direct sunlight.

3.04 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. Provide any assistance necessary to support inspection activities.
 - 2. Engineer inspections may include, but are not limited to, the following:
 - a. Inspect equipment and materials for physical damage.
 - b. Inspect installation for compliance with Drawings and Specifications.
 - c. Inspect installation for obstructions and adequate clearances around equipment.
 - d. Inspect equipment installation for proper leveling, alignment, anchorage, and assembly.
 - e. Inspect equipment nameplate data to verify compliance with design requirements.

3.05 PROTECTION

- A. Protect all Work from damage or degradation until date of Substantial Completion.

END OF SECTION

SECTION 17404

PRESSURE/VACUUM MEASUREMENT: GAUGES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Pressure/vacuum gauges.
- B. Provide all instruments specified in the Contract Documents.

1.02 REFERENCES

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. American Society of Mechanical Engineers (ASME):
 - 1. B40.100 - Pressure Gauges and Gauge Attachments.

1.03 DEFINITIONS

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.04 SUBMITTALS

- A. Furnish submittals as specified in Sections 01330 - Submittal Procedures and 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.05 QUALITY ASSURANCE

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Examine the complete set of Contract Documents and verify that the instruments are compatible with the installed conditions including:
 - 1. Process conditions: Fluids, pressures, temperatures, flows, materials, etc.
 - 2. Physical conditions:
 - a. Installation and mounting requirements.
 - b. Location within the process.
 - c. Accessories: Verify that all required accessories are provided and are compatible with the process conditions and physical installation.
- C. Notify the Engineer if any installation condition does not meet the instrument manufacturer's recommendations or specifications.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.07 PROJECT OR SITE CONDITIONS

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.08 WARRANTY

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

1.09 MAINTENANCE

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. One of the following or equal:
 - 1. Ashcroft:
 - a. Maximum pressure greater than or equal to 10 pounds per square inch: Model 1279.
 - 2. Wika.
 - 3. Ametek U.S. Gauge.

2.02 MANUFACTURED UNITS

- A. General:
 - 1. Pressure gauge assembly shall include pressure sensing element, gauge case, and dial mechanism.
- B. Performance requirements:
 - 1. Pressure range: 0 to 100 pounds per square inch gauge:
 - a. As specified in the Contract Documents.
 - 2. Accuracy: 0.5 percent:
 - a. Grade 2A, as defined by ASME B40.100.
 - b. Within 0.5 percent of span after friction errors are eliminated by tapping or vibration.
 - c. Overpressure: Minimum 130 percent of maximum range pressure without damage to gauge or sensing element.
 - 3. Dial gauge:
 - a. Dial size: 4-1/2 inches.
 - b. Dial face: Gasketed shatterproof glass or polycarbonate.

2.03 ACCESSORIES

- A. Provide stainless steel tags for each instrument. Tags shall be labeled as specified in the Contract Documents.

2.04 SOURCE QUALITY CONTROL

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Factory calibrate each pressure gauge at a facility that is traceable to the NIST.
- C. Provide complete documentation covering the traceability of all calibration instruments.

PART 3 EXECUTION

3.01 EXAMINATION (NOT USED)

3.02 PREPARATION (NOT USED)

3.03 INSTALLATION

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.
- B. Coordinate the installation with all trades to ensure that the mechanical system has all necessary appurtenances including weld-o-lets, valves, etc. for proper installation of instruments.

3.04 FIELD QUALITY CONTROL

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

3.05 ADJUSTING

- A. Verify factory calibration of all instruments in accordance with the manufacturer's instructions:
 - 1. Return factory calibrated devices to the factory if they do not meet the field verification requirements for calibration.

3.06 CLEANING

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

3.07 DEMONSTRATION AND TRAINING

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

3.08 PROTECTION

- A. As specified in Section 17050 - Common Work Results for Process Control and Instrumentation Systems.

END OF SECTION

APPENDIX A
DRAFT CITY OF MARINA
ENCROACHMENT PERMIT



City of Marina
Public Works Department
211 Hillcrest Ave., Marina, CA 93933 • Phone: (831) 884-1212

APPLICATION AND PERMIT FOR ENCROACHMENT IN CITY STREET AREA

PERMIT NO. _____

PERMIT EXPIRATION DATE: _____

APPLICANT/CONTRACTOR

Name: _____		
Address: _____		
Phone: _____	Fax: _____	Email: _____
Business License #: _____	Contractor State License # _____	
Expiration date: _____	Type: _____	
Estimated Cost of Work: \$ _____		
Start Date: _____	End Date: _____	Duration: _____

PROPERTY/SITE INFORMATION

Property/Site Address: _____
If no address available, describe location using streets, intersections, etc.: _____ _____

PROPOSED ENCROACHMENT

Describe Proposed Encroachment	
<i>Select project to be done in city's right-of-way:</i> <input type="checkbox"/> Driveway Approach <input type="checkbox"/> Parking Space Closure <input type="checkbox"/> Trench/Asphalt Cut <input type="checkbox"/> Landscaping <input type="checkbox"/> Storm Drain <input type="checkbox"/> Temporary Traffic Control <input type="checkbox"/> ADA Ramp <input type="checkbox"/> Curb & Gutter <input type="checkbox"/> Utility Work (Describe Below) <input type="checkbox"/> Other (Describe Below)	<i>Select type of work to be done:</i> <input type="checkbox"/> New Construction <input type="checkbox"/> Replace Existing <input type="checkbox"/> Modify Existing <input type="checkbox"/> Annual Encroachment Permit Work Permit #: _____ <input type="checkbox"/> Other: _____
<i>Provide detailed additional description of project to be done (attach plans or sketch if necessary):</i> _____ _____ _____ _____ _____	

Plans or Sketch Attached

TRAFFIC CONTROL (if applicable)

Please attach the following to the permit application

- Traffic Control Plan*
- Construction Schedule

*The following minimum requirements shall be shown on the Traffic Control Plan:

- North Arrow and Scale or "NOT TO SCALE"
- Existing roadway improvements including existing speed limits, street names, striping, medians, traffic signals, pavement legends and signage
- If reducing speed for construction zones use "ROAD WORK SPEED LIMIT 25" signs
- Show entire work area including area where advance warning signs are to be placed.
- Show all proposed signs and/or MUTCD sign reference numbers in a legend

Point of Contact

Name

Address

Phone:

Fax:

Email:

Contractor City License #:

Contractor State License #:

Expiration Date:

Type:

**CALL FOR INSPECTION TWO (2) BUSINESS DAYS BEFORE BEGINNING WORK
(831) 884-1212**

The permittee agrees to properly maintain said encroachment at no expense to the city and to indemnify the City from any liability arising out of or caused by said encroachment, and that all work shall be in accordance with city standards. The permittee unconditionally guarantees and implies warranty for all materials and workmanship affected by this permit for a period of one year from the date of acceptance of the work. Acceptance by the city of the work completed under this permit is not a waiver of the permittee's obligation as stated above.

Applicant/Permittee Signature

Application Date

FOR CITY STAFF USE ONLY

PERMIT FEES

Item	Quantity	Unit Fee	Subtotal
<input type="checkbox"/> Temporary Encroachment Permit	EA	\$155.00	\$
<input type="checkbox"/> Permanent Encroachment Permit	EA	Deposit and Fee Agreement with charges at Fully Allocated Hourly Rates for all personnel involved plus any outside costs.	\$
Curb and Gutter			
<input type="checkbox"/> 1-50 LF (base permit fee)	LF	\$355.00	\$
<input type="checkbox"/> 50+ LF	LF	\$355.00 + \$100.00/50LF	\$
Sidewalk			
<input type="checkbox"/> 1-250 SF (base permit fee)	SF	\$355.00	\$
<input type="checkbox"/> 250+ SF	SF	\$355.00 + \$100.00/250SF	\$
<input type="checkbox"/> Driveway Approach	EA	\$355.00 – Residential \$455.00 – Commercial	\$
Potholes			
<input type="checkbox"/> 1-5 Locations (base permit fee)	loc	\$570.00	\$
<input type="checkbox"/> 5+ Locations	loc	\$570.00 + \$35.00/Location	\$
<input type="checkbox"/> Staging R-O-W Permit	EA	\$780.00	\$
Roadway Construction Inspection			
<input type="checkbox"/> 1-50SF (base permit fee)	SF	\$585.00	\$
<input type="checkbox"/> 50+ SF	SF	\$585.00 + \$520.00/50SF	\$
Traffic Control Plan/Inspection			
<input type="checkbox"/> Residential	EA	\$380.00	\$
<input type="checkbox"/> Arterial/Collector	EA	\$405.00	\$
<input type="checkbox"/> additional days after first day	days	+ \$195.00 each additional day after first day	
<input type="checkbox"/> Multiple Location	EA	\$340.00 in addition to:	\$
<input type="checkbox"/> Residential Street (per day)	days	\$65.00 per day	\$
<input type="checkbox"/> Art/Coll Street (per day)	days	\$130.00 per day	\$
<input type="checkbox"/> Road Closure	EA	\$660.00	\$
<input type="checkbox"/> number of days	days	+\$130.00 per day	
Receipt No.		Total Fee	\$

INSPECTOR COMMENTS:

PERMIT APPROVED
(To be completed by the City)

By: _____ Date: _____

I have examined the work covered by this permit and find that it is in accordance with the standards of the City of Marina and recommend acceptance.

ENCROACHMENT INSPECTOR Date: _____

STANDARD ENCROACHMENT PERMIT PROVISIONS

1. All work shall be in accordance with the City of Marina Standard Specifications, Design Standards, and Standard Plans 2006 Edition, as amended (herein after called City Standards). In case of conflict between the City Standards and these Conditions of Approval, the Conditions of Approval shall prevail.
2. Temporary traffic control shall be provided in accordance with the State of California Department of Transportation MUTCD California Supplement, as amended. Traffic control plans must be submitted **two weeks prior to start of construction** and approved by the City Engineer prior to implementation.
3. Pavement restoration shall conform to "A.C. Improved Areas" or "P.C.C Improved Areas" cross-section detail as shown on City Standard Plan No. SD-1.
4. Existing traffic striping, pavement markings, and pavement markers within the limits of the proposed work that are damaged or partially damaged shall be replaced in whole. Upon request by the City Engineer, the permittee shall submit a replacement/rehabilitation plan along with the temporary traffic control plan for review and approval.
5. Existing traffic signal loop detectors within the limits of the proposed work that are damaged shall be replaced per the City Engineer.
6. Notify in writing abutting property owners at least 10 calendar days, and again in 72 hours, in advance of work which would affect their access.
7. Access to private property shall be maintained at all times unless the closing of such access is approved by the City Engineer. The permittee shall request in writing permission from the City Engineer in advance of making such closing.
8. Existing traffic signs shall be protected in place by the permittee during the construction period.
9. The permittee shall furnish, post, and maintain temporary "No Parking" signs in those parking areas in which the permittee will be working at least 72 hours in advance of parking restriction. Include reference to MMC 10.040.40G and CVC 22651(m) on "No Parking" signs.
10. No trench shall be permitted to remain open overnight or when construction activities are not in progress. Each trench shall be backfilled to the surface. The permittee shall not open more trench than can be successfully completed and backfilled in one day. Where this requirement is impracticable, the permittee shall request in writing permission from the City Engineer to extend the trench to its practical limit and to bridge the trench with steel plates. Steel plates shall be imbedded into roadway to match flush to existing grade. The bridging shall be placed to permit an unobstructed flow of traffic. Advanced warning signs shall be required when trenches and other excavation are bridged in the travel way.
11. Personal operated vehicles of the permittee's contractor(s) shall not be parked on the traveled way or shoulders, including any section closed to public traffic.
12. The permittee shall cooperate with Public Safety Department relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles. See Provision 9 for clarification on "No Parking" signage requirements.
13. Permittee shall follow MMC Section 9.24.040 and 15.04.055 regarding construction noise regulations.
14. Hours of construction within the intersection of Reservation Road and Crescent Avenue shall be between the hours of 8 a.m. and 4 p.m. (standard time) on Monday through Saturday, and between the hours of 10 a.m. and 4 p.m. (standard time) on Sunday and holidays. Holidays shall include New Year's Day, July 4th, Thanksgiving, and Christmas. Hours of construction on Imjin Pkwy shall be between the hours of 9 a.m. and 4 p.m.

FOR CITY STAFF USE ONLY

APPENDIX B
DRAFT CITY OF SEASIDE
ENCROACHMENT PERMIT



Encroachment Permit

City of Seaside Public Works
440 Harcourt Avenue
Seaside, Ca 93955
Phone: (831) 899-6825, Fax: (831) 899-6211

Permit #: _____
Permit Fee: _____
Receipt #: _____
Bond Fee: _____
Receipt #: _____

All information except signature must be typed or legibly printed. Notify City 48 hours in advance before start of project. (831) 899-6825

(Office Use Only)

Date Issued: _____ Expiration Date: _____

A

Applicant/Permittee: _____ Phone# _____

Mailing Address: _____

Applicant/Permittee is Contractor: No Yes

Contractor: _____ Phone# _____

Mailing Address: _____

Applicant/ Permittee

State Contractor's License # _____

Seaside Business License # _____

Certificate of Liability Insurance on file with the City of Seaside: No Yes

Applicant/Permittee hereby agrees to comply with the Standard Conditions attached as Exhibit A, and special provisions outlined in this permit and all City Ordinances, Resolutions, Standards and Specifications currently in force. Execution below shall confirm that contractor and/or Applicant/Permittee has received and reviewed the Standard Conditions, understands the same and agrees to be bound thereby.

Applicant/Permittee Signature: _____ Date: _____

Contractor Signature: _____ Date: _____

B

Job Address/Location: _____

APN: _____ Cross Street: _____

Type of Encroachment: Street Improvement: Sidewalk: Other:

Check all that apply: Street Excavation: Driveway Approach:

Excavation Size (Sq. Ft.) _____

Project Description: _____

Project Location & Description

Sampling and Testing Frequency Table

For projects OFF the SHS & NHS.

HOT MIX ASPHALT (HMA) / ASPHALT CONCRETE (AC)

Test Name	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Aggregate Gradation (Sieve)	CT 202	1/Week plus one Random	At Plant
Sand Equivalent	CT 217	1/Week plus one Random	At Plant
Asphalt Binder Content	CT 382	1/Day	Behind Paver
In-Place Density and Relative Compaction	CT 375 (Nuclear)(a)(b)	1/Day (a)	Random location in paved surface (b)
Theoretical Maximum Specific Gravity and Density (Rice)	CT 308 & CT309	1/Day	Behind Pavers
HMA Moisture Content	CT 370	1/Day	Behind Pavers
Stabilometer Value (c)	CT 366	1/Day	Behind Pavers
Air Voids	CT 367	1/Day	Behind Pavers
Tensile Strength Ratio	CT 371	1/Week plus one Random	At Plant
Smoothness	12- Foot Straightedge	As necessary to confirm contract compliance	Final Pavement Surface
Asphalt Binder	Sample per Section 92	Sample 1 minimum per day for production over 300 tons per day; See (d) regarding testing.	At Plant Per CT 125

(a) Compaction determined by Nuclear Density Device. Core testing required if compaction fails the nuclear test.

(b) Correlation between core densities and nuclear device required only if compaction fails the nuclear test.

(c) Report the average of 3 tested briquettes from a single split source.

(d) No testing required unless warranted by concern; sample and store until completion of project.

SUBGRADE (DISTURBED BASEMENT SOIL) OR EMBANKMENT

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Maximum Density and Relative Compaction	CT 375	1 Min. Test per 5000 sq ft under vehicle traveled way and shoulder 1 Min. Test Per 300 linear foot under sidewalk	Random locations as determined by the Engineer in place after compaction.

AGGREGATE BASES AND SUBBASES, IMPORTED BORROW

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement.
R-Value	CT 301		
Sand Equivalent	CT 217		
Maximum Density and Relative Compaction	CT 375	1 Min. Test per 5000 sq ft	Random locations as determined by the Engineer in place after compaction.

STRUCTURE BACKFILL, SELECT BACKFILL

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement
R-Value	CT 301		
Sand Equivalent	CT 217		
Maximum Density and Relative Compaction	CT 375	1 Min. Test Per 2 Vertical Lifts of Placement	Random locations as determined by the Engineer in place after compaction.

PORTLAND CEMENT CONCRETE (PCC) - STRUCTURAL AND SIGNAL/LIGHTING FOUNDATIONS

COARSE AGGREGATE

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 min. test per 500 cu yds. and per each material source ; 1 min. test on smaller projects; If bridge, 1 min. set per separate pour per abutment/pier/deck.	Sample from site stockpile/plant prior to placement
Cleanness Value	CT 227		

FINE AGGREGATE

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 min. test per 500 cu yds. and per each material source ; 1 min. test on smaller projects; If bridge, 1 min. set per separate pour per abutment/pier/deck.	Sample from site stockpile/plant prior to placement
Sand Equivalent	CT 217		

WET MIX

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Slump/Penetration	CT 533	2 per day	Sample from truck/work site
Cylinders	CT 539/540	1 min. set of 3 per day; If bridge, 1 min. set per separate pour of abutment/pier/deck.	

C Permit Conditions <small>(Office Use Only)</small>	Applicant/Permittee to notify the following:		
	Underground Service Alert (800)-227-2600		
	Seaside Police Department (831)-899-6748		
	Seaside Fire Department (831)-899-6790		
	Monterey-Salinas Transit, fax work location (831)-899-7789		
	AMR Ambulance Service (831)-718-9555		
	Latitude/Longitude:		
	Traffic Control/Lane Drop Required:		Yes: No:
Sidewalk Closure Required:		Yes: No:	
Special Provisions: Permit # _____			

D Issuance & Acceptance <small>(Office Use Only)</small>	Seaside Public Works/Engineering Department	
	Permit Issued By	
	Signature: _____	Date: _____
	<i>I have examined the work covered by this permit and find that it is in accordance with the standards of the City of Seaside.</i>	
	Encroachment Inspector	
Signature: _____	Date: _____	
O.K. To Release Bond: Yes: No:		
Comments:		

EXHIBIT A

CITY OF SEASIDE PERMIT TO ENCROACH

I. STANDARD CONDITIONS

- A. Permittee or Permittee's authorized representative must notify the City of Seaside (the City) at least 48 hours before starting any work under this Permit. Failure to so notify is cause for revocation of Permit. Should Permittee fail to commence the work or project for which this permit was issued within 180 days from the date of issuance set forth above or fail to actively and diligently exercise the privileges of this Permit, the Permit becomes null and void.
- B. The City shall not be responsible for monitoring the Permittee's compliance with any laws or regulations. If the Permittee performs any work knowing or having reason to know that it is contrary to laws or regulations, the Permittee shall bear 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.
- C. Permittee or Permittee's authorized representative shall notify (underground service alert) at least 24 hours before commencing any excavation necessary to perform the work authorized by this Permit. Permittee agrees to contact and obtain an Inquiry ID Number from (underground service alert) 800-227-2600 at least two (2) working days prior to commencing work. By signing this Permit application, Permittee acknowledges that Permittee understands the statutes and regulations pertaining to excavation near or in the vicinity of underground utilities and agrees to strictly conform all of Permittee's activities to such requirements. And failure on the part of Permittee to comply with such requirements shall be grounds for the immediate revocation of this Permit.
- D. A copy of this Permit shall be kept at the site of the work throughout the period of operations within the jurisdictional limits of the City and any right-of-way therein and shall be shown to any City employee, agent or duly authorized representative or any law enforcement officer upon demand.
- E. This Permit is valid only for the purpose specified herein. No change to the scope of work as identified in the application and/or drawings submitted therewith is permitted except upon written permission of the City Engineer or his/her duly authorized representative.
- F. Compliance with the American with Disabilities Act (ADA): All work shall be conducted in compliance with all applicable Federal, State, and Local Access Laws, regulations and guidelines including but not limited to the Americans with Disabilities Act Accessibility Guidelines (ADAAG), the Public Rights-of-Way Guidelines (PROWG), Design Information Bulletin 82-05, "Pedestrian Accessibility Guidelines for Highway Projects" and the City's encroachment permit and encroachment permit packet shall be approved by the City's California Licensed Professional Engineer, Licensed Architect, or Licensed Landscape Architect. Activities and uses authorized under this Permit are subject to any instruction of the City Engineer or his/her designated representative, including but not limited to the Public Works Inspector. All instructions must be strictly observed.
- G. The permittee shall, upon notice from the Public Works Director repair any injury, damage or nuisance in any portion of the right-of-way caused to City infrastructure by reason of exercise of this Permit. Damage shall be replaced or repaired by Permittee at his/her/its sole expense to the satisfaction of the City. Upon notice of damage to City infrastructure arising from the exercise of this Permit, should Permittee fail to act within a reasonable time or should the exigencies of the injury or damage require repairs or replacement before the permittee can be notified or can respond to the notification, the City may at it's option make necessary repairs, replacement or perform the necessary work and the Permittee shall be charged with all the expenses incurred in the performance of the work. Each separate day on which a violation of this section shall exist shall be a separate misdemeanor and shall be punishable as set forth in SMC1.16. (Ord. 304, 1966; prior code Â§ 10-406)
- H. Unless otherwise specifically provided, all costs incurred by Permittee as a result of the conditions of the Permit or the exercise by City of any right, authority, or reservation contained therein shall be the sole responsibility of and shall be borne entirely by the Permittee.

- I. Issuance of this Permit shall not be construed as an obligation on the part of the City to assume responsibility for any damages incurred to the Permittee's improvements and/or for any injury or death to person(s) or damage to property arising out of the permitted work.
- J. This permit is non-transferable. Applicant required to pay application fee's prior to issuance of permit, unless work is for Emergency Utility Work.
- K. Unless otherwise specified herein, this Permit may be revoked or canceled at any time by the City Engineer or his/her duly authorized representative at the sole discretion of the City Engineer or his/her duly authorized representative.
- L. Upon written notice of cancellation or revocation of this Permit for any cause whatsoever, Permittee shall promptly restore City right-of-way and structures to their condition prior to the issuance of the Permit and then shall vacate City property. Should Permittee fail to promptly restore the premises or structures to a condition satisfactory to the City Engineer or his/her duly authorized representative, the City may make any and all repairs or have repairs made and Permittee will be billed and shall reimburse City for all costs incurred.
- M. Progress of work shall proceed as expeditiously as possible. If the work consists of multiple phases, each phase of work must be approved the City before proceeding with the next phase. The City Engineer or his/her designated representative may cancel the permit if the work authorized herein is not commenced within sixty (60) days of issuance and thereafter, in the opinion of the City Engineer, is not diligently prosecuted to completion. Cancellation may be effected by giving written notice thereof by sending the same to the Permittee by ordinary mail to the address shown on the application.
- N. The permittee or permittee's authorized representative shall notify the City Engineer when all work is completed.

II. **INSURANCE**

- A. Permittee shall maintain and provide commercial general liability insurance, with coverage at least as broad as Insurance Services Office form CG 00 01, in an amount not less than \$2,000,000 per occurrence, \$4,000,000 general aggregate, for bodily injury, personal injury, and property damage. The policy must include coverage for contractual liability that has not been amended. Any endorsement restricting standard ISO "insured contract" language will not be accepted. Any insurance proceeds available to Permittee in excess of the minimum limits and coverage set forth in this Permit and which is applicable to a given loss or claim shall be deemed by this Permit to be applicable to the City. A certificate of insurance evidencing this coverage shall be provided to the City prior to the start of any work under this Encroachment Permit. The City's Risk Manager may from time to time increase the limits of the required insurance coverage.
- B. The City is to be named as an additional insured with an endorsement in favor of the City.
- C. Coverage provided by Permittee shall be primary and any insurance or self-insurance procured or maintained by City shall not be required to contribute with it. The limits of insurance required herein may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain, or be endorsed to contain a provision that such coverage shall also apply on a primary and non-contributory basis for the benefit of City before the City's own insurance or self-insurance shall be called upon to protect it as a named insured.
- D. A severability of interests provision must apply for all additional insureds ensuring that Permittee's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policy(ies) shall not contain any cross-liability exclusions.
- E. None of the coverages required herein will be in compliance with these requirements if they include any limiting endorsement of any kind that has not been first submitted to City and approved in writing.
- F. If Permittee maintains higher limits than the minimums shown above, City requires and shall be entitled to coverage for the higher limits maintained by Permittee. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to City.
- G. Permittee must also maintain worker's compensation insurance as required by State law.

III. INDEMNITY AGREEMENT

- A. Permittee shall indemnify, defend, and hold harmless City, its officers, employees, and agents from any and all losses, costs, expenses, claims, liabilities, actions, or damages, including liability for injuries to any person or persons or damage to property arising at any time during and/or arising out of or in any way connected with Permittee's authorized activities under the terms of this permit unless solely caused by the gross negligence or willful misconduct of City, its officers, employees, or agents.
- B. It is expressly understood and agreed between the parties to this Permit that this is an agreement and permit for access to and for certain events to occur or work to take place on City property. This Agreement and permit is not a construction contract or an agreement for design professional services as those terms are defined or used under Title 12 of the California Civil Code (§§ 2772 et. seq.).

IV. DUTY TO DEFEND

- A. As an express and material term of City's issuance of this Permit, Permittee agrees to defend, at its sole expense, the Indemnitees from and against any and all Claims arising out of or related to the permitted encroachment. Permittee's duty to defend shall apply immediately upon demand from the Indemnitees for any injury or death to persons or damage to property occasioned by reason of or arising out of the acts or omissions of the City, its officers, employees and/or agents and the acts or omissions of Permittee, his/her/its agents, employees, contractors and subcontractors and/or any other person or entity performing work authorized by this Permit.
- B. In the event of any controversy, claim or dispute arising out of or relating to this Permit or the violation of any covenant contained herein, the prevailing party shall be entitled to receive from the losing party reasonable expenses, including attorney's fees and costs.
- C. The City Engineer or his/her designated representative may, either at the time of the issuance of this permit or at any time thereafter until the completion of the work, prescribe such additional conditions as he/she may deem necessary for the protection of the public property or for the prevention of undue interference with traffic or to assure public safety.

V. OTHER CONDITIONS

- A. **Care of Drainage** If the proposed work alters surface runoff or interferes with established drainage, ample provisions shall be made by the Permittee to provide adequate drainage and erosion control as approved by the City Engineer. Construction waste or excavated materials will not be allowed to be washed into the storm drain or sewer system.
- B. **Maintenance** The Permittee agrees by acceptance of this permit to exercise reasonable care to properly maintain utilities within the City right of way and to inspect for and immediately repair any damage to any improvement within the right of way which occurs as a result of the Permittee activities.
- C. **Test Results** If necessary, the Permittee shall provide the City Engineer with soil compaction test results. Compliance with compaction requirements shall be certified by a City-approved materials testing laboratory with local experience.
- D. **Pavement Replacement** Permittee shall backfill excavation in accordance with the City of Seaside Standards. Slurry backfill shall remain a minimum of 4 inches below the finished surface. Permittee shall place 4 inches of Cold Mix Asphalt as a temporary pavement surface. At the discretion of the City Engineer the Permittee shall install 4 inches of Hot Mix Asphalt surface in accordance with City standards.
- E. **Protection of Traffic** Provide protection for the traveling public. Barricades shall be placed with flashing amber lights at night. Flag persons shall be provided if necessary. Warning signs, lights and temporary traffic control devices shall be placed in conformance with the requirements of the City Engineer or Inspector and the Caltrans Manual of Traffic Control.

- F. **Storage of Materials** No material shall be stored within two (2) feet of the edge of the pavement, sidewalk or traveled way or within the shoulder line where the shoulders are wider than five (5) feet. No supplies or equipment shall be stored on the City Street or right-of-way.
- G. **Cleanup** Immediately, upon completion of work and after each work day, all material and debris shall be entirely removed. The right of way shall be left in the same or better condition as before work started.
- H. **Conformance of Construction** All construction shall conform to the most current Caltrans and City of Seaside standards and specifications.
- I. **Bond** Prior to permit issuance, the Permittee is required to provide a bond in the form of a Letter of Credit, Cashier's Check, Money Order, Cash, or Surety Bond in an amount determined by the City Engineer. The bond will be in the name of the City of Seaside and be held by or deposited to the City. The bond will be released or refunded to the individual submitting it upon satisfactory completion of the improvements, acceptance of the project by the City, and written request by the Permittee [SMC 12.04.020].

VI. DOCUMENTS INCORPORATED BY REFERENCE

- A. **The following documents are incorporated into this encroachment permit.**
 - a. City Standard Plans
 - b. Caltrans Standard Plans
 - c. Caltrans Standard Specifications
- B. **In the event of conflict in the referenced documents for this encroachment permit, the order of precedence from highest to lowest shall be as follows:**
 - i. Permits and Licenses
 - ii. Project Specific Conditions found in Exhibit B to the Encroachment Permit
 - iii. Standard Conditions found in Exhibit A to the encroachment Permit
 - iv. Project Plans
 - v. Revised Standard Specifications
 - vi. Standard Specifications
 - vii. Revised Standard Plans
 - viii. Standard Plans
 - ix. Supplemental project information

Exhibit A

City of Seaside, Public Works Engineering Encroachment Permit Special Provisions

Marina Coast Water District (MCWD) CIP# RW-0174
Prepared by Carollo Engineers
Permit # (Insert Permit #)
Applicant: (Contractor)
Applicant: Marina Coast Water District

(Insert Date here)

These specifications are for the construction of the proposed Recycled Water Distribution Mains, and along with construction drawings titled "MCWD CIP # RW-0174 by Carollo Engineers, and details, will accompany each individual Encroachment Permit. All activities shall comply with applicable State, Federal and Local regulations, including but not limited to the Seaside Public Improvement Standards and Standard Specifications, California Department of Transportation

A. General

1. Adhere to applicable city standards, except as modified herein.
2. Notification sent to all affected residents and businesses. Notices shall be sent at least 72 hours in advance of construction activities. See Section B, Traffic Control, below for requirements for placing "No parking signs".
3. Applicant shall implement the following outreach programs as a minimum during construction of the pipeline project:
 - 3.1. Provide a 24/7 public hotline
 - 3.2. Door hangers and mailing notices as appropriate
 - 3.3. Neighborhood meetings as appropriate
 - 3.4. Install signs along pipeline route on barricades identifying project name and hotline phone number
 - 3.5. Attend council meetings if requested.
4. Notify City of Seaside Engineering Division **2 weeks prior to start of construction** and provide regular updates as may be required.
 - 4.1. Email notifications to Scott Ottmar, sottmar@ci.seaside.ca.us, Billy Thomas, bthomas@ci.seaside.ca.us, and Rick Riedl, riedl@ci.seaside.ca.us.
5. Adhere to the Mitigation Monitoring and Reporting Program (MMRP) for the Regional Urban Recycled Water Project (RWP), prepared by Denise Duffy & Association, Inc., dated October 18, 2006, amended November 18, 2016.
 - 5.1. Provide mitigation plans when requested by the City.
6. If the disturbed area is to be over one (1) acre, a Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and a WDID obtained by the applicant from the State Water Quality Control Board. Submit the SWPPP for City of Seaside review.
 - 6.1. See Section F, Storm Water Pollution Prevention, below for further details.
7. Subsurface construction shall be accomplished utilizing the following methods:
 - A. Trenching in street
 - B. Trenching in sidewalk
8. Pot holes are required to determine the type and location of underground utilities.
 - 8.1. Unless waived by the city inspector, contractor will provide profile of utility crossings. Profile shall identify which utilities are present and depth to the utility.
 - 8.2. Notify City of Seaside at least 24 hours in advance of digging potholes.

- 8.3. City of Seaside may inspect potholes and depths as deemed appropriate.
9. Coe Avenue shall be coated from lip of gutter to lip of gutter with a slurry seal upon pavement restoration. See section E, Paving, below for pavement restoration requirements.
10. Protection and Repair of Existing Storm Drains
 - 10.1. Closed Circuit Television (CCTV) inspections of City storm drain lines shall be performed and meet "Performance Specification Guidelines for Pipe Condition Assessment using CCTV" by the National Association of Sewer Service Companies (NASSCO).
 - 10.2. CCTV inspections are to be performed at all utility crossings or any other locations where City utilities (storm drains) are found to be located within 6'-5" of the outside diameter of the pipeline (i.e. based on USA markings and/or potholing).
 - 10.3. Contractor shall repair storm drains damaged by construction operations to the satisfaction of the City.
11. Provide City with an indexed preconstruction video of existing surface improvements shown from both directions. Provide copy of preconstruction photographs.
12. Restore, repair, or replace private property improvements damaged by construction operations to the pre-construction conditions as commercially practical and to the private property owner's satisfaction. In the event the private property owner is not satisfied with the restoration or repair of damaged improvements, Applicant's External Affairs Manager, Construction Manager, and/or other such representative shall meet with the property owner to resolve the issue.
13. Landscape areas disturbed by construction shall be restored to existing condition. Contractor shall submit a landscape restoration plan for disturbed areas for review and approval by the City.
14. The City of Seaside retains the right to hire a third party inspector, to monitor adherence to these conditions.
 - 14.1. Third party inspector to be paid by Applicant.
 - 14.2. Any expenses greater than paid permit fees will be billed to Applicant, and paid upon demand. Failure to pay constitutes a breach of this permit.
 - 14.3. City inspections are intended for Quality Assurance (QA) purposes.
 - 14.4. Conduct sampling and testing as specified in the City's QAP "*Sampling and Testing Frequency Table*" revised April, 2018 and provide results to the City upon request. In the event of a conflict between the *Sampling and Testing Frequency Table* and the conditions in this permit, the QAP shall prevail unless otherwise directed by the City Engineer.
 - 14.5. City shall be included in construction progress meetings and provided copies of meeting agendas and minutes when requested
15. Contractor and sub-contractors contracted by Applicant shall provide insurance and indemnification to the City of Seaside prior to start of construction. Insurance shall have following minimum policy coverage:
 - 15.1. Bodily injury: \$2,000,000 per occurrence and \$4,000,000 aggregate
 - 15.2. Automobile liability: \$1,000,000 combined single
 - 15.3. Worker's compensation: \$1,000,000 per accident or disease.
16. Contractors must have a City of Seaside business license.
17. New underground water main and appurtenances to be located per most recent plans titled: MCWD CIP# RW-0174 by Carollo Engineers
 - 17.1. This permit authorizes work only in areas of the City of Seaside right of way or property owned by the City of Seaside within existing easements.
 - 17.2. Applicant is responsible for determining easements and coordinating with property owners for installation of water mains and associated infrastructure, including fire hydrants, blow-off valves and air release valves.
 - 17.3. Applicant shall submit record drawings upon completion of the work.

B. Temporary Traffic Control

1. Notify, coordinate, and resolve access, ingress, egress, special needs (disabilities), and parking issues with all private property owners/tenants and businesses along the pipeline route.
2. Temporary Traffic control shall conform to the most recent edition of the California Manual of Uniform Traffic Control Devices and must be prepared and stamped by a licensed traffic engineer.
3. Haul roads will follow pipeline alignment and approved traffic control plans to the extent possible.
4. Avoid truck trips through designated school zones during school drop off and pickup hours. Provide construction schedule updates to the schools for bus route coordination (see section H).
5. Full road closure with detour is not permitted along Coe Avenue.
 - 5.1. At least one lane of traffic shall be maintained at all times.
 - 5.2. At least one driveway approach shall be available for each parcel affected.
 - 5.3. Provide safe provision for pedestrians and bicycles around and within construction zones in conformance with approved traffic control plans.
6. "No Parking" signs shall be posted a minimum of 72 hours prior to work beginning in that area, and
 - 6.1. shall clearly state the date(s) and time that no parking is in effect, and
 - 6.2. shall provide a contact phone number for the project manager and/or contractor
 - 6.3. All construction vehicles are prohibited from over-night parking on public right of way inside or outside of the work zone.
7. Provide changeable message signs (CMS) alerting motorists of detours two weeks in advance for work along Coe Avenue. CMS to be left out for duration of traffic control.
8. Notify Seaside Police, Seaside Fire Departments, and Monterey Salinas Transit prior to construction commencing.

C. Excavation in Parkways and Sidewalks

1. Unless otherwise approved by City Inspector, excavations in sidewalks and parkways must be backfilled or temporarily paved. No excavations shall remain open past work hours.
2. Backfill in parkways and sidewalks as approved by City Inspector. Temporary backfill shall be ADA compliant.
3. Compaction of backfill in parkways and sidewalks shall be 90% minimum.
4. All improvements and landscaping in parkways shall be restored in-kind. The contractor shall take photographs of each work area prior to beginning and retain in files for reference and examination.
5. Sidewalk areas shall be repaired per City of Seaside standards S-101, S-102, S-103, S-104.
 - a. Damaged concrete shall be removed and replaced to the nearest construction joint.
6. Vaults and boxes installed within parkways and sidewalks shall be flush to finish grade.
 - 6.1. Lids and covers must clearly denote type of utility contained within.

D. Excavation in Streets

1. Street excavations shall be square and saw cut with smooth straight edges unless otherwise approved by the City.
2. Backfill or plating shall occur on same day as excavation. No excavations may remain open past work hours.
 - 2.1. See S-601 for trench restoration details.
3. Compaction shall achieve 95% relative at optimum moisture content, in agreement with Section 19-5 of the current Standard Specifications, State of California, Department of Transportation.
 - 3.1. Compaction shall be **in layers** not to exceed 0.67 feet (8 inches). At depths greater than 2.5 feet (30 inches), compaction shall be in layers not to exceed 1 foot (12 inches).

- 3.2. Compaction testing will be provided for each day when backfill occurs or at 300 LF maximum, whichever is more frequent.
- 3.3. Compaction test for at least one lift of each type of backfill material placed during the day.
- 3.4. Provide copies of compaction reports from a certified **third party testing company**.
- 3.5. Compaction testing shall be identified by stationing location as shown on plans.
4. Slurry backfill, if used, shall conform to S-600 or alternative slurry backfill material by written approval of the City Inspector. Admixtures shall not be used without first providing product submittals and obtaining City's written approval. Care shall be taken to keep the edges of the asphalt free from slurry.
5. Steel plates shall conform to California Department of Transportation Standard Specifications and shall have a traction surface. Provide Certificate of Compliance that plate meets these standards.
6. Slurry backfill shall remain a minimum of 4 inches below the finished surface. Slurry shall cure for 24 hours. If the slurry has attained sufficient hardness for traffic, the excavation shall be covered with temporary paving. Where the slurry has not attained sufficient hardness, the excavation must be covered with steel plates until the next day.
7. Temporary paving and trench plates shall be maintained in good condition at all times, and shall be inspected by the permittee at the end of each work day. Temporary paving materials shall be added as needed to maintain a smooth riding surface within 48 hours of any complaint received from the public or as directed by the City Engineer.
8. Trenching within existing pavement will be patched with cold mix upon completion of slurry backfill. Cold mix removed at time of final pavement installation.
9. Provide shoring, trench box or shield when required by OSHA excavation requirements. Submit stamped calculations to the City for review.
10. Vaults and boxes installed within city streets shall be flush with final pavement and rated for vehicular traffic, H-20 wheel loading.
11. Damage to streets by construction vehicles, including track marks, shall be repaired to the satisfaction of the City Engineer.

E. Paving

1. Temporary paving may be cold-mix asphalt 2" inches thick and must be flush with the finished surface.
2. Prior to paving with hot mix asphalt, the edges of the asphalt shall be cleaned as necessary before the application of the tack coat.
3. Coe Avenue shall receive a Type II slurry seal for the entire width.
4. Trench restoration shall be in conformance with standard plan s-601.
5. Hot mix asphalt work shall conform to Section 39 of the Standard Specification, State of California, Department of Transportation, most recent edition, with the following requirements:
 - 5.1. In streets that are cracked, damaged or "alligatored," the extent of removal and replacement of asphalt shall be per the city inspector's direction.
 - 5.2. Where excavation results with existing pavement less than 3 foot in width, existing pavement shall be removed to the nearest lip of gutter and new pavement provided with trench restoration.
6. Quality Assurance testing shall conform to the Sampling and Testing Frequency Table provided by the City titled "Sampling and Testing Frequencies for Projects not on the SHS or NHS" revised April 2018.
7. Restore pavement markings in kind. Existing signs, striping, pavement legends, and markings will be restored to current City standards and as directed by the City. Provide temporary pavement markings and striping on arterials in accordance with MUTCD and Caltrans standards. Provide permanent

- striping, legends, and markings within ten (10) business days of permanent pavement restoration. City to provide specifications on painting, striping, and markings.
- 7.1. Adhere to sections 84 and 85 of Caltrans Standard Specifications as applicable.
 - 7.2. Markings shall be thermoplastic.
8. Repair cross gutters per standard S-106.
 - 8.1. Replace cross gutter to nearest construction joint, unless otherwise directed by the city inspector
 - 8.2. As allowed by weather, trench restoration paving should occur within 10 working days of the completion of the underground construction as shown on plans.
 9. Survey monuments and benchmarks removed or damaged due to construction shall be restored by a licensed land surveyor.
 - 9.1. All survey monuments shall be replaced in accordance with City standard detail S-802 and recorded with the County in conformance with the requirements of the “Business and Professional Code” of the State of California, chapter 15, “Land Surveyors” article 5, “Surveying Practice”, and section 8762 “Record of Survey” as appropriate.
 - 9.2. Benchmarks shall be re-established to the point nearest the original benchmark and set with a bronze disc.
 10. All final pavement restoration including pavement markings shall be completed within three (3) months of pipeline completion, unless otherwise agreed to in writing by the City.

F. Storm Water Pollution Prevention Requirements

1. Adhere to submitted project SWPPP prepared by (Prepared by) titled “SWPPP Title”, prepared (Date Prepared).
2. Provide drain inlet protection.
 - 2.1. Drain inlet protection shall not interfere with storm water flows. Contractor is responsible for maintaining drain inlet protection.
 - 2.2. No obstructions to storm drain inlets are permitted during a rain event.
3. Materials management
 - 3.1. Covering stockpiles, trash and debris
 - 3.2. Concrete washout if applicable
 - 3.3. Containment of hazardous materials and waste.
 - 3.4. Drip pans beneath heavy equipment.
4. Daily sweeping at a minimum or more frequent as required to prevent offsite tracking of sediment.
5. Applicant or its contractor shall submit a plan prior to discharge of flush water from pipeline mains.
 - 5.1. Applicant responsible for securing necessary permission from Monterey Regional Water Pollution Control Agency for discharge to the sanitary sewer system.
6. No discharge to the storm drain system without prior written approval by the City of Seaside
 - 6.1. Develop and submit a plan demonstrating removal of chlorine, sediment, or other pollutants as identified by the City prior to discharge to the storm drain system.
7. At the direction of the city inspector, video inspection of storm drains will be conducted when significant leak has occurred causing sediment to discharge to the storm drain system. Hydro flushing of the system will be required to remove sediment created by water main leaks.
 - 7.1. Provide information requested by city inspector, to include but not limited to: date, time and duration of leak, how much water discharged to the storm drain system, quantity of storm drain system flushing collected, summary of other clean up measures and description of cause, if known, and corrective actions to prevent repeat of water main failure.

G. Cleanup

1. Cleanup shall occur at the end of each day, including vacuuming if necessary. All construction tools, equipment, trash, debris, spoils and materials shall be removed from the area or otherwise secured within 10 feet of the face of curb within the work zone in a manner that will not impede traffic.
2. Stock piling of materials and equipment within the public right of way outside of the work zone will not be allowed
3. Boring operations will require vacuum equipment to clean up mud and/or slurry.
 - 3.1. Storm water protection devices shall be utilized to prevent mud from entering the storm drains. Contractor responsible for maintaining storm water protection devices to prevent flooding.

G. Supervision

1. City of Seaside shall be provided a copy of daily reports, as requested by inspector.
2. Each crew shall have a responsible and competent foreman present during construction who shall exercise strict supervision over the crew.
3. Workers shall not use private property for any reason. Adequate water and toilet facilities shall be provided. Workers shall be courteous, considerate and conduct themselves professionally.
4. Workers shall wear shirts or tags that clearly identify their company's name.

H. Permit Duration & Working Hours

1. This permit is valid for 60 calendar days. All construction and pavement restoration shall be completed within 60 calendar days from the date the applicant provides notice in writing to the City.
 - 1.1. The City Engineer may extend the duration of the permit for weather delays or reasonable unforeseen conditions.
 - 1.2. Applicant shall submit in writing a request for permit extension a minimum of 14 days prior to expiration.
2. When Seaside Middle School is in session, working hours are Monday through Friday, 9 AM to 2 PM.
3. When Seaside Middle School is not in session (i.e. summer, fall or winter break), working hours are Monday through Friday, 7 AM to 5 PM or as approved in writing by the City Engineer.
4. Work may be suspended during significant regional events including:
 - 4.1. Major Tournaments and events held at Bayonet & Blackhorse golf course. Major events Contractor is responsible for checking with golf course
5. City may perform inspections on backfill and paving and general road reconstruction work throughout the project.
6. No work may occur in the street on Saturday, Sunday or holidays or as approved in writing by the City Engineer.

Summary of Engineering Standards

City of Seaside: S-101, S-102, S-103, S-104, , S-600, S-601, S-802

APPENDIX C
DRAFT COUNTY OF MONTEREY
ENCROACHMENT PERMIT

APPLICATION FOR MONTEREY COUNTY ENCROACHMENT PERMIT



SEND TO:
 COUNTY OF MONTEREY
RESOURCE MANAGEMENT AGENCY - ENCROACHMENTS
 1441 SCHILLING PLACE, South 2nd Floor
 SALINAS CA 93901-4527

The undersigned hereby applies for a permit to encroach on County right-of-way as indicated below and agrees that all work will be done in accordance with existing county ordinances; general conditions of: Chapter 14.04, and constructed to designated grades and specification requirements. All pertinent Monterey County Code sections indicated on permit shall apply. Work shall be in accordance with attached plan and indicated form(s) for the building or encroachment permit to be acknowledged as complete. Applicant is responsible for preservation and/or perpetuation of all existing monuments which control subdivisions, tracts, boundaries, streets, highways, or other rights-of-way, easements, or provide survey control which will be disturbed or removed due to applicant's work. Applicant shall provide a minimum of ten (10) working days notice to project surveyor prior to disturbance or removal of existing monuments. Project surveyor shall coordinate with applicant to reset monuments or provide permanent witness monuments and file the required documentation with the County Surveyor pursuant to Business and Professions Code Section 8771.

SIGNATURE REQUIRED HERE _____ **DATE** _____

APPLICANT NAME _____ PHONE(1) _____
 C/O _____ CELL PH _____
 MAILING ADDRESS _____ EMAIL _____
 CITY _____ STATE _____ ZIP _____

PROVIDE LOCATION AND DESCRIPTION OF PROPOSED WORK PROJECT BELOW

ROAD NAME _____
 PROJECT ADDRESS _____
 LOCATED BETWEEN ROAD NAMES _____ and _____
 AREA OF COUNTY _____ ASSESSOR'S PARCEL # _____
 DESCRIBE PROPOSED WORK TO BE DONE: _____

<input type="checkbox"/> CHECK IF PLAN ATTACHED BEGIN WORK DATE _____ END WORK DATE _____		← PROVIDE SKETCH AS NEEDED AND INCLUDE: 1) DISTANCE FROM LOCATION OF WORK TO CROSS STREET OR MILEPOST MARKER. 2) SHOW NORTH ARROW.
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AREA BELOW FOR PUBLIC WORKS OFFICE USE ONLY

ATTACH FORM(s) _____ APPLICABLE MONTEREY COUNTY CODE, TITLE(s) _____
 FEE _____ CEQA EXEMPT BY SECTION _____ 1 _____
 REC'D BY _____ CLASS _____ 2 _____
 DATE RECEIVED _____ 3 _____
 ROAD DISTRICT _____ @ _____ PERMIT EXPIRES _____
 INSPECTOR _____ DATE _____

“ENCROACHMENT” includes any structure or object of any kind or character placed, without authority of law, either in, on, under, or over any County highway.

GENERAL CONDITIONS FROM MONTEREY COUNTY CODE - CHAPTER 14.04

An ordinance to protect the County highways and works incidental thereto by regulating their excavation and encroachment.

Sec.14.04.010 "County highway" means and includes all or any part of the entire width of right-of-way of any road, street, land, alley, way, place, or cul-de-sac maintained by the County and open to the use of the public for purposes of travel, whether or not such entire width is actually used for highway purposes, and whether or not it has been accepted into the County road system by resolution of the County Board of Supervisors. It also includes bridges, culverts, curbs, drains, ditches, and all works incidental to County highway construction, improvement, and maintenance.

Sec.14.04.020 A - When satisfied an applicant's right or necessity, the Public Works Director may issue to him or her, a writing permit, which shall not be transferable, authorizing him or her to do any of the following acts:

1. Make an opening or excavation for any purpose in any County highway;
2. Place, change, or renew an encroachment;
3. Construct, grade, or place any driveway within a County highway; but no driveway shall be located within any portion of the normal curve returns of any intersection;
4. Plant, remove, cut, cut down, injure or destroy any tree/shrub/plant/flower growing within any County highway. (Ord. 1162 § 6, 1960)

Sec.14.04.070 A - This Chapter shall not be construed to prohibit any act for which a permit is required when the performance of such act is reasonably necessary for the preservation of life or property in an emergency. In all such cases, however, the person performing such act shall promptly notify the Public Works Director and shall apply for a permit therefor at the earliest practicable time thereafter, in any event not later than the next succeeding day during which the office of the Public Works Director is open.

B - Any person who violates any of the provisions of this Section is guilty of a misdemeanor. (Ord. 1162 § 11, 1960)

Sec.14.04.100 The Public Works Director may, but is not required to, supervise any work done under any permit issued under the County, but no cost of supervision shall be charged by the Public Works Director to any public Agency. (Ord. 1162 § 11, 1960)

Sec.14.04.110 A - Every permittee shall:

1. Notify the Public Works Director at least forty-eight (48) hours, exclusive of Saturdays, Sundays, and legal holidays, before starting any permit work;
2. Keep his or her permit, or a copy thereof, at the site of the permit work at all times when he or she is actually engaged in work thereat, and exhibit it to the Public Works Director, or his or her representative or any peace officer, upon demand;
3. Promptly remove all refuse, debris, equipment, and excess material from the site of the permit work upon its completion, and leave the premises in as presentable a condition as before the work started;
4. Place and maintain suitable warning lights, signs, barriers, devices, or flagmen, which be the types specified in Section 21406 of the California Vehicle Code;
5. Deliver to the Public Works Director, upon his or her demand, after the completion of any permit work, a plan or drawing showing locations and details of permitted encroachments and connections, if any, to existing structures where such encroachments and connections differ substantially from any plats and diagrams submitted with the application for a permit;
6. In every case where he or she has disturbed the existing surface of a County highway, replace, repair or restore such highway in accordance with the terms of his or her permit. In case his or her permit contains no such terms, then he or she shall do such replacing, repairing, or restoring at his or her own expense promptly upon completion of his or her permit work, in a good and workmanlike manner as directed by the applicable provisions of this Chapter, to as good condition as before the permit work started; provided, however, that if the surface which was disturbed was a bituminous-surfaced roadway, such surface shall be replaced, repaired or restored with not less than one and one-half inches, compacted in thickness, of asphaltic concrete surfacing, over a minimum of six inches, compacted, in depth, of aggregate base material of a type approved by the Public Works Director;
7. Comply with all of the terms and conditions of his or her permit;
8. Comply with all construction standards and methods specified in this Chapter;
9. Store, place or deposit no material within five feet (5') from the edge of the pavement or traveled way or within the shoulder line, where the shoulders are wider than five feet (5'), of any County highway, without the prior approval of the Public Works Director;
10. Diligently pursue the permit work in such a way as not to cause an unreasonable interference or inconvenience to the traveling public.

Sec.14.04.120 A - Unless the permit provides otherwise: All permit work shall conform to the following specifications as may be designated by the permit:

1. The Standard Specifications of the Department of Public Works of the State of California;
2. The Special Provisions for Encroachment Work, on file in the office of the Public Works Director.

Sec.14.04.125 Indemnity and hold harmless: an applicant shall agree to indemnify, defend, and save harmless the County, its officers, agents and employees, from and against any and all claims and losses whatsoever accruing or resulting to any and all persons, firms or corporations, and public and private property in connection with the encroachment or the conduct of the special event, unless arising out of the sole negligence or willful misconduct of the County. (Ord. 3889, 1996)

Sec.14.04.160 The Public works Director may, in the manner provided in this section, require and enforce the removal of any of the things authorized by Subsection A of this Section, when, in his or her opinion, any of said things are so placed or done as to constitute a traffic hazard, or to interfere with normal highway maintenance, or otherwise to violate any of the conditions under which said things are authorized. (Ord. 3889, 1996; Ord. § 7, 1960)

**MONTEREY COUNTY
RESOURCE MANAGEMENT AGENCY**

Carl P. Holm, AICP, Director

LAND USE & COMMUNITY DEVELOPMENT | PUBLIC WORKS & FACILITIES | PARKS
1441 Schilling Place, South 2nd Floor
Salinas, California 93901-4527
(831)755-4800
www.co.monterey.ca.us/rma



PLEASE READ THIS PERMIT CAREFULLY

NO PERMIT SHALL BE CONSTRUED AS AUTHORITY TO CLOSE A ROAD

Failure to comply will result in a Stop Work Order and may result in suspension/loss of permit and applicant will be subject to any applicable fines and penalties.

The following conditions become a part of Encroachment Permit No. _____

- a. A copy of this permit must be kept at the work site at all times while work is in progress, and shall be exhibited upon demand by representatives of the County of Monterey-Resource Management Agency (RMA), Sheriff's Department and/or California Highway Patrol (CHP).
- b. Permittee shall notify the RMA at (831) 755-4800 forty-eight (48) hours, exclusive of Saturday, Sunday and Holidays, prior to commencing or resuming any work.
- c. Prior to commencing any work, the permittee shall designate in writing, an authorized representative and telephone number, who shall have the authority to represent and act in the permittee's behalf. Also the name and telephone of an individual with the authority and appropriate skills to perform emergency work in regard to public safety and/or public convenience at any hour including weekends, holidays and during periods of work permit suspensions or cancellations. Once work has begun, the permittee shall diligently pursue the work in such a manner as to cause the least interference and inconvenience to the public.
- d. When any trench is five feet (5') or more in depth, the permittee shall obtain a "Permit to Excavate" (except as modified in subsequent paragraphs), from the Division of Industrial Safety, Department of Industrial Relations, State of California, at (510) 794-2521 or visit their website at www.dir.ca.gov. ***Public Utility Companies and U.S. government agencies are not required to obtain such permit.***
- e. Pipe and jointing materials shall be at the site prior to trenching within the road right-of-way.
- f. Trenches shall be located further from roadway structures, curbs, gutters and sidewalks, etc., than a distance equal to the depth of the trench or six (6) feet from face of curb except as shown otherwise on the approved plans. All road structures, pavement, curbs, gutters, sidewalks, etc., that are undermined or disturbed during construction shall be removed, the ground recompacted, and a new structure installed in accordance with County of Monterey standard details and specifications, at the permittee's expense.

- g. A T-trench shall be required on all paved road on traveled way with a minimum of twelve (12") inches (typ) on both sides except on shoulder area.
- h. All existing roadside ditches and drainage facilities shall be promptly restored to original existing condition and proper drainage maintained during construction.
- i. Permittee shall provide all signs, lights, barricades, barrier rail, and/or traffic control facilities, including fences, and competent flagmen as may be required to adequately warn, guide and protect the public. All signing shall meet the requirements of the State of California's "Manual of Warning Signs, Lights and Devices for Use in Performance of Work upon Highways," current edition, and shall be diligently maintained at all times, including non-working hours, weekends and holidays. Reference is made to the Standard Specifications, State of California, Section 7.
- j. With the approval of the RMA, traffic may be reduced to a twelve (12') foot lane when properly signed, coned, and properly equipped flagmen are posted at both ends of the restricted area to assist in the safe flow of traffic. Roads shall be restored to two (2), twelve (12') foot (minimum) unrestricted traffic lanes for dark of non-working hours.
- k. County of Monterey roads may be closed to thru traffic provided written approval is obtained from the Monterey County Road Commissioner for such closure. The request shall outline, in writing, all traffic control measures and alternate routes. Allow not less than ten (10) working days for obtaining approval.
- l. In the event the permittee or permittee's contractor fails to satisfactorily comply with the requirements of Paragraph (i) and /or fails to maintain trenches in a safe, smooth condition as required in Paragraph (h), the County of Monterey may place the necessary signs and/or perform the trench repair and other maintenance work to ensure public safety and convenience, and will collect all costs incurred from the permittee. Such failure to comply with the terms of this permit shall be considered cause for suspending and/or cancelling this permit.
- m. Excavations for jacking and boring devices shall not be located nearer to the edge of pavement, paved shoulder or concrete curb than a distance equal to the depth of bore/jacking pit or day lighting pit. In no case shall the pit be nearer than five (5') feet to the edge of pavement or surfaced shoulder.
- n. Relative compaction within the County of Monterey roadway ("roadway" as defined in the Standard Specifications-State of California) shall not be less than 95%. Trenches outside the roadway shall be compacted to not less than 90%.

- o. All material testing, including relative compaction may be performed by a registered engineer specializing in material testing. This Department reserves the right to require additional tests at locations and depths designated during performance of the work. All material testing shall be at the permittee's expense. The County of Monterey shall be the sole judge as to the adequacy of all tests and test results and shall receive a copy of all test results within seven (7) working days after testing. The County reserves the right to require Certificates of Compliance and other test reports.
- p. Trench restoration requirements shall consist of:
 - a. Structure Backfill, minimum thickness of twenty-two (22") inches (R-60, SE-25, C-95%)
 - b. Class 2 Aggregate Base, minimum thickness six (6") inches (R-78, SE-27, RC-95%)
 - c. Liquid Asphalt – Prime Coat – minimum 0.20 gal/sq yd.
 - d. Type B asphalt concrete, minimum thickness three (3") inches or match existing or better.
 - e. Asphalt emulsion – paint binder.

However, in areas where existing base and surfacing exceed the minimum specified thickness, replacement shall equal existing structural section.

The above shall be considered the minimum requirements allowed and are not intended to restrict the permittee from increasing the structural section as may be deemed necessary.

In the event the requirements contained in the Specifications and Plans submitted by the permittee exceed those specified above, the permittee's requirements shall prevail.

- q. Where one-half (1/2) of a traffic lane, or more than one-half (1/2) the roadway is disturbed, damaged or undermined, the entire lane or roadway shall be reconstructed in accordance with Paragraph (n).
- r. Before permanent pavement is placed, the edges of the trench shall be cut to a straight line with vertical sides and treated with paint binder. Paving is to be finished to a true and even plane with the adjacent pavement. In addition to asphalt paving, on chip seal finish roads, a medium type chip seal shall be required and shall be applied in accordance with Section 37 of the Caltrans Standard Specifications latest edition.
- s. The Monterey County Road Commissioner shall be the sole judge as to the adequacy of the finished pavement within the area of responsibility of the County of Monterey.

- t. If the trench is located within three (3') feet outside of the edge of pavement, the trench and the shoulder between the trench and edge of pavement shall be regarded and restored with a minimum of four (4") inches of Class 4 Aggregate Base and to the grade of the original shoulder.
- u. Upon completion of the work, the disturbed portion of the roadway shall be finished in accordance with Section 22 of the Standard Specifications – State of California. Surplus material shall be removed and disposed of and the streets restored to a safe, neat condition. Grass, ice plant and shrubbery in areas supporting such vegetation disturbed by this work shall be replaced and restored in kind. Dust control shall be in accordance with Section 10 of the State Standard Specifications.
- v. The permittee agrees that upon final acceptance of the work within the County of Monterey right-of-way, the permittee will repair, at his sole expense, any trench settlement, erosion, cracking, or failure which occurs any time during the one (1) year period subsequent to the date of final acceptance. Should the permittee, within a reasonable time after demand fail to make any and all such repair or replacements, the County of Monterey will undertake said repairs and replacements and the permittee shall reimburse the County of Monterey for any and all costs of said repair or replacement including overhead and engineering costs.

Permittee may be required at the time of final acceptance to file with the County of Monterey, a corporate surety bond to insure the requirements of this paragraph will be complied with.

- w. Reference is made to Monterey County Code, Title 14.04.150. In the event the future improvement of the highway necessitates the relocation of this encroachment, the permittee will relocate the same at his sole expense.
- x. A permit may be required by the Coastal Development Act of 1976.
- y. The permittee shall indemnify and save harmless the County of Monterey and all its officers, agents and employees thereof, from all claims, suits, or actions of any name, kind, and description brought forth and resulting directly or indirectly in connection with this encroachment permit.

If you have any questions regarding these conditions please contact the County of Monterey, Resource Management Agency, Encroachment Section at (831) 755-4800.

APPENDIX D

**DRAFT CALIFORNIA STATE UNIVERSITY
MONTEREY BAY ENCROACHMENT PERMIT**

(Not Used)

APPENDIX E
FINAL RUWAP MITIGATION MONITORING AND
REPORTING PLAN

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
4.1-R1: Prior to the finalization of project specific plans, the design engineer and MCWD should ensure that the design and placement of the final treatment and filtration facility and pump/lift stations will minimize impacts on the aesthetic nature of their surrounding areas, by providing screening using decorative fencing, vegetation, and painting new buildings and facilities in a color that will blend in with the surrounding landscape.	Prior to finalizing project design	Contractor and MCWD	MCWD	
4.3-R1: The contractors shall adhere to the following requirements <u>as required</u> to reduce particulate matter emissions below the MBUAPCD threshold: <ul style="list-style-type: none"> • water all active construction areas as required with non-potable sources to the extent feasible; frequency should be based on the type of operation, soil, and wind exposure and minimized to prevent wasteful use of water. • prohibit grading activities during periods of high wind (over 15 mph). • cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard, • pave or apply water three times daily or apply non-toxic soil stabilizers on all unpaved access roads, parking areas & staging areas at construction sites, • sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites, • sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets, • hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more), • enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.), • limit traffic speeds on unpaved roads to 15 mph, • install appropriate best management practices or other erosion control measures to prevent silt runoff to public roadways, • replant vegetation in disturbed areas as quickly as possible, • install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site, • limit the area subject to excavation, grading and other construction activity at any one time, • post a publicly visible sign which specifies the telephone number and person to contact regarding dust complaints (the person shall respond to complaints and take corrective action within 48 hours), and • ensure that the phone number of MBUAPCD is visible to ensure compliance with Rule 402 (Nuisance). (Please note that mitigation measure 4.3-R1 is consistent with mitigation measure AQ-1 from Final Pure Water Monterey Groundwater Replenishment Project MMRP). 	During Construction	Contractor and MCWD	MBUAPCD	
4.3-R2: Subject to approval by the MBUAPCD prior to <u>and, as needed, during project construction approval and implementation</u> , MCWD <u>and the contractor</u> shall implement measures to reduce or eliminate diesel exhaust emissions to meet identified thresholds of significance, such as reduction in hours of operation of equipment contributing to such emissions or by utilizing oxidation catalysts or catalytic particulate matter filters on all diesel powered equipment above 50 horsepower that require CARB-certified low-sulfur diesel fuel (less than or equal to 15 parts per million by weight (ppmw)). Site-specific risk assessment may be required to determine the appropriate measures to implement.	Confirm with MBUAPCD prior to project construction; implement measures during	Contractor and MCWD	MBUAPCD	
4.4-R1: Conduct Pre-Construction Survey. A qualified biologist shall conduct a pre-construction survey for Hickman's onion <u>special-status plant species</u> to determine presence of this <u>these</u> species. The biologist shall prepare a report that provides the results of the survey, including a description of the baseline habitat conditions, and, if found, the number of individuals and location of the populations identified within the area of impact. If no individual are found, no further mitigation is necessary. If individuals are found, the following measures shall be implemented: <ul style="list-style-type: none"> • Based on the results of the report, the design of the alternative shall avoid individuals to the maximum extent possible. • If avoidance is not feasible, a Rare Plant Restoration Plan shall be prepared by a qualified biologist and implemented. The plan shall include, but is not limited to, the following: <ul style="list-style-type: none"> ○ a description of the baseline conditions of the habitats within the area of impact, including the presence of any special-status species, their locations, and densities; ○ procedures to control non-native species invasion and elimination of existing non-native species within the area of impact; ○ provisions for ongoing training of facility maintenance personnel to ensure compliance with the requirements of the plan; ○ a detailed description of on-site and off-site restoration areas, salvage of seed and/or soil bank, plant salvage, seeding and planting specifications; and ○ a monitoring program that describes annual monitoring efforts which incorporate success criteria and contingency plans if success criteria are not met. 	Prior to project construction (within 30 days)	Qualified Biologist and Contractor	MCWD	
4.4-R2: Conduct Pre-Construction Surveys for Burrowing Owls and Implement CDFG Guidelines. Pre-construction surveys shall be conducted to locate active nesting burrows. Surveys will consist of visually checking the area within 500 feet of the proposed storage reservoir site within 30 days of initiating construction. If active nests are found, no-disturbance buffers shall be established around all active nesting burrows during the breeding season, and the CDFG burrowing owl guidelines shall be implemented during the non-breeding season. If no burrowing owls are found, no further mitigation measures are required. Breeding season: If active nests are found, biologist shall establish a 250-foot buffer zone around each burrow. No construction activities shall be permitted within the zone until after the breeding season, which extends from February 1 to August 21, or until it is determined that the young have fledged. Winter Season: Adult burrowing owls can occupy burrows year-round. Therefore, before construction activities begin in the vicinity of active burrows (and following the breeding season), CDFG mitigation guidelines for burrowing owls (1995) shall be implemented. The guidelines require that one-way doors be installed at least 48 hours before construction at all active burrows that exist	Prior to project construction (within 30 days)	Qualified Biologist and Contractor	MCWD	

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Imple- mentation	Responsibility for Implementation	Verified for Compliance by:	X
within the construction area so that the burrows are not occupied during construction. The guidelines also require installation of two artificial burrows for each occupied burrow that is removed. Qualified wildlife biologists shall conduct pre-construction surveys for burrowing owls within 30 days of initiating construction activities. The one-way doors shall be installed at that time to ensure that the owls can get out of the burrows and not back in. Artificial burrows shall be constructed within the area prior to installation of the one-way doors. (Please note that mitigation measure 4.4-R2 is consistent with mitigation measure BT-11 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).				

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4.4-R3: A Memorandum of Understanding (MOU) with CDFG shall be obtained to allow a qualified biologist to remove and relocate coast horned lizards from the construction area if encountered during construction activities. The MOU shall include, but is not limited to, the methods of capture and handling, an estimation of the number expected to be captured and handled, the duration of capture and handling, and a description of the established relocation area. If the relocation is proposed to occur outside of the project site, MCWD must coordinate and obtain approval from the landowner. Details of this procedure shall be reviewed by CDFG and implemented by a qualified biologist.	Prior to construction	Qualified Biologist and MCWD	CDFG	
4.4-R4: Conduct Construction Monitoring Program for coast horned lizards, which includes procedures for capture and release. A qualified biologist shall remain on-site during initial grading activities to salvage and move coast horned lizards that may be uncovered during earthmoving activities. Recovered individuals shall be placed in appropriate habitat outside of the within the project site in accordance with the MOU with CDFG. The monitor shall walk alongside the grading equipment in each new area of disturbance, and shall have the authority to halt construction temporarily if necessary to capture and relocate an individual. Any individual captured in the grading zone shall be relocated as soon as possible to adjacent suitable habitat outside of the area of impact.	During Construction	Qualified Biologist and Contractor	MCWD	
BT-1j: Conduct Pre-Construction Surveys for American Badger¹. To avoid and reduce impacts to the American badger, the project proponents shall retain a qualified biologist to conduct focused pre-construction surveys for badger dens in all suitable habitat proposed for construction, ground disturbance, or staging no more than two weeks prior to construction. If no potential badger dens are present, no further mitigation is required. If potential dens are observed, the following measures are required to avoid potential significant impacts to the American badger: <ul style="list-style-type: none"> • If the qualified biologist determines that potential dens are inactive, the biologist shall excavate these dens by hand with a shovel to prevent badgers from reusing them during construction. • If the qualified biologist determines that potential dens may be active, the den shall be monitored for a period sufficient (as determined by a qualified biologist) to determine if the den is a maternity den occupied by a female and her young, or if the den is occupied by a solitary badger. • Maternity dens occupied by a female and her young shall be avoided during construction and a minimum buffer of 200 feet in which no construction activities shall occur shall be maintained around the den. After the qualified biologist determines that badgers have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction. Solitary male or female badgers shall be passively relocated by blocking the entrances of the dens with soil, sticks, and debris for three to five days to discourage the use of these dens prior to project construction disturbance. The den entrances shall be blocked to an incrementally greater degree over the three to five day period. After the qualified biologist determines that badgers have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction.	Prior to project construction	MCWD construction contractors and qualified biologists	MCWD qualified biologist	
BT-1k: Conduct Pre-Construction Surveys for Protected Avian Species, including, but not limited to, white-tailed kite and California horned lark. Prior to the start of construction activities, a qualified biologist shall conduct pre-construction surveys for suitable nesting habitat within the Project Study Area and within a suitable buffer area from the Project Study Area. The qualified biologist shall determine the suitable buffer area based on the avian species with the potential to nest at the site. In areas where nesting habitat is present within the project area or within the determined suitable buffer area, construction activities that may directly (e.g., vegetation removal) or indirectly (e.g., noise/ground disturbance) affect protected nesting avian species shall be timed to avoid the breeding and nesting season. Specifically, vegetation and/or tree removal can be scheduled after September 16 and before January 31. Alternatively, a qualified biologist shall be retained by the project proponents to conduct pre-construction surveys for nesting raptors and other protected avian species where nesting habitat was identified and within the suitable buffer area if construction commences between February 1 and September 15. Pre-construction surveys shall be conducted no more than 14 days prior to the start of construction activities during the early part of the breeding season (February through April) and no more than 30 days prior to the initiation of these activities during the late part of the breeding season (May through August). Because some bird species nest early in spring and others nest later in summer, surveys for nesting birds may be required to continue during construction to address new arrivals, and because some species breed multiple times in a season. The necessity and timing of these continued surveys shall be determined by the qualified biologist based on review of the final construction plans. If active raptor or other protected avian species nests are identified during the preconstruction surveys, the qualified biologist shall notify the project proponents and an appropriate no-disturbance buffer shall be imposed within which no construction activities or disturbance shall take place until the young have fledged and are no longer reliant upon the nest or parental care for survival, as determined by a qualified biologist. (Please note that mitigation measure BT-1k was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP. BT-1k is consistent with mitigation measure 4.4-R5 previously identified in this RWP MMRP and is more inclusive therefore has been added in place of 4.4-R5 to ensure compliance.)	Prior to Construction if it occurs between Aug. 1 & Apr. 14	Qualified Biologist and MCWD	MCWD	
4.4-R6: Conduct Pre-Construction Surveys for Coast Horned Larks and Loggerhead Shrike. A qualified biologist shall perform pre-construction surveys for active nests of these two species prior to construction (within 30 days of construction initiation). If active nests are found, a suitable construction buffer shall be established by a qualified biologist until the young of the year have fledged. Alternatively, construction activities that may affect nesting raptors can be timed to avoid the nesting season (generally the nesting season is April 15 to August 1).	Prior to Construction if it occurs between Aug. 1 & Apr. 14	Qualified Biologist and MCWD	MCWD	
4.4-R7: A Revegetation Plan shall be prepared by a qualified biologist to revegetate and restore impacted habitat. This plan shall include a list of appropriate species, planting specifications,	Prior to	Qualified	MCWD	

¹ Mitigation Measure BT-1j was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

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monitoring procedures, success criteria, and contingency plan if success criteria are not met.	construction	Biologist and Contractor		
4.4-R8: Conduct an Employee Education Program for Construction Crew and MCWD staff prior to construction activities. <u>A qualified biologist (if necessary, the biological monitor) shall meet with the construction crew at the onset of construction to educate the construction crew on the following: 1) the appropriate access route in and out of the construction area; 2) how biological monitor will examine the area and agree upon a method which will ensure the safety of the monitor during such activities, 3) the special-status species that may be present; 4) the specific mitigation measures that will be incorporated into the construction effort; 5) the general provisions and protections afforded by the USFWS and CDFW; and 6) the proper procedures if a special-status animal or any other animal is encountered within the project site. Refer to Mitigation Measure 4.4 D8 above.</u> (Please note that mitigation measure 4.4-R8 is consistent with mitigation measure BT-1s #1 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior to construction	Qualified Biologist and Contractor	MCWD	
4.4-R9: Trees and vegetation not planned for removal shall be protected during construction to the maximum extent possible. This includes the use of exclusionary fencing of herbaceous and shrubby vegetation, such as hay bales, and protective wood barriers for trees. Only certified weed-free straw shall be used to avoid the introduction of non-native, invasive species. A biological monitor shall supervise the installation of protective fencing and monitor at least once per week until construction is complete to ensure that the protective fencing remains intact. (Please note that mitigation measure 4.4-R9 is consistent with mitigation measure BT-1s #2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior, during, and post construction	Contractor	MCWD	
4.4-R10: Following construction, disturbed areas shall be restored to pre-project contours to the maximum extent possible and revegetated using locally-occurring native species and native erosion control seed mix, per the requirements of the Revegetation Plan. (Please note that mitigation measure 4.4-R10 is consistent with mitigation measure BT-1s #4 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Following construction	Contractor	MCWD	
4.4-R11: Protective fencing shall be placed prior to and during construction so as to keep construction vehicles and personnel from impacting vegetation adjacent to the project site outside of work limits. A biological monitor shall supervise the installation of protective fencing and monitor at least once per week until construction is complete to ensure that the protective fencing remains intact. (Please note that mitigation measure 4.4-R11 is consistent with mitigation measure BT-1s #3 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior, during, and post construction	Contractor	MCWD	
4.4-R12: Grading, excavating, and other activities that involve substantial soil disturbance shall be planned and carried out in consultation with a qualified hydrologist, engineer, or erosion control specialist, and shall utilize standard erosion control techniques to minimize erosion and sedimentation to native vegetation. (Please note that mitigation measure 4.4-R12 is consistent with mitigation measure BT-1a #5 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior, during, and post construction	Contractor & qualified hydrologist/engineer	MCWD	
4.4-R13: A representative shall be appointed by MCWD who will be the contact source for any employee or contractor who may inadvertently kill or injure a special-status species or find one dead, injured, or trapped. The representative shall be notified immediately to notify USFWS and CDFG. The representative shall be identified during the Employee Education Program and his/her contact information shall be provided to USFWS and CDFG.	Prior to construction	Appointed Representative and Contractor	MCWD	
4.4-R14: If maintenance activities require ground disturbance, the impacts shall be subject to the requirements of the Revegetation Plan described in Mitigation Measure 4.4-R7.	Ongoing if maintenance requires ground disturbance	MCWD	MCWD	
4.4-R15: Conduct an Employee Education Program for Maintenance Construction Crew and other MCWD staff prior to project <u>implementation construction activities</u> . <u>A biological monitor shall meet with the maintenance crew at the onset of project operations to educate the crew on the following: 1) the appropriate access route in and out of the facility area; 2) how biological monitor will examine the area and agree upon a method which will ensure the safety of the monitor during such activities, 3) the special-status species that may be present; 4) the specific mitigation measures that will apply to maintenance activities; 5) the general provisions and protections afforded by the USFWS and CDFW; and 6) the proper procedures if a special-status animal or any other animal is encountered within the project site. Refer to Mitigation Measure 4.4 D8 above.</u> (Please note that mitigation measure 4.4-R8 is consistent with mitigation measure BT-1a #1 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior to construction	Qualified Biologist and MCWD	MCWD	
BT-1a: Implement Construction Best Management Practices². The following best management practices shall be implemented during all identified phases of construction (i.e., pre-, during, and post-) to reduce impacts to special-status plant and wildlife species: 1. No firearms shall be allowed on the construction sites at any time. 2. To protect against spills and fluids leaking from equipment, the project proponent shall require that the construction contractor maintains an on-site spill plan and on-site spill containment measures that can be easily accessed. 3. Refueling or maintaining vehicles and equipment should only occur within a specified staging area that is at least 100 feet from a waterbody (including riparian and wetland habitat) and that has sufficient management measures that will prevent fluids or other construction materials including water from being transported into waters of the state. Measures shall include confined concrete washout areas, straw wattles placed around stockpiled materials and plastic sheets to cover materials from becoming airborne or otherwise transported due to wind or rain into surface waters.	Prior to, during and after project construction	MCWD construction contractors and qualified biologist	MCWD qualified biologist and construction biological monitor;	

² Mitigation Measure BT-1a was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance. The other components of BT-1a as identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP, are identified within this MMRP. The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

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BT-1b: Implement Construction-Phase Monitoring³. The project proponents shall retain a qualified biologist to monitor all ground disturbing construction activities (i.e., vegetation removal, grading, excavation, or similar activities) to protect any special-status species encountered. Any handling and relocation protocols of special-status wildlife species shall be determined in coordination with CDFW prior to any ground disturbing activities, and conducted by a qualified biologist with appropriate scientific collection permit. After ground disturbing project activities are complete, the qualified biologist shall train an individual from the construction crew to act as the on-site construction biological monitor. The construction biological monitor shall be the contact for any special-status wildlife species encounters, shall conduct daily inspections of equipment and materials stored on site and any holes or trenches prior to the commencement of work, and shall ensure that all installed fencing stays in place throughout the construction period. The qualified biologist shall then conduct regular scheduled and unscheduled visits to ensure the construction biological monitor is satisfactorily implementing all appropriate mitigation protocols. Both the qualified biologist and the construction biological monitor shall have the authority to stop and/or redirect project activities to ensure protection of resources and compliance with all environmental permits and conditions of the project. The qualified biologist and the construction monitor shall complete a daily log summarizing activities and environmental compliance throughout the duration of the project. The log shall also include any special-status wildlife species observed and relocated.	Prior to and during project construction	MCWD, qualified biologists	MCWD qualified biologist and construction biological monitor; CDFW	
BT-1c: Implement Non-Native, Invasive Species Controls⁴. The following measures shall be implemented to reduce the introduction and spread of non-native, invasive species: 1. Any landscaping or replanting required for the project shall not use species listed as noxious by the California Department of Food and Agriculture (CDFA). 2. Bare and disturbed soil shall be landscaped with CDFA recommended seed mix or plantings from locally adopted species to preclude the invasion on noxious weeds in the Project Study Area. 3. Construction equipment shall be cleaned of mud or other debris that may contain invasive plants and/or seeds and inspected to reduce the potential of spreading noxious weeds, before mobilizing to arrive at the construction site and before leaving the construction site. 4. All non-native, invasive plant species shall be removed from disturbed areas prior to replanting.	During project construction	Construction contactors	MCWD qualified biologist and construction biological monitor	
BT-1d: Conduct Pre-Construction Surveys for California Legless Lizard⁵. The project proponents shall retain a qualified biologist to prepare and implement a legless lizard management plan in coordination with CDFW, which shall include, but is not limited to, the protocols for pre-construction surveys, construction monitoring, and salvage and relocation. The management plan shall include, but is not limited to, the following: <ul style="list-style-type: none"> Pre-Construction Surveys. Pre-construction surveys for legless lizards shall be conducted in all suitable habitat proposed for construction, ground disturbance, or staging. The qualified biologist shall hold or obtain a CDFW scientific collection permit for this species. The pre-construction surveys shall use a method called "high-grading." The high grading method shall include surveying the habitat where legless lizards are most likely to be found, and the survey must occur under the conditions when legless lizards are most likely to be seen and captured (early morning, high soil moisture, overcast, etc.). The intensity of a continued search may then be adjusted, based on the results of the first survey in the best habitat. A "three pass method" shall be used to locate and remove as many legless lizards as possible. A first pass shall locate as many legless lizards as possible, a second pass should locate fewer lizards than the first pass, and a third pass should locate fewer lizards than the second pass. All search passes shall be conducted in the early morning when legless lizards are easiest to capture. Vegetation may be removed by hand to facilitate hand raking and search efforts for legless lizards in the soil under brush. If lizards are found during the first pass, an overnight period of no soil disturbance must occur before the second pass, and the same requirement shall be implemented after the second pass. If no lizards are found during the second pass, a third pass is not required. Installation of a barrier, in accordance with the three pass method, shall be required if legless lizards are found at the limits of construction (project boundaries) and sufficient soft sand and vegetative cover are present to suspect additional lizards are in the immediate vicinity on the adjacent property. A barrier shall prevent movement of legless lizards into the property. All lizards discovered shall be handled according to the salvage procedures outlined below. Construction Monitoring. Monitoring by a qualified biologist shall be ongoing during construction. The onsite monitor shall be present during all ground disturbing construction activities. To facilitate the careful search for lizards during construction, vegetation may need to be removed. If removal by hand is impractical, equipment such as a chainsaw, string trimmer, or skid-steer may be used, if a monitor and crew are present. The task of the vegetation removal is to remove plants under the direction of the monitor, allowing the monitor to watch for legless lizards. After plants are removed, the monitor and crew shall search the exposed area for legless lizards. If legless lizards are found during preconstruction surveys or construction monitoring, the protocols for salvage and relocation identified below shall be followed. Upon completion of pre-construction surveys, construction monitoring, and any resulting salvage and relocation actions, a report shall be submitted to the CDFW. The CDFW must be notified at least 48 hours before any field activity begins. Salvage and Relocation. Only experienced persons may capture or handle legless lizards. The monitor must demonstrate a basic understanding, knowledge, skill, and experience with this species and its habitat. Once captured, a lizard shall be placed in a lidded, vented box containing clean sand. Areas of moist and dry sand need to be present in the box. The boxes must be kept out of direct sunlight and protected from temperatures over 72°F. The sand must be kept at temperatures under 66°F. Ideal temperatures are closer to 60°F. On the same day as capture, the lizards shall be examined for injury and data recorded on location where found as well as length, color, age, and tail condition. Once data is recorded, lizards shall be relocated to appropriate habitat, as determined through coordination with the CDFW, qualified biologist, and potential landowners. 	Prior to and during project construction	MCWD qualified biologist	MCWD, qualified biologist	

³ Mitigation Measure BT-1b was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

⁴ Mitigation Measure BT-1c was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

⁵ Mitigation Measure BT-1d was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

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Suitability of habitat for lizard release must be evaluated and presented in a management plan. The habitat must contain habitat factors most important to the health and survival of the species such as appropriate habitat based on soils, vegetated cover, native plant species providing cover, plant litter layer and depth, soil and ambient temperature, quality and composition of invertebrate population and prey availability. Potential relocation sites that contain the necessary conditions may exist within the habitat reserves on the former Fort Ord, including the Fort Ord National Monument. Lizards shall be marked with a unique tag (pit or tattoo) prior to release. Release for every lizard shall be recorded with GPS. GPS locations shall be submitted as part of the survey result report to document the number and locations of lizards relocated.				
<p>BT-1e: Prepare and Implement Rare Plant Restoration Plan to Mitigate Impacts to Sandmat Manzanita, Monterey Ceanothus, Monterey Spineflower, Eastwood's Goldenbush, Coast Wallflower, and Kellogg's Horkelia⁶. Impacts to rare plant species individuals shall be avoided through project design and modification, to the extent feasible while taking into consideration other site and engineering constraints. If avoidance is not possible, the species shall be replaced at a 1:1 ratio for area of impact through preservation, restoration, or combination of both. A Rare Plant Restoration Plan, approved by the lead agency prior to commencing construction on the project site, shall be prepared and implemented by a qualified biologist. The plan shall include, but is not limited to, the following:</p> <p>a. A detailed description of on-site and/or off-site mitigation areas, salvage of seed and/or soil bank, plant salvage, seeding and planting specifications, including, if appropriate, increased planting ratio to ensure the applicable success ratio. Specifically, seed shall be collected from the on-site individuals that would be impacted and grown in a local greenhouse, and then transplanted within the mitigation area. Plants shall be transplanted while they are young seedlings in order to develop a good root system. Alternatively, the mitigation area may be broadcast seeded in fall; however, if this method is used, some seed shall be retained in the event that the seeding fails to produce viable plants and contingency measures need to be employed.</p> <p>b. A description of a 3-year monitoring program, including specific methods of vegetation monitoring, data collection and analysis, restoration goals and objectives, success criteria, adaptive management if the criteria are not met, reporting protocols, and a funding mechanism.</p> <p>The mitigation area shall be preserved in perpetuity through a conservation easement or other legally enforceable land preservation agreement. Exclusionary fencing shall be installed around the mitigation area to prevent disturbance until success criteria have been met.</p>	Prior to project construction	Project engineers, project biologist, MCWD	MCWD qualified biologist	
<p>BT-1g: Conduct Pre-Construction Surveys for Special-Status Bats⁷. To avoid and reduce impacts to special-status bat species, the project proponents shall retain a qualified bat specialist or wildlife biologist to conduct site surveys during the reproductive season (May 1 through September 15) to characterize bat utilization of the site and potential species present (techniques utilized to be determined by the biologist) prior to tree or building removal. Based on the results of these initial surveys, one or more of the following shall occur:</p> <ul style="list-style-type: none"> • If it is determined that bats are not present at the site, no additional mitigation is required. • If it is determined that bats are utilizing the site and may be impacted by the Project, pre-construction surveys shall be conducted no more than 30 days prior to any tree or building removal (or any other suitable roosting habitat) within 100 feet of construction limits. If, according to the bat specialist, no bats or bat signs are observed in the course of the pre-construction surveys, tree and building removal may proceed. If bats and/or bat signs are observed during the pre-construction surveys, the biologist shall determine if disturbance would jeopardize a maternity roost or another type of roost (i.e., foraging, day, or night). • If a single bat and/or only adult bats are roosting, removal of trees, buildings, or other suitable habitat may proceed after the bats have been safely excluded from the roost. Exclusion techniques shall be determined by the biologist and would depend on the roost type. <p>If an active maternity roost is detected, avoidance is preferred. Work in the vicinity of the roost (buffer to be determined by biologist) shall be postponed until the biologist monitoring the roost determines that the young have fledged and are no longer dependent on the roost. The monitor shall ensure that all bats have left the area of disturbance prior to initiation of pruning and/or removal of trees that would disturb the roost. If avoidance is not possible and a maternity roost must be disrupted, authorization from CDFW shall be required prior to removal of the roost.</p>	Prior to project construction	MCWD qualified biologist (bat/wildlife specialist)	MCWD and qualified biologist	
<p>BT-1h: Implementation of Mitigation Measures BT-1a and BT-1b to Mitigate Impacts to the Monterey Ornate Shrew, Coast Horned Lizard, Coast Range Newt, Two-Striped Garter Snake, and Salinas Harvest Mouse⁸. If these species are encountered, implementation of Mitigation Measures BT-1a and BT- 1b, which avoid and minimize impacts through implementing construction best management practices and monitoring, would reduce potential impacts to these species to a less-than-significant level.</p>	Prior to and during project construction	MCWD contractors and qualified biologists	MCWD qualified biologist	
<p>BT-1i: Conduct Pre-Construction Surveys for Monterey Dusky- Footed Woodrat⁹. To avoid and reduce impacts to the Monterey dusky-footed woodrat, the project proponents shall retain a qualified biologist to conduct pre-construction surveys in suitable habitat proposed for construction, ground disturbance, or staging within three days prior to construction for woodrat nests within the</p>	Prior to project construction	MCWD contractors and	MCWD	

⁶ Mitigation Measure BT-1e was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance , The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

⁷ Mitigation Measure BT-1g was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance , The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

⁸ Mitigation Measure BT-1h was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance , The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
project area and in a buffer zone 100 feet out from the limit of disturbance. All woodrat nests shall be flagged for avoidance of direct construction impacts and protection during construction, where feasible. Nests that cannot be avoided shall be manually deconstructed prior to land clearing activities to allow animals to escape harm. If a litter of young is found or suspected, nest material shall be replaced, and the nest left alone for 2-3 weeks before a re-check to verify that young are capable of independent survival before proceeding with nest dismantling.		qualified biologists		
4.4-R18: A Memorandum of Understanding (MOU) with CDFG shall be obtained for a qualified biologist to remove and relocate black legless lizards, coast horned lizards, and globose dune beetles from the construction area if encountered during construction activities. The MOU shall include, but is not limited to, the methods of capture and an estimation of the number of individuals expected to be captured and handled, the duration of capture and handling, and a description of the established relocation area. If the relocation is proposed to occur outside of the project site, MCWD must coordinate and obtain approval from the landowner. Details of this procedure shall be reviewed by CDFG and implemented by a qualified biologist.	Prior to construction	Qualified Biologist and MCWD	CDFG	
4.4-R19: Conduct Construction Monitoring Program for Black Legless Lizards, which includes procedures for capture and release. A qualified biologist shall remain on-site during initial grading activities to salvage and move lizards that may be uncovered during earthmoving activities. Recovered individuals shall be placed in appropriate habitat outside of the within the project site in accordance with the MOU with CDFG. The monitor shall walk alongside the grading equipment in each new area of disturbance, and shall have the authority to halt construction temporarily if necessary to capture and relocate an individual. Any individual captured in the grading zone shall be relocated as soon as possible to adjacent suitable habitat outside of the area of impact.	During Construction	Qualified Biologist and Contractor	MCWD	
4.4-R22: All food-related and other trash shall be disposed of in closed containers and removed from the project area at least once a week during the construction period, or more often if trash is attracting avian or mammalian predators. Construction personnel shall not feed or otherwise attract wildlife to the area. (Please note that mitigation measure 4.4-R22 is consistent with mitigation measure BT-1a #7 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction	Contractor	MCWD	
BT-4. HMP Plant Species Salvage¹⁰. For impacts to the HMP plant species within the Project Study Area that do not require take authorization from USFWS or CDFW, salvage efforts for these species shall be evaluated by a qualified biologist per the requirements of the HMP and BO. A salvage plan shall be prepared and implemented by a qualified biologist, which shall include, but is not limited to: a description and evaluation of salvage opportunities and constraints; a description of the appropriate methods and protocols of salvage and relocation efforts; identification of relocation and restoration areas; and identification of qualified biologists approved to perform the salvage efforts, including the identification of any required collection permits from USFWS and/or CDFW. Where proposed, seed collection shall occur from plants within the Project Study Area and topsoil shall be salvaged within occupied areas to be disturbed. Seeds shall be collected during the appropriate time of year for each species by qualified biologists. At the time of seed collection, a map shall also be prepared that identifies the specific locations of the plants for any future topsoil preservation efforts. The collected seeds shall be used to revegetate temporarily disturbed construction areas and reseeded and restoration efforts on- or off-site, as determined appropriate in the salvage plan.	Prior to, during, and after construction	MCWD Biologist	MCWD qualified biologist	
4.6-R1 See Note 1				
4.6-R2: If buried human remains are encountered during construction, work within 50 meters (±160 feet) of the find must halt and the archaeologist and the coroner immediately notified. If the find is determined to be significant, appropriate mitigation measures shall be formulated and implemented. If the remains are determined to be Native American, then the NAHC must be notified within 24 hours as required by Public Resources Code 5097. The NAHC will notify designated Most Likely Descendants who will provide recommendations for the treatment of the remains within 24 hours. The NAHC will mediate any disputes regarding treatment of remains. (Please note that mitigation measure 4.6-R2 is consistent with mitigation measure BT-1s #1 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction	Qualified Archaeologist and MCWD	MCWD	
CR-2c: Native American Notification¹¹. Because of their continuing interest in potential discoveries during construction, all listed Native American Contacts shall be notified of any and all discoveries of archaeological resources in the project area.	During project construction	MCWD and qualified archaeologist	MCWD and qualified archaeologist	
4.6-R3: MCWD shall comply with the policies and programs for the Cities of Marina, Seaside, and Monterey, and Monterey County relating to protecting resources and identifying additional archaeological sites that may be affected by project implementation.	All phases of project	Qualified Archaeologist & MCWD	MCWD	
4.6-R4: Unsurveyed areas within the areas proposed for ground disturbance or other construction activities shall be inventoried for the presence of cultural resources. This would include surface examination of the project site. Cultural resources, if found, shall be recorded on State Forms DPR 523 depending on the type of resource. After field studies are completed, an Archaeological Survey Report will be prepared, as appropriate, for documenting the type(s) of resources encountered.	Prior to and during construction	Qualified Archaeologist and MCWD	MCWD	
4.6-R5: If cultural resources cannot be avoided, they shall be evaluated for CEQA significance. The purpose of which would be to define a course of action to satisfy CEQA requirements for an Assessment of Effects. If cultural resources are considered significant resources per CEQA, then a data recovery program shall be implemented to reduce impacts to less-than-significant levels as required by CEQA Guidelines.	All phases of project	Qualified Archaeologist and MCWD	MCWD	

⁹ Mitigation Measure BT-1i was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

¹⁰ Mitigation Measure BT-4 was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

¹¹ Mitigation Measure CR-2c was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
4.6-R6: To insure that no inadvertent damage occurs to cultural resources, the resource boundaries should be marked as exclusion zones both on the ground and on construction maps. Construction supervisory personnel should be notified of the existence of these resources and required to keep personnel and equipment away from these areas. Periodic monitoring of cultural resources to be avoided should be completed by MCWD to insure that no inadvertent damage to the resources occurs as a result of construction or construction-related activities.	Prior to construction	Qualified Archaeologist and MCWD	MCWD	
4.6-R7: Prior to the initiation of construction or ground-disturbing activities adjacent to cultural resources, all construction personnel should be alerted to the possibility of buried cultural remains. Personnel should be instructed that upon discovery of cultural materials, no collection is to be undertaken and work in the immediate area of the find should be halted and MCWD be notified. During construction and operation, personnel and equipment will be restricted to the corridor surveyed for archaeological resources.	All phases of project	Qualified Archaeologist and MCWD	MCWD	
4.6-R8: Unsurveyed areas within proposed areas of ground disturbance or other construction activities shall be inventoried for the presence of historical resources. This would include surface examination of the project site. Historical resources, if found, shall be recorded on State Forms DPR 523 depending on the type of resource. The proposed alternative shall comply with the Office of Historic Preservation's instructions for recording historical resources. Refer to http://www.ohp.parks.ca.gov/ for more information.	All phases of project	Qualified Archaeologist and MCWD		
4.6-R9: If historical resources cannot be avoided, they shall be evaluated for CEQA significance and eligibility for the CRHP. The purpose of which would be to define a course of action to satisfy CEQA requirements for an Assessment of Effects. Historical resource mitigation measures may include further study to evaluate the sites, detailed recording, and/or excavation. If the historical resources per CEQA are significant or eligible for the CRHP, then a data recovery program shall be implemented to reduce impacts to less-than-significant levels as required by CEQA Guidelines.	When resources are encountered	Qualified Archaeologist and MCWD		
4.6-R10: Prior to the initiation of construction or ground-disturbing activities adjacent to cultural resources, all construction personnel should be alerted to the possibility of buried cultural remains. This would include prehistoric and/or historic resources. Personnel should be instructed that upon discovery of prehistoric and/or historic resources, no collection is to be undertaken and work in the immediate area of the find should be halted and MCWD be notified.	Prior to construction	Qualified Archaeologist and MCWD	MCWD	
EN-1: Construction Equipment Efficiency Plan¹². MCWD shall contract a qualified professional (i.e., construction planner/energy efficiency expert) to prepare a Construction Equipment Efficiency Plan that identifies the specific measures that MCWD (and its construction contractors) will implement as part of project construction to increase the efficient use of construction equipment. Such measures shall include, but not necessarily be limited to: procedures to ensure that all construction equipment is properly tuned and maintained at all times; a commitment to utilize existing electricity sources where feasible rather than portable diesel-powered generators; consistent compliance with idling restrictions of the state; and identification of procedures (including the use of routing plans for haul trips) that will be followed to ensure that all materials and debris hauling is conducted in a fuel-efficient manner.	Prior to project construction	MCWD energy efficiency expert, construction contractors	MCWD	
4.7-R1: To minimize the potential effects from strong seismic ground shaking on the project, a project specific geotechnical analysis shall be performed by a registered professional engineer with geotechnical expertise prior to the development of project level plans. <u>The recommendations of the geotechnical analysis shall be incorporated into project plans and implemented during construction, as appropriate.</u>	Prior to final design	Registered geotechnical engineer	MCWD	
4.7-R2: The engineer shall develop project level plans based upon and in response to the observations and recommendations made in the project specific geotechnical analysis.	Prior to final design and after geotech	Design engineer and MCWD		
4.7-R3: <u>MCWD</u> , the contractor and engineer (<u>as appropriate</u>) shall develop emergency response procedures in order to control and stop the release of recycled water in the event that seismic ground shaking causes a leak or rupture in the <u>earthen or tank</u> reservoirs or pipelines.	Prior to project completion	MCWD, engineer, contractor, as appropriate	MCWD	
HH-2a: Environmental Site Assessment¹³. If required by local jurisdictions and property owners with approval responsibility for construction, MCWD shall conduct a Phase I Environmental Site Assessment in conformance with ASTM Standard 1527-05 to identify potential locations where hazardous material contamination may be encountered. If an Environmental Site Assessment indicates that a release of hazardous materials could have affected soil or groundwater quality at a project site, a Phase II environmental site assessment shall be conducted to determine the extent of contamination and to prescribe an appropriate course of remediation, including but not limited to removal of contaminated soils, in conformance with state and local guidelines and regulations. If the results of the subsurface investigation(s) indicate the presence of hazardous materials, additional site remediation may be required by the applicable state or local regulatory agencies, and the contractors shall be required to comply with all regulatory requirements for facility design or site remediation.	Prior to project construction (if presence of hazardous materials is identified, site remediation or design changes may be	MCWD project engineers, construction contractors	MCWD	

¹² Mitigation Measure EN-1 was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

¹³ Mitigation Measure HH-2a was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance, The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

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<p>HH-2b: Health and Safety Plan¹⁴. The construction contractor(s) shall prepare and implement a project-specific Health and Safety Plan (HSP) for each site on which construction may occur, in accordance with 29 CFR 1910 to protect construction workers and the public during all excavation, grading, and construction. The HSP shall include the following, at a minimum:</p> <ul style="list-style-type: none"> • A summary of all potential risks to construction workers and the maximum exposure limits for all known and reasonably foreseeable site chemicals (the HSP shall incorporate and consider the information in all available existing Environmental Site Assessments and remediation reports for properties within ¼-mile using the EnviroStor Database); • Specified personal protective equipment and decontamination procedures, if needed; • Emergency procedures, including route to the nearest hospital; <p>Procedures to be followed in the event that evidence of potential soil or groundwater contamination (such as soil staining, noxious odors, debris or buried storage containers) is encountered. These procedures shall be in accordance with hazardous waste operations regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of the unknown hazardous materials release, notifying Monterey County Department of Environmental Health, and retaining a qualified environmental firm to perform sampling and remediation; and</p> <p>The identification and responsibilities of a site health and safety supervisor.</p>	Prior to project construction	Construction contactors	MCWD Monterey County Dept. of Environmental Health	
<p>HH-2c: Materials and Dewatering Disposal Plan¹⁵. MCWD and/or their contractors shall develop a materials disposal plan specifying how the contractor will remove, handle, transport, and dispose of all excavated material in a safe, appropriate, and lawful manner. The plan must identify the disposal method for soil and the approved disposal site, and include written documentation that the disposal site will accept the waste.</p> <p>The contractor shall develop a groundwater dewatering control and disposal plan specifying how the contractor will remove, handle, and dispose of groundwater impacted by hazardous substances in a safe, appropriate, and lawful manner. The plan must identify the locations at which potential contaminated groundwater dewatering are likely to be encountered (if any), the method to analyze groundwater for hazardous materials, and the appropriate treatment and/or disposal methods. If the dewatering effluent contains contaminants that exceed the requirements of the General WDRs for Discharges with a Low Threat to Water Quality (Order No. R3-2011-0223, NPDES Permit No. CAG993001), the construction contractor shall contain the dewatering effluent in a portable holding tank for appropriate offsite disposal or discharge. The contractor can either dispose of the contaminated effluent at a permitted waste management facility or discharge the effluent, under permit, to the Regional Treatment Plant.</p>	Prior to and during project construction	Contractor and MCWD	MCWD	

¹⁴ Mitigation Measure HH-2b was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance , The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

¹⁵ Mitigation Measure HH-2c was identified in the Final Pure Water Monterey Groundwater Replenishment Project MMRP as mitigation necessary for the construction and project implementation of the RWP and therefore has been added to this MMRP to ensure compliance , The Pure Water Monterey Groundwater Replenishment Project Final EIR and MMRP approved and certified by Monterey Regional Water Pollution Control Agency (MRWPCA) on October 8, 2015.

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4.8-R1: The MCWD shall require review of construction plans for the pipeline by the Fort Ord BRAC office to confirm that construction is planned in cleared areas <u>cleared of Military Munitions (MM)</u> before construction is initiated. <u>An Army-approved MM monitor shall be present during grading in areas where excavation exceeds two feet and any MM encountered shall be properly managed. Access shall be restricted to adjacent areas by means of temporary fencing and signage.</u>	Prior and during to construction	MCWD and Contractors	MCWD	
4.8-R2: For areas recommended or required by Army's BRAC Fort Ord (see EPA Superfund Record of Decision; EPA ID CA7210020676, dated 4/6/05), the MCWD shall require that all pipeline construction workers receive an Army OE <u>MM</u> safety briefing <u>from the BRAC Fort Ord office</u> prior to starting construction <u>and, as needed thereafter</u> . In the event OE <u>MM</u> is suspected or discovered, <u>the following actions shall be taken:</u> <ul style="list-style-type: none"> • <u>MCWD and their contractors shall immediately suspend actions which may affect the item,</u> • <u>the item shall not be touch or disturbed, work shall be stopped immediately,</u> • <u>the location shall be clearly marked, all personnel evacuated, and</u> • <u>the local law enforcement agency (Presidio of Monterey (POM) Police or applicable City Police Department) shall be contacted immediately for further investigation. Upon notification, the police shall secure the area and make arrangements to have the item identified and destroyed.</u> 	Prior and during to construction	MCWD and Contractors	MCWD	
4.11-R1: The construction contractor shall limit exterior construction related activities to the hours <u>of restriction consistent with the noise ordinance of, and encroachment permits issued, by the relevant land use jurisdictions between 7:00 a.m. and 7:00 p.m. on weekdays and Saturdays, and between 10:00 a.m. and 7:00 p.m. on Sundays and holidays.</u> <u>If alternative traffic control measures are unavailable and if approved by staff of the relevant City identified below through their encroachment permit, nighttime construction may be conducted for the following segments of road (as identified in the Higgins' Associates letter dated October 17, 2006) provided that sensitive receptors (in this case, residences, nursing homes, and hotels/motels) are located an adequate distance from construction activities (as determined by the relevant land use jurisdiction):</u> <ul style="list-style-type: none"> • <u>Reservation Road between Seacrest Avenue and Crescent Avenue [Marina - preferred alignment]</u> • <u>Fremont Street between Kimball Avenue and Airport Boulevard [Seaside - preferred alignment]</u> • <u>Del Monte Avenue between Park Avenue and Camino Aguajito [Monterey - alternative alignment]</u> • <u>Del Monte Avenue between Camino Aguajito and Figueroa Street [Monterey - preferred alignment]</u> (Please note that mitigation measure 4.11-R1 is consistent with mitigation measure NV-1d from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior to construction	MCWD and Contractors	MCWD	
4.11-R2: The contractor shall locate all stationary noise-generating equipment as far as possible from nearby noise-sensitive receptors. Where possible, noise-generating equipment shall be shielded from nearby noise-sensitive receptors by the use of noise-attenuating buffers. Stationary noise sources located 500 feet from noise-sensitive receptors shall be equipped with noise reducing engine housings. Portable acoustic barriers shall be placed around noise-generating equipment that is located less than 200 feet from noise-sensitive receptors. (Please note that mitigation measure 4.11-R2 is consistent with mitigation measure NV-1d from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction	Contractor	MCWD	
4.11-R3: The contractor shall assure that construction equipment powered by gasoline or diesel engines have sound control devices at least as effective as those provided by the original equipment manufacturer (OEM). No equipment shall be permitted to have an un-muffled exhaust. (Please note that mitigation measure 4.11-R3 is consistent with mitigation measure NV-1d from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction	Contractor	MCWD	
NV-2b: Construction Hours. The construction contractor shall limit all noise-producing construction activities within the City of Marina to between the hours of 7:00 AM and 7:00 PM on weekdays and between 9:00 AM and 7:00 PM Saturdays.	During project construction	Construction contractor	MCWD	
4.11-R4: The contractor shall assure that noise-generating mobile equipment and machinery are shut-off when not in use. (Please note that mitigation measure 4.11-R4 is consistent with mitigation measure NV-1d from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction	Contractor	MCWD	
4.11-R5: Residences within 500 feet of a construction area shall be notified of the construction schedule in writing, prior to construction. The Project Applicant <u>MCWD</u> and contractor shall designate a noise disturbance coordinator who would be responsible for responding to complaints regarding construction noise. The coordinator shall determine the cause of the complaint and ensure that reasonable measures are implemented to correct the problem. A contact number for the noise disturbance coordinator shall be conspicuously placed on construction site fences and written into the construction notification schedule sent to nearby residences.	Prior to and during construction	MCWD and Contractor	MCWD	
NV-2a: Construction Equipment. Contractor specifications shall include a requirement that the contractor shall: <ul style="list-style-type: none"> • Assure that construction equipment with internal combustion engines has sound control devices at least as effective as those provided by the original equipment manufacturer. No equipment shall be permitted to have an un-muffled exhaust. • Impact tools (i.e., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler shall be placed on the compressed air exhaust to lower noise levels by approximately 10 dBA. External jackets shall be used on impact tools, where feasible, in order to achieve a further reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible. • The construction contractor(s) shall locate stationary noise sources (e.g., generators, air compressors) as far from nearby noise-sensitive receptors as possible. For Product Water Conveyance pipeline segments within the City of Marina, noise controls shall be sufficient to not exceed 60 decibels for more than twenty-five percent of an hour.	During project construction	Contractor and MCWD	MCWD	

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
4.13-R1: During construction, the contractor shall insure that adequate access to open space, park and public areas is made available to the public at all times. If construction activities require temporary closing of an existing entrance or exit, the contractor shall provide an alternate entrance/exit for the duration of construction within the vicinity. The appropriate City or County shall approve the alternate entrance/exit prior to installation. The contractor shall also provide adequate noticing and/or signage, as directed by the City or County, for public notification and safety.	During construction	Contractor and MCWD	MCWD/ staff at affected City or County	
PS-3: Construction Waste Reduction and Recycling Plan. The construction contractor(s) shall prepare and implement a construction waste reduction and recycling plan identifying the types of construction debris the Project will generate and the manner in which those waste streams will be handled. In accordance with the California Integrated Waste Management Act of 1989, the plan shall emphasize source reduction measures, followed by recycling and composting methods, to ensure that construction and demolition waste generated by the project is managed consistent with applicable statutes and regulations. In accordance with the California Green Building Standards Code and local regulations, the plan shall specify that all trees, stumps, rocks, and associated vegetation and soils, and 50% of all other nonhazardous construction and demolition waste, be diverted from landfill disposal. The plan shall be prepared in coordination with the Monterey Regional Waste Management District and be consistent with Monterey County's Integrated Waste Management Plan. Upon project completion, MCWD shall collect the receipts from the contractor(s) to document that the waste reduction, recycling, and diversion goals have been met.	Prior to, during, and after project construction	Contractor and MCWD	MCWD	
4.14-R1: The construction contractor shall prepare traffic control/management management plans for construction of the pipeline within each of the affected jurisdictions including the Cities of Monterey, Seaside and Marina, Monterey County, and Caltrans as appropriate. These traffic control plans shall be reviewed and approved by the affected public agency prior to the commencement of work <u>and an encroachment permit obtained based upon the traffic control plan(s) or other information prepared by a qualified traffic engineer.</u> The traffic control/management plan shall specify the times during which construction activities would occur and times when travel lanes cannot be blocked (e.g., peak traffic periods as directed by the affected City Engineer). The plans shall provide details regarding the placement of traffic control and warning devices, detours, and that the trench must be covered and/or plated during times of non-construction. (Please note that mitigation measure 4.14-R1 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior to construction within each jurisdiction	Contractor and MCWD	MCWD and staff at affected City or County	
4.14-R2: The traffic control/management plan must include a program that provides continual coordination program with the affected Agencies to allow for adjustments and refinements to the plan once construction is underway. (Please note that mitigation measure 4.14-R2 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction within each jurisdiction	Contractor and MCWD	MCWD and staff at affected City or County	

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
4.14-R3: As a supplement to the traffic control/management plan, the construction contractor shall coordinate with the affected agencies to determine the need for a public information program that would inform area residents, employers, and business owners of the details concerning construction schedules and expected travel delays. The public information program could utilize various media venues (e.g. newspaper, radio, television, telephone hot lines, Internet, etc.) to disseminate information such as: 1) Overview of construction project. 2) Updates on location of construction zone. 3) Identification on street(s) locations anticipated to be affected by construction. 4) Times when construction activities would occur and when traffic delays can be expected. 5) Identification of alternate travel routes that could be used to avoid construction delays. (Please note that mitigation measure 4.14-R3 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	Prior to and during construction within each jurisdiction	Contractor and MCWD	MCWD and staff at affected City or County	
4.14-R4: During the preparation and implementation of traffic control/management plans, special consideration shall be given to the locations where direct driveway access is being impacted. Measures shall be developed and coordinated with the individual property owners who are affected by project construction to minimize access disruption to their private residences and/or businesses. (Please note that mitigation measure 4.14-R4 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During the preparation / implementation of traffic control/management plans	Contractor and MCWD	MCWD	
4.14-R5: A component of the traffic control/management plan public information program shall include provisions for informing area residents, major employers, and commercial businesses that access restrictions/disruptions would occur. Additional information shall be prepared to advise the affected public of alternative access routes if local affected agencies determine that such a plan is necessary. (Please note that mitigation measure 4.14-R5 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During the preparation / implementation of traffic control/management plans	Contractor and MCWD	MCWD	
4.14-R6: The construction contractor shall coordinate with MST to identify routes affected by the pipeline construction. It is suggested that MST post notices at bus stops and on buses along affected routes to notify passengers of potential delays or service adjustments on these routes. Sufficient notification as to the exact dates when delays can be expected or service adjustments would be necessary would be given to MST to allow for timely posting of these notices. (Please note that mitigation measure 4.14-R6 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction along MST routes	Contractor and MCWD	MST	
4.14-R7: Traffic control/management plans which need to be prepared for the affected jurisdictions or agencies shall identify all bus stops in the immediate vicinity of construction zones and shall make provisions for these bus stops to remain accessible throughout the duration of the localized construction impact. In cases where the blockage of existing bus stops cannot be avoided the construction contractor shall coordinate with MST to provide temporary bus stop locations. (Please note that mitigation measure 4.14-R7 is consistent with mitigation measure TR-2 from Final Pure Water Monterey Groundwater Replenishment Project MMRP).	During construction along MST routes	Contractor and MCWD	MST	
TR-3: Roadway Rehabilitation Program. Prior to commencing project construction, MCWD shall detail the preconstruction condition of all local construction access and haul routes proposed for substantial use by project-related construction vehicles. The construction routes surveyed must be consistent with those identified in the construction traffic control and safety assurance plan developed under Mitigation Measure TR-2. After construction is completed, the same roads shall be surveyed again to determine whether excessive wear and tear or construction damage has occurred. Roads damaged by project-related construction vehicles shall be repaired to a structural condition equal to, or greater than, that which existed prior to construction activities. In the City of Marina, the construction in the city rights-way must comply with the City's design standards, including restoration of the streets from curb to curb, as applicable. In the City of Monterey, asphalt pavement of full travel lanes will be resurfaced without seams along wheel or bike paths.	Prior to project construction, after project construction	MCWD construction contractors	MCWD, and local jurisdictions	
TR-4: Construction Parking Requirements. Prior to commencing project construction, the construction contractor(s) shall coordinate with the potentially affected jurisdictions to identify designated worker parking areas that would avoid or minimize parking displacement in congested areas of Marina, and Seaside. The contractors shall provide transport between the designated parking location and the construction work areas. The construction contractor(s) shall also provide incentives for workers that carpool or take public transportation to the construction work areas. The engineering and construction design plans shall specify that contractors limit time of construction within travel lanes and public parking spaces and provide information to the public about locations of alternative spaces to reduce parking disruptions.	Prior to project construction	MCWD construction contractor	MCWD, City of Marina, City of Seaside,	
CUM-R2: Conduct pre-construction and post-construction biological surveys for special-status plant and wildlife species and their habitat for projects affecting undeveloped dune habitat, compensate for losses, and conduct construction monitoring. Each project proponent for other projects that would contribute to this cumulative impact (see Table 5.3-1) will retain a qualified botanist to conduct pre-construction and post-construction surveys for Hickman's onion to quantify the number of plants and size of the population removed by construction and to determine appropriate habitat compensation. The project proponent will compensate for habitat loss related to dune habitats by contributing to the habitat restoration and enhancement program implemented by the California Department of Parks and Recreation at the Marina State Beach. Each project proponent MCWD will retain a qualified biologist to conduct pre-construction and post-construction surveys for burrowing owl, loggerhead shrike, California horned lark, California horned lizard, black legless lizards, and raptors to determine whether species are present. The project proponent MCWD will implement the recommendations of the biologist. Recommendations could include relocating the species, altering the construction schedule to avoid breeding season, educating construction workers, and monitoring construction activities. These measures are described in more detail in Chapter 4.4 (see Mitigation Measures 4.4-R1, through 4.4-R23).	Prior to, during and after construction	Qualified Biologist and MCWD	MCWD	
CUM-R3: MCWD and/or MRWPCA shall coordinate with Relevant Local Agencies to Develop and Implement a Phased Construction Plan to Reduce Cumulative Traffic, and Noise Impacts. The MCWD and/or MRWPCA will contact local agencies that have projects planned in the same area (i.e., project sites within 1 mile or projects that affect the same roadways) and that have construction	Prior to construction	Contractor and MCWD	MCWD and staff at	

**MITIGATION MONITORING AND REPORTING PLAN
FOR THE REGIONAL URBAN RECYCLED WATER PROJECT (RWP)**

NOTES: Section 21081.6 of the Public Resources Code requires all state and local agencies to establish monitoring or reporting programs whenever approval of a project relies upon an environmental impact report (EIR). The purpose of the monitoring or reporting program is to ensure implementation of the measures being imposed to mitigate or avoid the significant adverse environmental impacts identified in the EIR as amended in Addendum No. 1 to the certified Final EIR for the MCWD Regional Urban Water Augmentation Project.

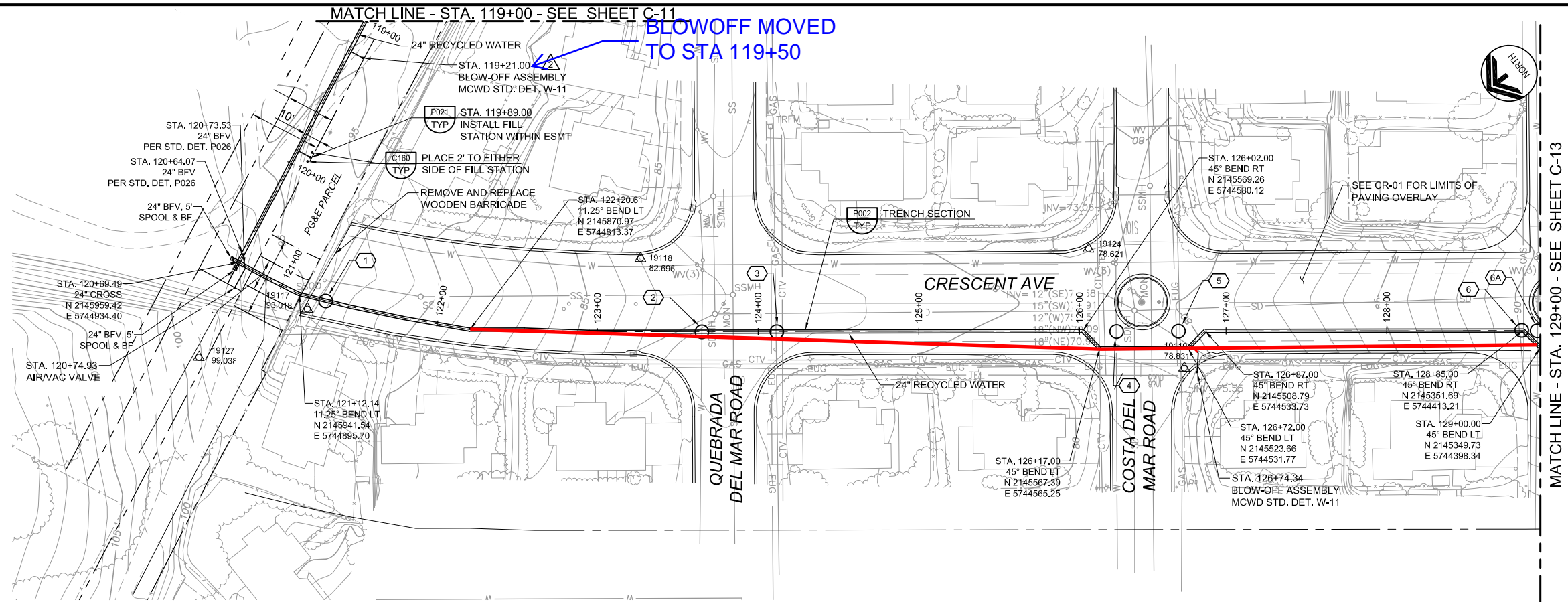
For those project features outside of MCWD's service areas (specifically, at the Monterey Regional Water Pollution Control Association, Regional Treatment Plant and within the Monterey Peninsula/Cal-Am Service Area) the lead agency and/or project proponent shall replace "MCWD" with their name each time it occurs prior to implementation of those project components.

RUWAP EIR Mitigation Measure with text edits to apply specifically to the RWP shown in strikeout for deleted text and <u>underline</u> for added text.	Timing of Implementation	Responsibility for Implementation	Verified for Compliance by:	X
<p>schedules that overlap with construction of the Recycled Water Alternative. MCWD (or their contractor) will coordinate with local agencies responsible for said projects to develop a phased construction plan that includes the following components.</p> <ul style="list-style-type: none"> • Evaluate roadways affected by construction activities and minimize roadway and traffic disturbance (e.g., lane closures and detours) and the number of construction vehicles using the roadways. This may involve scheduling some construction activities simultaneously or phasing. • Prepare compatible traffic control plans for construction projects. If one traffic control plan cannot be prepared, the construction contractor for the Recycled Water Alternative and the relevant local agencies (or their construction contractors) will ensure that the traffic control plans for projects affecting the same roadways are compatible. The traffic control plan can be modeled after that required for the Recycled Water Alternative (refer to Mitigation 4.14-R1 through 4.14-R3). • Implement noise reductions measures for each project with overlapping construction timeframes. These measures, which are described in more detail in Section 4.11, include: limiting hours of construction activities, employing noise-control construction practices, and implementing a noise control plan (4.11-R1 through 4.11-R5). 	within each jurisdiction		affected City or County	

NOTES:
Note 1: A preliminary archaeological survey for the project Areas of Potential Effects will be completed in October 2006. At this time, no resources have been identified in or near the Ord Community and Central Marina segments of the project. The portion of the pipeline within the City of Monterey has been revised to avoid impacts to the cultural resources identified in and near the alignment proposed by the RURWDP and RUWAP. It is preferred the impacts to cultural resources be avoided wherever possible and mitigated where avoidance is not feasible. A survey of the Armstrong Ranch alignment is under way and should be completed in October 2006.

APPENDIX F

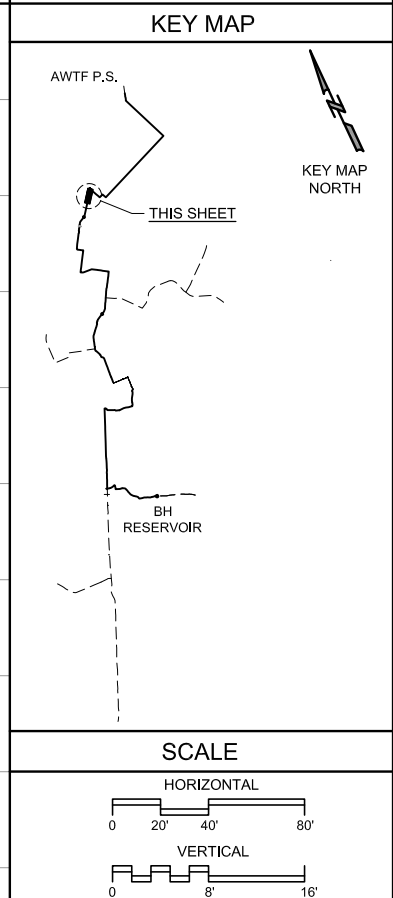
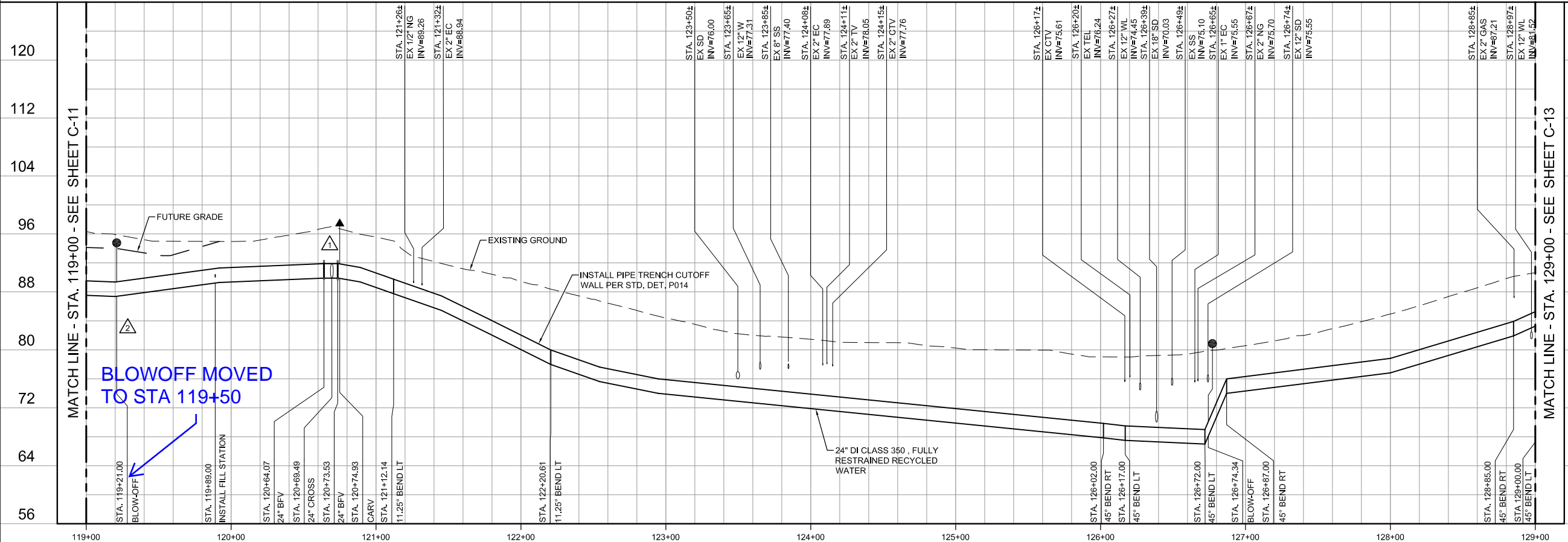
**MCWD RUWAP RECYCLED WATER PIPELINE
AND BLACKHORSE RESERVOIR -
AS-BUILT DRAWINGS**



GENERAL NOTES

- CONSTRUCT PIPELINE WITH A MINIMUM 4' OF COVER UNLESS SHOWN OTHERWISE IN THE PROFILE TO AVOID EXISTING UTILITIES OR ACCOMMODATE FUTURE GRADES.
- ANY CONSTRUCTION ACTIVITIES WHICH IMPACT PARKWAYS SHALL BE CONDUCTED TO MINIMIZE DISTURBANCE TO ADJACENT PROPERTY OWNERS. ANY AREAS IMPACTED SHALL BE PHOTOGRAPHED PRIOR TO CONSTRUCTION, AND RESTORED TO THEIR PRE-CONSTRUCTION CONDITION PRIOR TO CONTRACTOR DEMOBILIZATION.

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AS-BUILT DRAWINGS

REV	DATE	BY	DESCRIPTION
2	06/20/17	JPM	CHANGED PER ADDENDUM 3
1	06/19/17	JPM	CHANGED PER ADDENDUM 2

DESIGNED JPM	DISCIPLINE ENGINEER
DRAWN BH	
CHECKED AP	
DATE MAY 2017	

PROJECT ENGINEER

PROJECT MANAGER
** ORIGINAL SEALED BY JONATHON P. MARSHALL 05/17 73265 **



REGIONAL URBAN WATER AUGMENTATION PROJECT

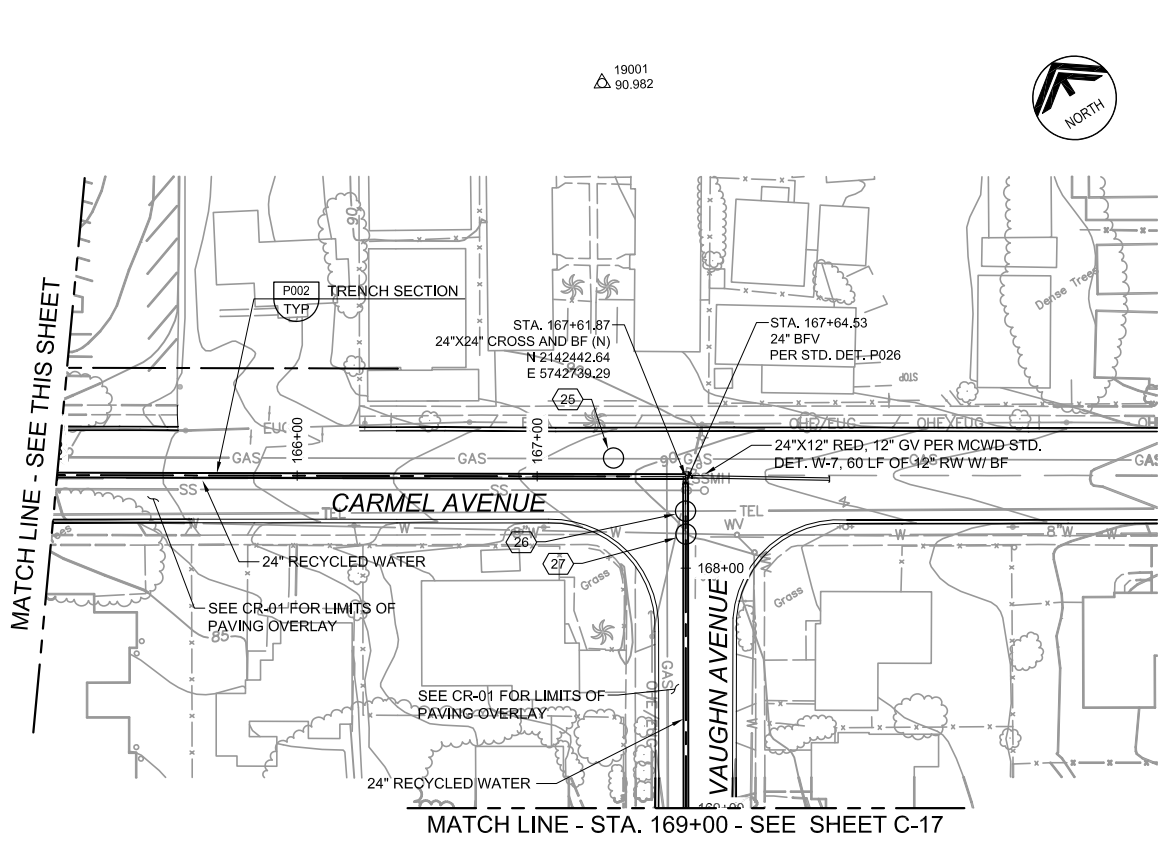
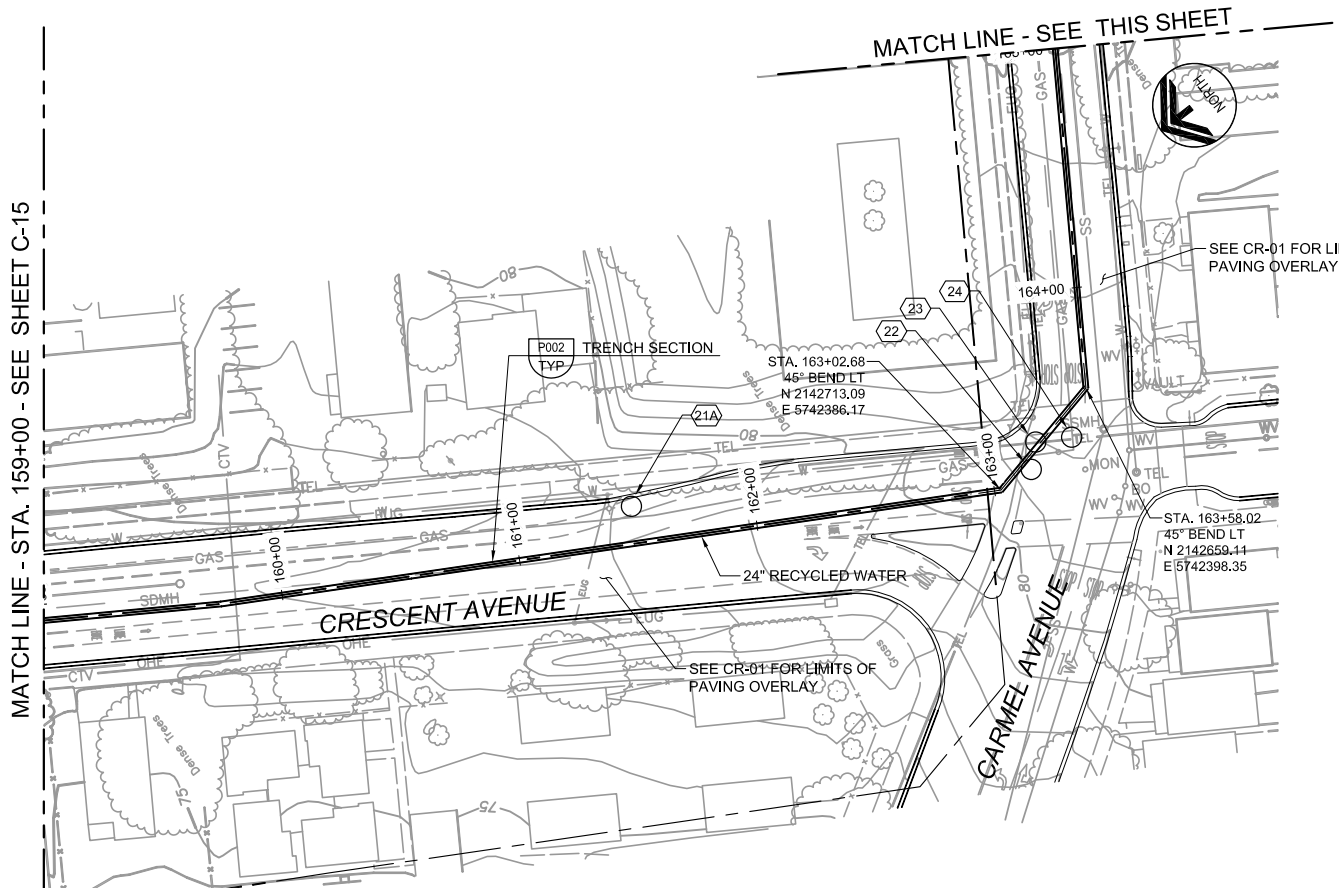
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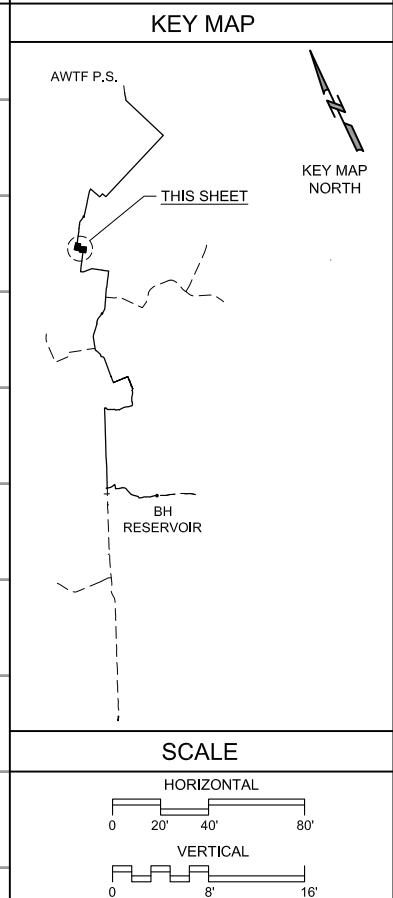
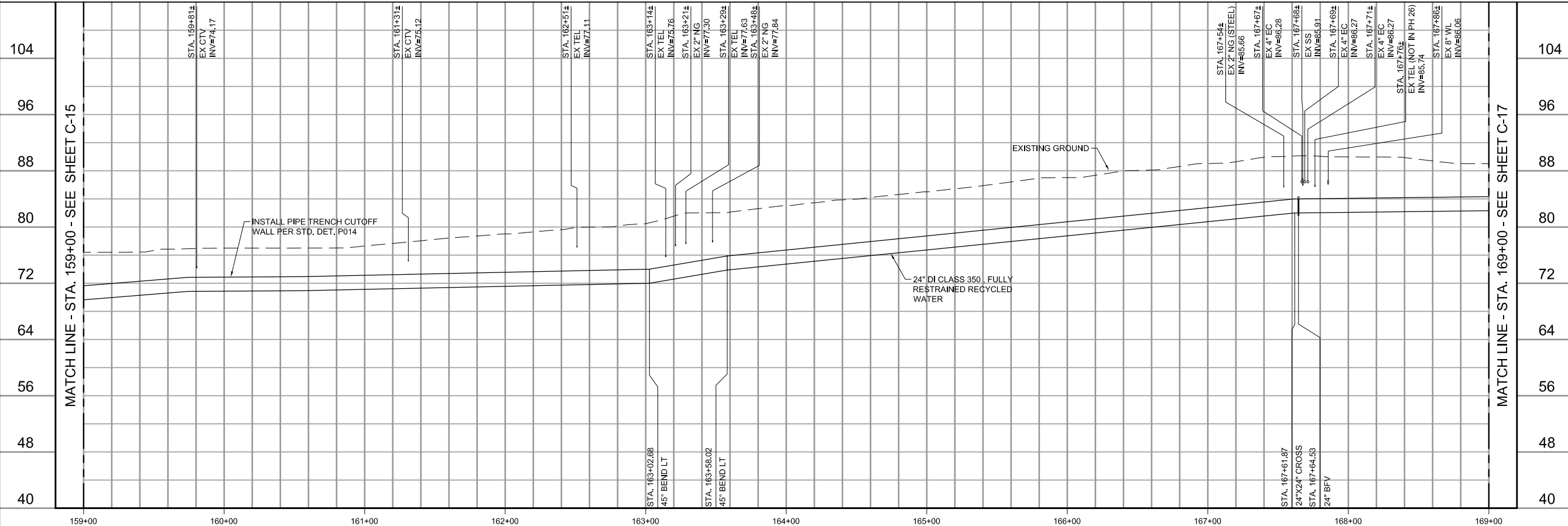
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GENERAL NOTES

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DESIGNED	JPM		
DRAWN	BH		
CHECKED	AP		
DATE	MAY 2017		
DISCIPLINE ENGINEER			
PROJECT ENGINEER			
PROJECT MANAGER	**		
ORIGINAL SEALED BY	JONATHON P. MARSHALL		
DATE	05/17		
	73265		
	**		

carollo
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Marina Coast Water District

REGIONAL URBAN WATER AUGMENTATION PROJECT

RECYCLED WATER PIPELINE

CIVIL

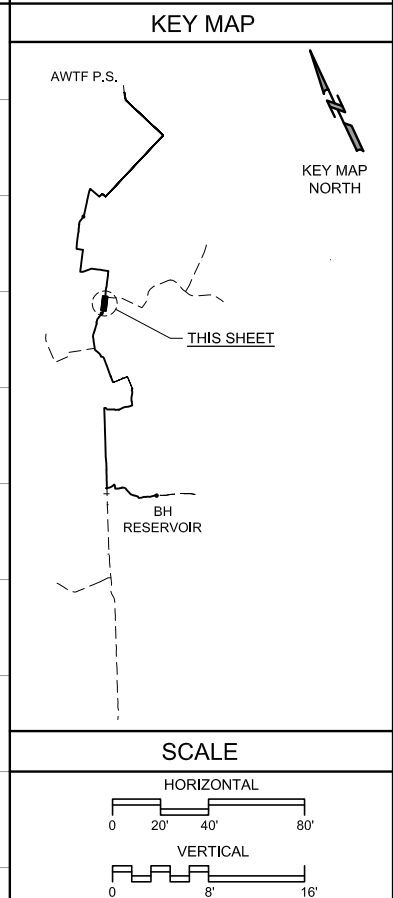
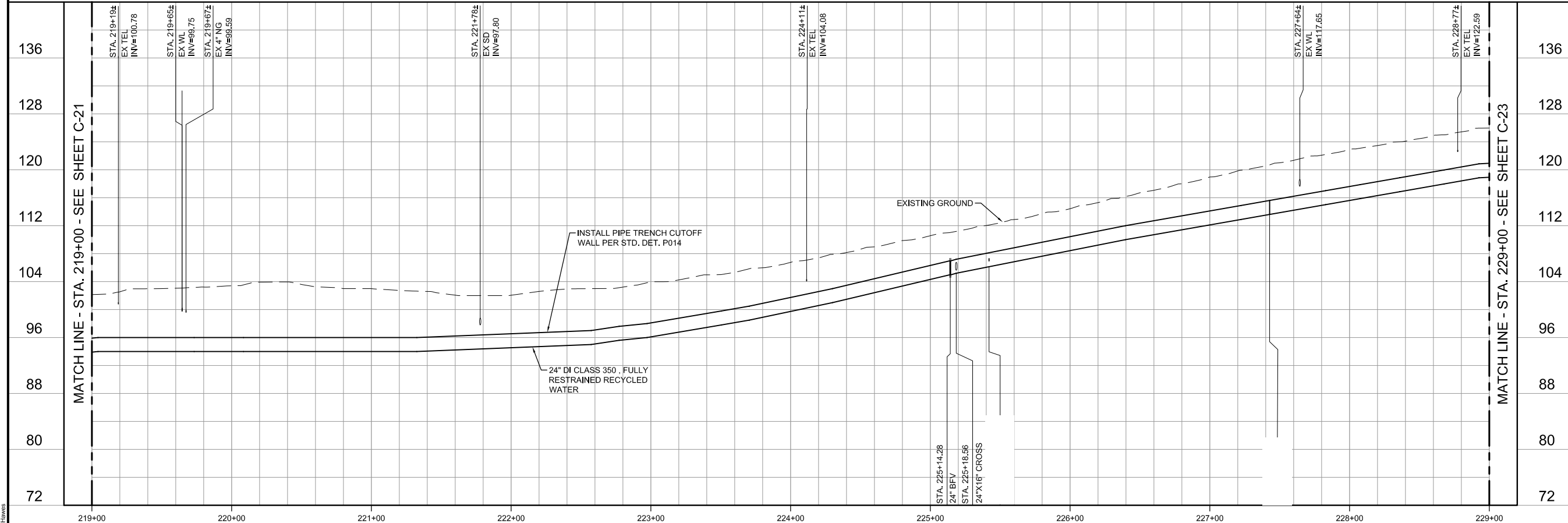
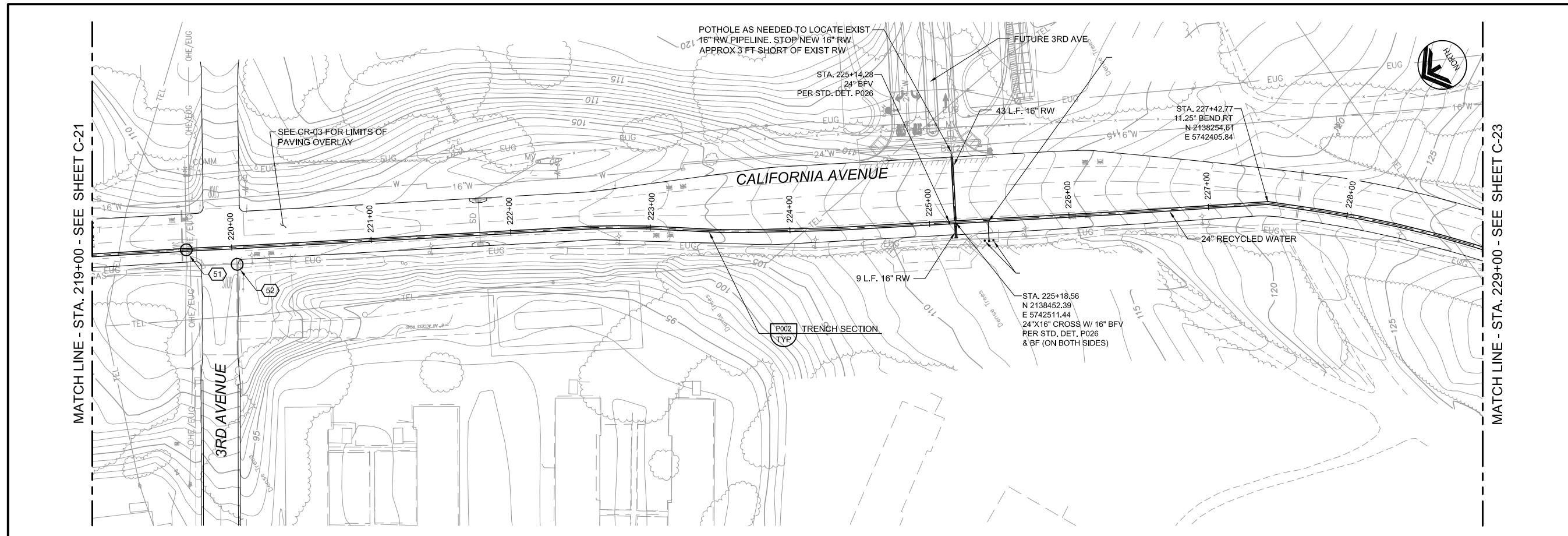
PLAN AND PROFILE

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	24 OF 93

GENERAL NOTES

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2. ANY CONSTRUCTION ACTIVITIES WHICH IMPACT PARKWAYS SHALL BE CONDUCTED TO MINIMIZE DISTURBANCE TO ADJACENT PROPERTY OWNERS. ANY AREAS IMPACTED SHALL BE PHOTOGRAPHED PRIOR TO CONSTRUCTION, AND RESTORED TO THEIR PRE-CONSTRUCTION CONDITION PRIOR TO CONTRACTOR DEMOBILIZATION.



AS-BUILT DRAWINGS			
DESIGNED	JPM		
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CHECKED	AP		
DATE	MAY 2017		
REV	DATE	BY	DESCRIPTION

DISCIPLINE ENGINEER	PROJECT ENGINEER	PROJECT MANAGER
		** ORIGINAL SEALED BY JONATHON P. MARSHALL 05/17 73265 **

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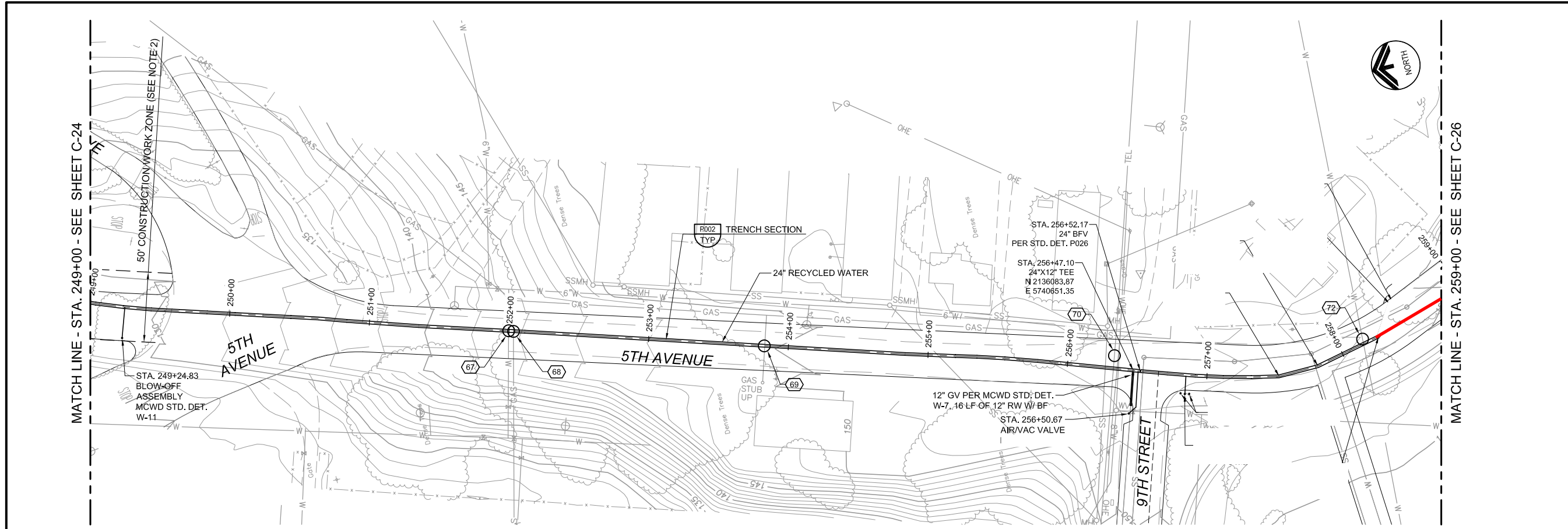
MARINA COAST WATER DISTRICT
Marina Coast Water District

REGIONAL URBAN WATER AUGMENTATION PROJECT
RECYCLED WATER PIPELINE
CIVIL
PLAN AND PROFILE
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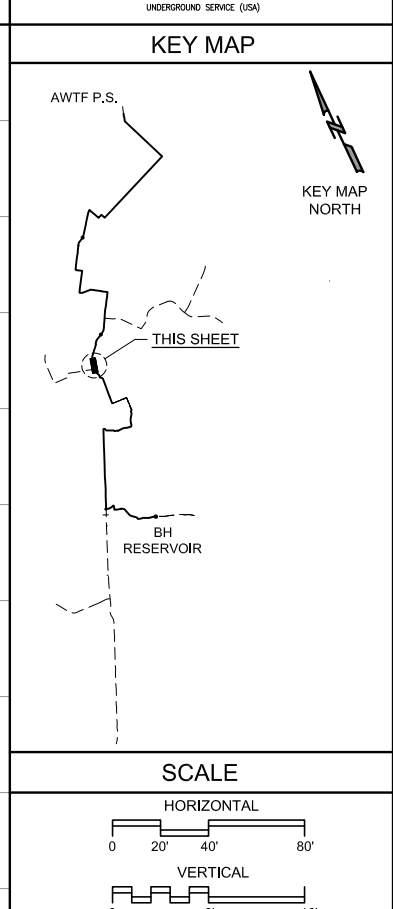
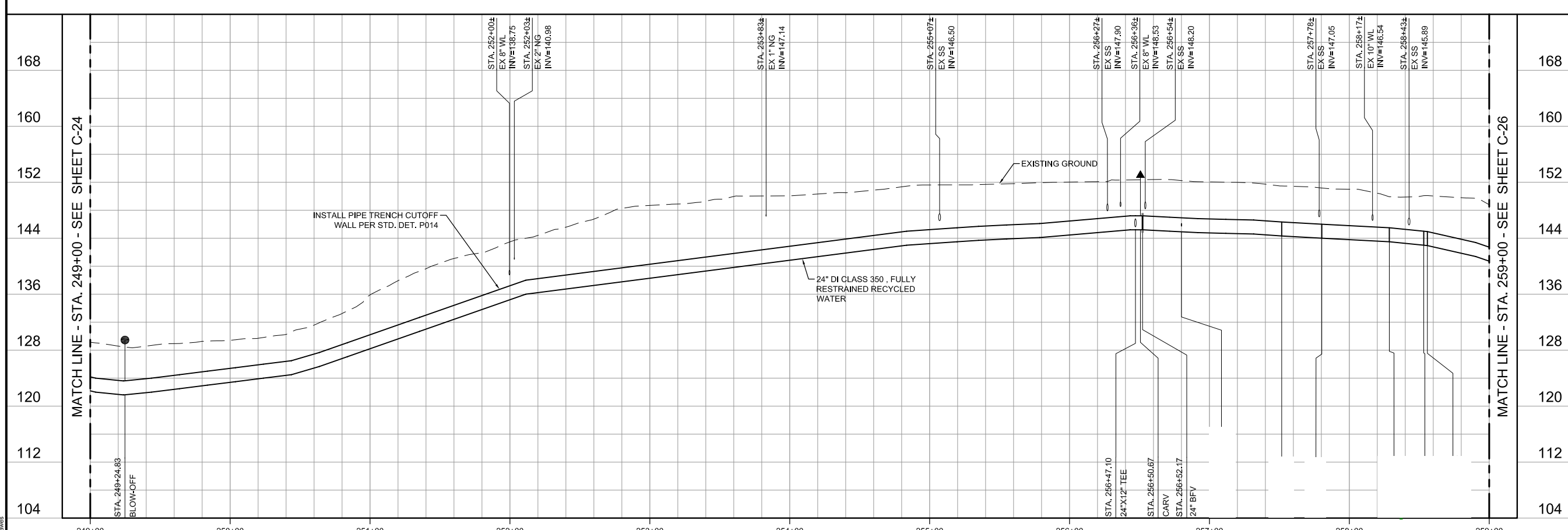
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- ### GENERAL NOTES
- CONSTRUCT PIPELINE WITH A MINIMUM 4' OF COVER UNLESS SHOWN OTHERWISE IN THE PROFILE TO AVOID EXISTING UTILITIES OR ACCOMMODATE FUTURE GRADES.
 - PIPELINE INSTALLATION IN OFF-ROAD AREAS BETWEEN STA. 241+13.18 AND 249+74.78 SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF MARINA ENCROACHMENT PERMIT CONDITIONS. THE CONTRACTOR IS RESTRICTED TO A 50 FOOT WORK ZONE CENTERED ON THE PIPELINE.
 - ANY CONSTRUCTION ACTIVITIES WHICH IMPACT PARKWAYS SHALL BE CONDUCTED TO MINIMIZE DISTURBANCE TO ADJACENT PROPERTY OWNERS. ANY AREAS IMPACTED SHALL BE PHOTOGRAPHED PRIOR TO CONSTRUCTION, AND RESTORED TO THEIR PRE-CONSTRUCTION CONDITION PRIOR TO CONTRACTOR DEMOBILIZATION.

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AS-BUILT DRAWINGS			
DESIGNED	JPM	DISCIPLINE ENGINEER	
DRAWN	BH	PROJECT ENGINEER	
CHECKED	AP		
DATE	MAY 2017		
REV	DATE	BY	DESCRIPTION

ORIGINAL SEALED BY
 JONATHAN P. MARSHALL
 05/17
 73265

Marina Coast Water District

REGIONAL URBAN WATER AUGMENTATION PROJECT

RECYCLED WATER PIPELINE

CIVIL

PLAN AND PROFILE

STA. 249+00 TO STA. 259+00

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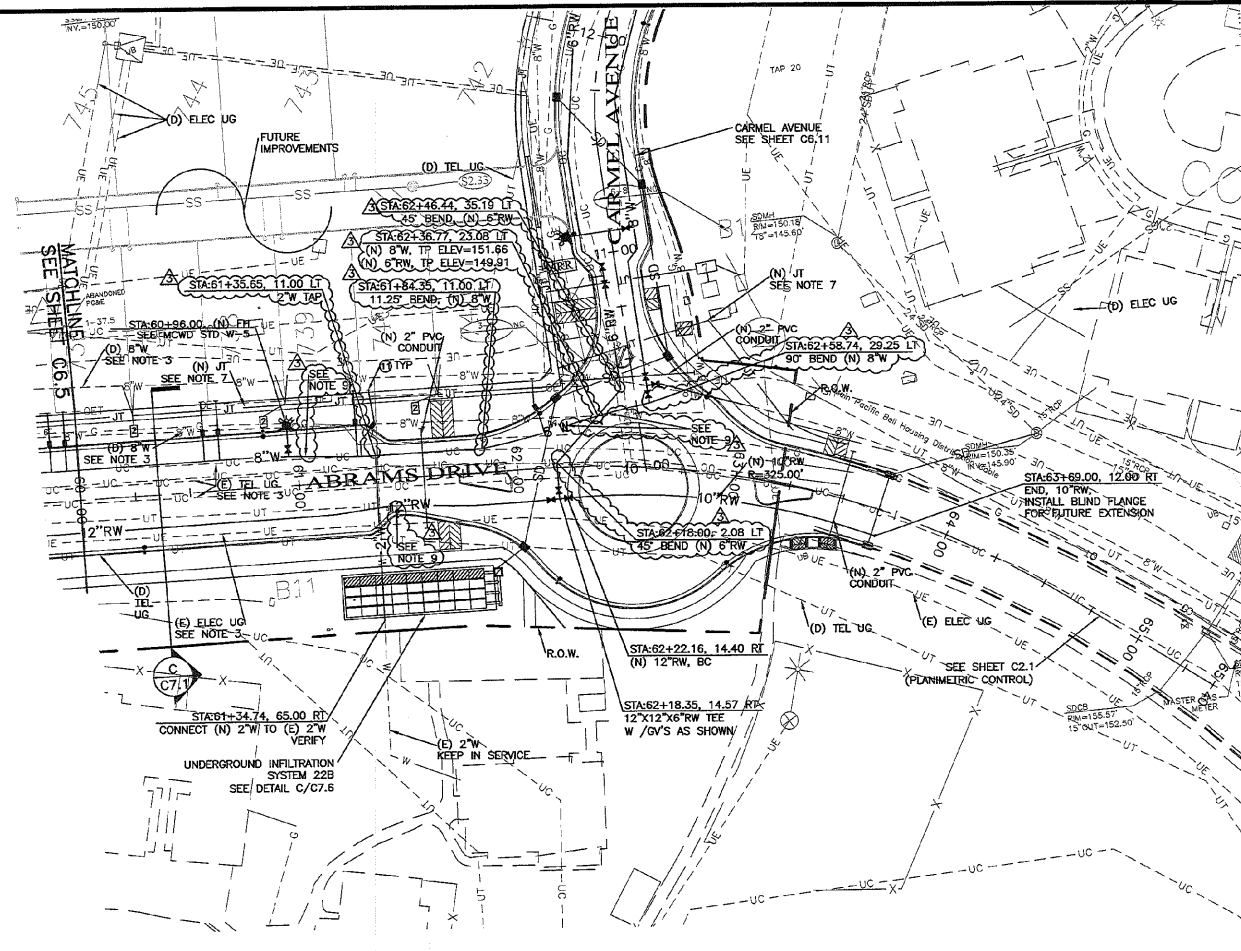
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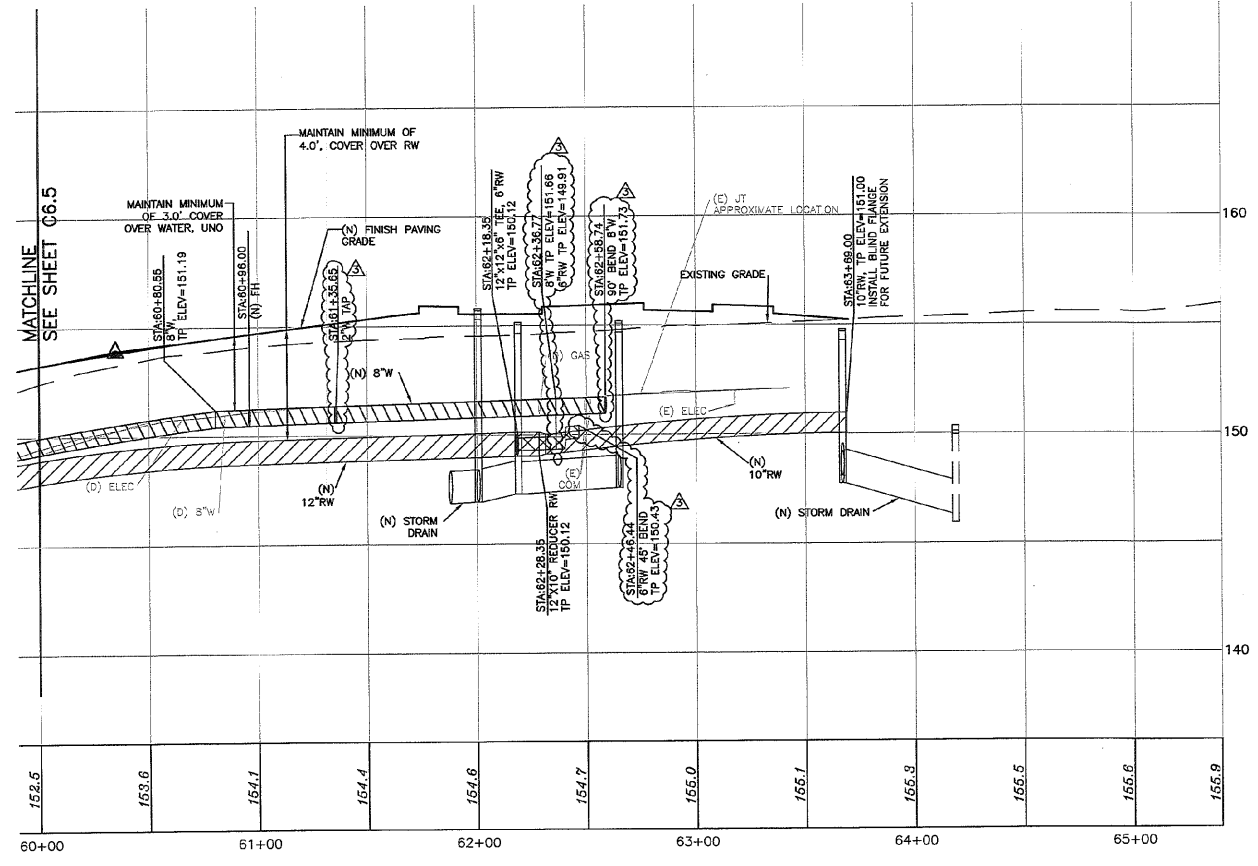
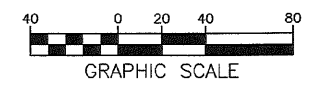
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33 OF 93

APPENDIX G
ABRAMS DRIVE AS-BUILT DRAWINGS

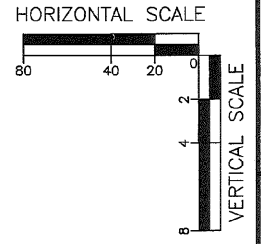


WATER LATERALS	
LOT NO.	STATION
737	60+57.45
738	60+84.45
739	61+27.45
740	61+34.45
741	62+10.80



- NOTES:
- SEE STREET PLAN AND PROFILE SHEET (C4.6) FOR DETAILED INFORMATION ON NEW AND EXISTING STORM DRAIN FACILITIES. FOR UTILITY KEY NOTES SEE SHEET C2.3.
 - EXISTING UTILITIES ARE SHOWN PER FORMER FORT ORD BASEMAPS AND UTILITY COMPANY BASEMAPS. THE EXISTING UTILITIES SHOWN ON THESE PLANS AND PROFILES HAVE NOT BEEN FIELD VERIFIED AS TO LOCATION AND DEPTH. UTILITIES MAY BE PRESENT WHICH ARE NOT SHOWN ON THE PLANS. LOCATIONS, SIZES AND DEPTHS SHOWN ON PLANS MAY VARY SIGNIFICANTLY. THE CONTRACTOR SHALL POTHOLE OR OTHERWISE FIELD VERIFY LOCATIONS, SIZES AND DEPTHS PRIOR TO WORK AND ORDERING OF MATERIALS. THE CONTRACTOR SHALL NOTIFY ENGINEER AND UTILITY COMPANY OF DIFFERENCES WHICH COULD IMPACT DESIGN.
 - SEE DEMOLITION PLAN SHEET (C3.1-C3.5) FOR ADDITIONAL INFORMATION REGARDING ABANDONMENT/DEMOLITION OF EXISTING UTILITIES. MANY EXISTING UTILITIES MUST REMAIN IN SERVICE UNTIL RELOCATED. THE CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE/PHASING PLAN PRIOR TO BEGINNING WORK.
 - STAMP "2", "W", "S", "RW", IN CURB FACE TO IDENTIFY LOCATION OF DOMESTIC SERVICE, SEWER LATERAL, OR RECYCLED WATER SERVICE.
 - LOCATION OF ALL WATER SERVICES, SEWER LATERALS, AND JOINT TRENCH SERVICES WHICH WILL BE SERVING PHASE 2 LOTS SHALL BE REVIEWED PRIOR TO INSTALLATION AND RELOCATED IF PHASE 2 LOTS HAVE BEEN MOVED.
 - WHERE A POTABLE WATER MAIN CROSSES OVER THE TOP OF A NON-POTABLE MAIN PIPELINE (SUCH AS SEWER, RECYCLED, STORM DRAIN, ETC) AND HAS LESS THAN ONE FOOT OF VERTICAL CLEARANCE: THE WATER MAIN SHALL BE AWMA C900 PVC, CLASS 200 OR DUCTILE IRON PIPE CLASS 50 AND SHALL HAVE NO JOINTS WITHIN EIGHT FEET FROM EITHER SIDE OF THE SAID NON-POTABLE MAIN PIPELINE. (DEPARTMENT OF HEALTH SERVICES, STATE OF CALIFORNIA: GUIDANCE MEMO NO. 2003-02 AS REVISED ON OCTOBER 16, 2003; TITLED "GUIDANCE CRITERIA FOR SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES"). THE POTABLE WATER MAIN SHALL BE CONSTRUCTED AS CLOSE TO PERPENDICULAR AS FEASIBLE TO THE PIPELINE(S) CARRYING NON-POTABLE FLUID.
 - LOCATION OF THE NEW JOINT UTILITY TRENCH (JT) AND RELATED FACILITIES SHOWN HEREON ARE FOR GENERAL INFORMATION ONLY. SEE PG&E PLANS FOR DETAILED INFORMATION ON GAS, ELECTRIC, TELEPHONE AND TELEVISION FACILITIES.
 - LOCATION OF THE NEW INJECTION AND EXTRACTION PIPE LINES AND RELATED FACILITIES SHOWN HEREON ARE FOR GENERAL INFORMATION ONLY. SEE "PIPELINE RELOCATION MARINA HEIGHTS PHASE 1 ABRAMS DRIVE" PLANS FOR DETAILED INFORMATION ON INJECTION AND EXTRACTION PIPE LINES AND RELATED FACILITIES (NOT ATTACHED).
 - MODIFY PIPE ALIGNMENT BY CURVING PIPE TO ACHIEVE 4' OFFSET FOR RECYCLED WATER AND 6' FOR POTABLE WATER FROM FACE OF CURB. MINIMUM RADII FOR 6" PVC IS 150', FOR 8" PVC IS 200' AND FOR 12" PVC IS 300'.

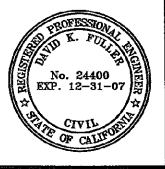
REVISION #	REVISIONS	DESIGN BY	DESIGN DATE	APPR.	APPR. DATE
1	REVISED WATER LINE ALIGNMENT	MSG	08/01/06	[Signature]	11/6/07



WWD CORPORATION
 ENGINEERING - SURVEYING
 PLANNING - CONSULTANTS

WWD

2801 MONTEREY - SALINAS HIGHWAY, MONTEREY, CALIFORNIA 93940
 TEL: (831) 655-2723 FAX: (831) 655-3425
 E-MAIL: MAIL@WWDENGINEERING.COM



DRAWN BY: MSG
 DESIGNED BY: DKF
 DATE: 3-21-06
 SCALE: AS NOTED
 JOB NUMBER: 02-015

CYPRESS MARINA HEIGHTS, LP
 2716 OCEAN PARK BOULEVARD
 SUITE 3025
 SANTA MONICA, CA 90405
 (310) 314-2590



MARINA HEIGHTS
 PHASE 1
 ABRAMS DRIVE
 UTILITY PLAN & PROFILE
 STA. 60+00 - END

C6.6

APPENDIX H
UCMBEST RECORD DRAWINGS

Existing Recycled Water Facilities on UCMBEST Property



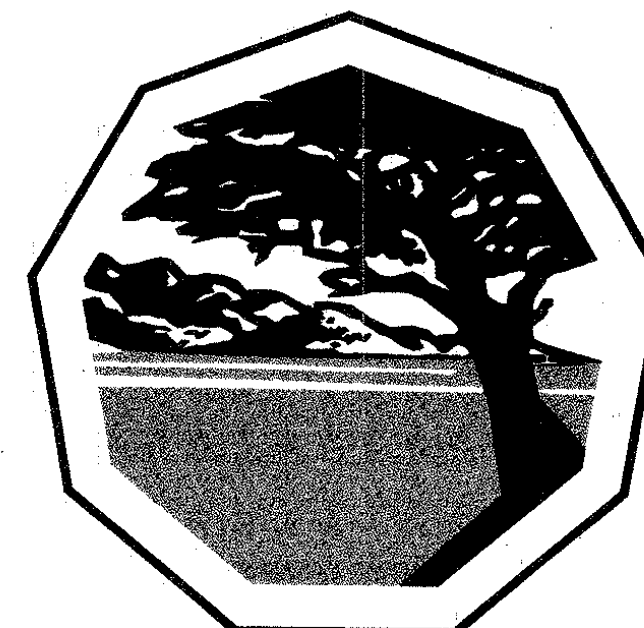
Location of RW facilities shown are approximate only. Please find record drawings, attached, for more accurate location of facilities.

FORT ORD REUSE AUTHORITY

IMPROVEMENT PLANS FOR

Basis of Bearings

The bearing of S57°44'10"E along the southerly boundary of Lot 1 between Imjin Rd. and Blanco Rd. as shown on Book 19 of Surveys at Page 20 was taken as Basis of Bearings for this Project.



Benchmarks

- "US&GS 2" Brass Disc. in concrete base at metal gate post, west side of driveway 70 feet north of centerline of Reservation Road - stamped Res. 2 1988 Elevation 197.414
- Chiseled square in center of west island on Reservation Road at the intersection of Blanco Road. Elevation 145.46

UNIVERSITY OF CALIFORNIA - SANTA CRUZ

MONTEREY BAY EDUCATION, SCIENCE AND TECHNOLOGY PARK

STREET AND UTILITY OPENING PROJECT

EDA Award No. 07-01-03734

June 1999

Fort Ord Reuse Authority
Engineering Section

Approved For Construction:

James Feeney, PE Date: 7/6/99
James Feeney, PE
Assistant Executive Officer
Fort Ord Reuse Authority

Approved For Construction:

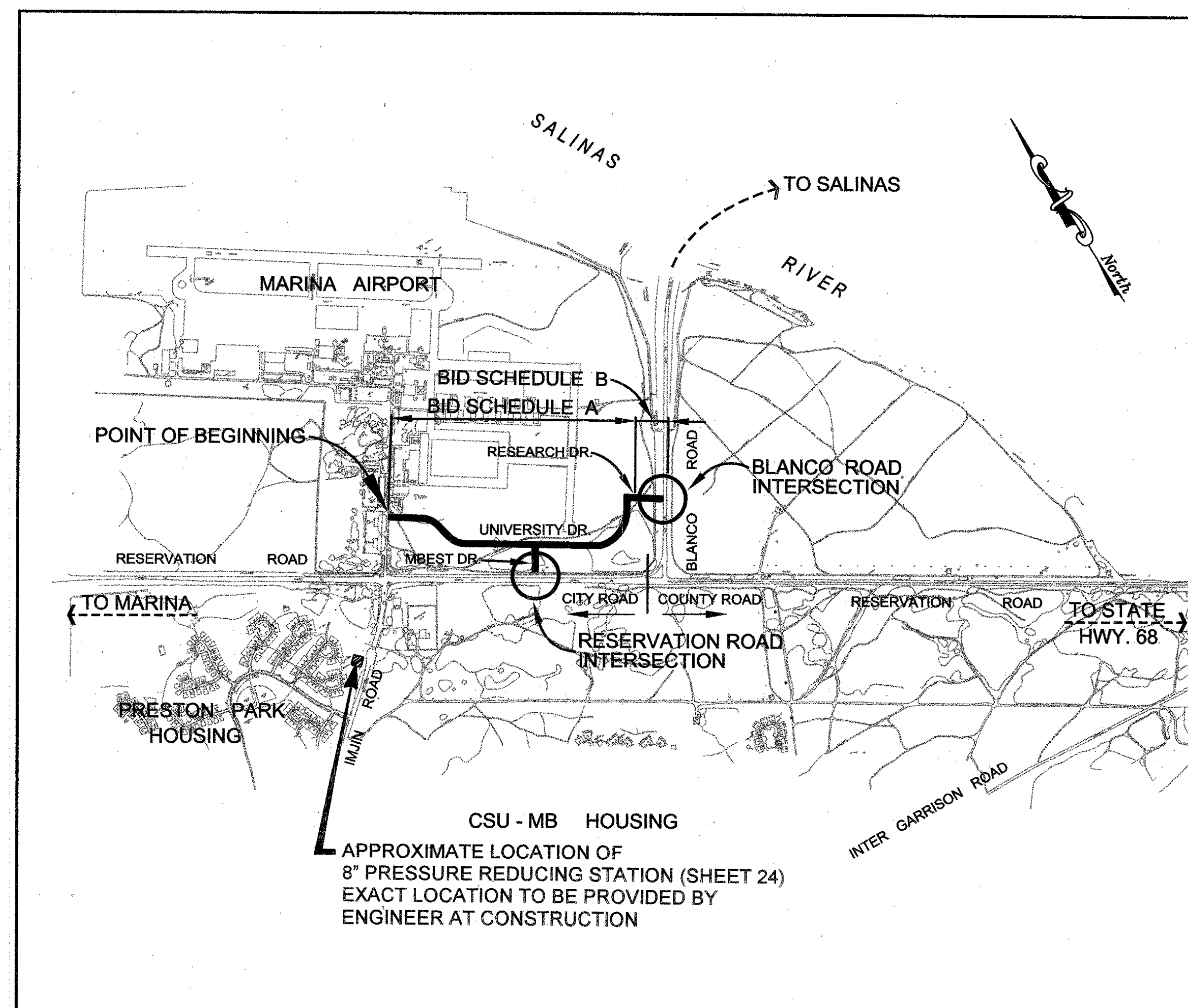
Charles Johnson Date: 7-6-99
Charles Johnson, PE
Director of Public Works
City of Marina, California

Dave Meza Date: 7/21/99
FOR Dave Meza, P.E.
District Engineer
Marina Coast Water District

Frank Zwart Date: 7/6/99
Frank Zwart
Assistant Vice Chancellor
Physical Planning and Construction
UC MBEST Center
(No Code Or Technical Approval Implied)

Project Design Team:

- Reimer Associates
- CH2M Hill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



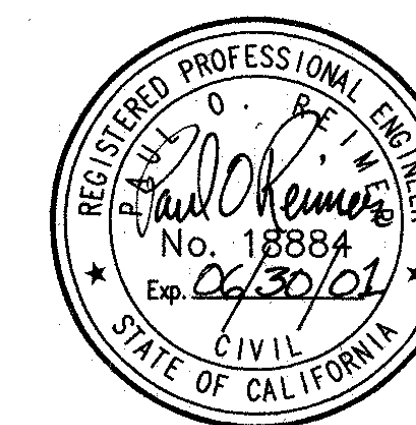
Vicinity Map
Scale: 1" = 1200'

Sheet Index

Sheet No.	Description
1	Cover Sheet
2	Legend, Abbreviations & General Notes
3 & 4	Typical Sections
Plan & Profile	
5 - 10	University Drive
11 - 12	Research Drive
13	MBEST Drive
14	Reservation Road
15 - 17	Blanco Road
Details	
18 - 21	Street Details
22 & 23	Storm Drain Details
24	Water & Recycled Water Details
25 & 26	Communications Details
27	Street Lighting Details
Signing & Striping	
28	University Drive
29	University Drive & MBEST Drive
30	University Drive & Research Drive
31	Reservation Road
32 - 34	Blanco Road
Signal & Interconnect Plan	
35-38	Reservation Road
39-41	Blanco Road
18A	Curb Return Profiles

Participating Agencies

- City of Marina - Dept. of Public Works
- County of Monterey - Dept. of Public Works
- Marina Coast Water District
- University of California, Santa Cruz -
Monterey Bay Education, Science, and Technology Center



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GENERAL NOTES

- ALL STATIONING AND DISTANCES INDICATED ON THE DRAWINGS ARE BASED ON HORIZONTAL MEASUREMENTS.
- THE CONTRACTOR SHALL NOTIFY THE FORA REPRESENTATIVE AT LEAST 2 WORKING DAYS IN ADVANCE OF ANY WORK WHICH WILL REQUIRE THE INSPECTION SERVICES. THIS SHALL INCLUDE BUT NOT BE LIMITED TO TRENCH COMPACTION TESTING, SPOIL DISPOSAL AREA COORDINATION, CONCRETE REINFORCING BAR PLACEMENT, AND PIPELINE MANDREL PULLING AND PRESSURE TESTING.
- AT LEAST 2 WORKING DAYS PRIOR TO ANY EXCAVATION WORK, THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT AT 1-800-642-2444 FOR LOCATING AND MARKING UNDERGROUND UTILITIES IN THE AREAS OF THE WORK. ALSO REFER TO GENERAL NOTE 4 ON THIS SHEET.
- THE EXISTING UTILITIES SHOWN AND INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GENERAL INFORMATION ONLY, AND ARE BASED ON AVAILABLE UTILITY INFORMATION PROVIDED BY THE UTILITY OWNER AND SELECTED FIELD LOCATING. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR VERIFICATION OF EXISTING UNDERGROUND UTILITIES, WHETHER INDICATED OR NOT ON THE DRAWINGS, PRIOR TO ANY CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL PROTECT ALL EXISTING OR NEWLY PLACED UTILITY STRUCTURES AND LINES FROM DAMAGE OR DISRUPTION OF SERVICE DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE NECESSARY TEMPORARY UTILITY SERVICES AND SHALL RESTORE PERMANENT UTILITY SERVICES DISRUPTED BY CONSTRUCTION ACTIVITY.
- THE CONTRACTORS SHALL EXPOSE ALL EXISTING UTILITY LINES AT LEAST ONE WORKING DAY AHEAD OF PIPE LAYING OPERATION TO VERIFY LOCATION AND DEPTH OF EXISTING UTILITIES. ANY CONFLICTS WILL BE RESOLVED BY THE FORA REPRESENTATIVE PRIOR TO PIPE INSTALLATION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING FOR THE PRESENCE OF CONTAMINATED SOIL AND/OR GROUNDWATER DURING THE COURSE OF THE WORK. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE FORA REPRESENTATIVE IF ANY SUSPECT MATERIALS ARE ENCOUNTERED. CONTACT SHALL BE MADE IMMEDIATELY BY TELEPHONE, WITH WRITTEN NOTIFICATION WITHIN 3 WORKING DAYS.
- ALL TRENCHING OPERATIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF TITLE 8 (CAL/OSHA).
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE ON OR OFF THE PROJECT SITE AS A RESULT OF CONSTRUCTION ACTIVITIES INCLUDING THE LACK OF DUST CONTROL.
- UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL CERTIFY THAT ALL WORK WAS PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. VARIATIONS SHALL BE DECLARED AND PRESENTED TO THE ENGINEER IN WRITING UPON COMPLETION OF CONSTRUCTION.
- THE ENGINEER AND/OR THE FORA REPRESENTATIVE WILL NOT DIRECTLY CONTROL THE PHYSICAL ACTIVITIES OF THE CONTRACTOR OR ANY SUBCONTRACTORS. CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR WORKING CONDITIONS ON THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
- CONTRACTOR SHALL VERIFY WORK IN FIELD AND SHALL SATISFY HIMSELF AS TO THE ACCURACY BETWEEN WORK SET FORTH ON THESE PLANS AND THE WORK REQUIRED IN THE FIELD. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE FORA REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
- EXCEPT WHEN A LANE CLOSURE IS IN EFFECT IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED TRAFFIC CONTROL PLAN, NO VEHICLES EQUIPMENT OR MACHINERY ARE ALLOWED TO PARK ON THE SHOULDER OF RESERVATION ROAD AT ANY TIME.
- ANY AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO ORIGINAL CONDITIONS AND HYDROSEEDDED SO AS TO RESTORE NATURAL GROWTH.
- THERE WILL BE NO OVERLAPPING OF CONSTRUCTION ACTIVITY WITH PREVIOUS CONSTRUCTION OF SANITARY SEWER IMPROVEMENTS SINCE THE PREVIOUS CONTRACT IS NOW COMPLETE. CONTRACTOR IS ENCOURAGED TO UTILIZE THE SAME STAGING AREA ON IMJIN ROAD AS WAS PREVIOUSLY USED BY THE UNDERGROUND CONTRACTOR.
- DUE TO THE RECENTLY COMPLETED UNDERGROUND CONSTRUCTION ACTIVITIES, THE CONTOURS AND EXISTING GROUND ELEVATIONS HAVE BEEN ALTERED FROM THOSE SHOWN IN THIS SET OF PLANS. CONTRACTOR IS RESPONSIBLE FOR THEIR OWN INTERPRETATION OF THE ALTERED TERRAIN IN RESPECT TO BID ITEMS.
- A SOURCE OF CONSTRUCTION WATER IS SHOWN ON SHEET 5. CONTRACTOR IS RESPONSIBLE FOR OBTAINING PERMISSION FOR WATER USE AND METERING FROM MARINA COAST WATER DISTRICT - 200 12TH STREET, MARINA, CA

ABBREVIATIONS

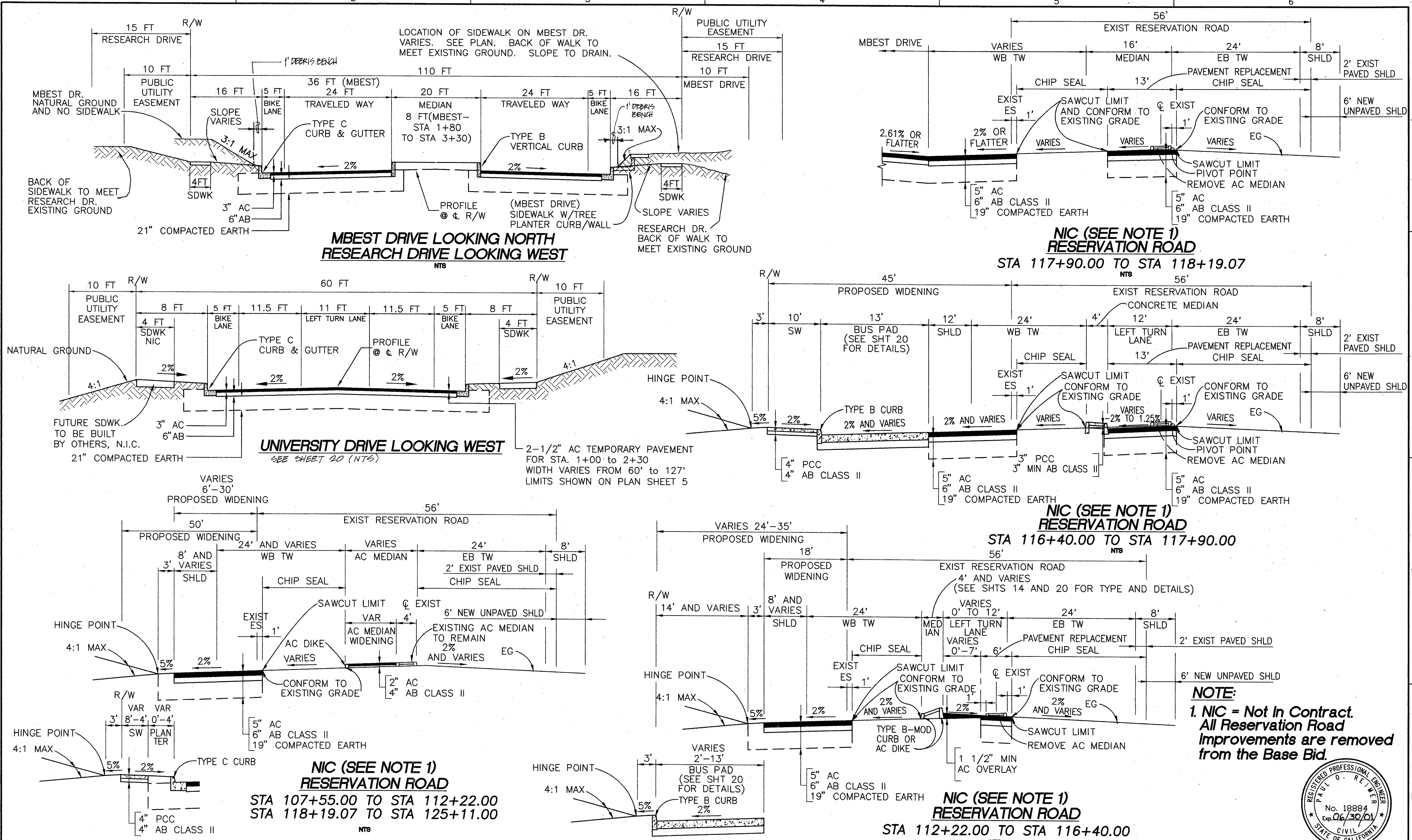
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
AB	AGGREGATE BASE	MH	MANHOLE
AC	ASPHALTIC CONCRETE	MIN	MINIMUM
AD	ALGEBRAIC DIFFERENCE	MOD	MODIFIED
ARV	AIR RELIEF VALVE	MON	MONUMENT
AS	AGGREGATE SUBBASE	N	NORTH
BC	BEGINNING OF CURVE	NB	NORTH BOUND
BF	BLIND FLANGE	NIC	NOT IN CONTRACT
BOV	BLOW-OFF VALVE	NTS	NOT TO SCALE
BOW	BACK OF WALK	O.C.	ON CENTER
BVC	BEGINNING VERTICAL CURVE	O.D.	OUTSIDE DIAMETER
BVCE	BEGINNING VERTICAL CURVE ELEVATION	PCC	POINT OF COMPOUND CURVE, PORTLAND CEMENT CONCRETE
BVCS	BEGINNING VERTICAL CURVE STATION	PRC	POINT OF REVERSE CURVE
CB	CATCH BASIN	PRVCE	POINT OF REVERSE VERTICAL CURVE ELEVATION
CCA	COPPER-CUPRIC-ARSENIC	PRVCS	POINT OF REVERSE VERTICAL CURVE STATION
C OR C/L	CENTER LINE	PT	PRESSURE TREATED
CMP	CORRUGATED METAL PIPE	PUE	PUBLIC UTILITY EASEMENT
CONST	CONSTRUCTION	PVC	POLYVINYLCHLORIDE PIPE
CRP	CURB RETURN PROFILE	PVI	POINT OF VERTICAL INTERSECTION
CSB	COMMUNICATION SUBBOX	R	RADIUS
CV	COMMUNICATION VAULT	RCP	REINFORCED CONCRETE PIPE
DIA	DIAMETER	REQ'D	REQUIRED
DIP	DUCTILE IRON PIPE	RDWD	REDWOOD
E	EAST	RT	RIGHT
EB	EAST BOUND	RW	RECYCLED WATER
EC	END OF CURVE	R/W	RIGHT OF WAY
EG	EXISTING GROUND	S	SOUTH OR SLOPE
ELEV	ELEVATION	SB	SOUTH BOUND
EP	EDGE OF PAVEMENT	SD	STORM DRAIN
ER	END OF RETURN	SDMH	STORM DRAIN MANHOLE
ES	EDGE OF SHOULDER	SDWK OR SW	SIDEWALK
ETW	EDGE OF TRAVELLED WAY	SHLD	SHOULDER
EVC	END VERTICAL CURVE	SHT	SHEET
EXIST	EXISTING	SS	SANITARY SEWER
FDC	FIRE DEPARTMENT CONNECTION	SSMH	SANITARY SEWER MANHOLE
FES	FLARED END SECTION	STA	STATION
FH	FIRE HYDRANT	SW	SOUTHWEST OR SIDEWALK
FM	FORCE MAIN	TC	TOP OF CURB
FORA	FORT ORD REUSE AGENCY	TG	TOP OF GRATE
FT	FEET(FOOT)	TW	TRAVELED WAY
GB	GRADE BREAK	TYP	TYPICAL
GV	GATE VALVE	VAR	VARIES
HIPT	HIGH POINT	VC	VERTICAL CURVE
HORIZ	HORIZONTAL	VERT	VERTICAL
ID	IRRIGATION DUCT	W	WEST OR WATER
INV	INVERT	W/	WITH
K	COEFFICIENT OF CURVATURE	WB	WEST BOUND
LF	LINEAR FEET	WS	WATER SURFACE
LoPt	LOW POINT	WV	WATER VALVE
LT	LEFT		
MAX	MAXIMUM		

LEGEND

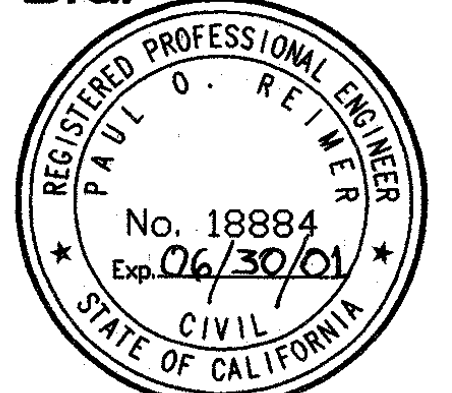
	NEW	EXISTING
CONTOUR		
PROPERTY LINE		
CENTERLINE OF STREET		
CURB AND GUTTER		
SIDEWALK		
HANDICAP RAMP		
LOT NUMBERS		
DIRECTION OF FLOW		
STORM DRAIN (ALL 15" UNLESS NOTED)		
STORM DRAIN MANHOLE		
CATCH BASIN		
FLARED END SECTION		
WATER SUPPLY LINE (SIZE IN INCHES)		
GATE VALVE		
EXISTING OR FUTURE FIRE HYDRANTS/ BLIND FLANGE		
RECYCLED WATER LINE (SIZE IN INCHES)		
BLOW OFF VALVE		
AIR RELIEF VALVE		
SANITARY SEWER (INSTALLED UNDER PREVIOUS FORA CONTRACT)		
SANITARY SEWER MANHOLE		
CITY MONUMENT		
TOP OF SLOPE		
TOE OF SLOPE		
ELECTRICAL CONDUITS & GAS LINES		
COMMUNICATION CONDUITS		
2" STREET LIGHTS CONDUIT		
ELECTRIC (TRAFFIC SIGNAL) (SIZE IN INCHES)		
TIMBER RETAINING WALL		
EXISTING GROUND (ON PROFILE)		
OAK TREE WITHIN CONSTRUCTION AREA REQUIRING SPECIAL PROTECTION		
UNIVERSITY AVENUE TYPICAL CROSS SECTION SHOWING UTILITY PLACEMENT		

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Project Design Team: <ul style="list-style-type: none"> Reimer Associates CH2MHill Kleinfelder Higgins Associates EMC Planning Group HD Peters Associates, Inc. 		<table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION</th> <th>BY</th> <th>APVD</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	REVISION	BY	APVD						<table border="1"> <tr> <td>VERIFY SCALE</td> <td>COMPANY</td> </tr> <tr> <td>BAR IS ONE INCH ON ORIGINAL DRAWING.</td> <td>Reimer Associates</td> </tr> <tr> <td>IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.</td> <td> DSGN POR/BCC DR RSG CHK POR </td> </tr> </table>	VERIFY SCALE	COMPANY	BAR IS ONE INCH ON ORIGINAL DRAWING.	Reimer Associates	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	DSGN POR/BCC DR RSG CHK POR	<table border="1"> <tr> <td>Fort Ord Reuse Authority</td> <td>University of California - Santa Cruz</td> </tr> <tr> <td>100 12th Street, Bldg. 2880</td> <td>Monterey Bay Education, Science and Technology Park</td> </tr> <tr> <td>Marina, CA 93933</td> <td>LEGEND, ABBREVIATIONS AND GENERAL NOTES</td> </tr> <tr> <td></td> <td>TYPICAL CROSS-SECTION</td> </tr> <tr> <td>Approved</td> <td>Date 7/6/99</td> </tr> </table>	Fort Ord Reuse Authority	University of California - Santa Cruz	100 12th Street, Bldg. 2880	Monterey Bay Education, Science and Technology Park	Marina, CA 93933	LEGEND, ABBREVIATIONS AND GENERAL NOTES		TYPICAL CROSS-SECTION	Approved	Date 7/6/99	<table border="1"> <tr> <td>SHEET 2 of 41</td> </tr> <tr> <td>DWG</td> </tr> <tr> <td>DATE June 1999</td> </tr> <tr> <td>PROJ R1680</td> </tr> </table>	SHEET 2 of 41	DWG	DATE June 1999	PROJ R1680
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PROJ R1680																																			



NOTE:
1. NIC = Not In Contract.
All Reservation Road
Improvements are removed
from the Base Bid.



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



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POR/BCC

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RSG

CHK
POR

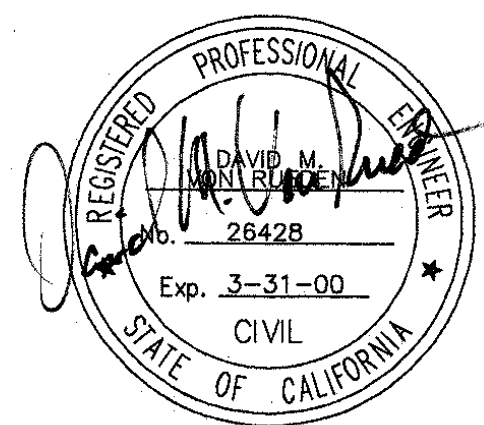
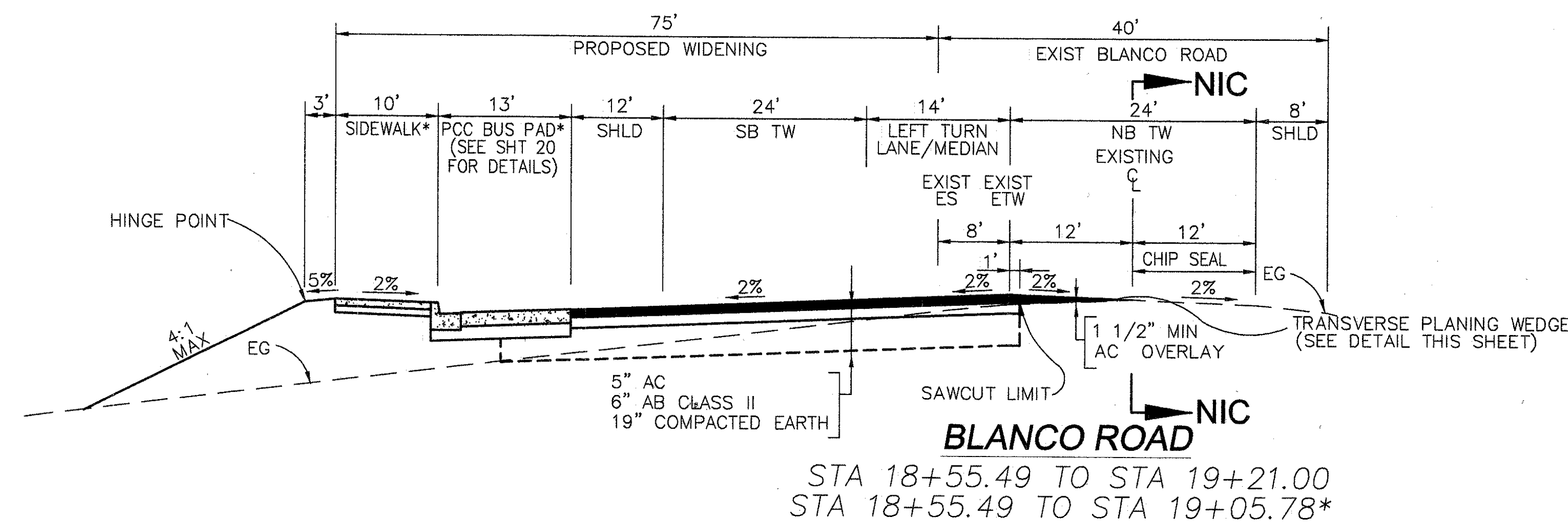
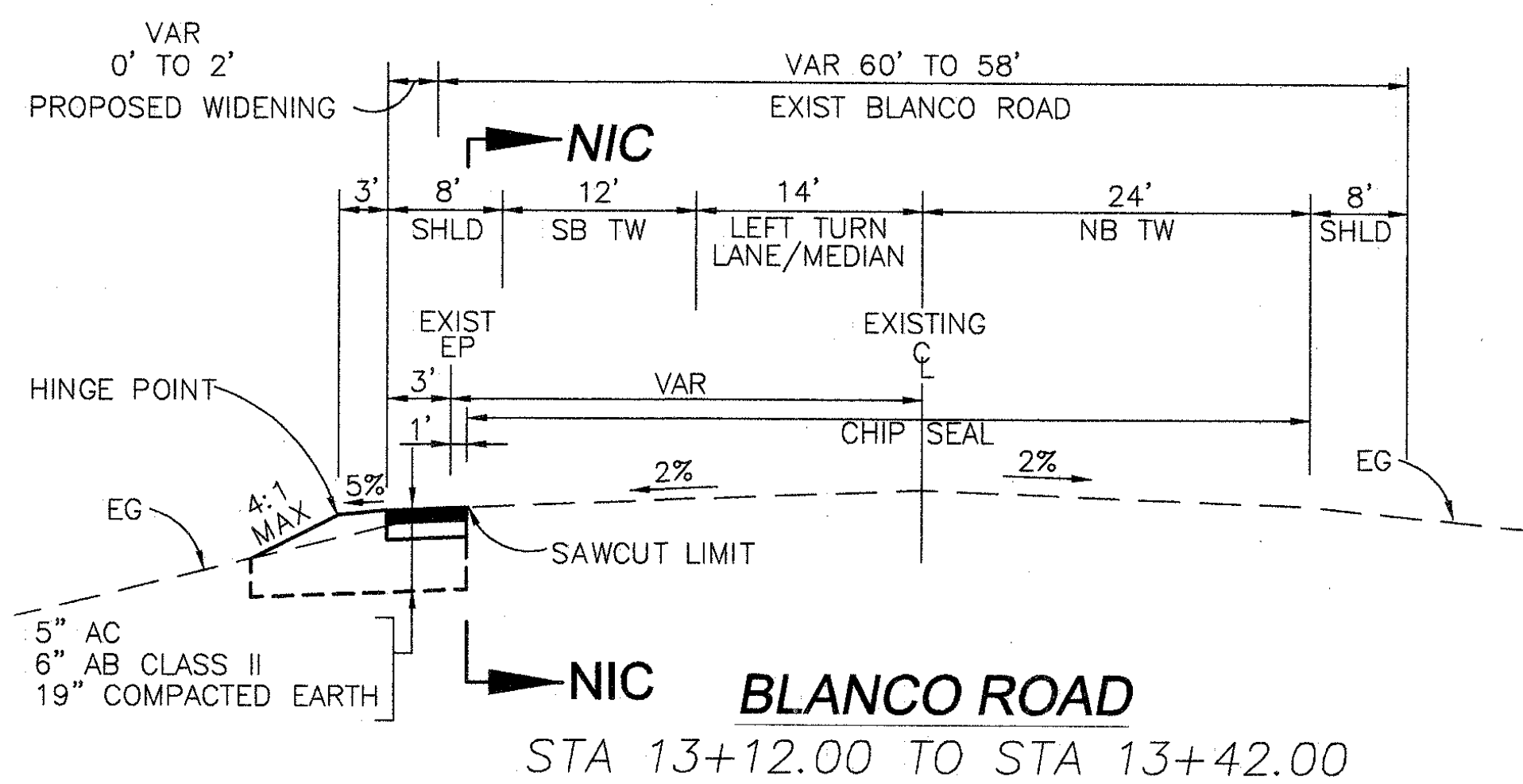
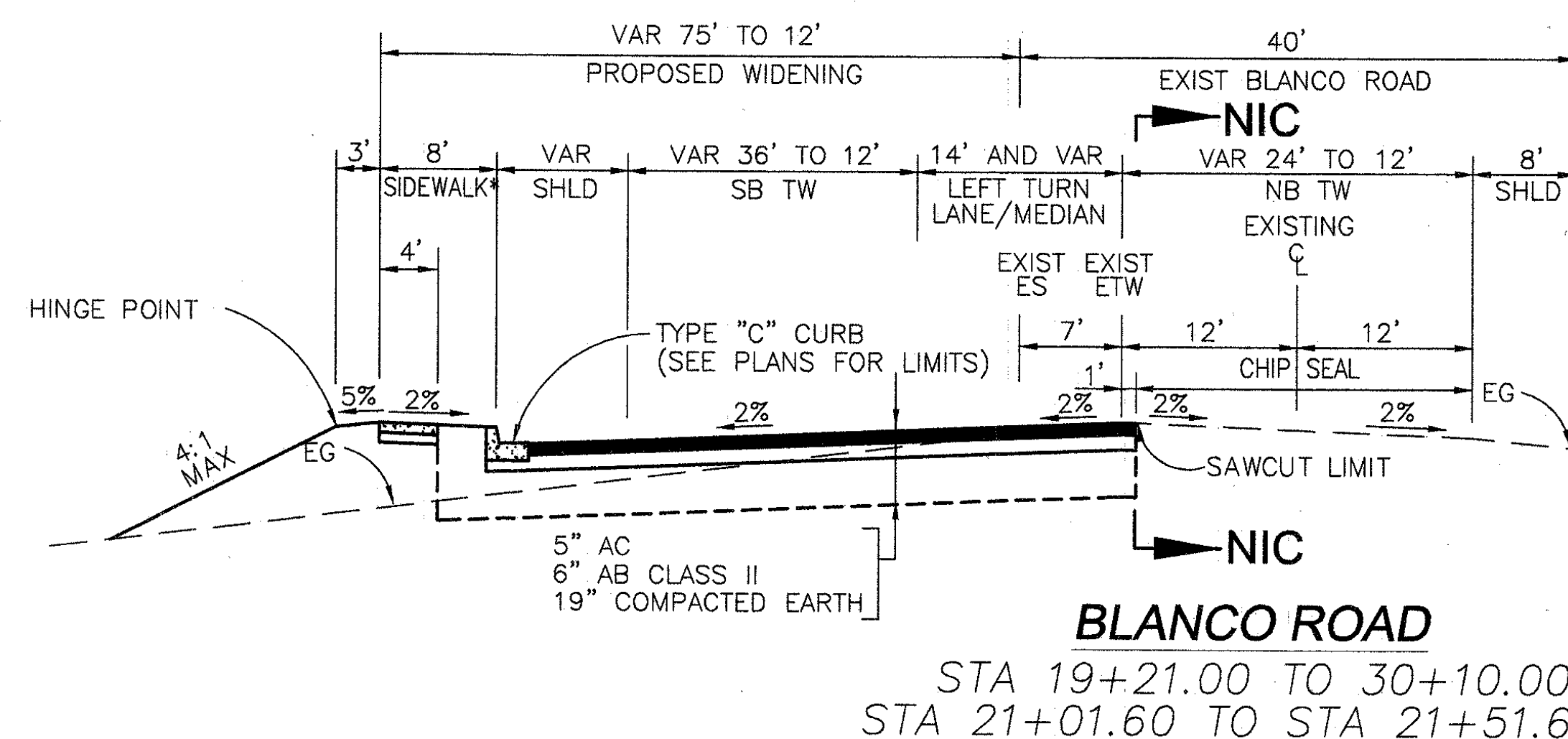
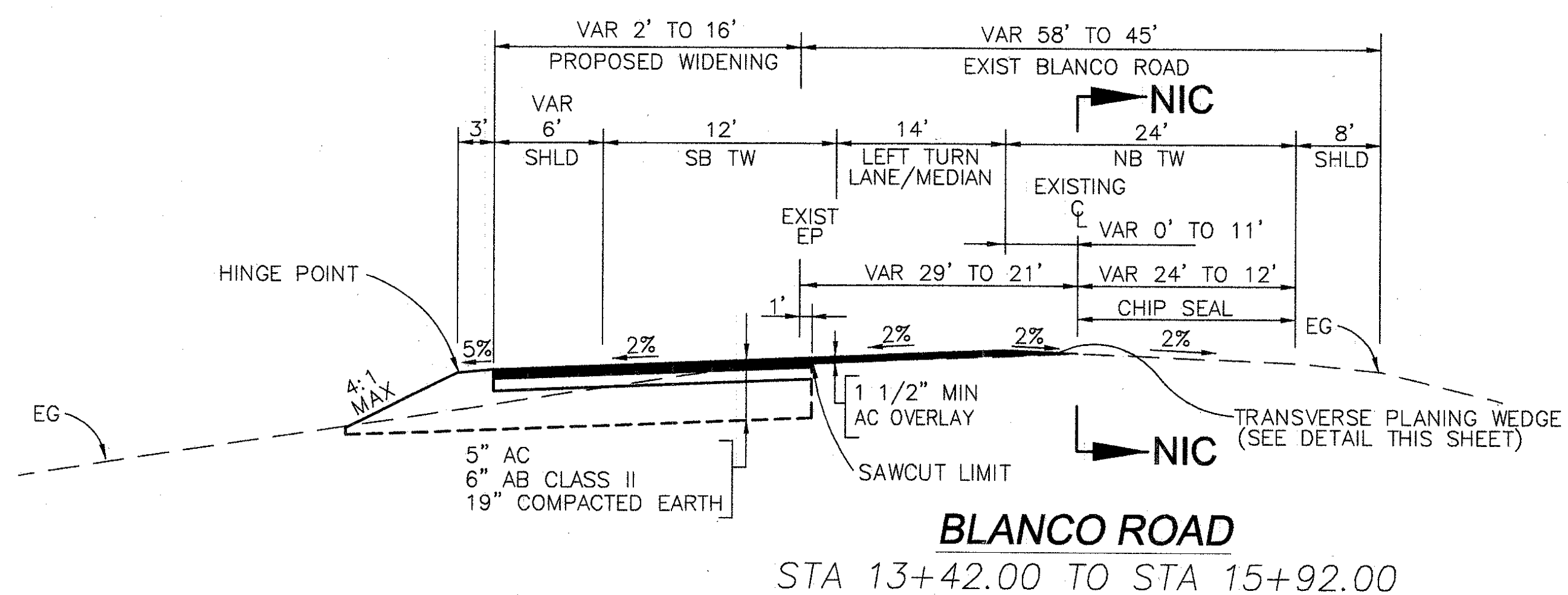
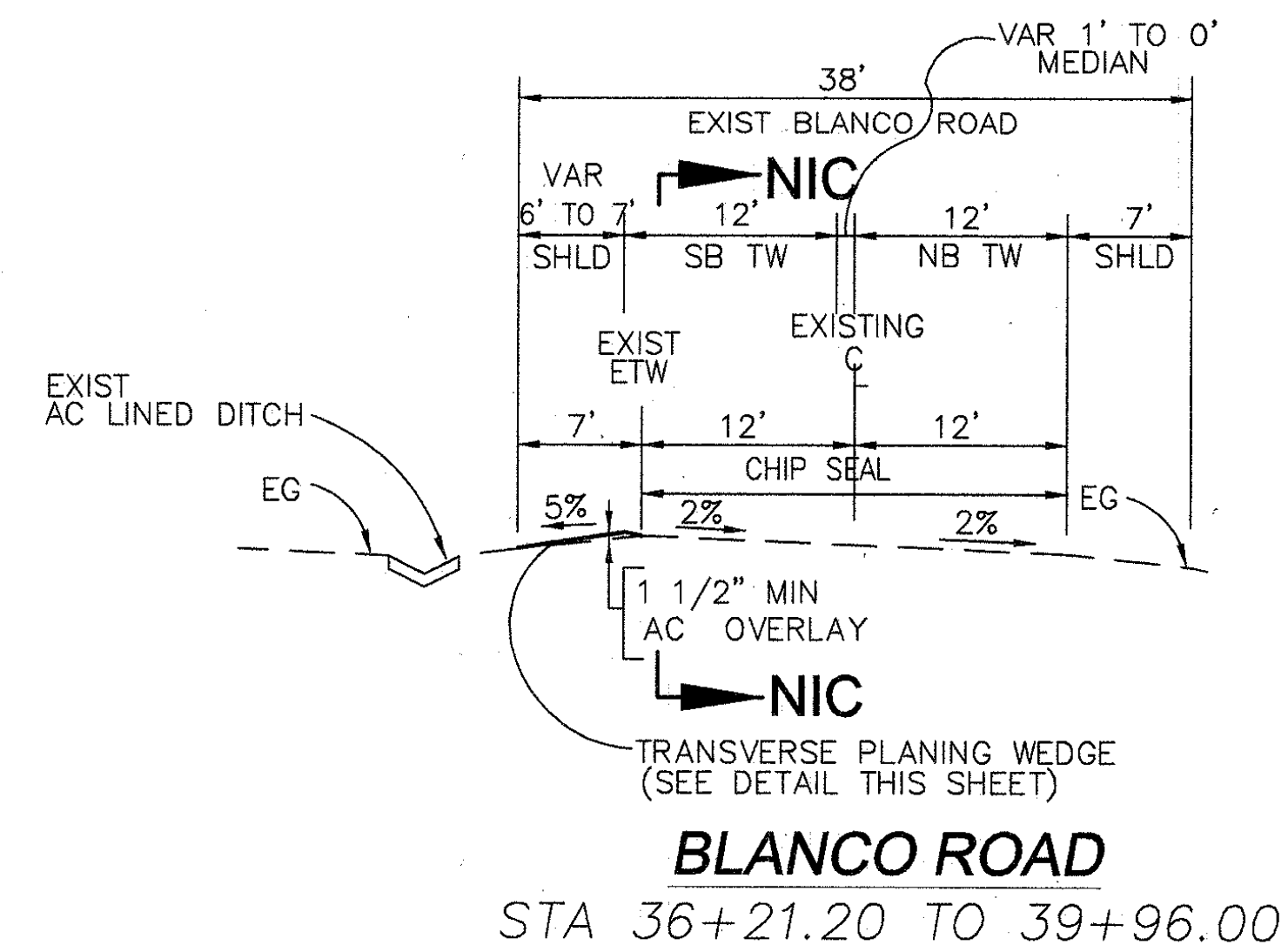
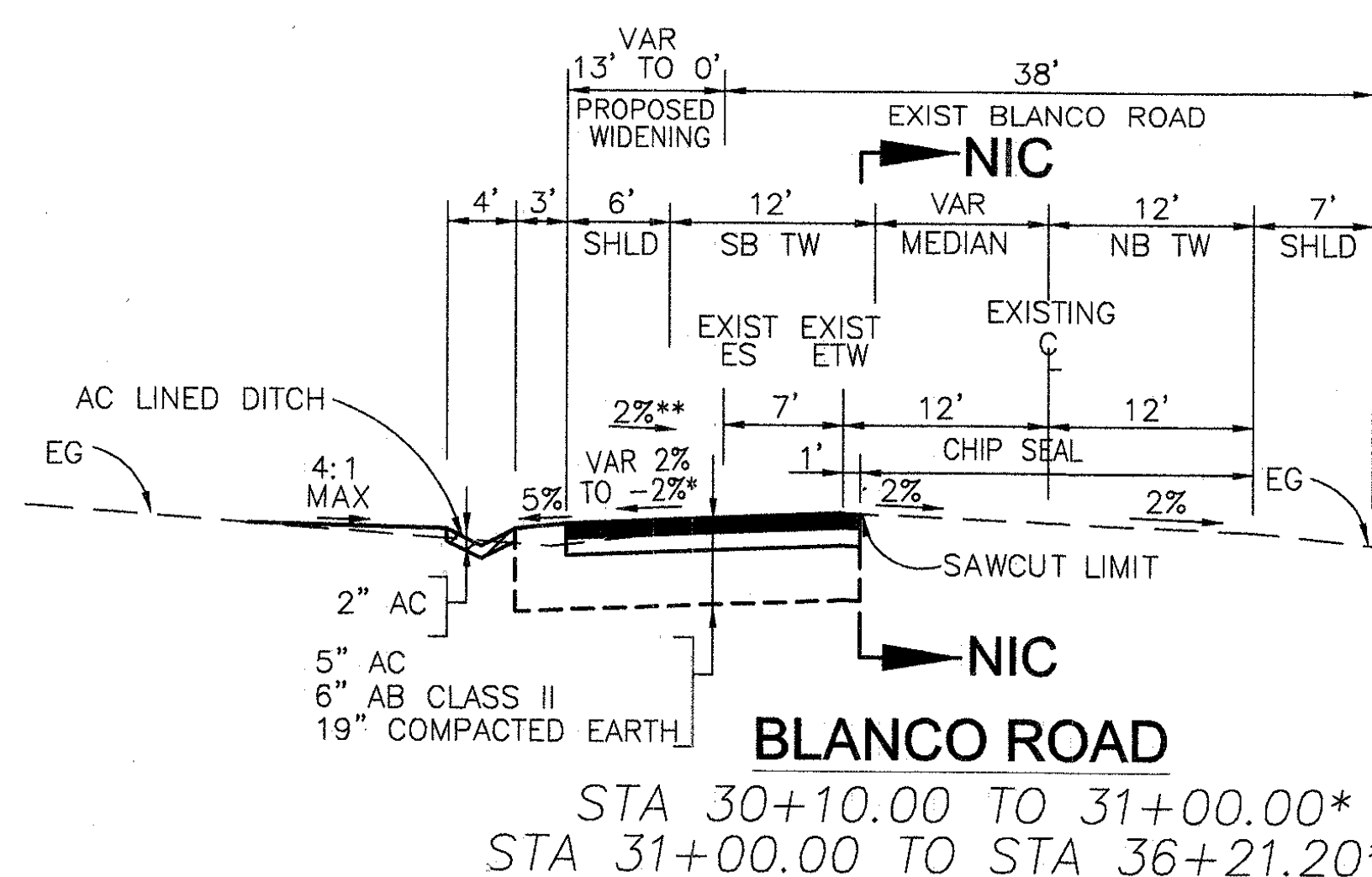
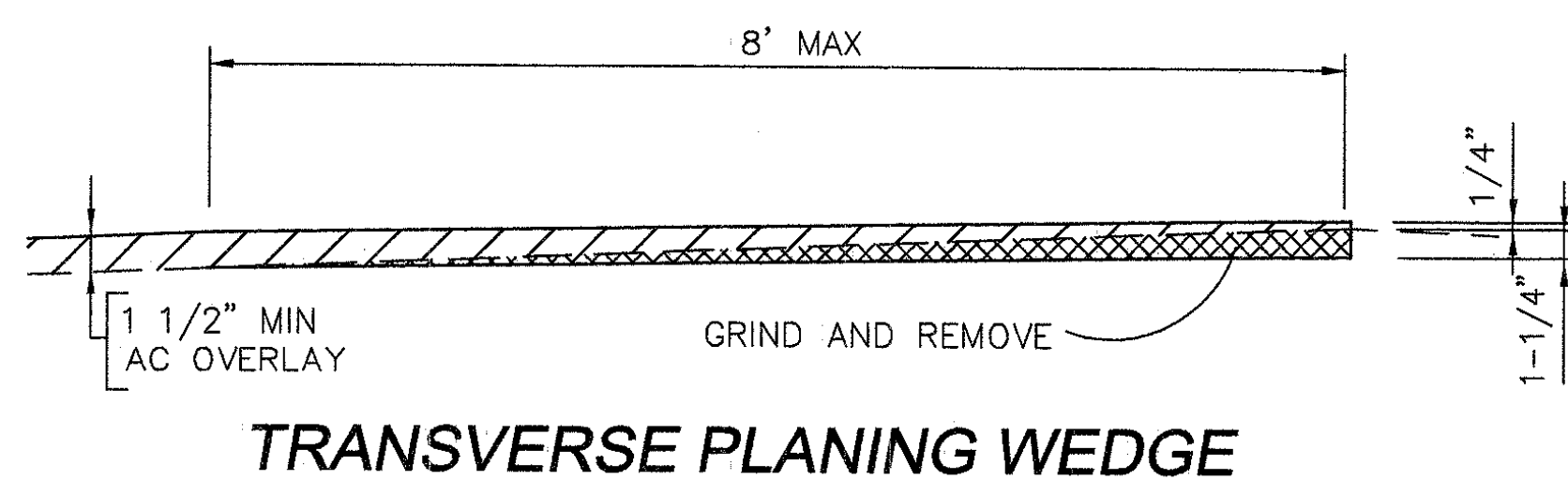
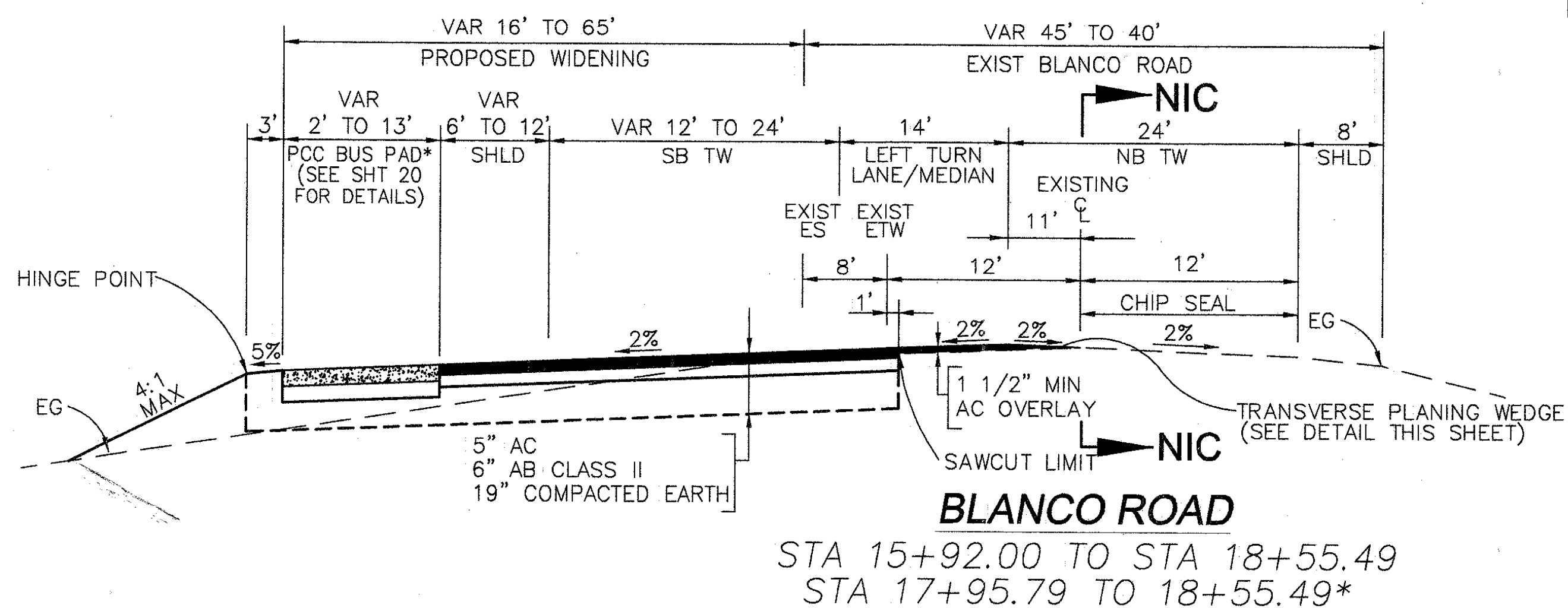
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100 12th Street, Bldg. 2880
Marina, CA 93933

Approved: *[Signature]* Date: 7/6/99

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Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT

SHEET 3 of 41
DWG SHEET-3
DATE JUNE 1999
PROJ R1680

NIC = Not In Contract.



Project Design Team:
 • Reimer Associates
 • Kleinfelder
 • EMC Planning Group
 • CH2MHill
 • Higgins Associates
 • HD Peters Associates, Inc.



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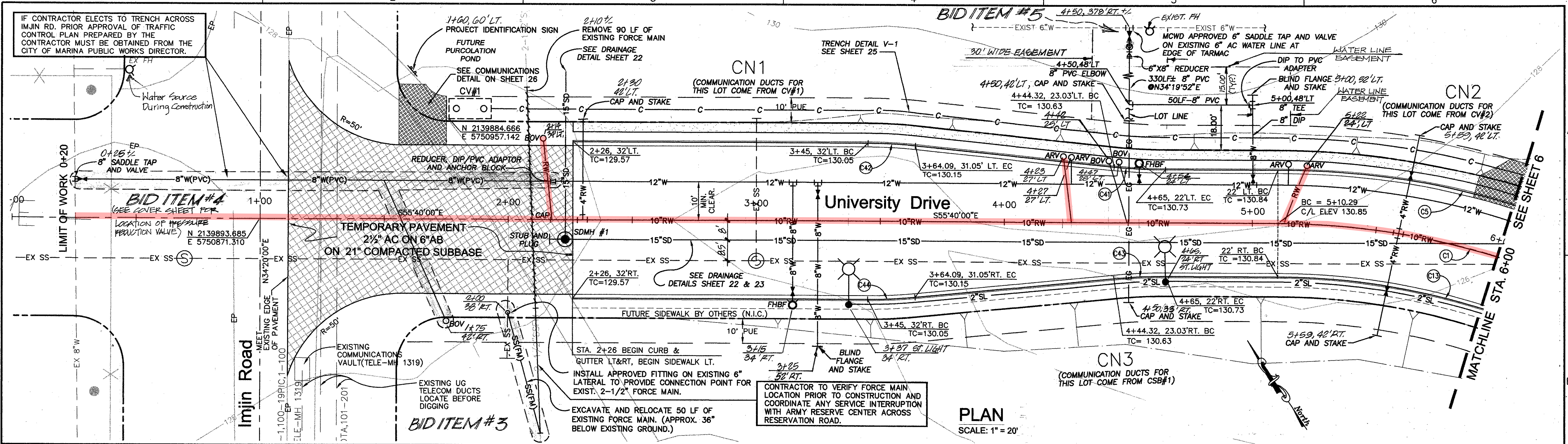
COMPANY
CH2M Hill
 DSGN M. AGUILAR
 DR M. AGUILAR
 CHK D. VON RUEDEN

Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933
 Approved: [Signature] Date: 7/6/99

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
TYPICAL SECTIONS

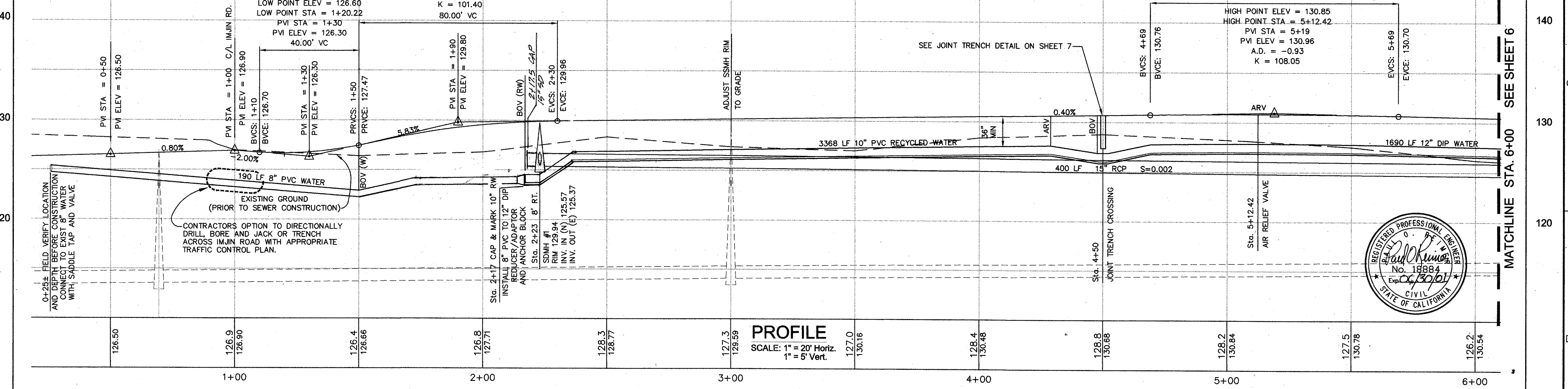
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CURVE TABLE

CURVE No.	RADIUS	DELTA	LENGTH
C1	300.00'	43°16'21"	226.57'
C5	322.00'	26°45'01"	150.34'
C13	278.00'	22°07'17"	107.33'
C41	208.00'	05°42'25"	20.72'
C42	192.00'	05°42'25"	19.12'
C43	208.00'	05°42'25"	20.72'
C44	192.00'	05°42'25"	19.12'



Project Design Team:

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- HD Peters Associates, Inc.

Reimer Associates

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1	8/9/99	BID ITEMS, OFFSETS AND CLARIFICATIONS	RSG	POR

COMPANY
Reimer Associates

DSGN
POR/BCC

DR
RSG

CHK
POR

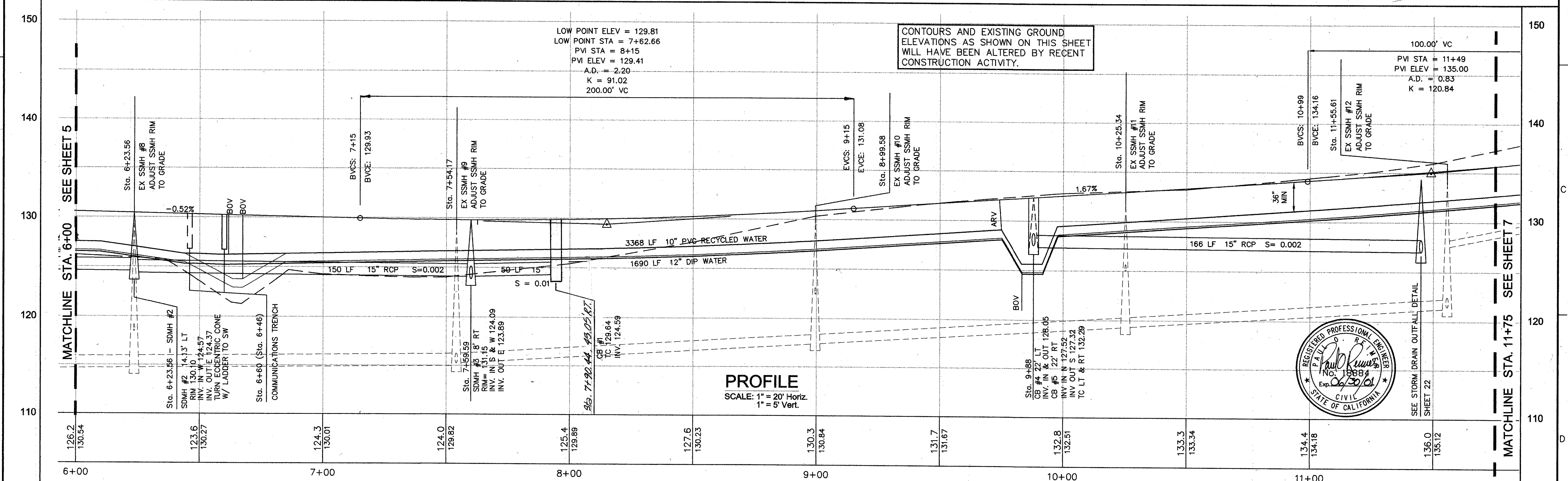
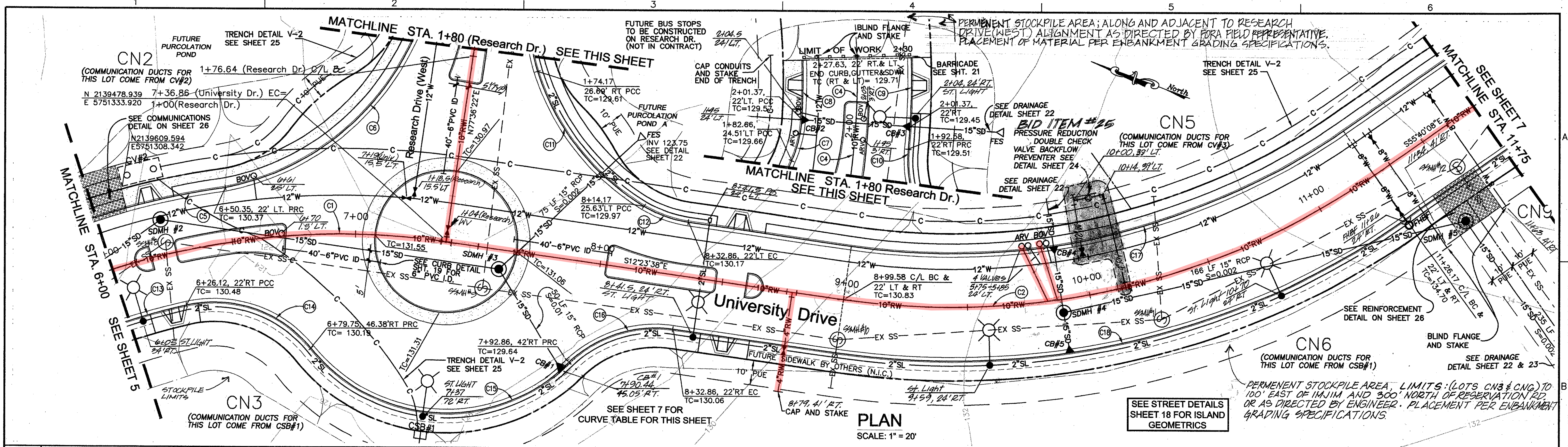
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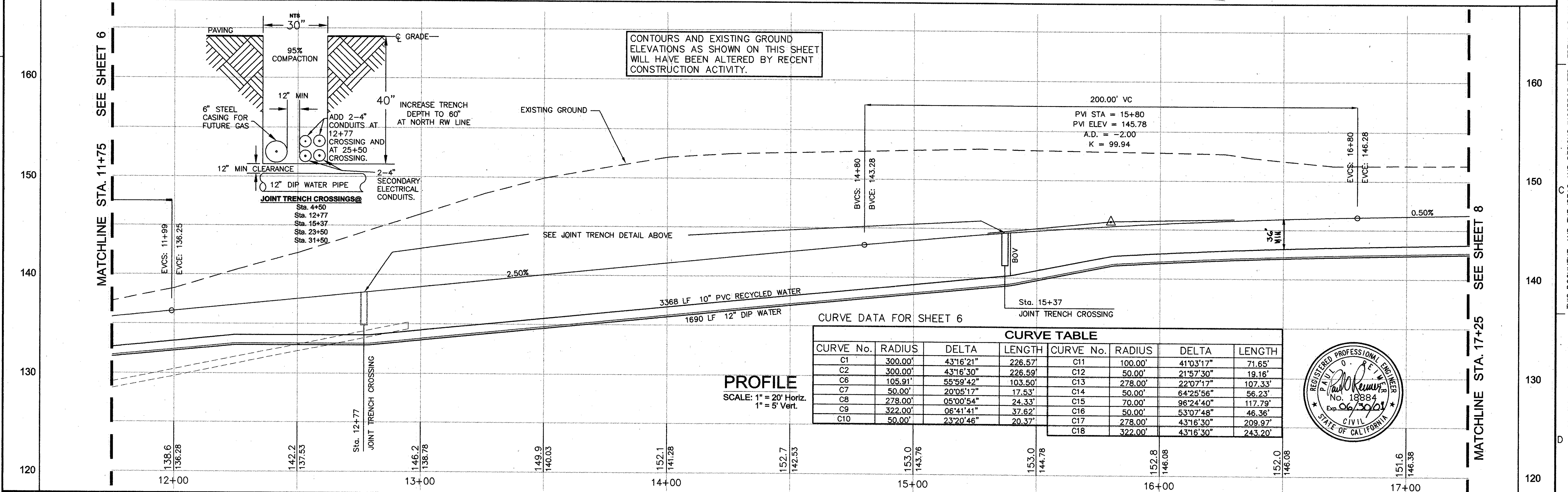
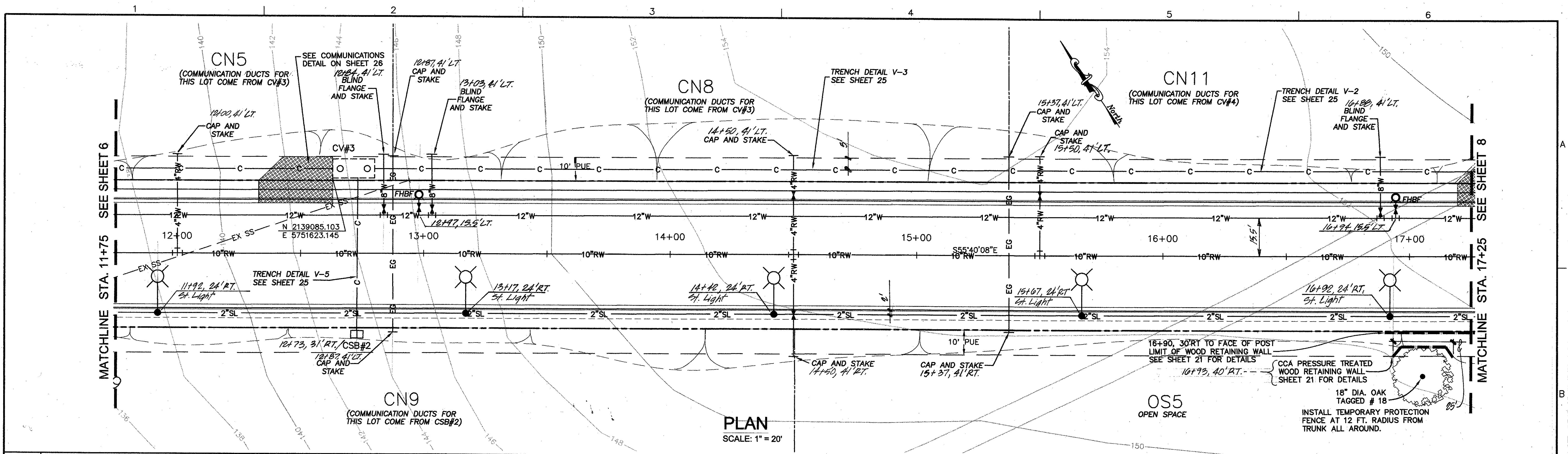
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STREET AND UTILITY OPENING PROJECT
PLAN AND PROFILE
University Drive Sta. 1+00 to 6+00

SHEET 5 of 41
DWG
DATE June 1999
PROJ R1680

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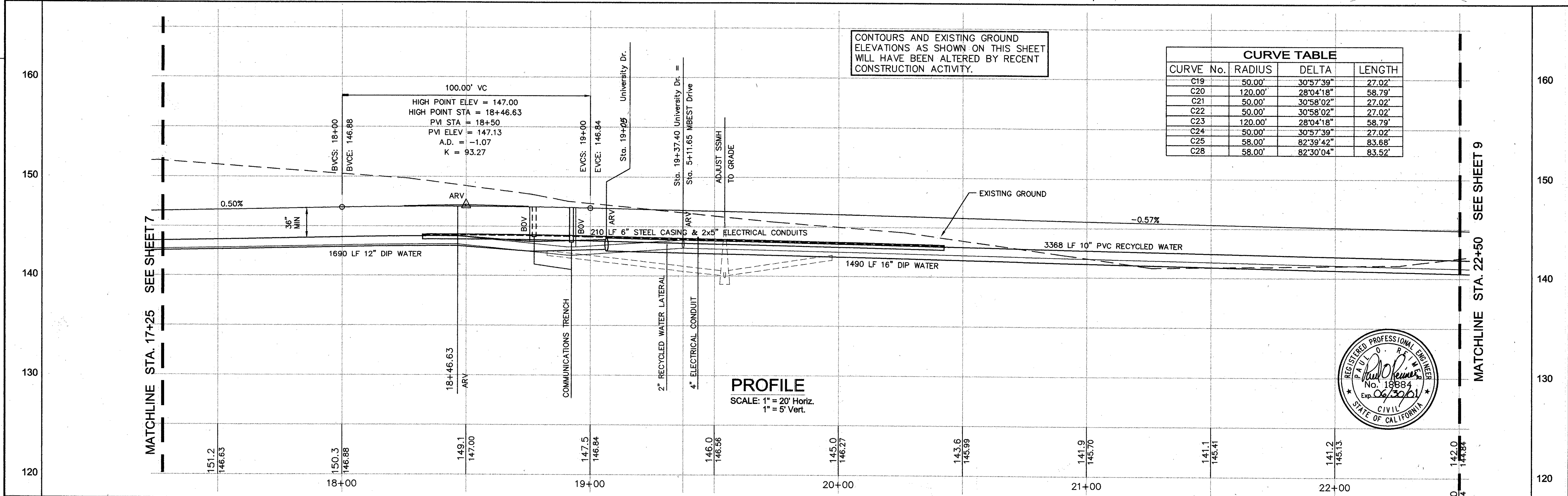
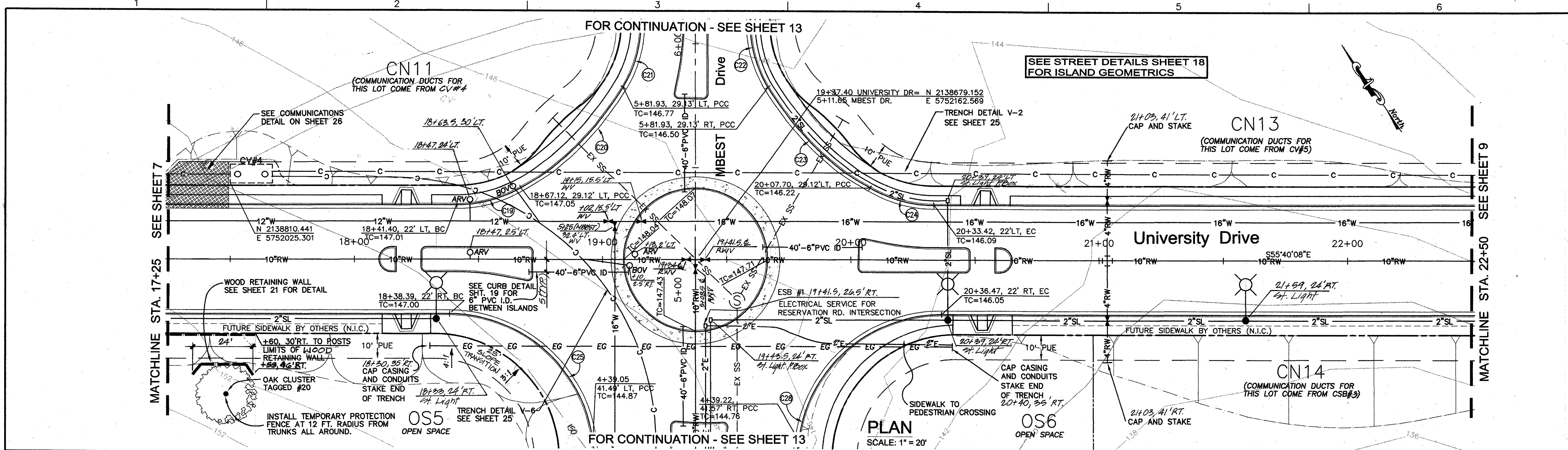


Project Design Team: • Reimer Associates • Kleinfelder • EMC Planning Group • CH2MHill • Higgins Associates • HD Peters Associates, Inc.			<table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION</th> <th>BY</th> <th>APVD</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	REVISION	BY	APVD						VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	<table border="1"> <tr> <th>COMPANY</th> <td>Reimer Associates</td> </tr> <tr> <th>DSGN</th> <td>POR/BCC</td> </tr> <tr> <th>DR</th> <td>RSG</td> </tr> <tr> <th>CHK</th> <td>POR</td> </tr> </table>	COMPANY	Reimer Associates	DSGN	POR/BCC	DR	RSG	CHK	POR	Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT PLAN AND PROFILE University Drive Sta 6+00 to 11+75	SHEET 6 of 41 DWG DATE June 1999 PROJ R1680
NO.	DATE			REVISION	BY	APVD																				
COMPANY	Reimer Associates																									
DSGN	POR/BCC																									
DR	RSG																									
CHK	POR																									



Project Design Team: • Reimer Associates • Kleinfelder • EMC Planning Group • CH2MHill • Higgins Associates • HD Peters Associates, Inc.	Reimer Associates 	VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	COMPANY Reimer Associates DSGN POR/BCC DR RSG CHK POR	Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 Approved: <i>[Signature]</i> Date: 7/6/99	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT PLAN AND PROFILE University Drive Sta. 11+75 to 17+25	SHEET 7 of 41 DWG DATE June 1999 PROJ R1680
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Project Design Team:

- Reimer Associates
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- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

Reimer Associates

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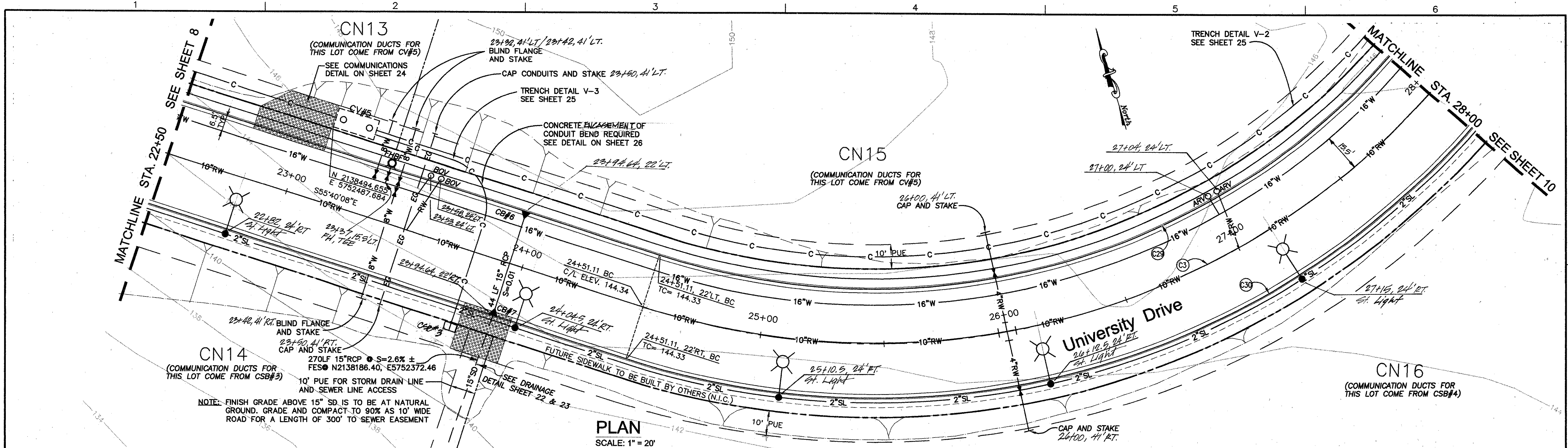
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STREET AND UTILITY OPENING PROJECT
PLAN AND PROFILE
University Drive Sta 17+25 to 22+50

SHEET 8 of 41
DWG
DATE June 1999
PROJ R1680

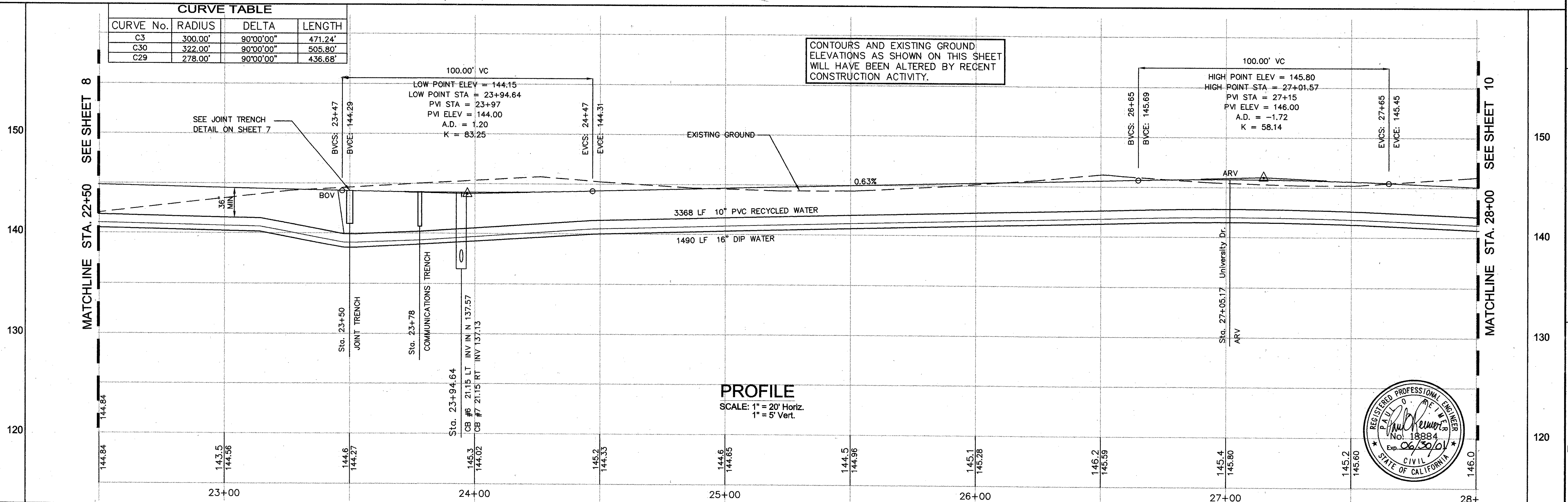
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CURVE TABLE

CURVE No.	RADIUS	DELTA	LENGTH
C3	300.00'	90°00'00"	471.24'
C30	322.00'	90°00'00"	505.80'
C29	278.00'	90°00'00"	436.68'



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



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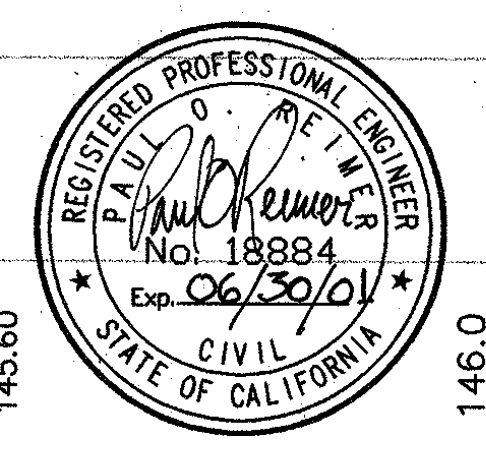
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COMPANY	DRGN	DR	CHK
Reimer Associates	POR/BCC	RSG	POR

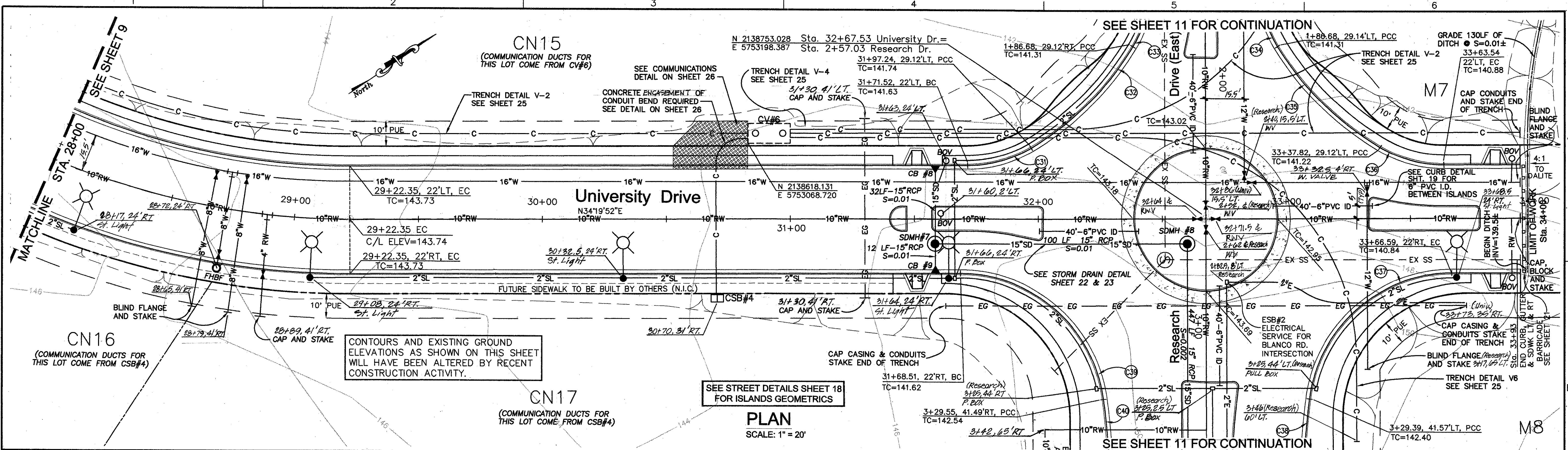
Fort Ord Reuse Authority
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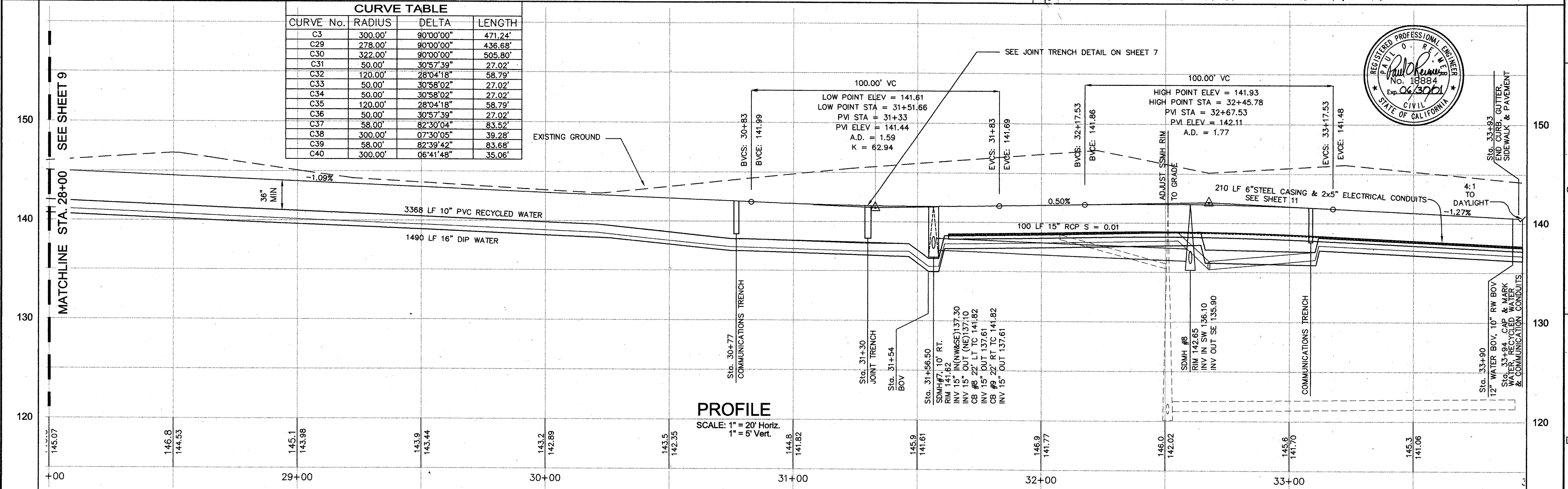
SHEET 9 of 41
DWG
DATE June 1999
PROJ R1680



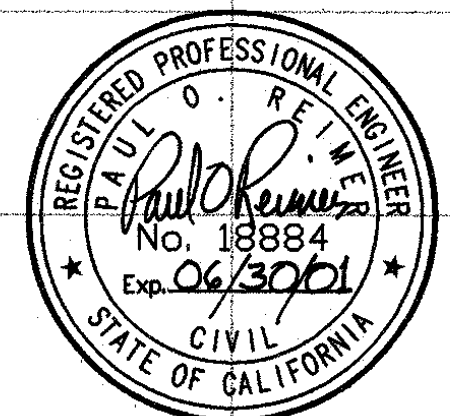
PLAN
SCALE: 1" = 20'

CURVE TABLE

CURVE No.	RADIUS	DELTA	LENGTH
C3	300.00'	90°00'00"	471.24'
C29	278.00'	90°00'00"	436.68'
C30	322.00'	90°00'00"	505.80'
C31	50.00'	30°57'39"	27.02'
C32	120.00'	28°04'18"	58.79'
C33	50.00'	30°58'02"	27.02'
C34	50.00'	30°58'02"	27.02'
C35	120.00'	28°04'18"	58.79'
C36	50.00'	30°57'39"	27.02'
C37	58.00'	82°30'04"	83.52'
C38	300.00'	07°30'05"	39.28'
C39	58.00'	82°39'42"	83.68'
C40	300.00'	06°41'48"	35.06'



PROFILE
SCALE: 1" = 20' Horiz.
1" = 5' Vert.



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

Reimer Associates

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COMPANY
Reimer Associates

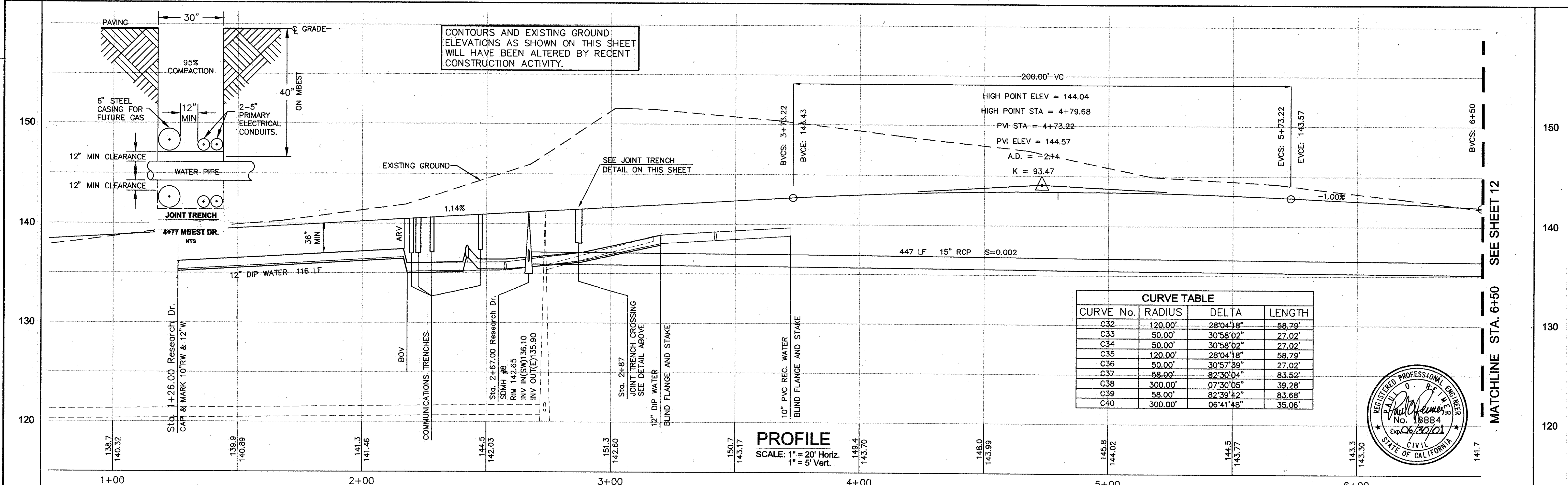
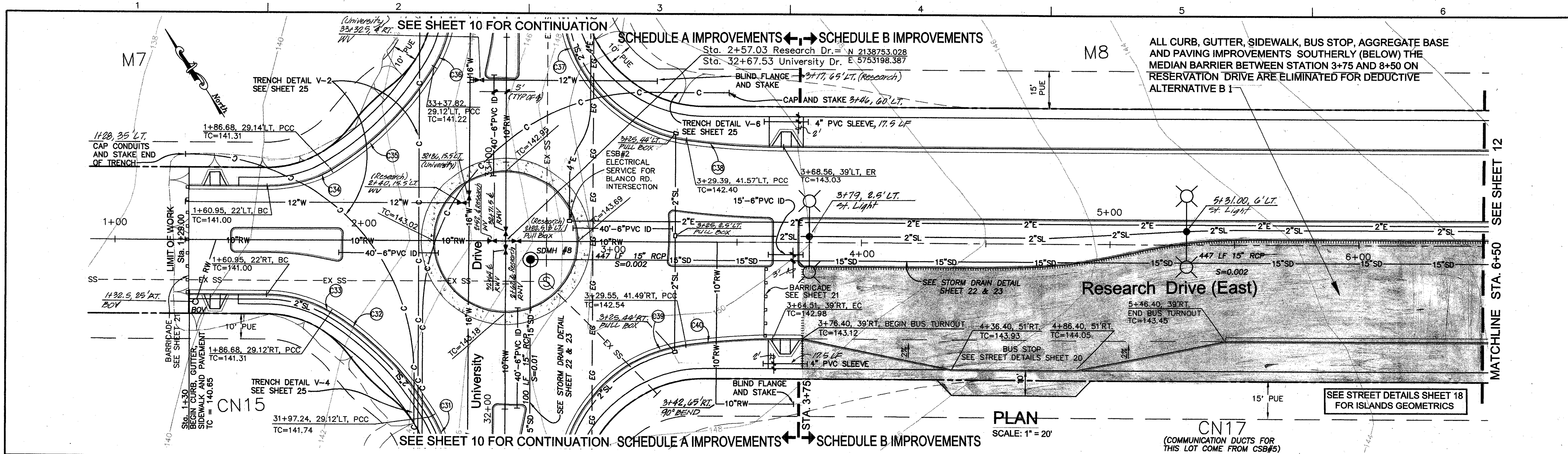
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DR RSG
CHK POR

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STREET AND UTILITY OPENING PROJECT
PLAN AND PROFILE
University Drive Sta 28+00 to Sta 34+00

SHEET 10 of 41
DWG
DATE June 1999
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Reimer Associates

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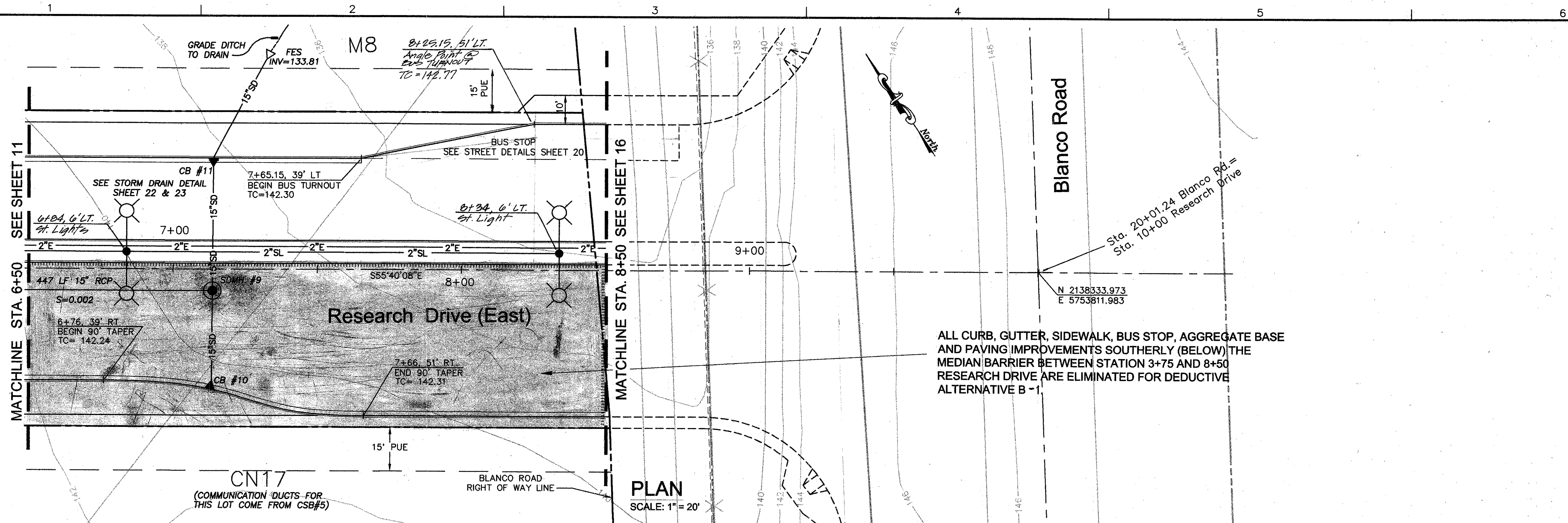
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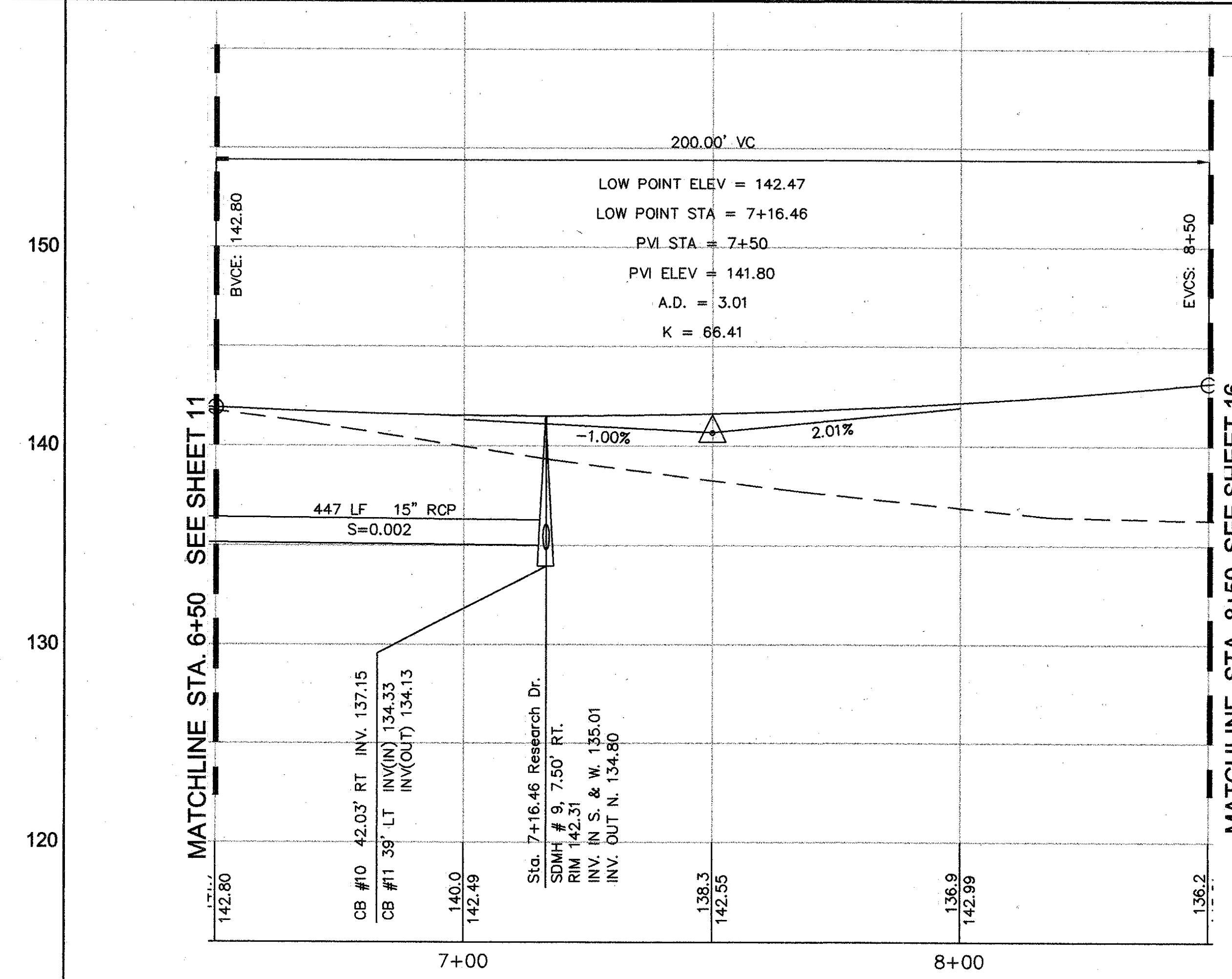
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Monterey Bay Education, Science and Technology Park
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PLAN AND PROFILE
Research Drive Sta 1+00 to 6+50

SHEET 11 of 41
DWG
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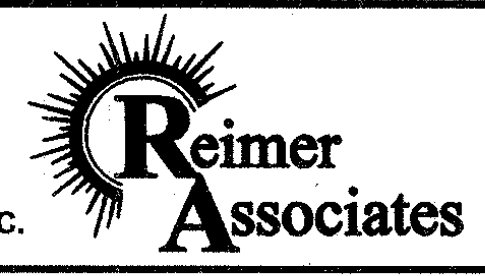


PLAN
SCALE: 1" = 20'



PROFILE
SCALE: 1" = 20' Horiz.
1" = 5' Vert.

Project Design Team:
 • Reimer Associates
 • Kleinfelder
 • EMC Planning Group
 • CH2MHill
 • Higgins Associates
 • HD Peters Associates, Inc.

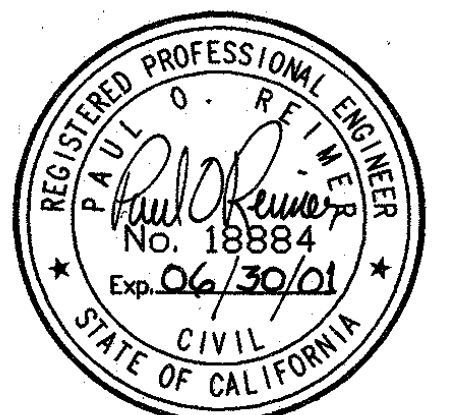


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1	4/30/99			

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	CHK POR

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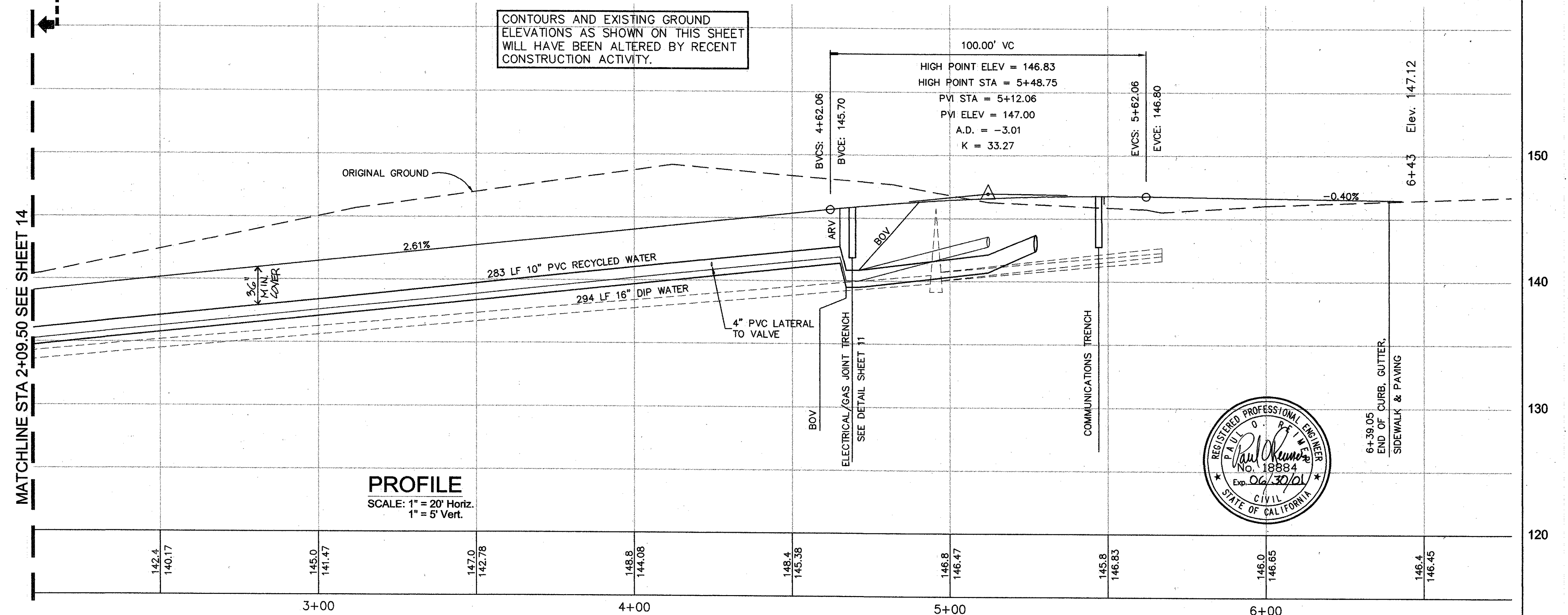
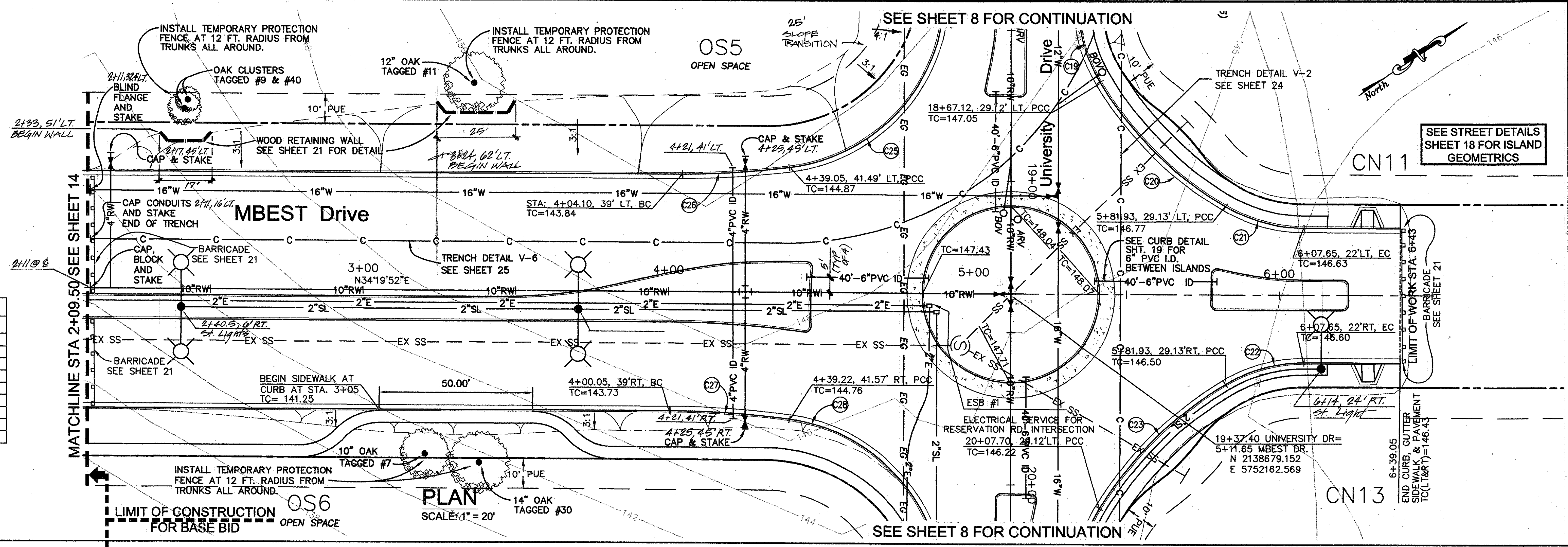
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PLAN AND PROFILE
 Research Drive Sta 6+50 to 8+50



SHEET	12 of 41
DWG	
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CURVE No.	RADIUS	DELTA	LENGTH
C19	50.00'	30°57'39"	27.02'
C20	120.00'	28°04'18"	58.79'
C21	50.00'	30°58'02"	27.02'
C22	50.00'	30°58'02"	27.02'
C23	120.00'	28°04'18"	58.79'
C25	58.00'	82°39'42"	83.68'
C26	300.00'	06°41'48"	35.06'
C27	300.00'	07°30'05"	39.28'
C28	58.00'	82°30'04"	83.52'



Project Design Team:
 • Reimer Associates
 • Kleinfelder
 • EMC Planning Group
 • CH2MHill
 • Higgins Associates
 • HD Peters Associates, Inc.



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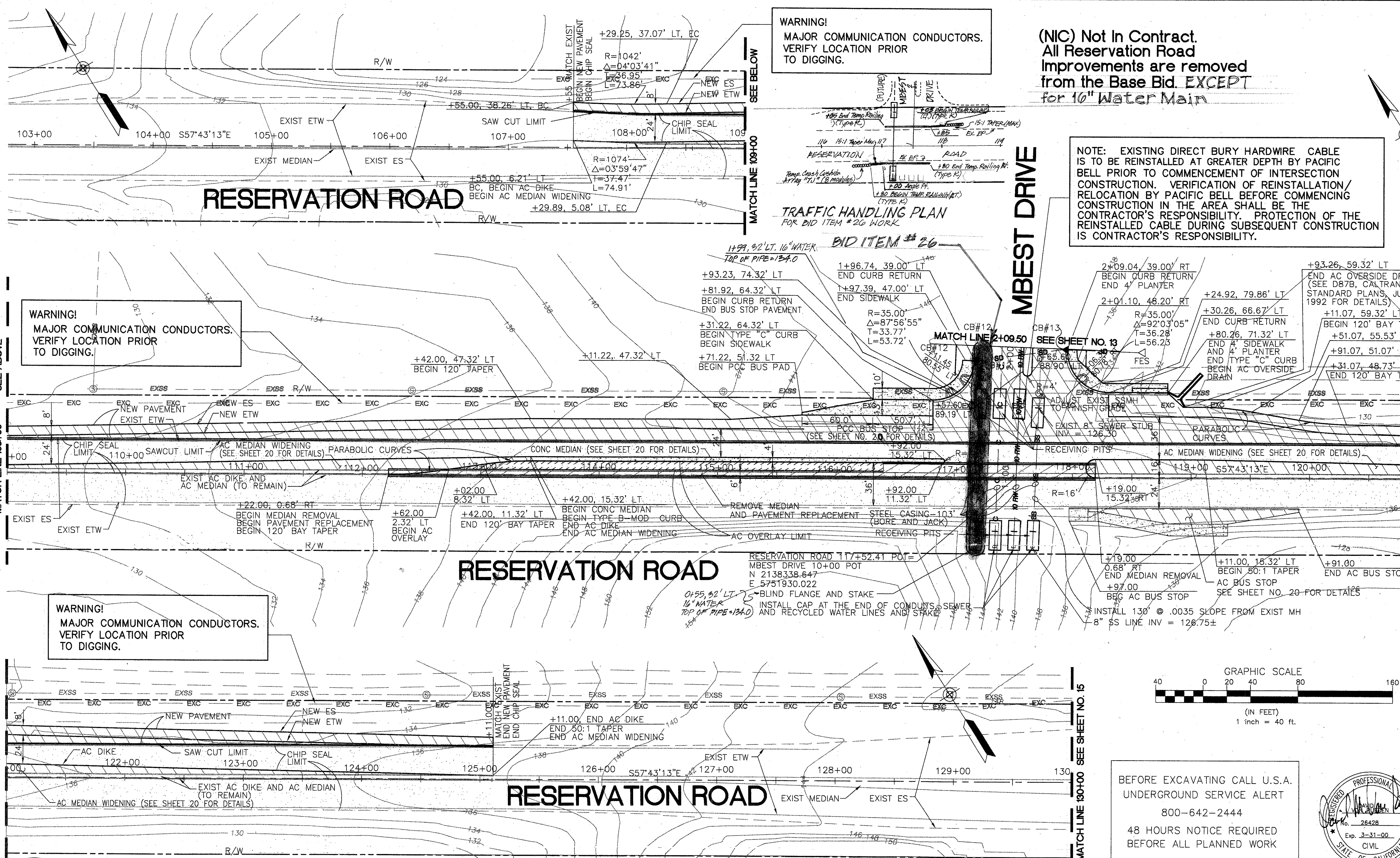
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COMPANY
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 DSGN POR/BCC
 DR RSG
 CHK POR

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 Monterey Bay Education, Science and Technology Park
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PLAN AND PROFILE
 MBEST Drive Sta 2+09.50 to 6+50

SHEET 13 of 41
 DWG
 DATE June 1999
 PROJ R1680



WARNING!
 MAJOR COMMUNICATION CONDUCTORS.
 VERIFY LOCATION PRIOR
 TO DIGGING.

(NIC) Not In Contract.
 All Reservation Road
 Improvements are removed
 from the Base Bid EXCEPT
 for 16" Water Main

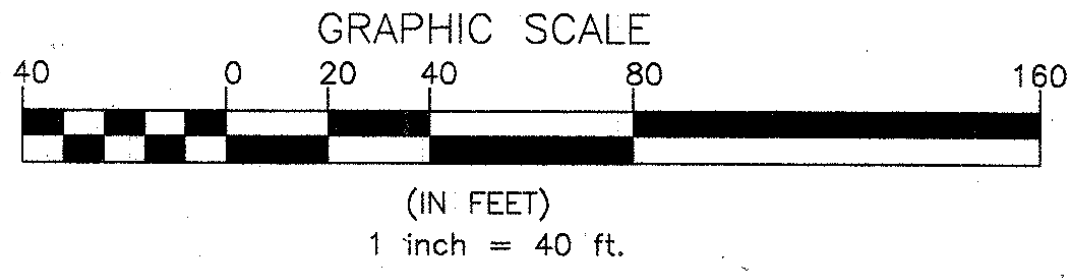
NOTE: EXISTING DIRECT BURY HARDWIRE CABLE IS TO BE REINSTALLED AT GREATER DEPTH BY PACIFIC BELL PRIOR TO COMMENCEMENT OF INTERSECTION CONSTRUCTION. VERIFICATION OF REINSTALLATION/RELOCATION BY PACIFIC BELL BEFORE COMMENCING CONSTRUCTION IN THE AREA SHALL BE THE CONTRACTOR'S RESPONSIBILITY. PROTECTION OF THE REINSTALLED CABLE DURING SUBSEQUENT CONSTRUCTION IS CONTRACTOR'S RESPONSIBILITY.

TRAFFIC HANDLING PLAN
 FOR BID ITEM #26 WORK

BID ITEM #26

WARNING!
 MAJOR COMMUNICATION CONDUCTORS.
 VERIFY LOCATION PRIOR
 TO DIGGING.

WARNING!
 MAJOR COMMUNICATION CONDUCTORS.
 VERIFY LOCATION PRIOR
 TO DIGGING.



BEFORE EXCAVATING CALL U.S.A. UNDERGROUND SERVICE ALERT
 800-642-2444
 48 HOURS NOTICE REQUIRED
 BEFORE ALL PLANNED WORK



Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

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COMPANY
 CH2M Hill
 DSGN M. AGUILAR
 DR M. AGUILAR
 CHK D. VON RUEDEN

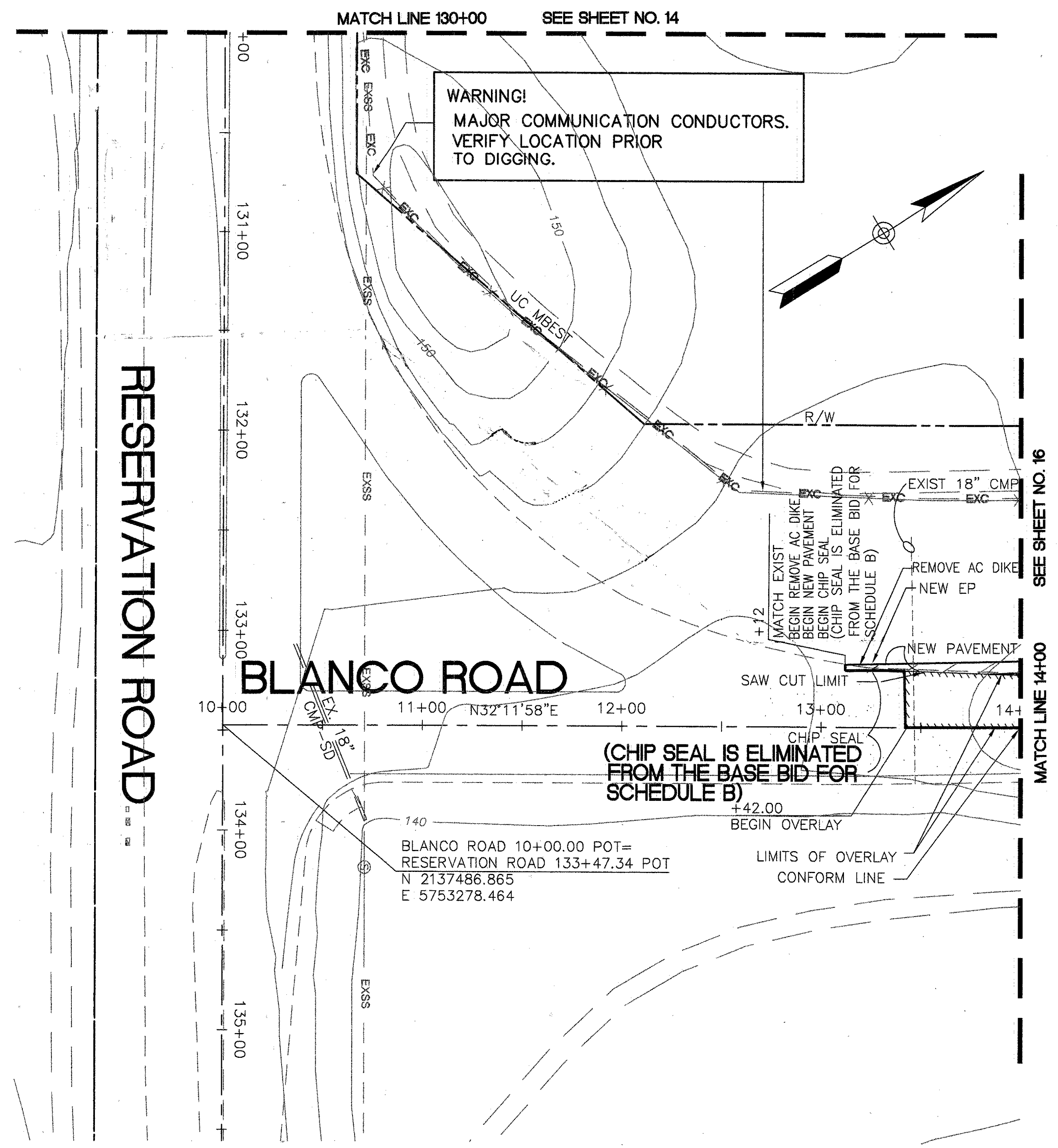
Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933

M. Aguilar
 Approved Date 1/6/99

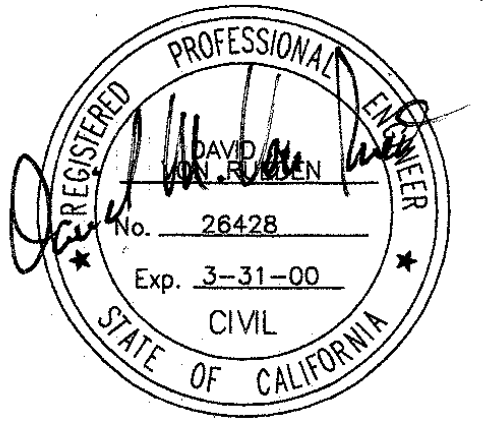
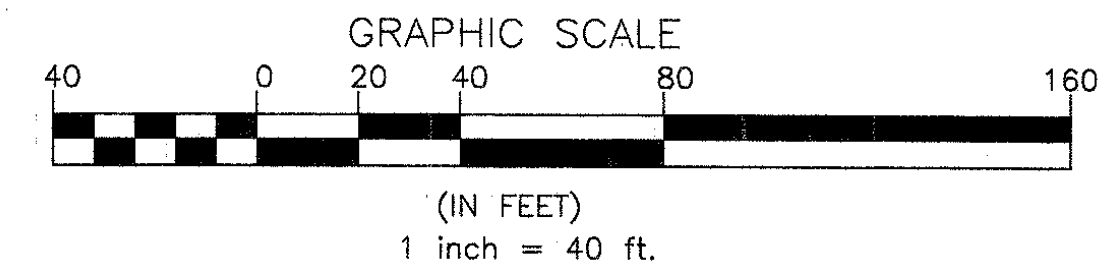
University of California - Santa Cruz
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STREET AND UTILITY OPENING PROJECT LAYOUT

SHEET 14 of 41
 DWG SHEET-14
 DATE JUNE 1999
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 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.



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COMPANY
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 DSGN M. AGUILAR
 DR M. AGUILAR
 CHK D. VON RUEDEN

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David M. Aguilar
 Approved Date 7/6/99

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STREET AND UTILITY OPENING PROJECT LAYOUT

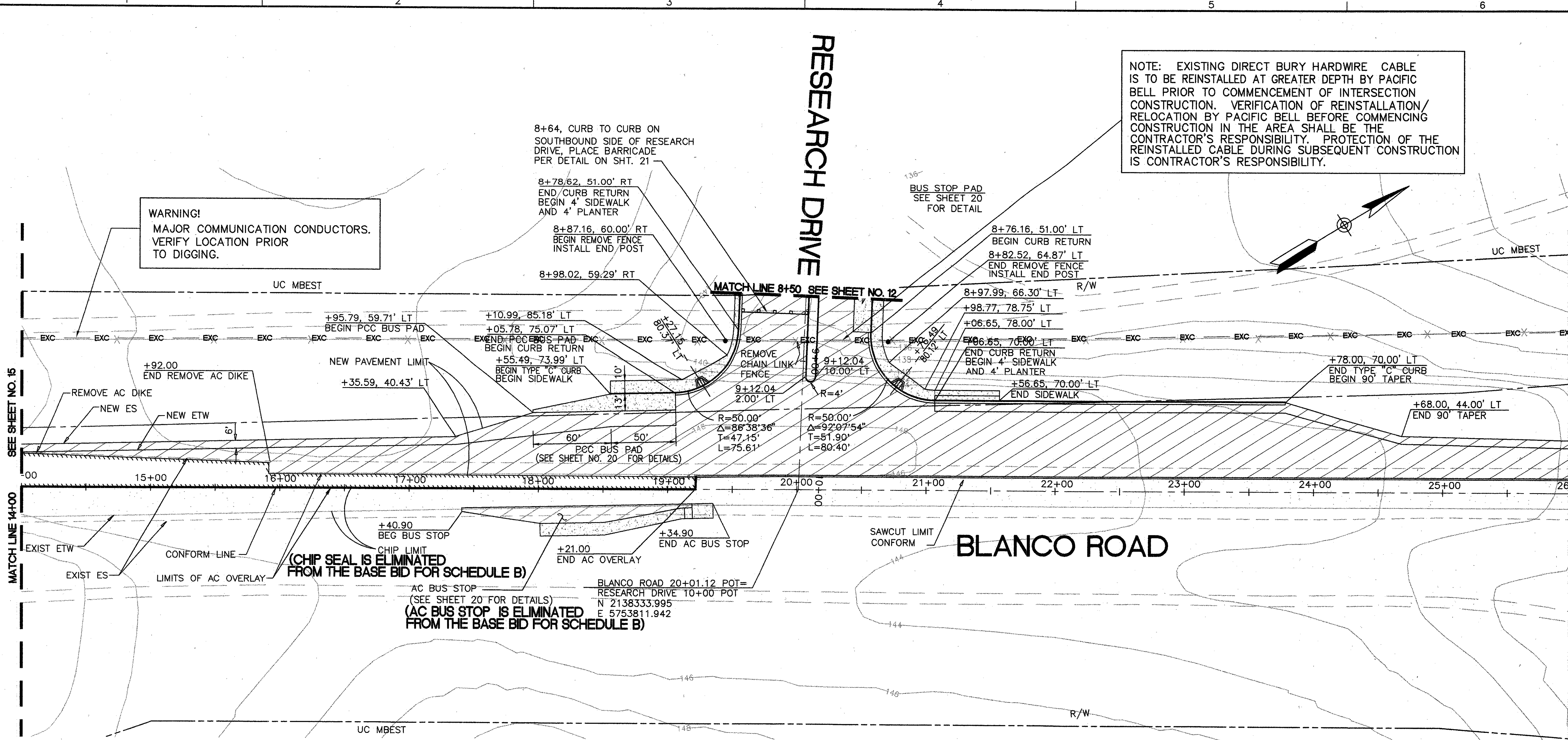
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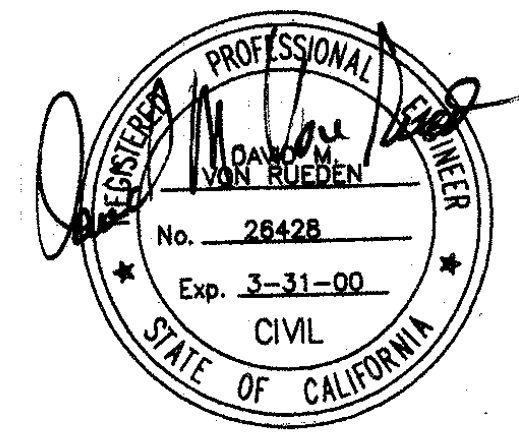
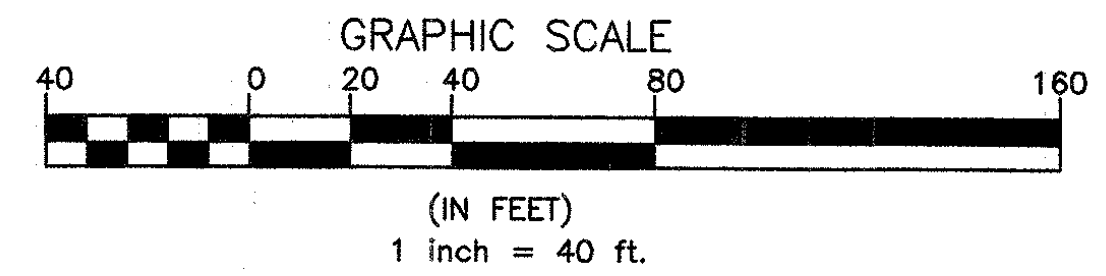
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WARNING!
MAJOR COMMUNICATION CONDUCTORS.
VERIFY LOCATION PRIOR
TO DIGGING.



(CHIP SEAL IS ELIMINATED FROM THE BASE BID FOR SCHEDULE B)
(AC BUS STOP IS ELIMINATED FROM THE BASE BID FOR SCHEDULE B)

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 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.

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 CHK D. VON RUEDEN

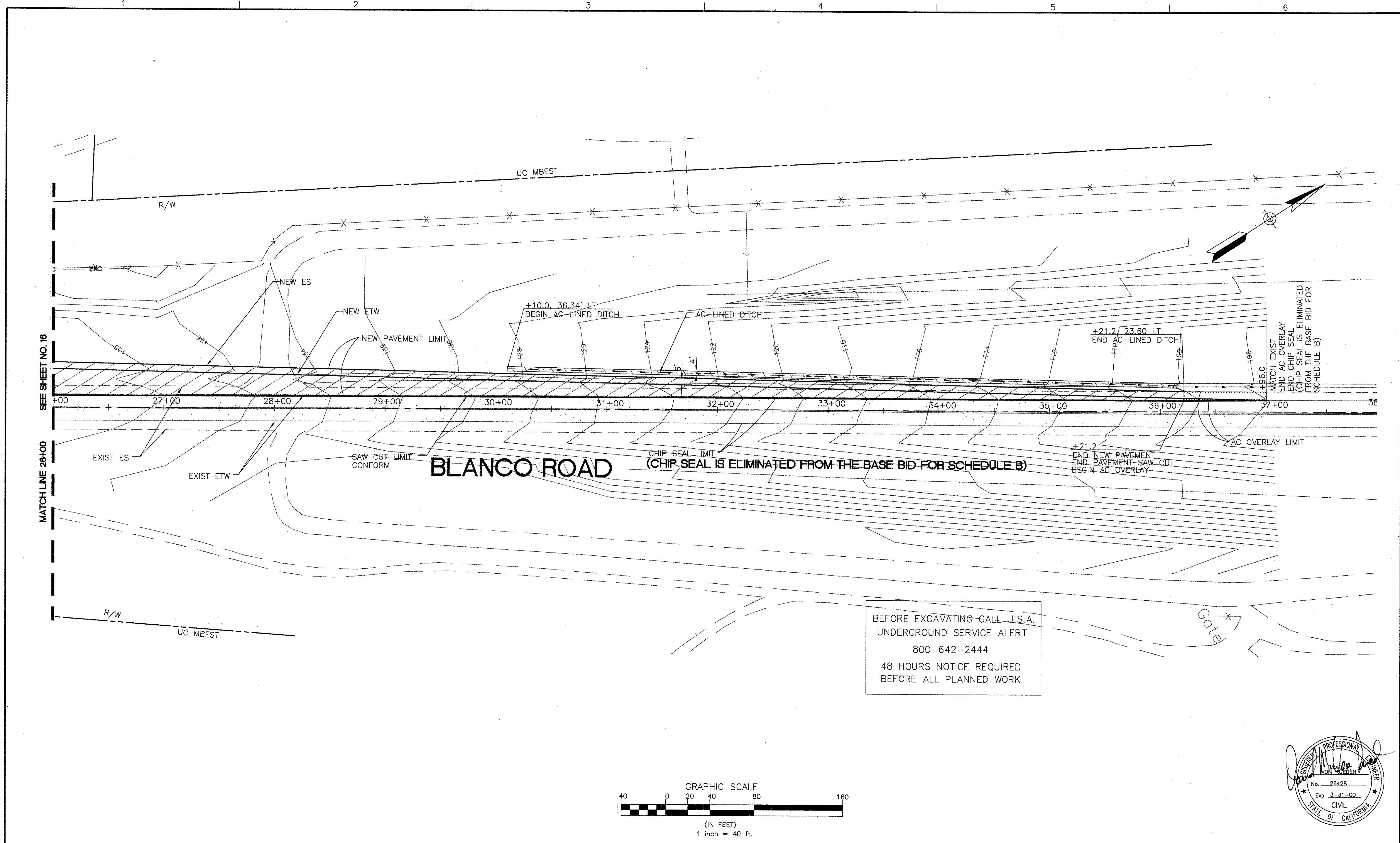
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 Marina, CA 93933

Approved: *[Signature]* Date: 7/6/99

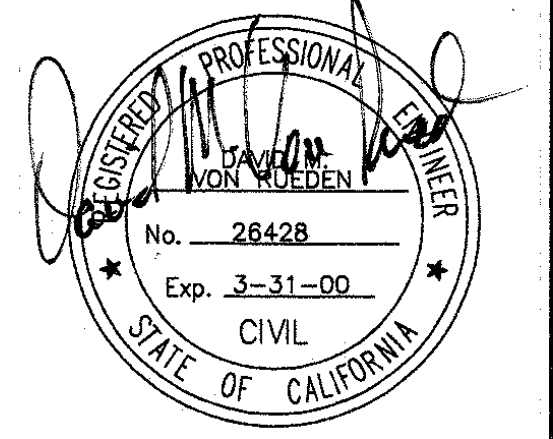
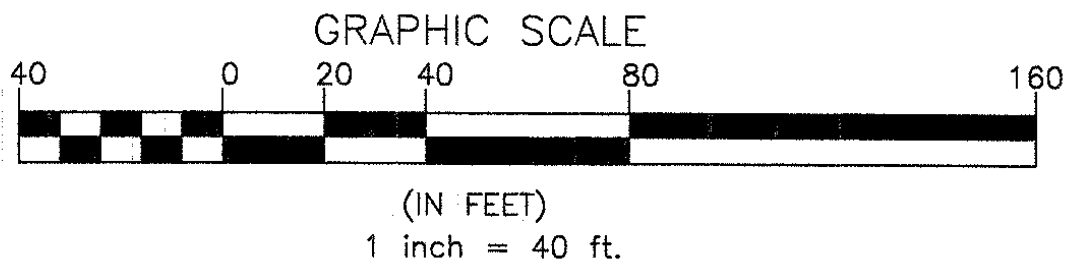
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SHEET 16 of 41
 DWG SHEET-16
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COMPANY
CH2M HILL
 DSGN M. AGUILAR
 DR M. AGUILAR
 CHK D. VON RUEDEN

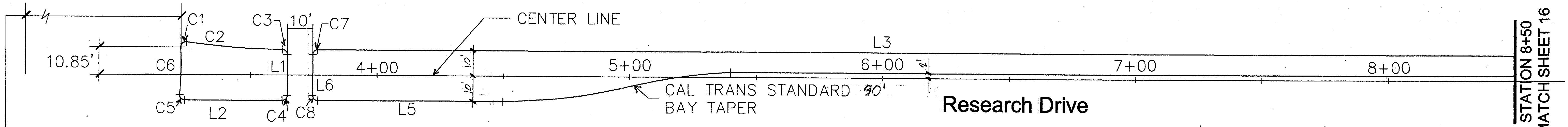


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 100 12th Street, Bldg. 2880
 Marina, CA 93933
 Approved *[Signature]* 7/6/99
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SHEET 17 of 41
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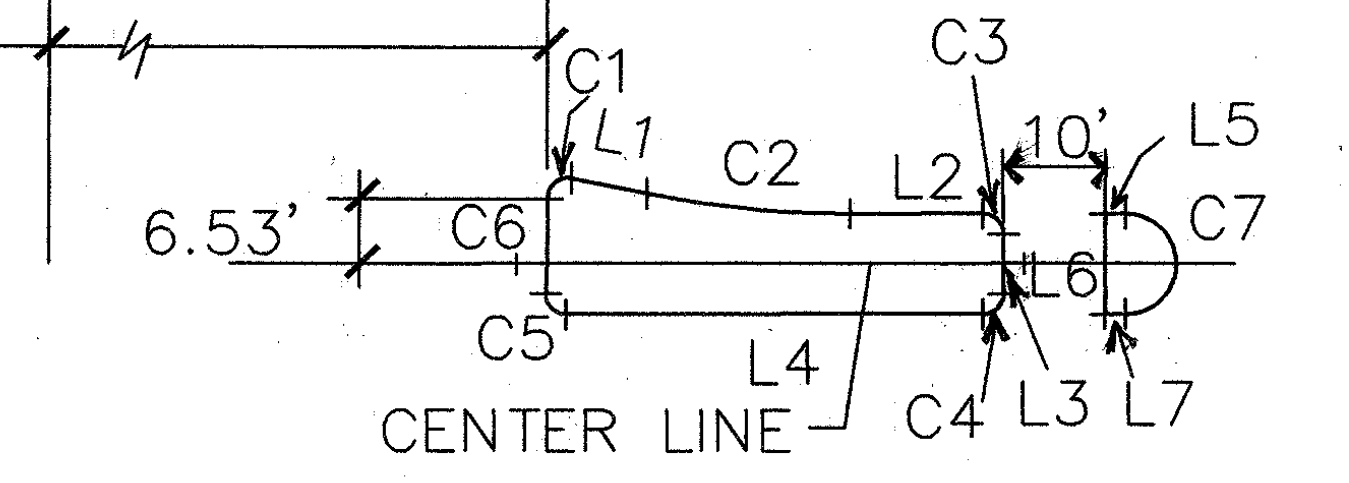


65.51' FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	3.52	2.00	100°44'21"	± + 0.24
C2	38.05	987.00	6°37'35"0	± + 0.30
C3	3.11	2.00	88°57'19"	± + 0.34
C4	3.14	2.00	90°00'00"	± + 0.30
C5	3.33	2.00	95°29'47"	± + 0.34
C6	18.67	375.00	8°33'53"	± + 0.28
C7	3.14	2.00	90°00'00"	± + 0.30
C8	3.14	2.00	90°00'00"	± + 0.34

LINE TABLE		
LINE	LENGTH	TC ELEV
L1	16.06	± + 0.34
L2	38.55	± + 0.30
L3	473.49	± + 0.30
L4	310.16	± + 0.46
L5	68.13	± + 0.30
L6	16.00	± + 0.34

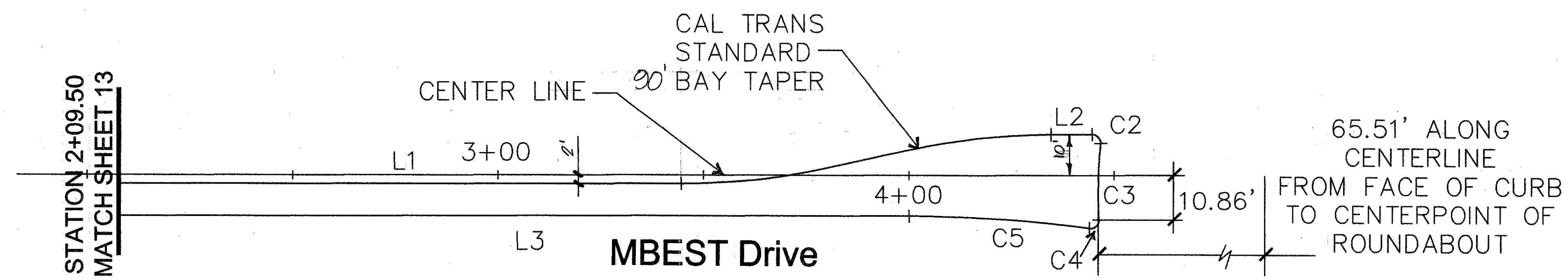
65.56' FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT



University Drive @ Stations 8+00, 18+50, 20+00 & 32+00

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	3.58	2.00	102°38'13"	± + 0.33
C2	20.14	100.00	11°32'13"	± + 0.40
C3	3.14	2.00	90°00'00"	± + 0.44
C4	3.14	2.00	90°00'00"	± + 0.40
C5	3.25	2.00	93°13'22"	± + 0.44
C6	9.43	125.00	4°19'22"	± + 0.37
C7	15.71	5.00	180°00'00"	± + 0.40

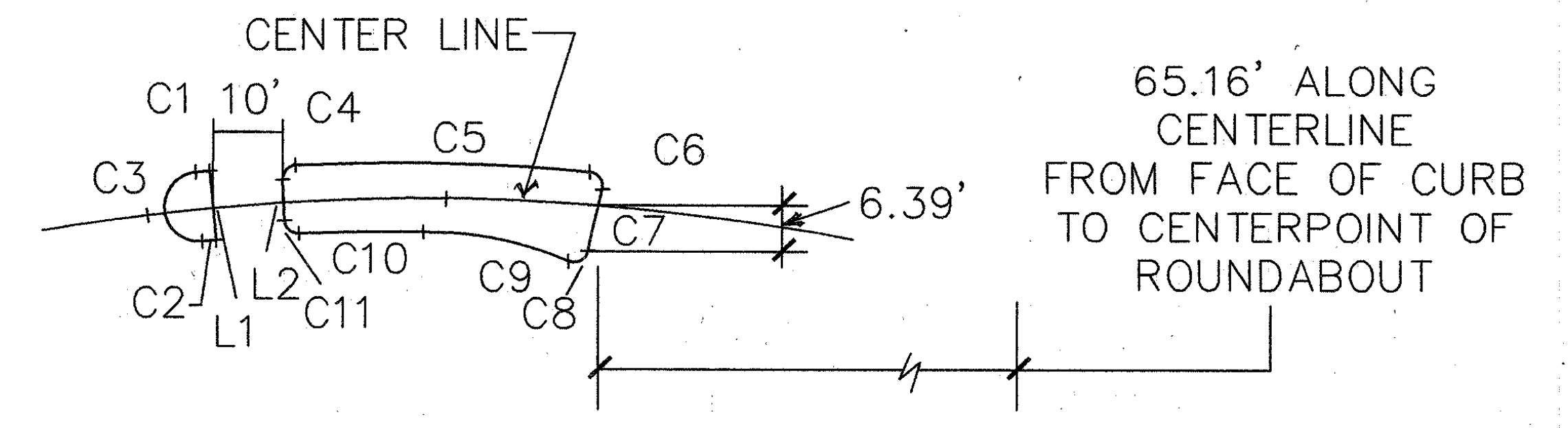
LINE TABLE		
LINE	LENGTH	TC ELEV
L1	7.58	± + 0.36
L2	13.12	± + 0.40
L3	6.00	± + 0.44
L4	41.13	± + 0.40
L5	2.00	± + 0.40
L6	10.00	± + 0.40
L7	2.00	± + 0.40



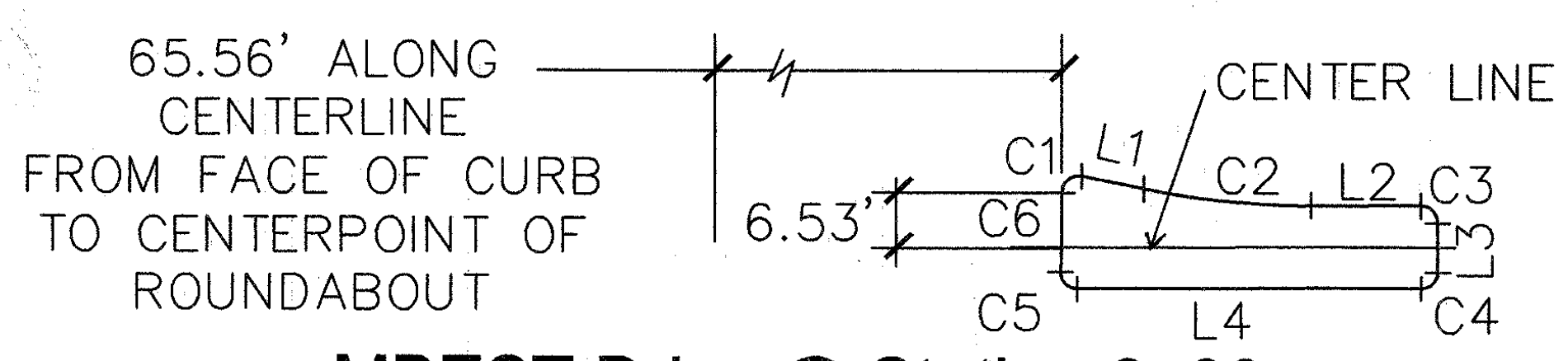
65.51' ALONG CENTERLINE FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	12.57	12.00	180°00'00"	± + 0.30
C2	3.33	2.00	95°29'47"	± + 0.34
C3	18.69	375.00	8°33'53"	± + 0.28
C4	3.52	2.00	100°44'21"	± + 0.24
C5	44.06	987.00	7°40'25"	± + 0.30

LINE TABLE		
LINE	LENGTH	TC ELEV
L1	136.80	± + 0.46
L2	10.02	± + 0.30
L3	192.60	± + 0.30

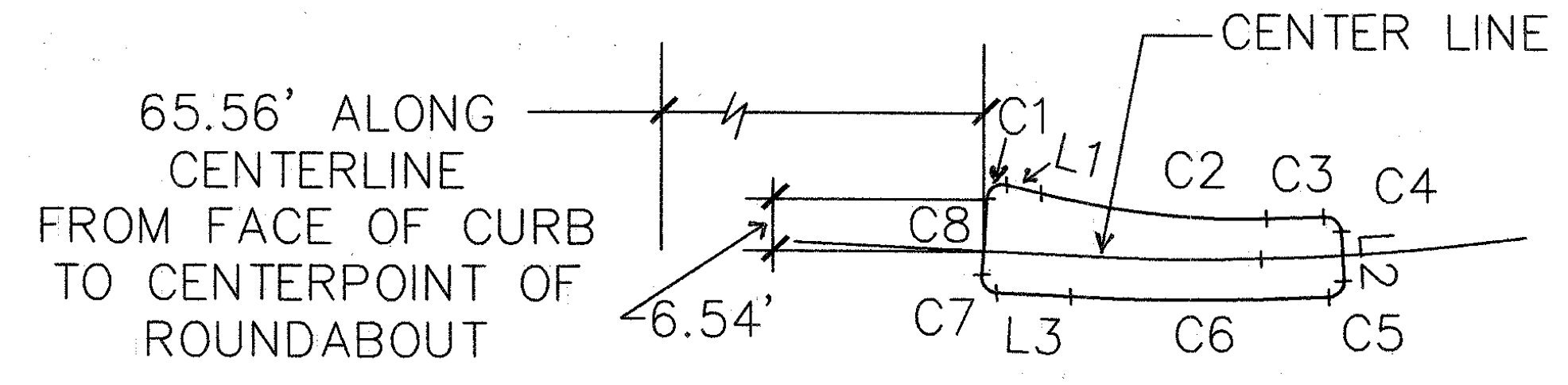


65.16' ALONG CENTERLINE FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT



65.56' ALONG CENTERLINE FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT

MBEST Drive @ Station 6+00
Research Drive (East) @ Station 1+50
University Drive @ Station 33+50



65.56' ALONG CENTERLINE FROM FACE OF CURB TO CENTERPOINT OF ROUNDABOUT

Research Drive (West) @ Station 2+00

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	2.00	305.00	0°22'32"	± + 0.40
C2	2.00	295.00	0°23'18"	± + 0.40
C3	15.71	5.00	180°00'00"	± + 0.40
C4	3.13	2.00	89°32'07"	± + 0.40
C5	42.14	305.00	7°54'58"	± + 0.40
C6	3.49	2.00	99°54'08"	± + 0.45
C7	9.14	125.00	4°11'14"	± + 0.37
C8	3.58	2.00	102°28'32"	± + 0.34
C9	21.36	51.25	23°52'41"	± + 0.40
C10	17.85	305.00	3°21'09"	± + 0.40
C11	3.15	2.00	90°09'59"	± + 0.45

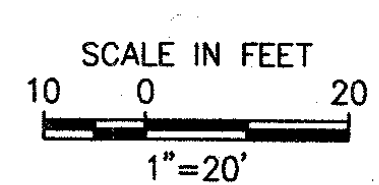
LINE TABLE		
LINE	LENGTH	TC ELEV
L1	10.00	± + 0.40
L2	5.81	± + 0.44

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	3.58	2.00	102°38'13"	± + 0.33
C2	20.14	100.00	11°32'13"	± + 0.40
C3	3.14	2.00	90°00'00"	± + 0.44
C4	3.14	2.00	90°00'00"	± + 0.40
C5	3.25	2.00	93°13'22"	± + 0.44
C6	9.43	125.00	4°19'22"	± + 0.37

LINE TABLE		
LINE	LENGTH	TC ELEV
L1	7.58	± + 0.36
L2	13.12	± + 0.40
L3	6.00	± + 0.44
L4	41.13	± + 0.40

CURVE TABLE				
CURVE	LENGTH	RADIUS	DELTA	TC ELEV
C1	3.58	2.00	102°38'13"	± + 0.33
C2	28.21	100.00	16°09'41"	± + 0.40
C3	7.10	295.00	1°22'42"	± + 0.40
C4	3.13	2.00	89°36'51"	± + 0.44
C5	3.15	2.00	90°22'41"	± + 0.40
C6	31.97	305.00	6°00'22"	± + 0.40
C7	3.25	2.00	93°13'43"	± + 0.44
C8	9.43	125.00	4°19'27"	± + 0.37

LINE TABLE		
LINE	LENGTH	TC ELEV
L1	4.42	± + 0.35
L2	6.00	± + 0.44
L3	9.21	± + 0.40



ISLAND AND MEDIAN GEOMETRICS STREET DETAILS



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

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COMPANY
Reimer Associates

DSGN
POR/BCC

DR
RSG

CHK
POR

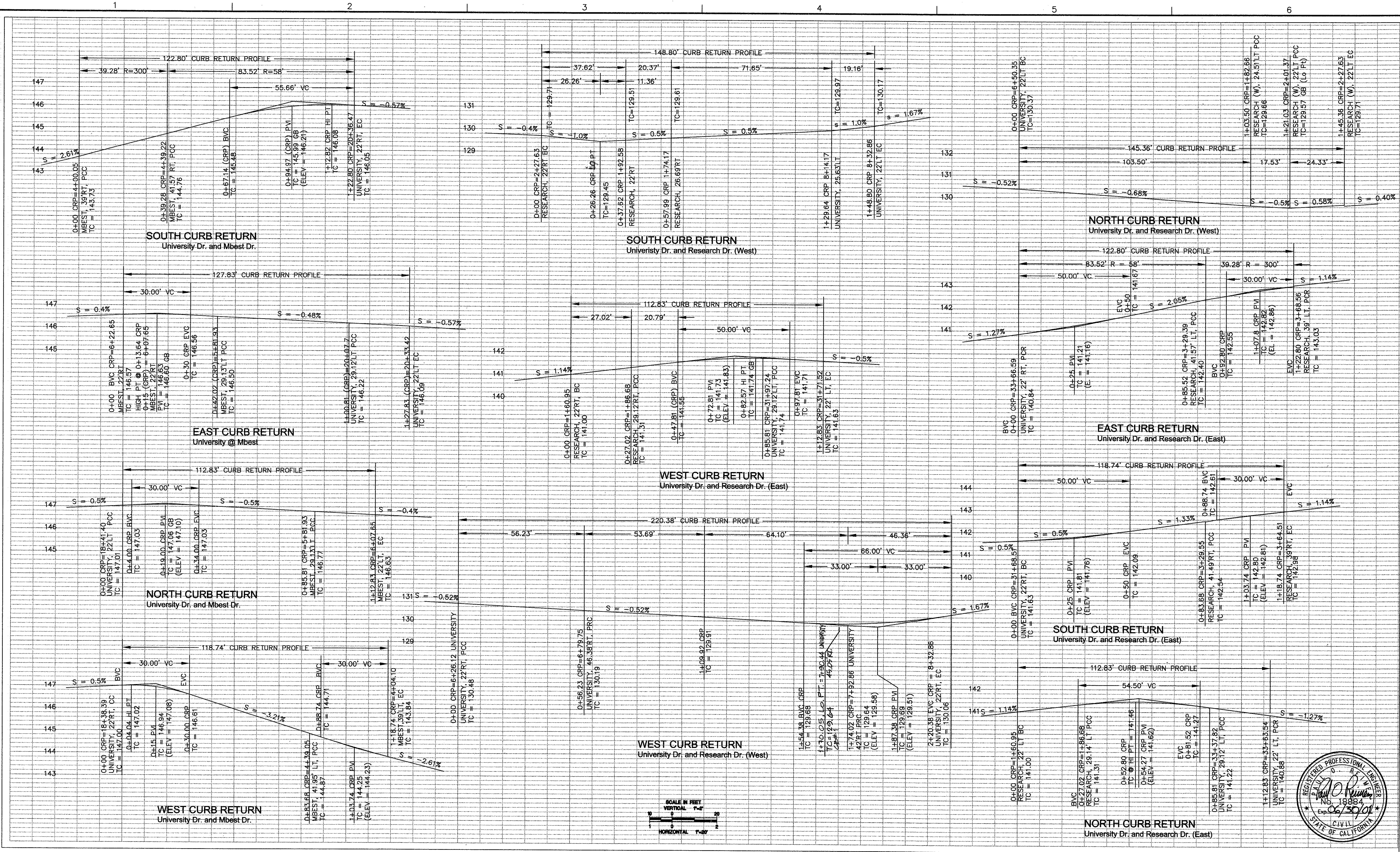
Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933

Approved
Date: 1/6/99

University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT STANDARD DETAILS

SHEET 18 of 41
DWG
DATE June 1999
PROJ R1680

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Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

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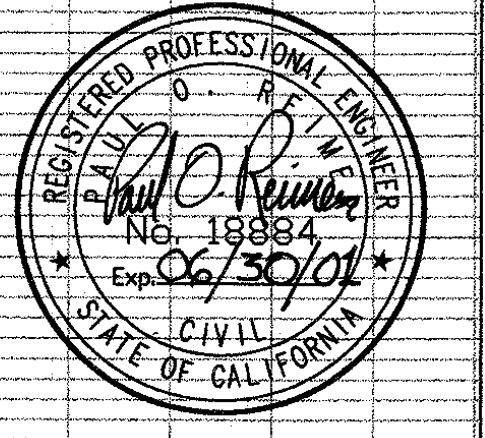
COMPANY
 Reimer Associates
 DSGN POR/BCC
 DR Staff
 CHK POR

Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933

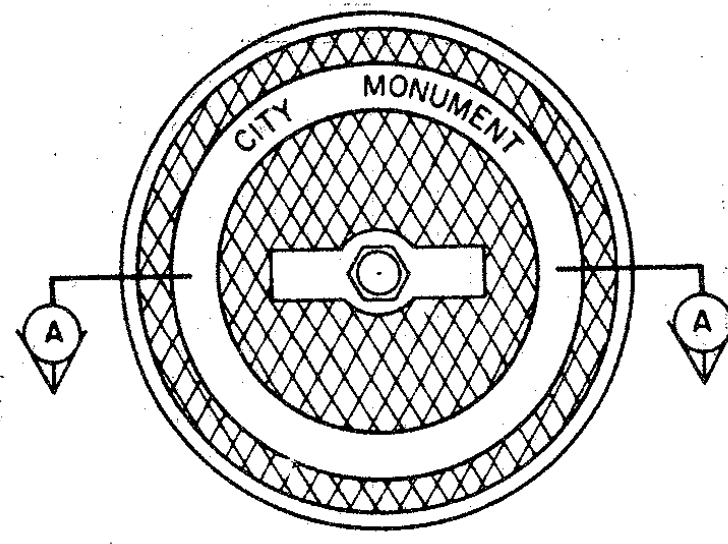
James J. [Signature]
 Approved Date 1/6/99

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
CURB RETURN PROFILES

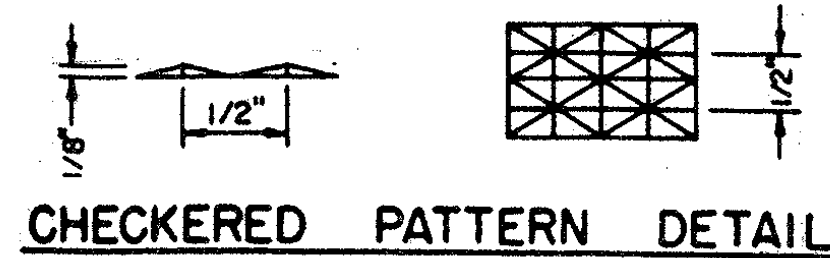
SHEET 18-a of 41
 DWG
 DATE June 1999
 PROJ R1680



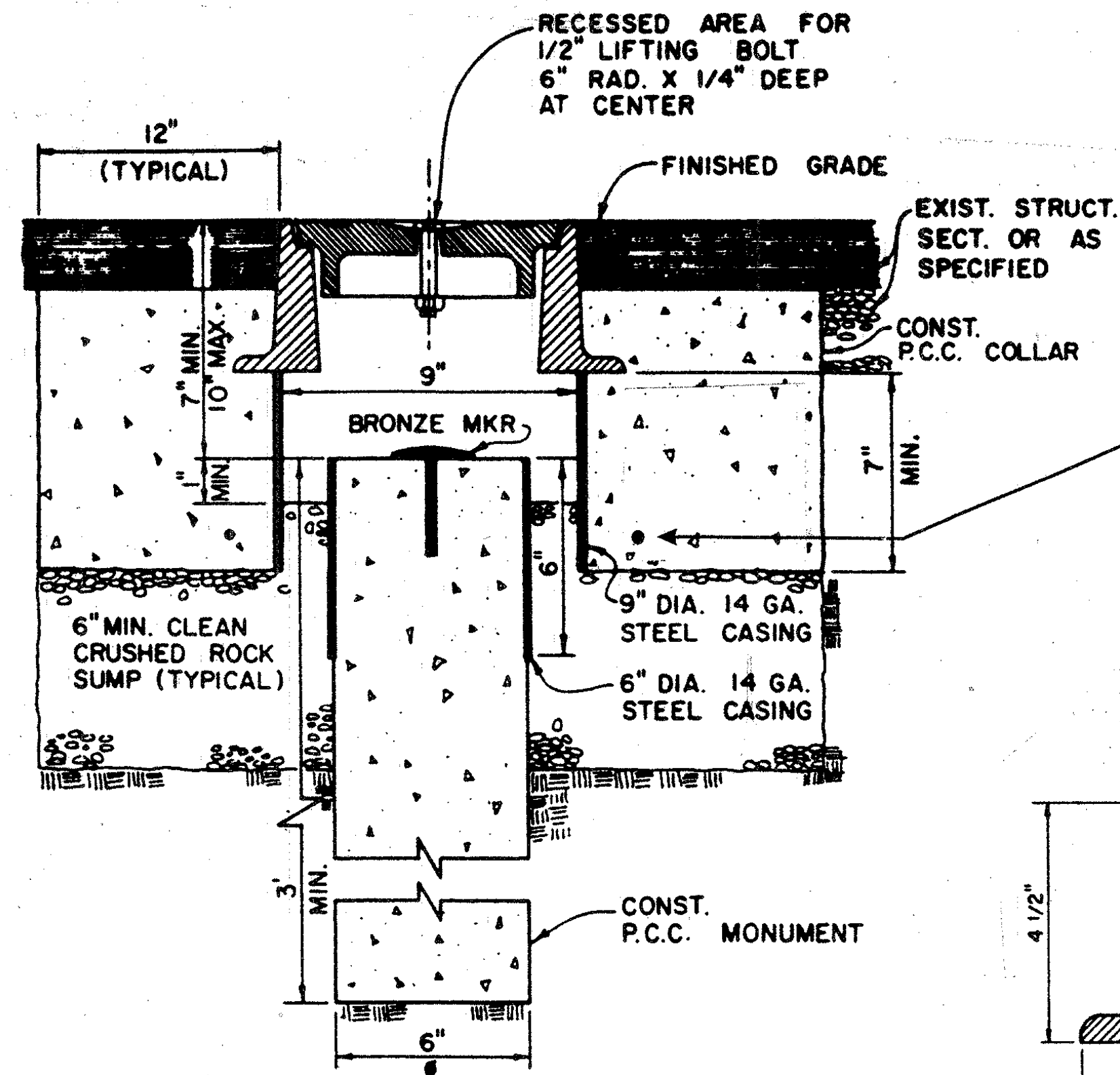
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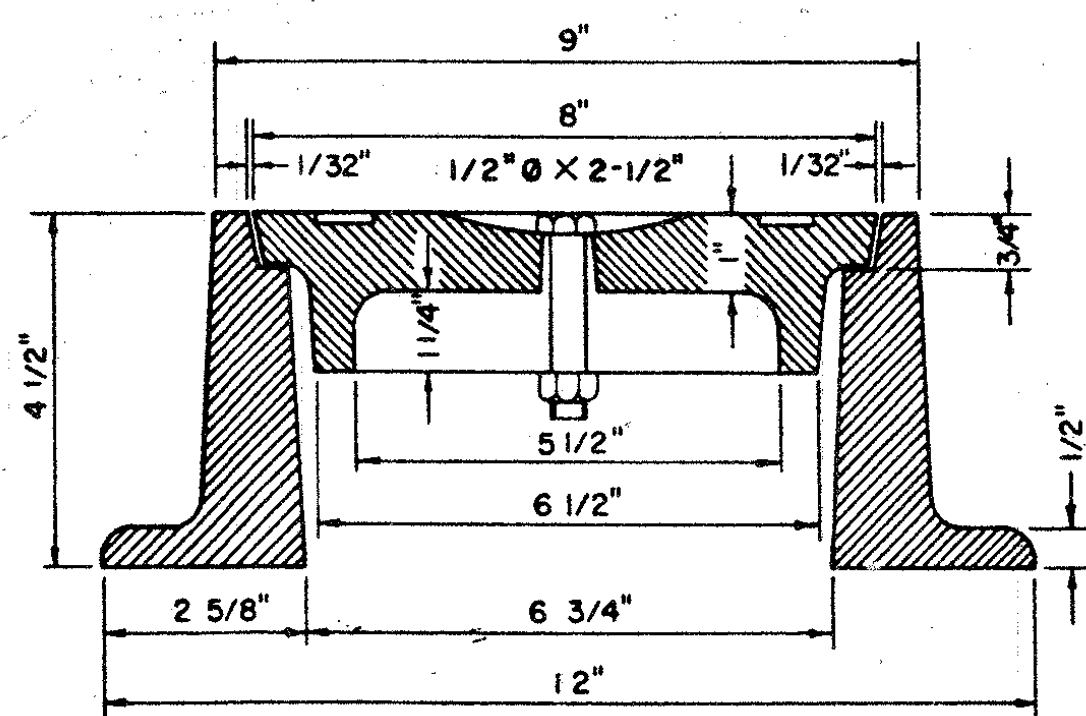
PLAN



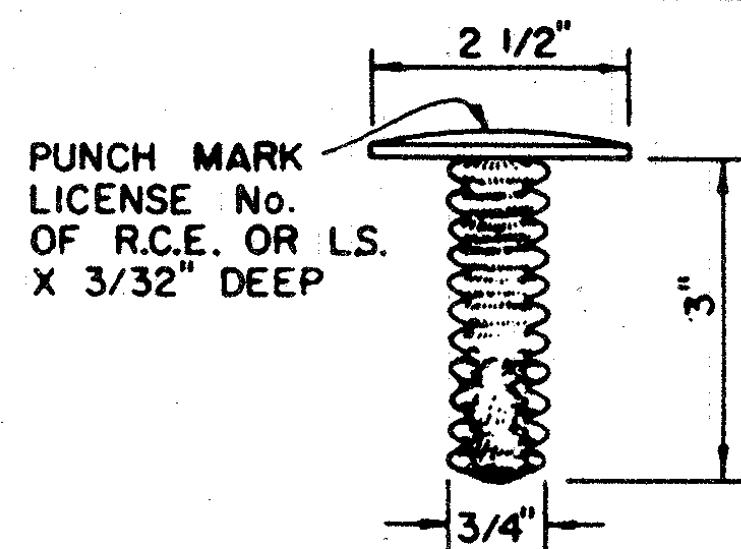
CHECKERED PATTERN DETAIL



SECTION A-A



FRAME & COVER SECTION



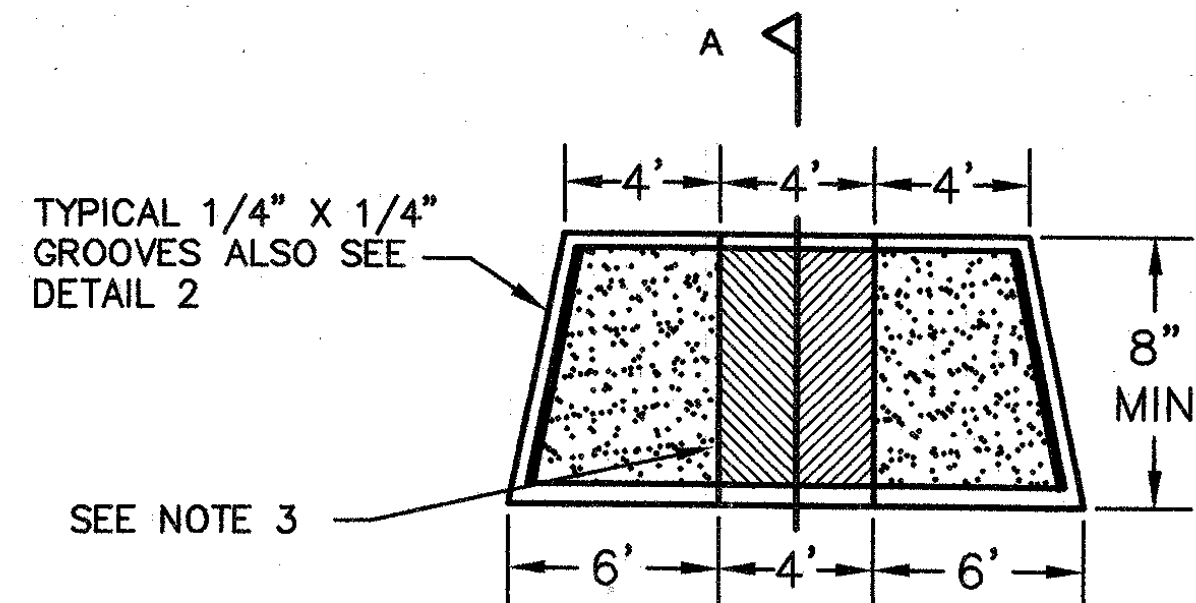
BRONZE MARKER DETAIL

CITY MONUMENT NOTES:

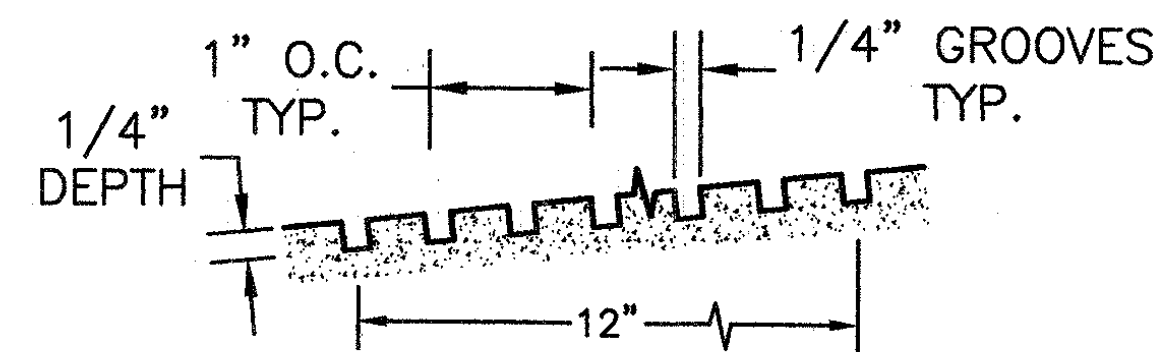
1. MONUMENT FRAME AND COVER SHALL BE GRAY CAST IRON, FREE OF BLISTERS, BLOW-HOLES, WARPAGE, AND COLD SHOTS.
2. MONUMENT SHALL BE FURNISHED & INSTALLED AS PER PLANS AND SECTION 81 OF THE CITY OF SALINAS STANDARD SPECIFICATIONS, COMPLETE W/MARKER.
3. BEARING SURFACES OF FRAME AND COVER SHALL FIT WITH POSITIVE PRESSURE ON ALL SURFACES AND SHALL BE NON-ROCKING.
4. ALL CONCRETE SHALL BE CONSTRUCTED IN ACCORDANCE WITH CLASS "B" OF STANDARD SPECIFICATIONS.
5. FRAME AND COVER SHALL BE AMERICAN BRASS & FOUNDRY 5020-21 OR APPROVED EQUAL.
6. FOR CENTERLINE CONTROLS PERFORMED BY LICENSED SURVEYOR IN ACCORDANCE WITH THE SUBDIVISION MAP ACT.

(NOT IN CONTRACT)
CITY MONUMENT DETAIL

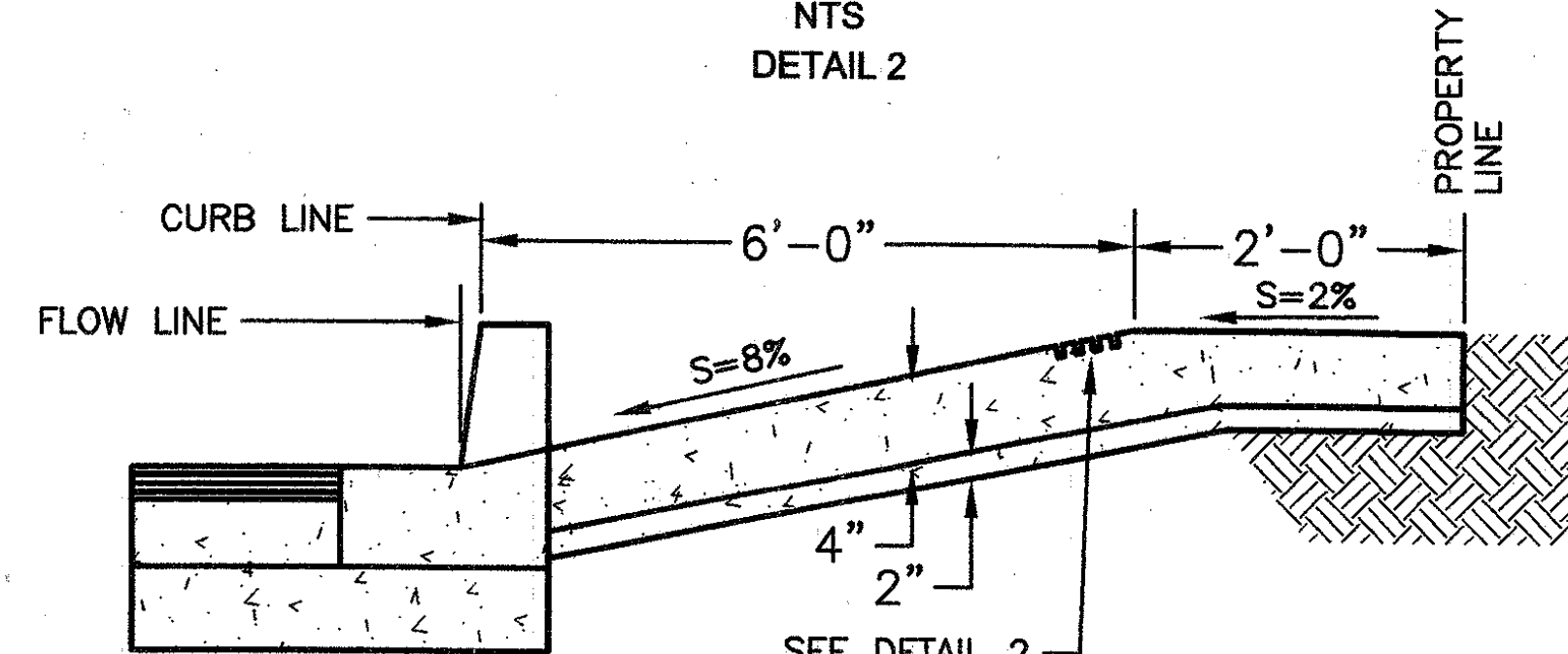
NTS



TYPICAL DIMENSIONS
DETAIL 1 FOR TYPE B
NTS



GROOVING PLAN
NTS
DETAIL 2



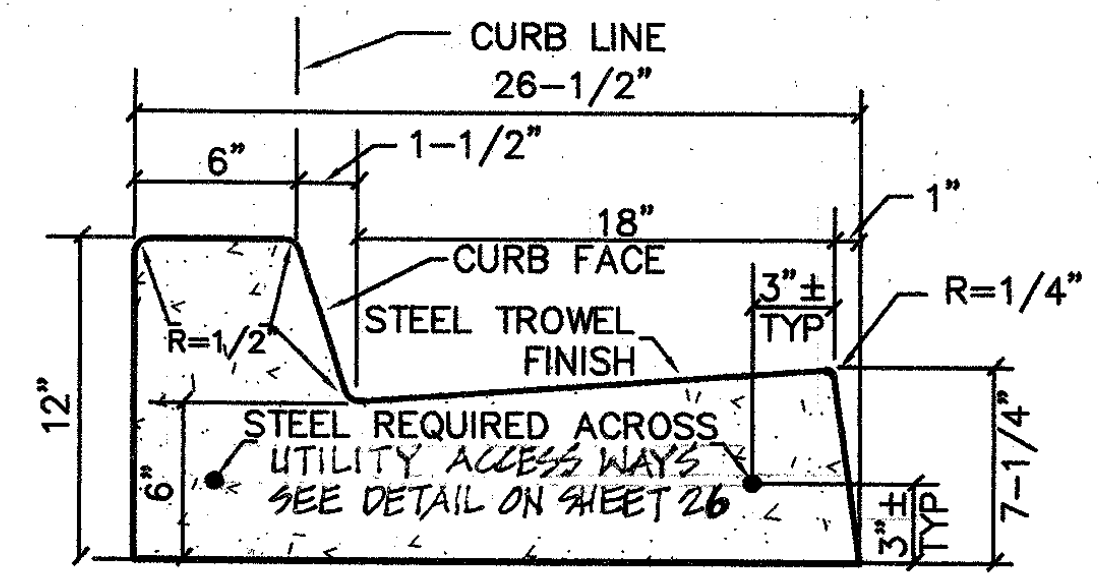
SECTION A-A
NTS

ACCESS RAMP NOTES:

1. ACCESS RAMP SHALL BE MONOLITHIC CLASS "B" P.C.C., 4" THICK WITH 2" SAND CUSHION, AND WITH A COARSE FINISH.
2. WIDTH OF SIDEWALK AND RADIUS OF CURB RETURN SHALL BE PER CONSTRUCTION DRAWINGS.
3. PROVIDE GROOVES (2" O.C.) ON SLOPING PORTION OF RAMP WITH ALIGNMENTS PARALLEL TO CROSSWALK STRIPING.
4. SCORE LINES SHALL BE PROVIDED FOR EVERY 16 S.F. OF CONCRETE.

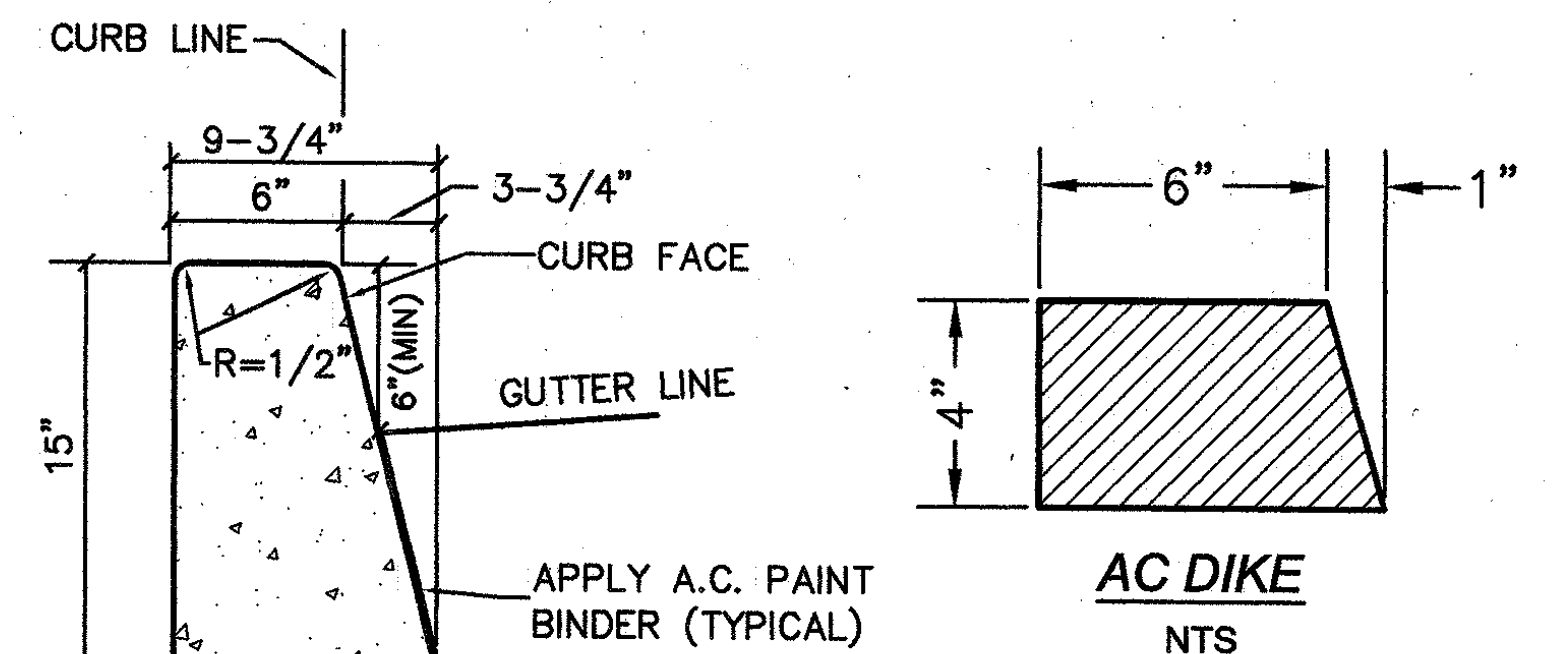
ACCESS RAMP DETAIL

NTS



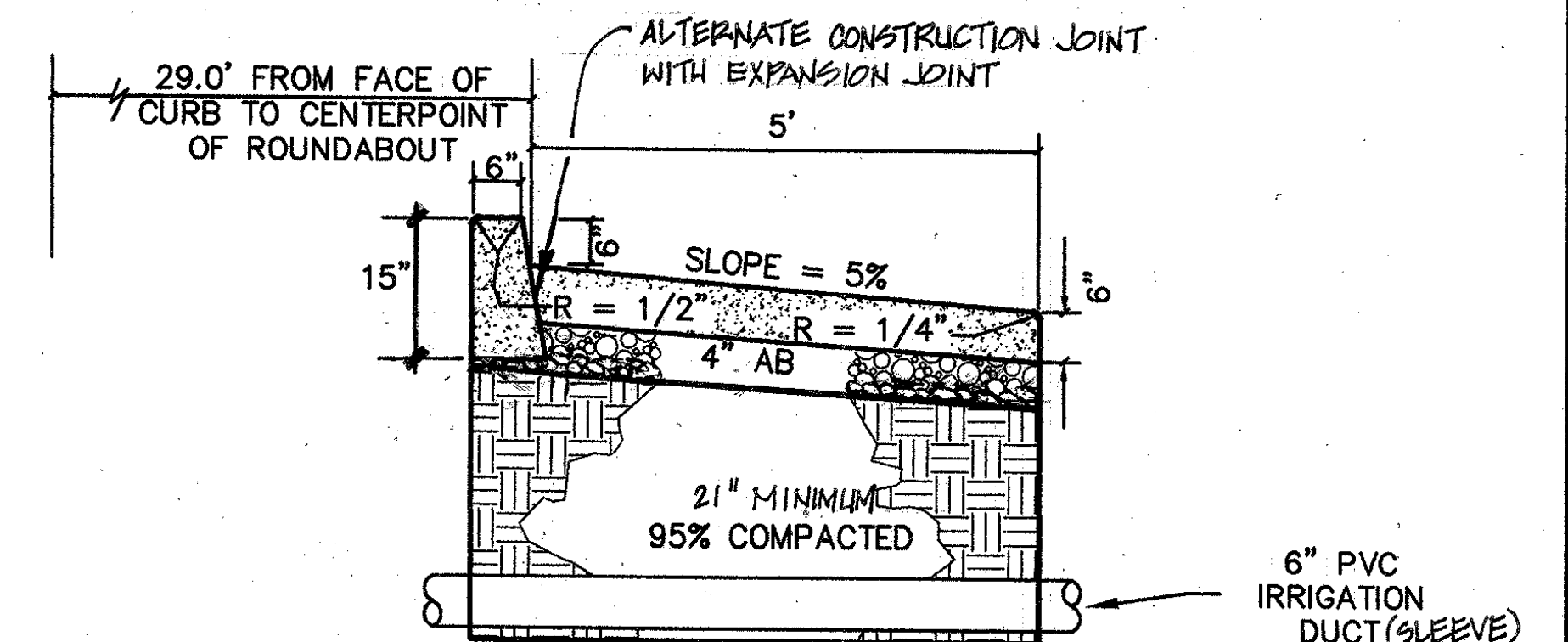
TYPE "C" CURB

NTS



TYPE "B" CURB

NTS



CURB FOR ROUNDABOUTS

NTS

CURB NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH SECTION 73 OF THE CITY OF SALINAS STANDARD SPECIFICATION.
2. EXPANSION JOINTS SHALL BE SLIP DOWELED AT CURB RETURNS PER DETAIL SHEET 21.
3. TOP AND FRONT OF ALL CURBS SHALL BE FINE BROOM FINISHED.
4. CURB RETURNS SHALL BE TYPE "C" CURB & GUTTER.
5. INSTALL 3/8" EXPANSION JOINTS AT 20-FOOT INTERVALS MAX. ON TYPE "C" CURB. PROVIDE WEAKENED PLAN JOINTS AT 20-FOOT INTERVALS WITH EXPANSION AT 60-FOOT INTERVALS ON EXTRUDED CURB.
6. CLASS "A" OR "B" CONCRETE SHALL BE USED.

CURB DETAILS

NTS



STREET DETAILS

Project Design Team:

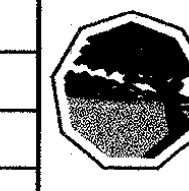
- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY	Reimer Associates
DSGN	POR/BCC
DR	RSG
CHK	POR

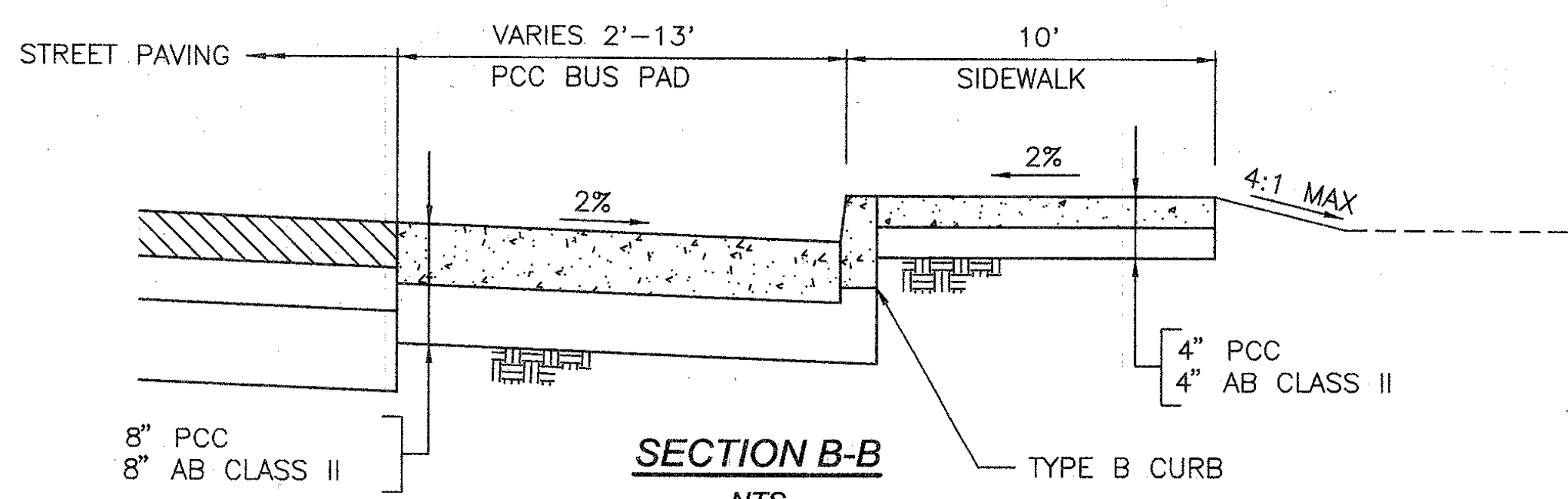


Fort Ord Reuse Authority
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Marina, CA 93933

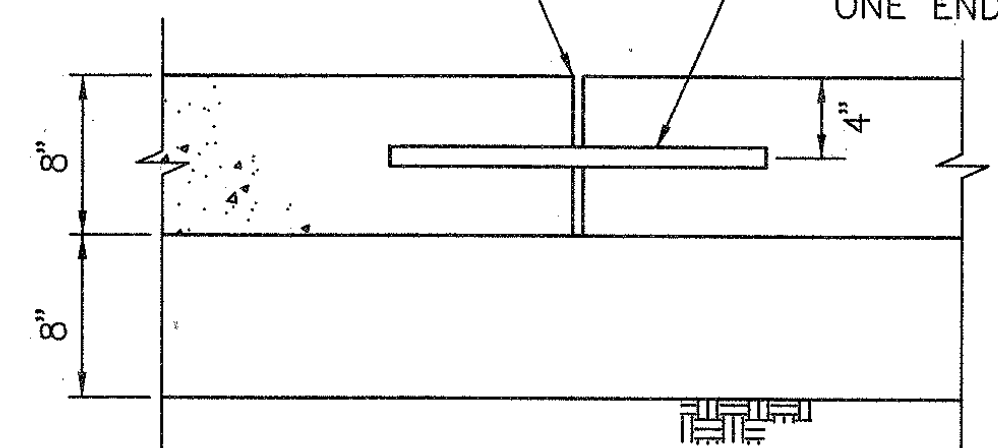
Approved: [Signature] Date: 7/16/99

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Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
STANDARD DETAILS

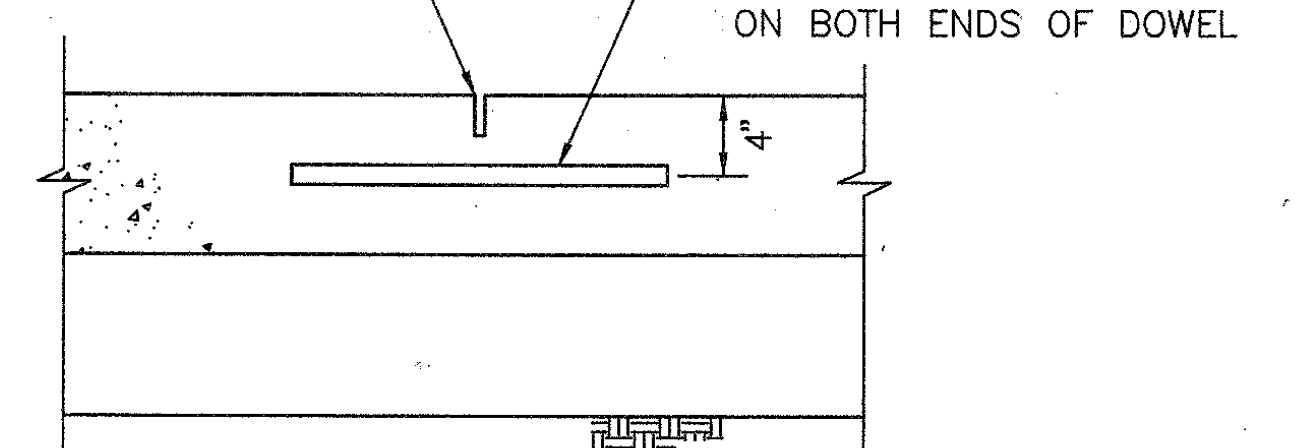
SHEET 19 of 41
DWG
DATE June 1999
PROJ R1680



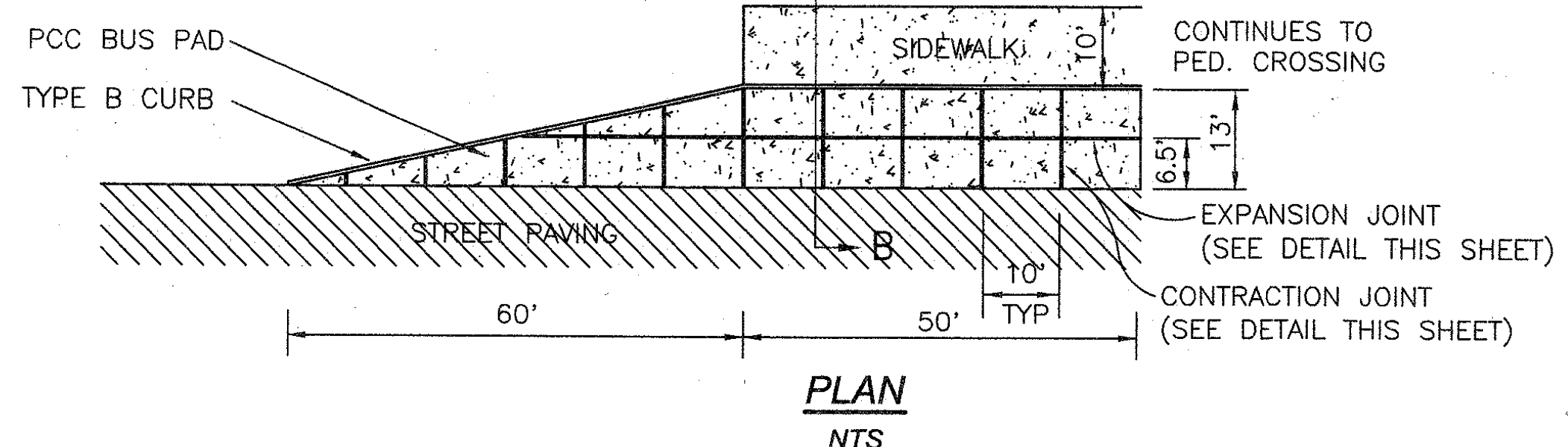
INSTALL 3/4" WIDE FIBER FABRIC TO 1/2" BELOW FINISHED SURFACE. FILL REMAINDER WITH TYPE C SEALANT. ROUND CORNERS TO 1/4" RADIUS.



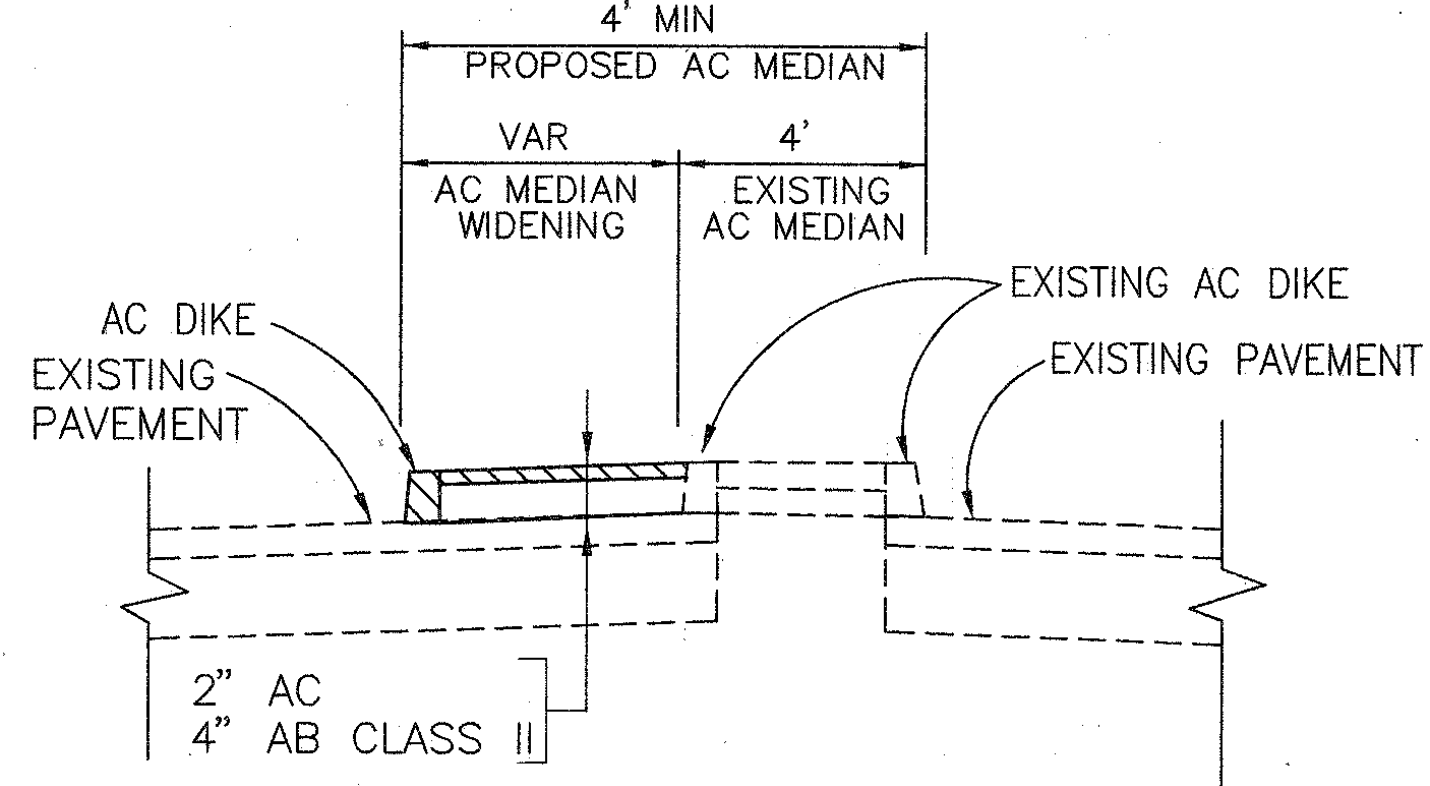
2"x1/4" WIDE SAWCUT CONTRACTION JOINT. FILL WITH TYPE C SEALANT.



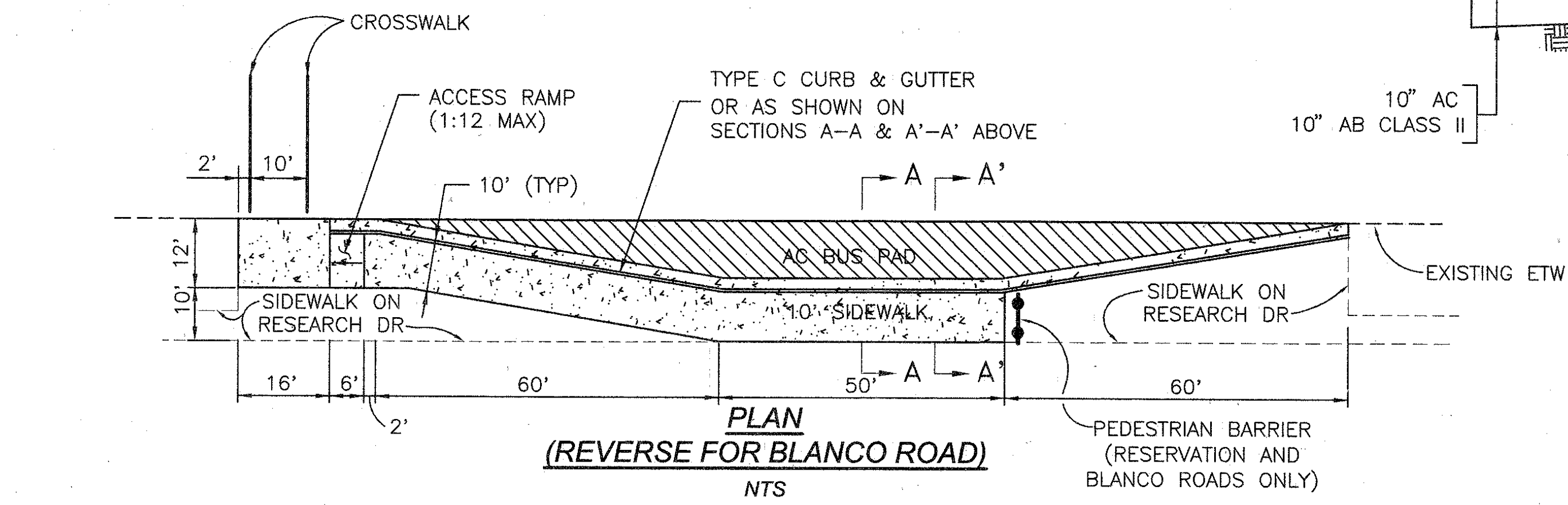
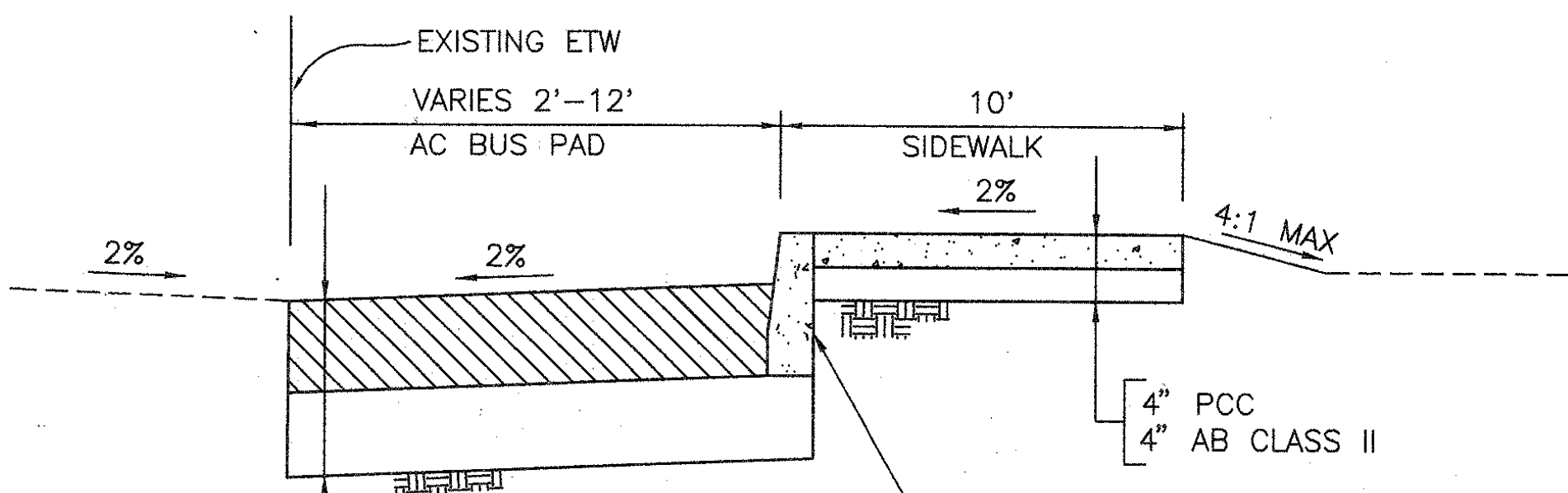
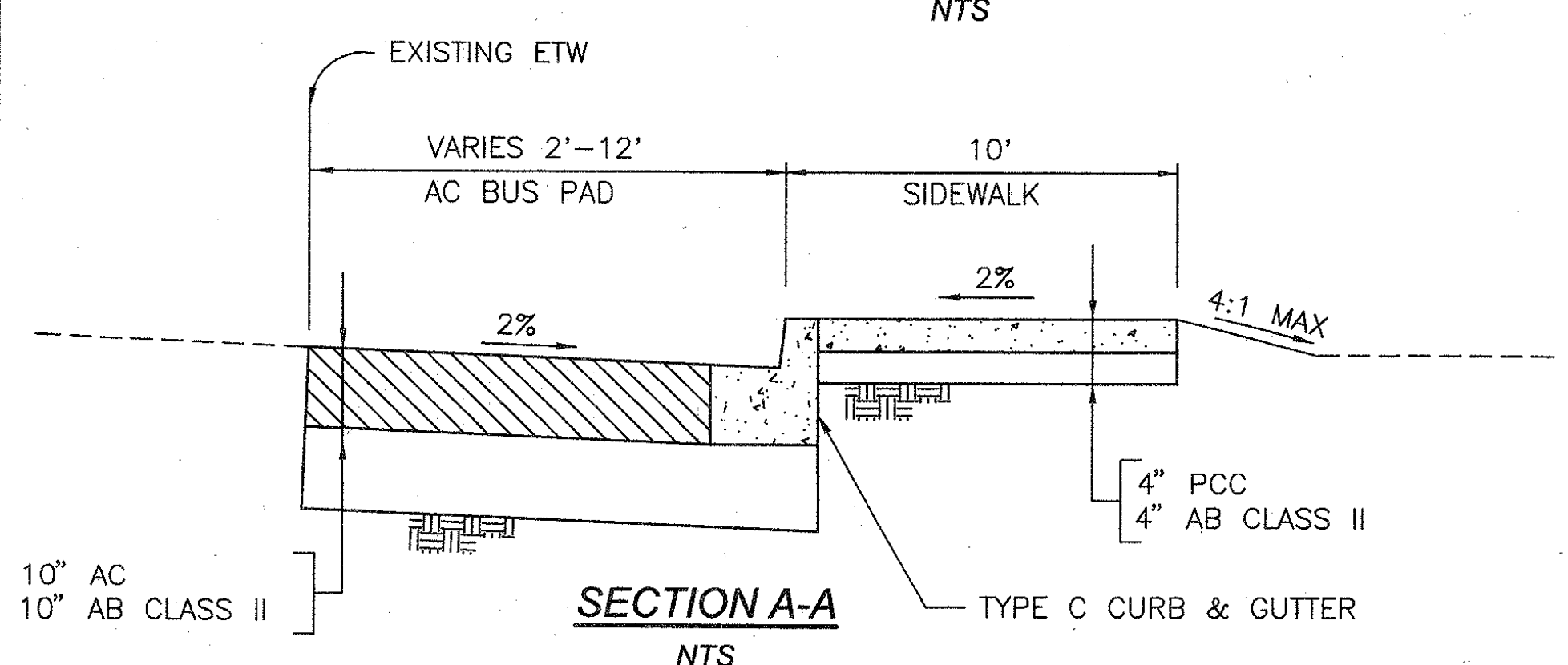
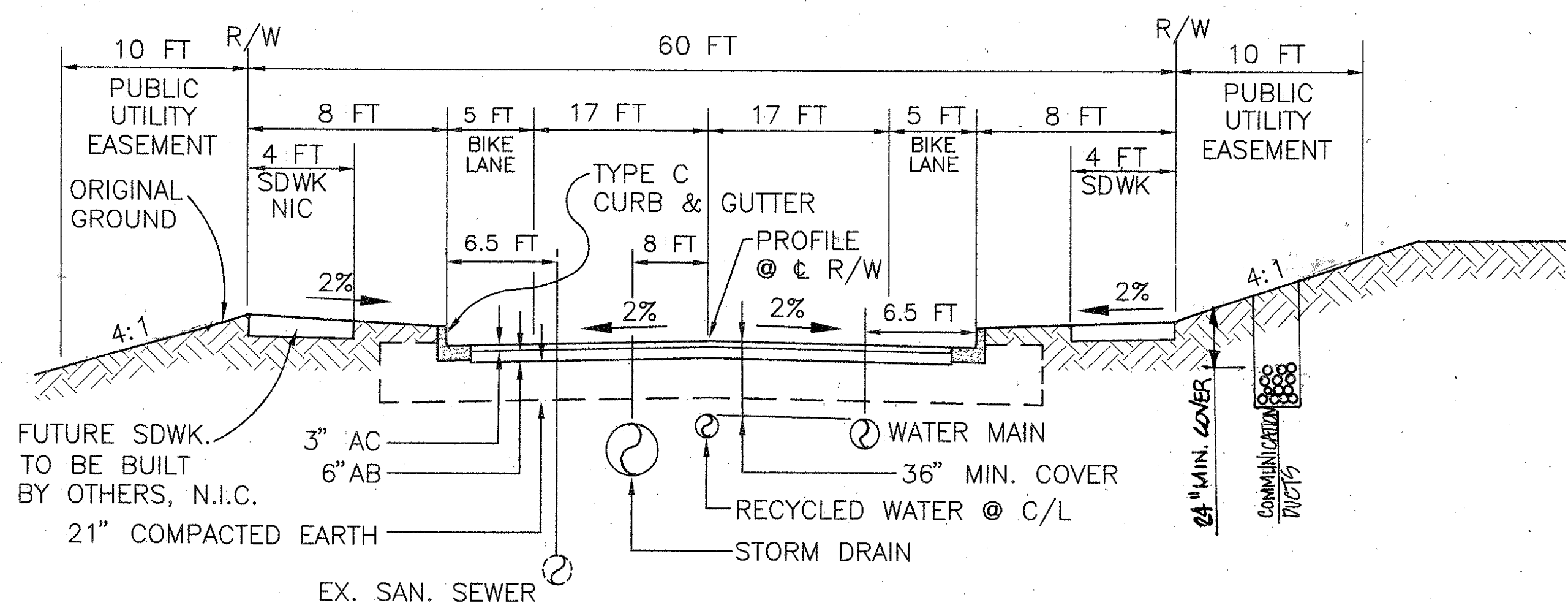
NOTE: PLACE EXPANSION JOINT AT 1/2 THE LENGTH OF THE PCC PAD. PLACE CONTRACTION JOINTS AT 10'± INTERVALS PERPENDICULAR TO CENTERLINE OF THE STREET.



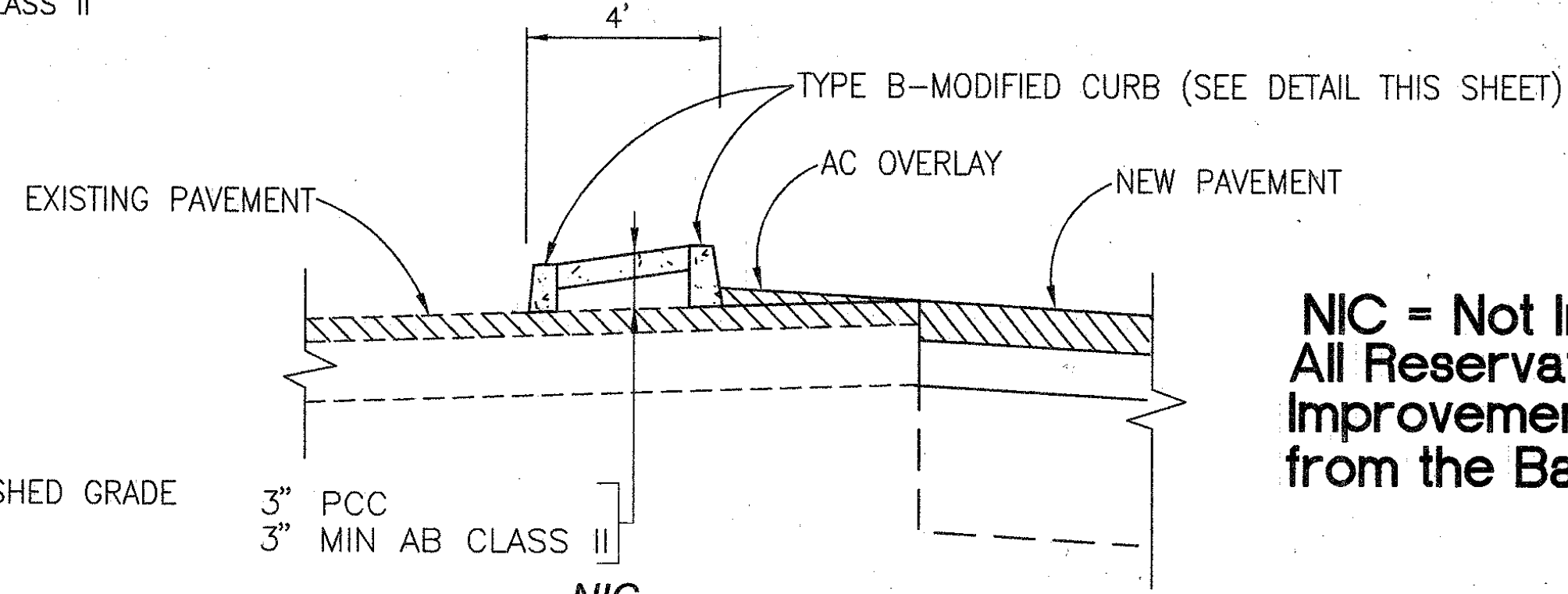
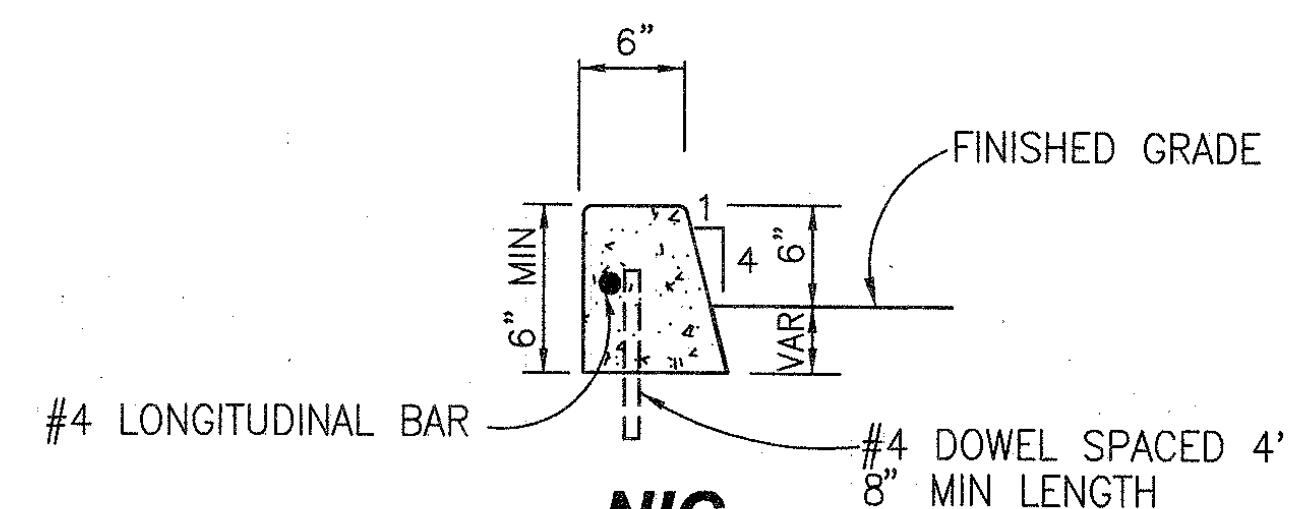
PCC BUS STOP ON NORTH SIDE OF RESERVATION ROAD (NIC) WEST SIDE OF BLANCO ROAD AND NORTH SIDE OF RESEARCH DRIVE



RESERVATION ROAD
STA 107+55.00 TO 113+42.00
STA 108+11.00 TO 125+11.00



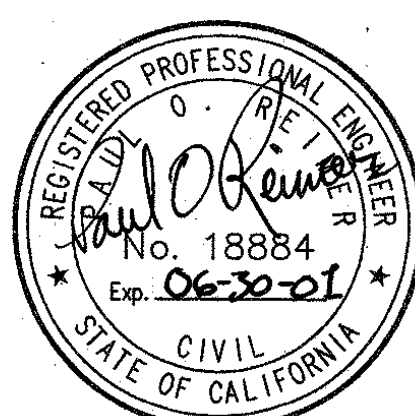
AC BUS STOP ON SOUTH SIDE OF RESERVATION ROAD (NIC), ON EAST SIDE OF BLANCO (NIC), AND ON SOUTH SIDE OF RESEARCH DRIVE



RESERVATION ROAD
STA 113+42.00 TO 116+92.00

NIC MEDIAN DETAILS

NIC = Not In Contract. All Reservation Road Improvements are removed from the Base Bid.



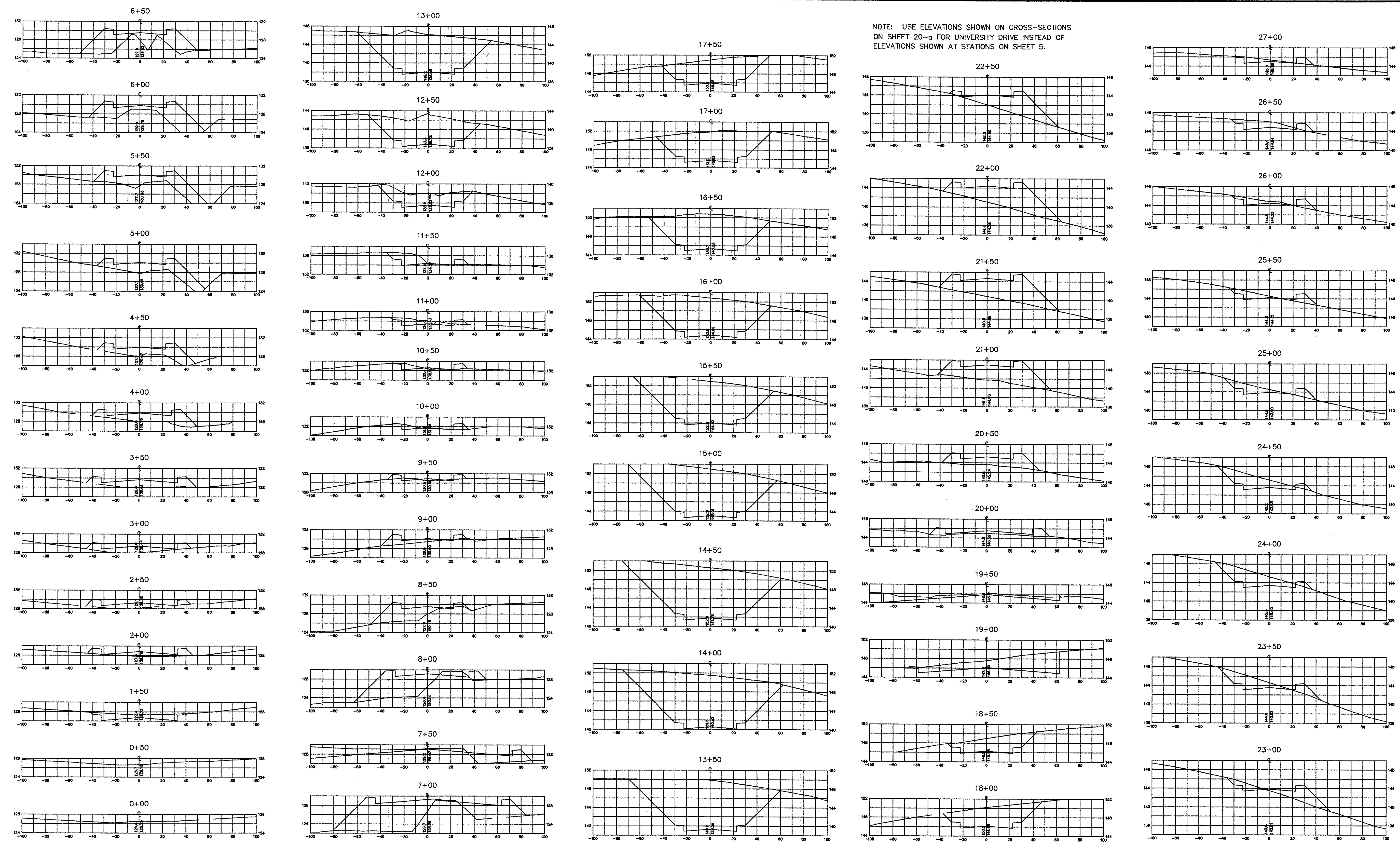
STREET DETAILS

Project Design Team:		VERIFY SCALE		COMPANY		University of California - Santa Cruz		SHEET 20 of 41	
• Reimer Associates	• CH2MHill	BAR IS ONE INCH ON ORIGINAL DRAWING.	CH2M Hill	Fort Ord Reuse Authority		Monterey Bay Education, Science and Technology Park		DWG SHEET-20	
• Kleinfelder	• Higgins Associates	0"	DSGN M. AGUILAR	100 12th Street, Bldg. 2880		STREET AND UTILITY OPENING PROJECT		DATE JUNE 1999	
• EMC Planning Group	• HD Peters Associates, Inc.	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	DR M. AGUILAR	Marina, CA 93933		STANDARD DETAILS		PROJ R1680	
NO. DATE		REVISION		BY APVD		Date			



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NOTE: USE ELEVATIONS SHOWN ON CROSS-SECTIONS ON SHEET 20-a FOR UNIVERSITY DRIVE INSTEAD OF ELEVATIONS SHOWN AT STATIONS ON SHEET 5.



UNIVERSITY DRIVE STA. 0+00 TO 27+00

SCALE: 1" = 40' Horizontal
1" = 10' Vertical

Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY
Reimer Associates
 DSGN POR/BCC
 DR RFH Jr.
 CHK POR



Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933

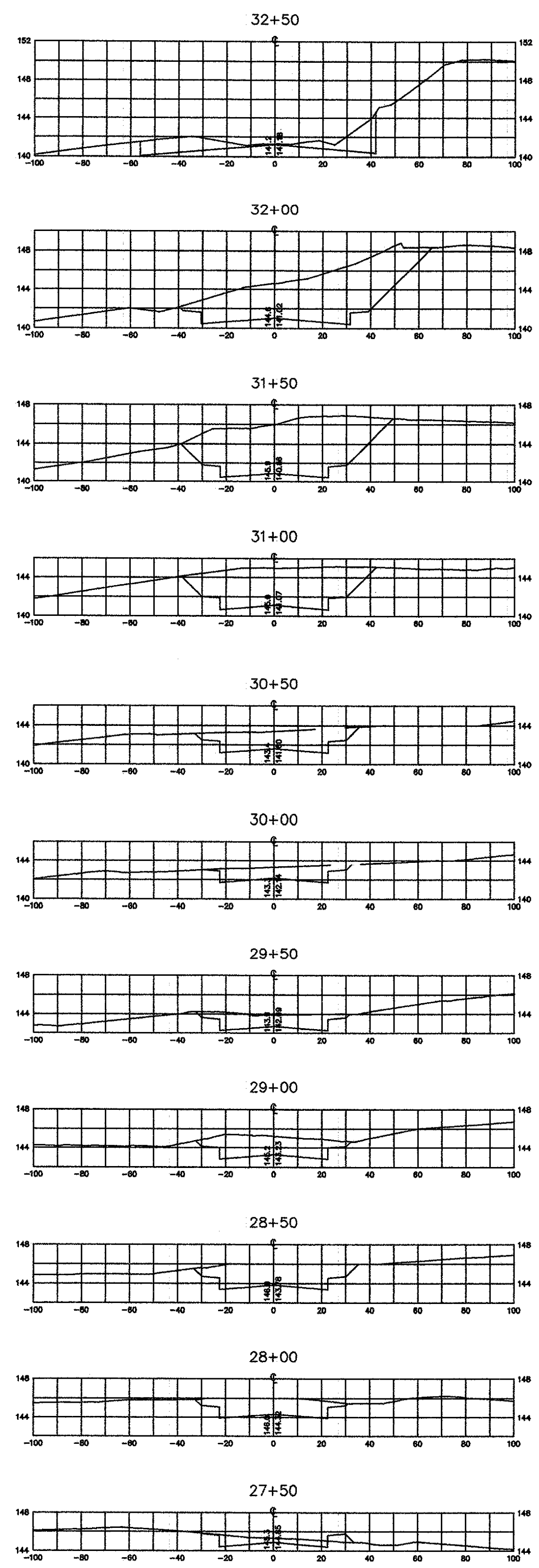
Approved _____ Date _____

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
ROADWAY CROSS-SECTIONS

SHEET 20-a of 41
 DWG
 DATE October 1999
 PROJ R1680

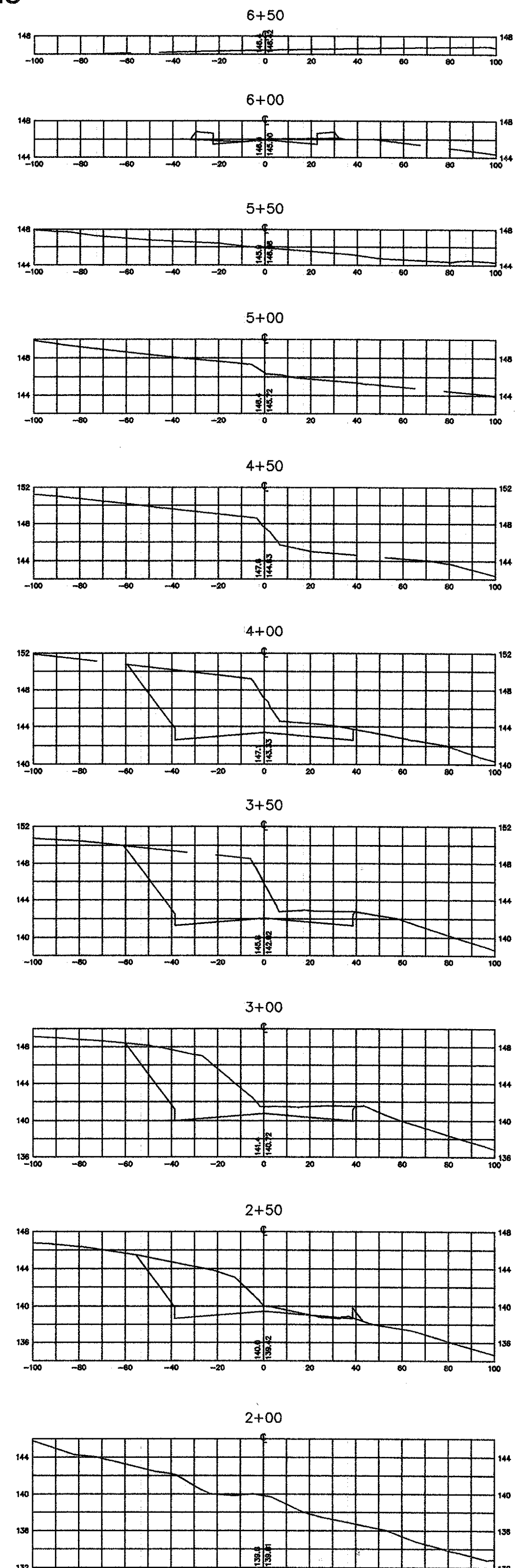
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UNIVERSITY DRIVE CUT/FILL CALCULATIONS



STATION	AREAS		VOLUMES		CUMULATIVE VOLUMES	
	CUT	FILL	CUT	FILL	CUT	FILL
0+00	0.00	0.00	0.00	0.00	0.00	0.00
0+50	0.00	0.00	137.62	0.00	137.62	0.00
1+50	74.32	0.00	68.88	61.05	206.50	61.05
2+50	0.23	72.66	0.28	128.32	207.79	189.37
3+50	0.00	87.70	0.21	148.48	207.00	337.85
4+50	0.00	120.30	0.00	182.59	207.00	530.44
5+50	0.00	140.93	0.00	241.88	207.00	772.32
6+50	0.00	148.22	0.00	267.73	207.00	1040.05
7+50	0.00	182.70	0.00	306.40	207.00	1346.46
8+50	0.00	198.00	0.00	336.24	207.00	1682.70
9+50	0.00	224.23	0.00	374.83	207.00	2057.53
10+50	0.00	254.48	0.00	436.99	207.00	2494.53
11+50	3.21	574.08	2.88	786.60	209.88	3281.13
12+50	120.11	89.50	122.07	562.91	331.95	3844.04
13+50	19.24	281.04	129.03	343.09	460.97	4187.13
14+50	1.47	139.63	19.17	389.51	480.15	4676.84
15+50	1.21	55.79	2.48	180.94	482.63	4757.88
16+50	6.76	22.44	7.51	70.90	490.14	4828.28
17+50	11.04	14.26	15.82	35.26	505.96	4863.74
18+50	16.48	12.68	24.20	26.84	530.17	4890.57
19+50	39.30	8.80	49.67	21.57	579.83	4912.14
20+50	57.04	11.29	85.58	20.24	665.42	4932.38
21+50	178.96	0.00	218.52	10.45	883.94	4942.83
22+50	416.19	0.00	551.08	0.00	1435.00	4942.83
23+50	673.74	0.00	1009.19	0.00	2444.19	4942.83
24+50	940.85	0.00	1494.99	0.00	3939.18	4942.83
25+50	1047.96	0.00	1841.49	0.00	5780.67	4942.83
26+50	1031.09	0.00	1925.05	0.00	7705.72	4942.83
27+50	905.91	0.00	1793.52	0.00	9499.24	4942.83
28+50	778.88	0.00	1559.99	0.00	11059.23	4942.83
29+50	661.28	0.00	1333.49	0.00	12392.72	4942.83
30+50	563.72	0.00	1134.27	0.00	13526.98	4942.83
31+50	469.72	0.00	956.89	0.00	14483.87	4942.83
32+50	368.38	0.00	776.01	0.00	15259.89	4942.83
33+50	290.47	0.00	600.78	0.00	15860.67	4942.83
34+50	180.55	0.00	426.87	0.00	16287.54	4942.83
35+50	273.75	2.61	420.65	2.42	16708.18	4945.25
36+50	241.48	0.00	477.06	2.42	17185.24	4947.67
37+50	0.00	63.12	223.59	58.45	17408.83	5006.12
38+50	0.00	142.13	0.00	190.05	17408.83	5196.16
39+50	0.00	282.46	0.00	393.13	17408.83	5589.30
40+50	0.00	349.20	0.00	584.86	17408.83	6174.16
41+50	0.00	323.18	0.00	622.57	17408.83	6796.73
42+50	0.00	215.14	0.00	498.45	17408.84	7295.18
43+50	29.81	91.06	27.61	283.52	17436.45	7578.70
44+50	94.24	29.84	114.87	111.94	17551.31	7690.64
45+50	145.42	10.45	221.91	37.30	17773.23	7727.94
46+50	122.49	11.07	248.07	19.92	18021.30	7747.86
47+50	55.63	22.70	156.40	34.29	18177.70	7782.16
48+50	35.57	26.43	79.73	49.87	18257.43	7832.03
49+50	31.04	22.53	58.65	49.68	18316.08	7881.70
50+50	61.74	16.65	82.93	39.79	18399.00	7921.50
51+50	24.05	15.07	76.90	32.19	18475.90	7953.68
52+50	30.50	6.91	49.30	22.25	18525.20	7975.93
53+50	93.56	0.00	113.93	6.69	18639.13	7982.63
54+50	133.35	0.00	209.94	0.00	18849.08	7982.63
55+50	111.87	0.00	226.89	0.00	19075.96	7982.63
56+50	76.88	0.00	174.77	0.00	19250.73	7982.63
57+50	67.42	0.01	133.61	0.01	19384.35	7982.64
58+50	112.67	0.00	166.75	0.01	19551.10	7982.65
59+50	258.82	0.00	343.98	0.00	19895.08	7982.65
60+50	375.79	0.00	587.60	0.00	20482.67	7982.65
61+50	374.68	0.00	694.88	0.00	21177.55	7982.65
62+50	199.30	0.00	531.47	0.00	21709.02	7982.65
63+50	281.41	0.00	445.11	0.00	22154.12	7982.65
64+50	139.64	0.00	389.86	0.00	22543.98	7982.65
65+50	0.00	0.00	0.00	0.00	22543.98	7982.65

UNIVERSITY DRIVE STA. 27+50 TO 33+50



START WORK MBEST DR. STA. 2+11

START WORK RESEARCH DR. STA. 1+26

MBEST DRIVE CUT/FILL CALCULATIONS

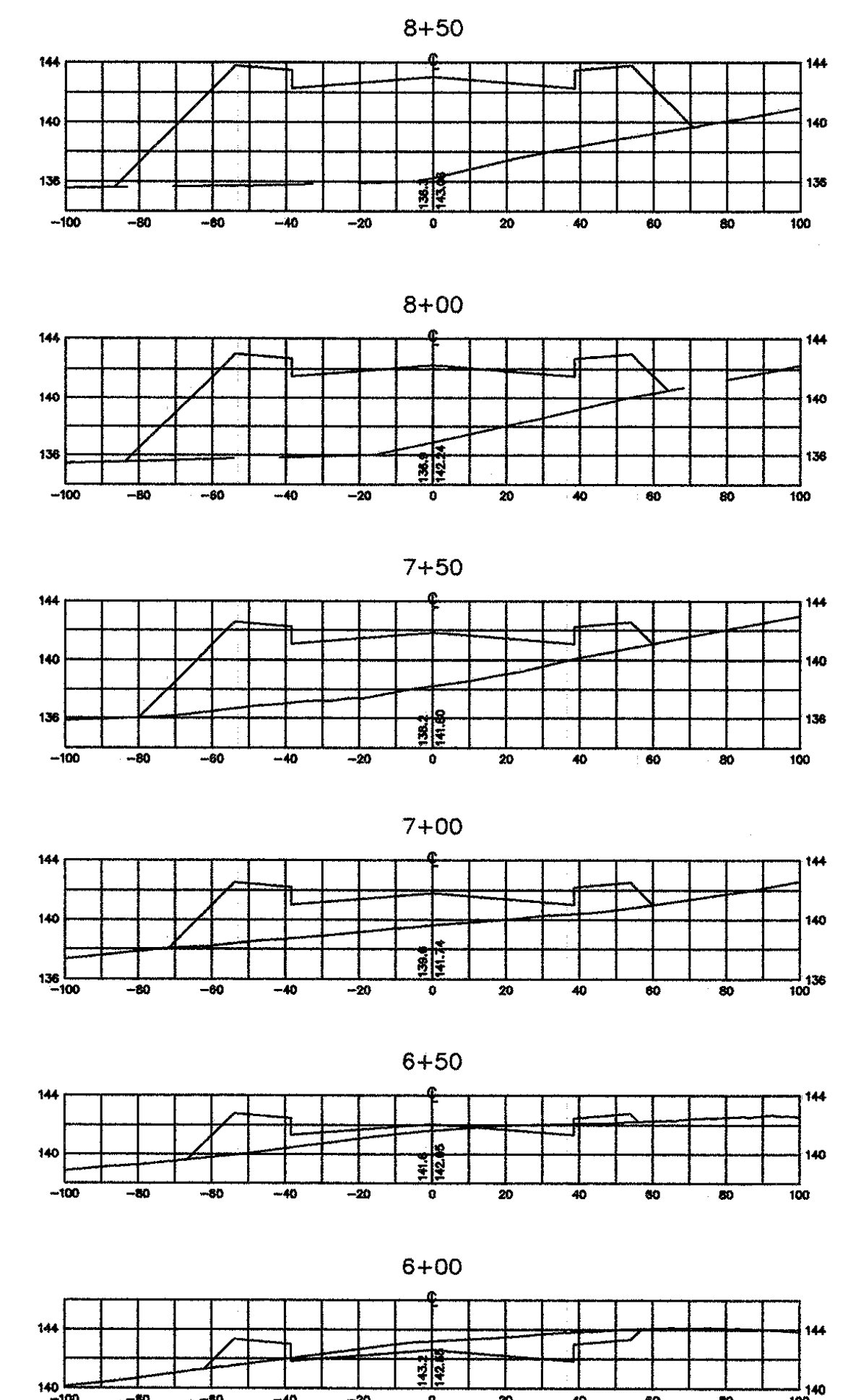
STATION	AREAS		VOLUMES		CUMULATIVE VOLUMES	
	CUT	FILL	CUT	FILL	CUT	FILL
1+00	0.00	0.00	0.00	0.00	0.00	0.00
1+50	0.00	0.00	0.00	0.00	0.00	0.00
2+00	0.00	0.00	190.88	3.67	190.88	3.67
2+50	206.15	3.97	467.08	3.67	657.96	7.35
3+00	298.29	0.00	647.26	0.00	1305.22	7.35
3+50	400.75	0.00	719.66	0.00	2024.88	7.35
4+00	376.48	0.00	348.59	0.00	2373.48	7.35
4+50	0.00	0.00	0.00	0.00	2373.48	7.35
5+00	0.00	0.00	0.00	0.00	2373.48	7.35
5+50	0.00	0.00	9.98	11.89	2383.46	19.24
6+00	10.78	12.84	9.98	11.89	2393.44	31.13
6+50	0.00	0.00	0.00	0.00	2393.44	31.13

SCALE: 1" = 40' Horizontal
1" = 10' Vertical

RESEARCH DRIVE CUT/FILL CALCULATIONS

STATION	AREAS		VOLUMES		CUMULATIVE VOLUMES	
	CUT	FILL	CUT	FILL	CUT	FILL
1+00	0.00	0.00	0.00	0.00	0.00	0.00
1+50	1.55	35.46	1.43	32.84	1.43	32.84
2+00	0.61	0.00	2.00	32.84	3.43	65.67
2+50	0.00	0.00	0.00	0.00	3.43	65.67
3+00	32.12	0.00	0.00	0.00	3.43	65.67
3+50	998.31	0.00	0.00	0.00	3.43	65.67
4+00	697.62	0.00	785.16	785.16	788.59	850.83
4+50	457.47	0.00	1069.52	0.00	1854.67	0.00
5+00	258.29	0.00	862.74	0.00	2517.41	0.00
5+50	155.88	8.28	383.49	7.66	2900.90	7.66
6+00	79.92	28.83	218.34	34.36	3119.24	42.02
6+50	11.15	92.08	84.33	111.95	3203.57	153.97
7+00	0.00	267.20	10.33	332.67	3213.90	486.64
7+50	0.00	440.66	0.00	855.43	3213.90	1142.07
8+00	0.00	651.51	0.00	1011.26	3213.90	2153.33
8+50	0.00	838.82	0.00	1379.93	3213.90	3533.26
9+00	0.00	0.00	0.00	778.69	3213.90	4309.95
9+50	0.00	0.00	0.00	0.00	3213.90	4309.95
10+00	0.00	0.00	0.00	0.00	3213.90	4309.95
10+50	0.00	0.00	0.00	0.00	3213.90	4309.95

CROSS-SECTIONS FOR INTERSECTION AT UNIVERSITY DR. & RESEARCH DR. (STA. 2+00 TO 3+00 RESEARCH DR.) HAVE BEEN ACCOUNTED FOR IN UNIVERSITY DR.



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

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COMPANY: Reimer Associates
 DESGN: POR/BCC
 DR: RFH Jr.
 CHK: POR

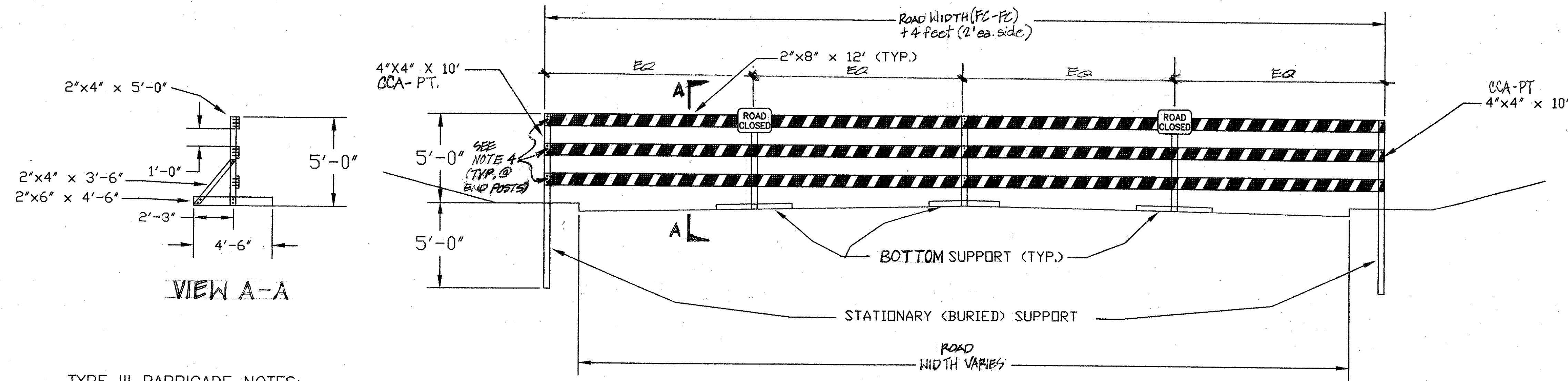
Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933

Approved: _____ Date: _____

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
 STREET AND UTILITY OPENING PROJECT
 ROADWAY CROSS-SECTIONS

SHEET 20-b of 41
 DWG
 DATE October 1999
 PROJ R1680

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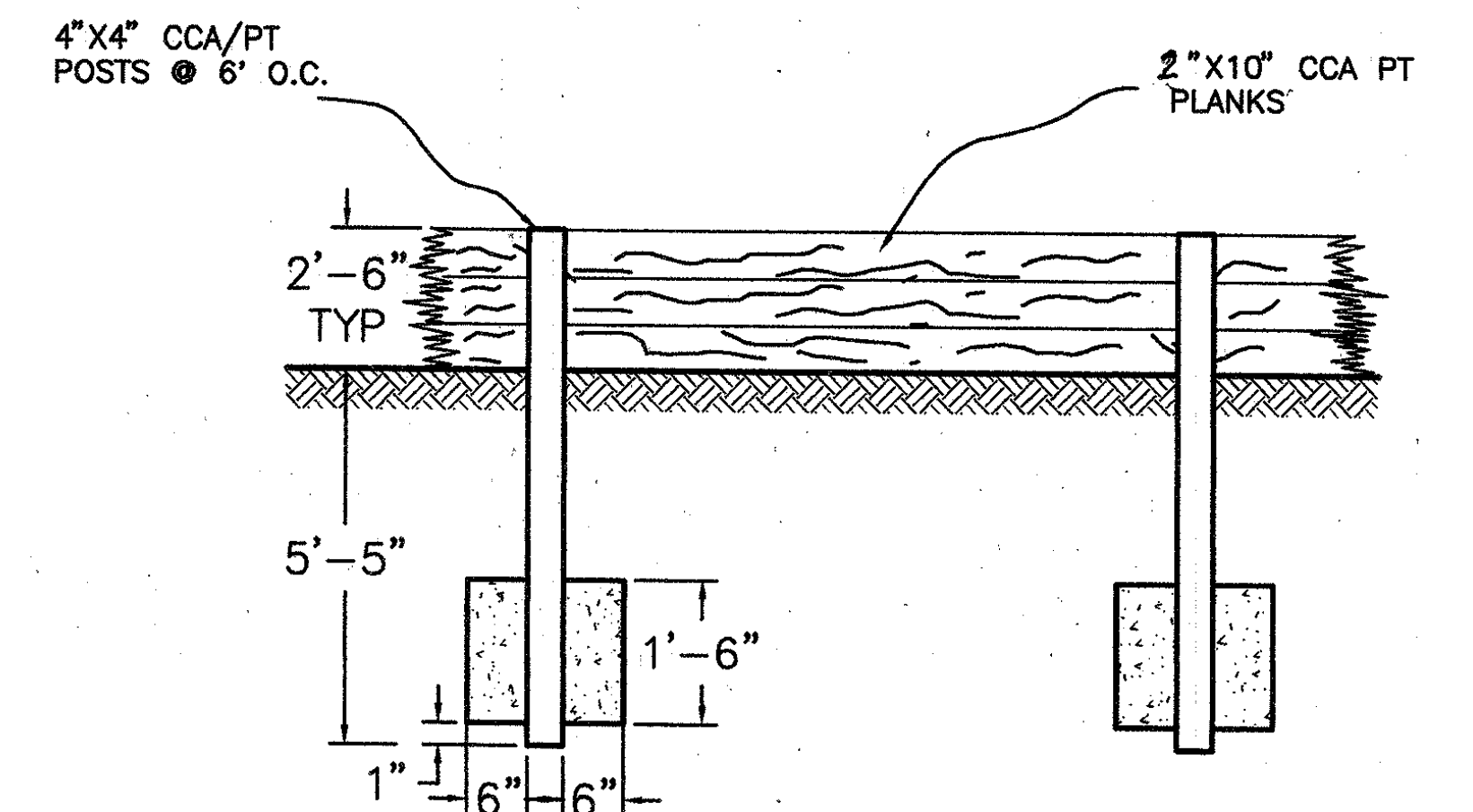
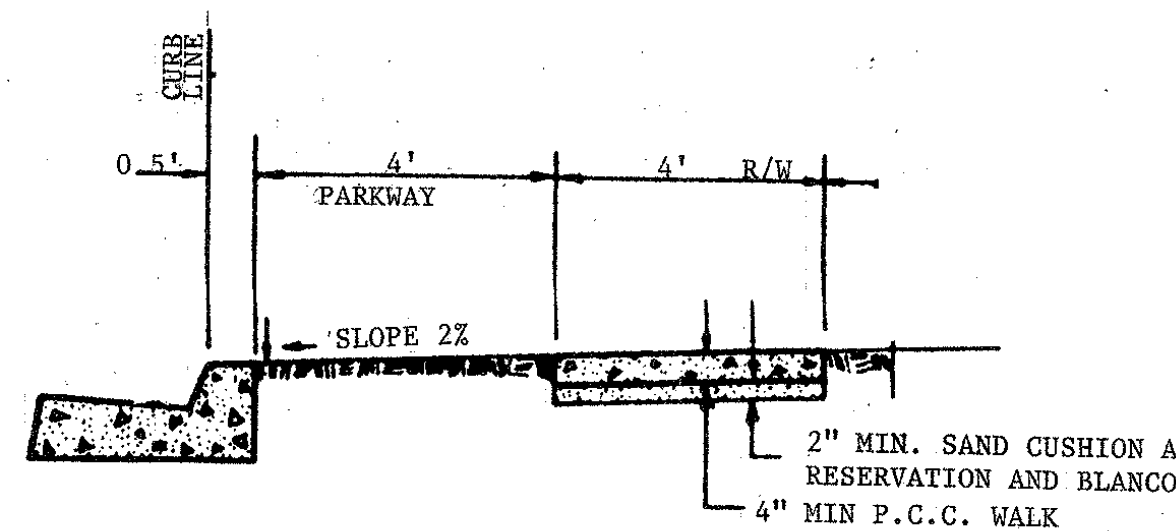
VIEW A-A

TYPE III BARRICADE NOTES:

1. RAILS FACING TRAFFIC TO BE REFLECTORIZED.
2. IF MORE WEIGHT IS NEEDED TO RESIST OVERTURNING BY WIND USE SAND FILLED BAGS.
3. ALL TIMBER TO BE S4S. ALL DIMENSIONS ARE NOMINAL TIMBER DIMENSIONS.
4. USE 3/8" MACHINE BOLTS WITH NUTS AND NUT WASHERS.
5. USE 16d CEMENT COATED NAILS FOR FASTENING 2"x8" HORIZONTAL BOARD TO 2"x4" VERTICAL POSTS.
6. USE 1/4"x5" LAG SCREWS FOR FASTENING 2"x4" SPACER TO 2"x6" BOTTOM SUPPORT.
7. PLANS FOR BARRICADES MADE OF WOOD ARE SHOWN. BARRICADES MAY BE MADE OF ANY COMBINATION OF WOOD, METAL, OR PLASTIC AS APPROVED BY THE ENGINEER.

TYPE III BARRICADE TREATMENT:

1. INSTALL "ROAD CLOSED" (C-2) SIGNS.

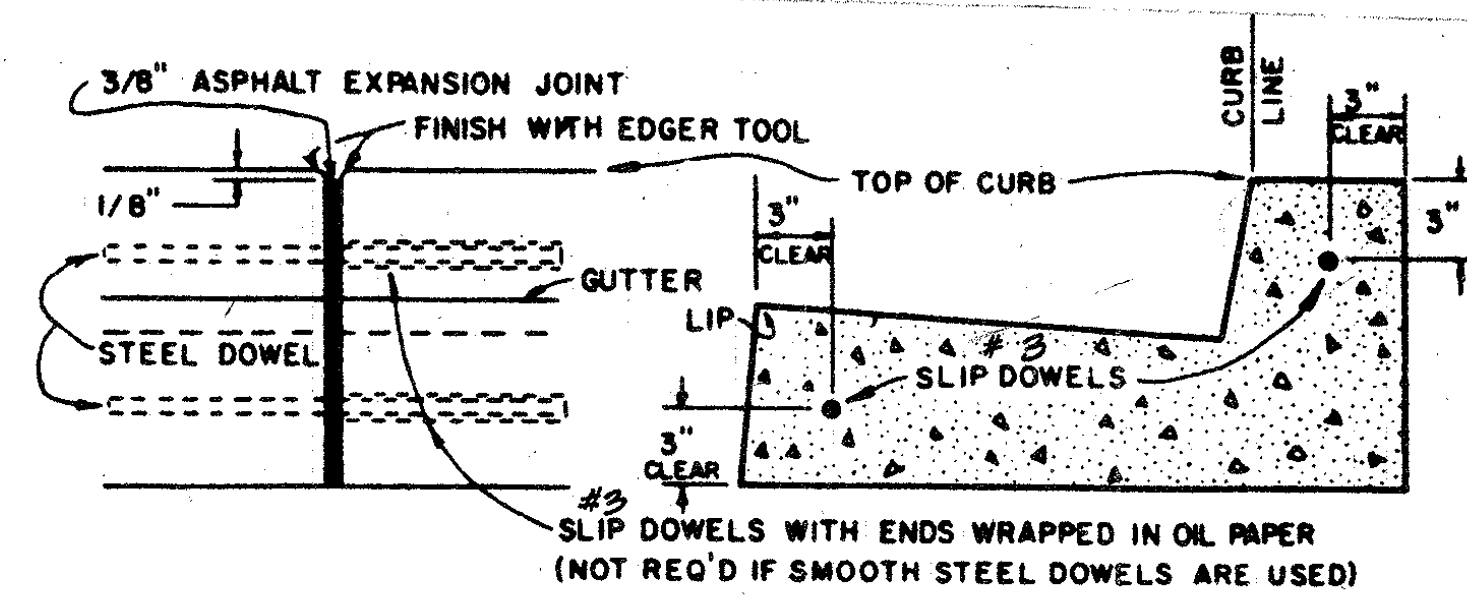


TIMBER RETAINING WALL

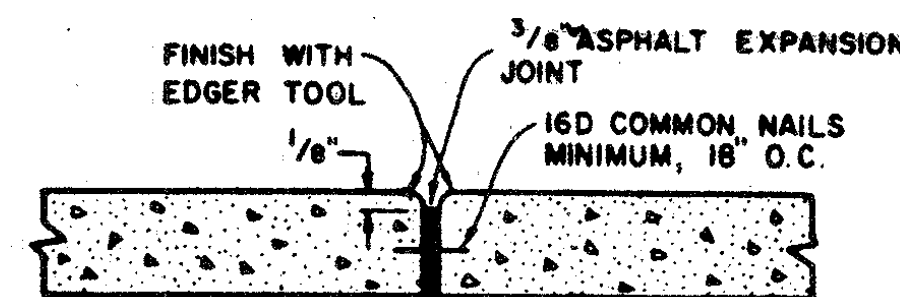
NTS

SIDEWALK NOTES:

1. CONCRETE SIDEWALK SHALL BE 4.0 FEET MINIMUM.
2. ALL SIDEWALK IS TO BE ONE COURSE, CLASS B P.C.C. AND FINE BROOM FINISHED.
3. ASPHALT EXPANSION JOINTS SHALL BE PLACES WITH MAXIMUM SPACING 60 FEET AND WHEREVER SIDEWALK ADJOINS EXISTING BUILDING OR SIDEWALK.
4. ASPHALT EXPANSION JOINT SHALL BE COMPOSED OF ASPHALT, FIBER, AND MINERAL FILLER PREMOULDED INTO SHEETS WITH ASPHALT IMPREGNATED LINERS ON BOTH SIDES AND SHALL CONFORM WITH ASTM D-994-53 AND AASHTO M-33-48 SPECIFICATIONS.
5. SLIP DOWELS PER DETAIL AT B.C.R. AND E.C.R.
6. CONTRACTOR SHALL STAMP HIS NAME AND MONTH AND YEAR OF CONSTRUCTION ON SIDEWALK A MINIMUM OF ONCE PER CONSTRUCTION AND ONCE PER EACH 500 SQUARE FEET. MONTH AND YEAR MAY BE STAMPED IN NUMBERS.
7. ALL DIMENSIONS AS SHOWN UNLESS OTHERWISE SPECIFIED ON PLANS.



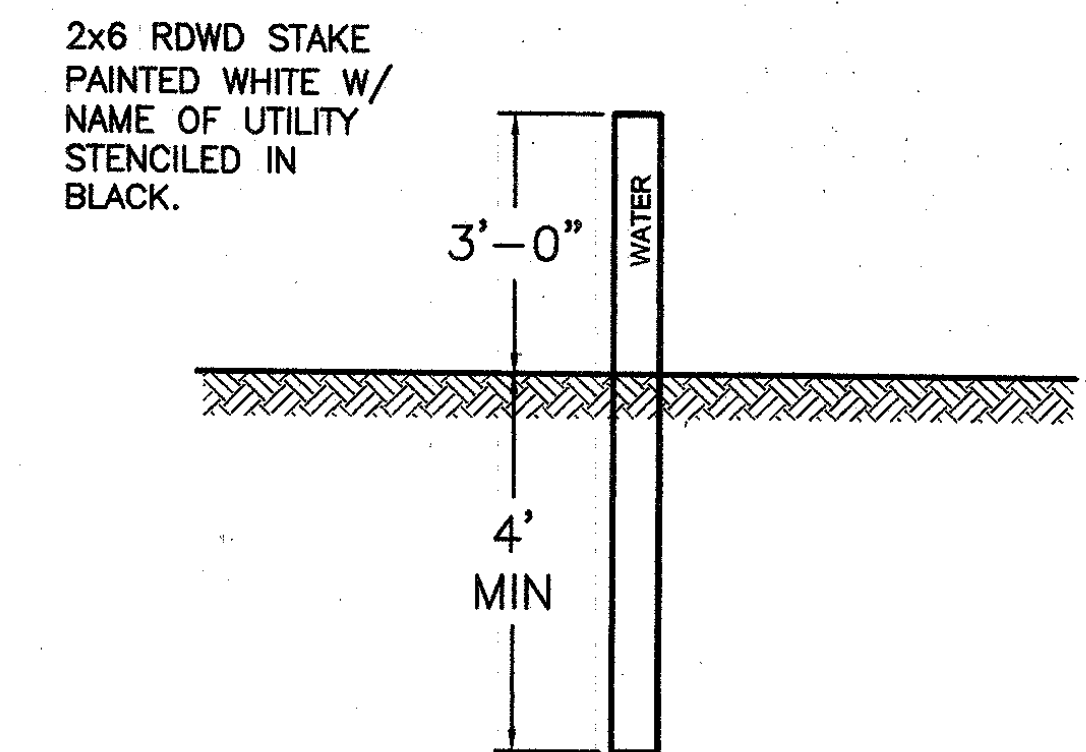
TYPICAL DOWEL DETAIL AT CURB RETURNS



TYPICAL SIDEWALK EXPANSION JOINT

SIDEWALK DETAILS

NTS



UTILITY STAKE

NTS



STREET DETAILS

Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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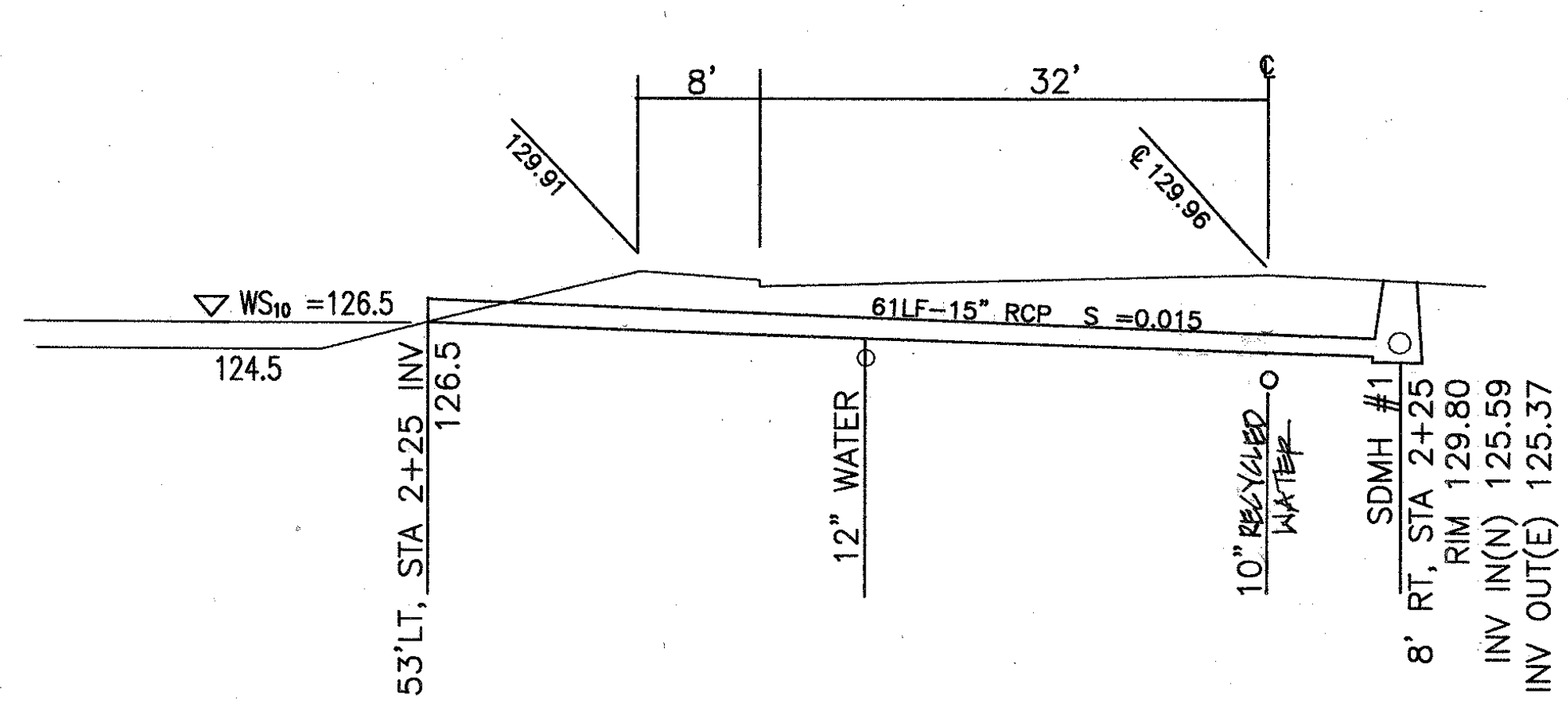
COMPANY	Reimer Associates
DSGN	POR/BCC
DR	RSG
CHK	POR

Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933
Approved: *Samuel...* Date: 1/6/99

University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
STANDARD DETAILS

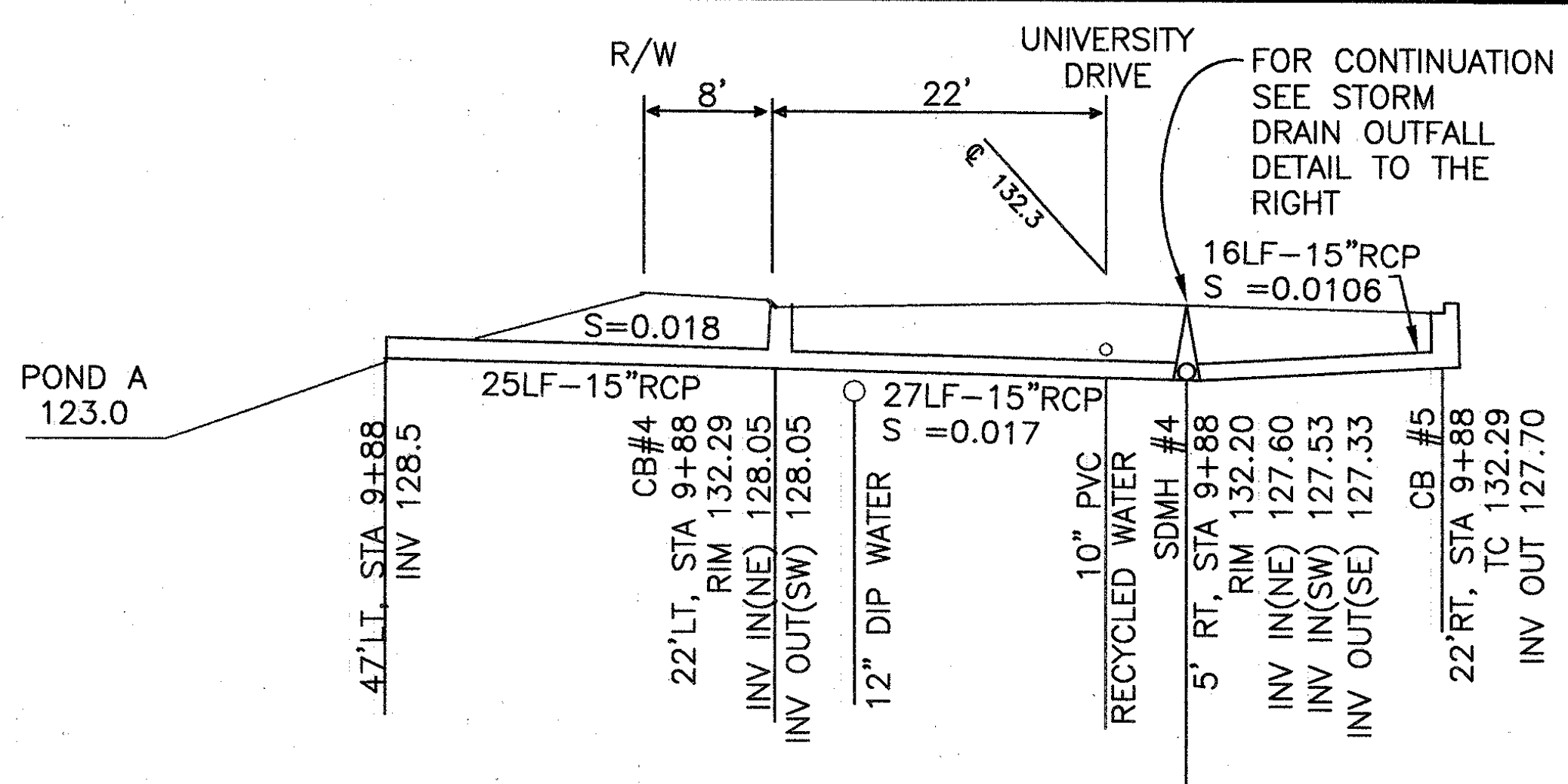
SHEET	21 of 41
DWG	
DATE	June 1999
PROJ	R1680

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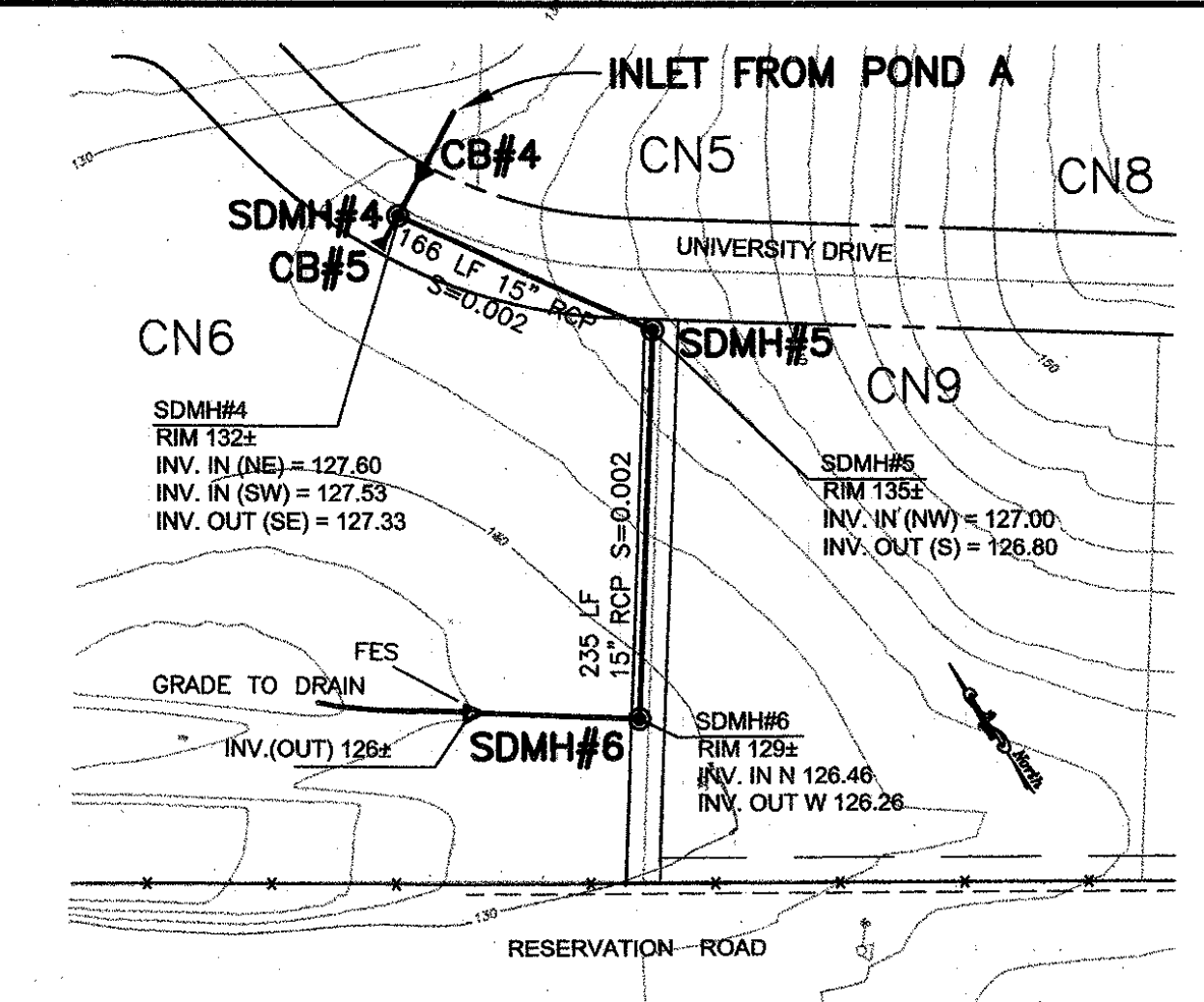
**OVERFLOW DRAIN @ FUTURE POND #1
STATION 2 + 25 UNIVERSITY DRIVE**

NTS



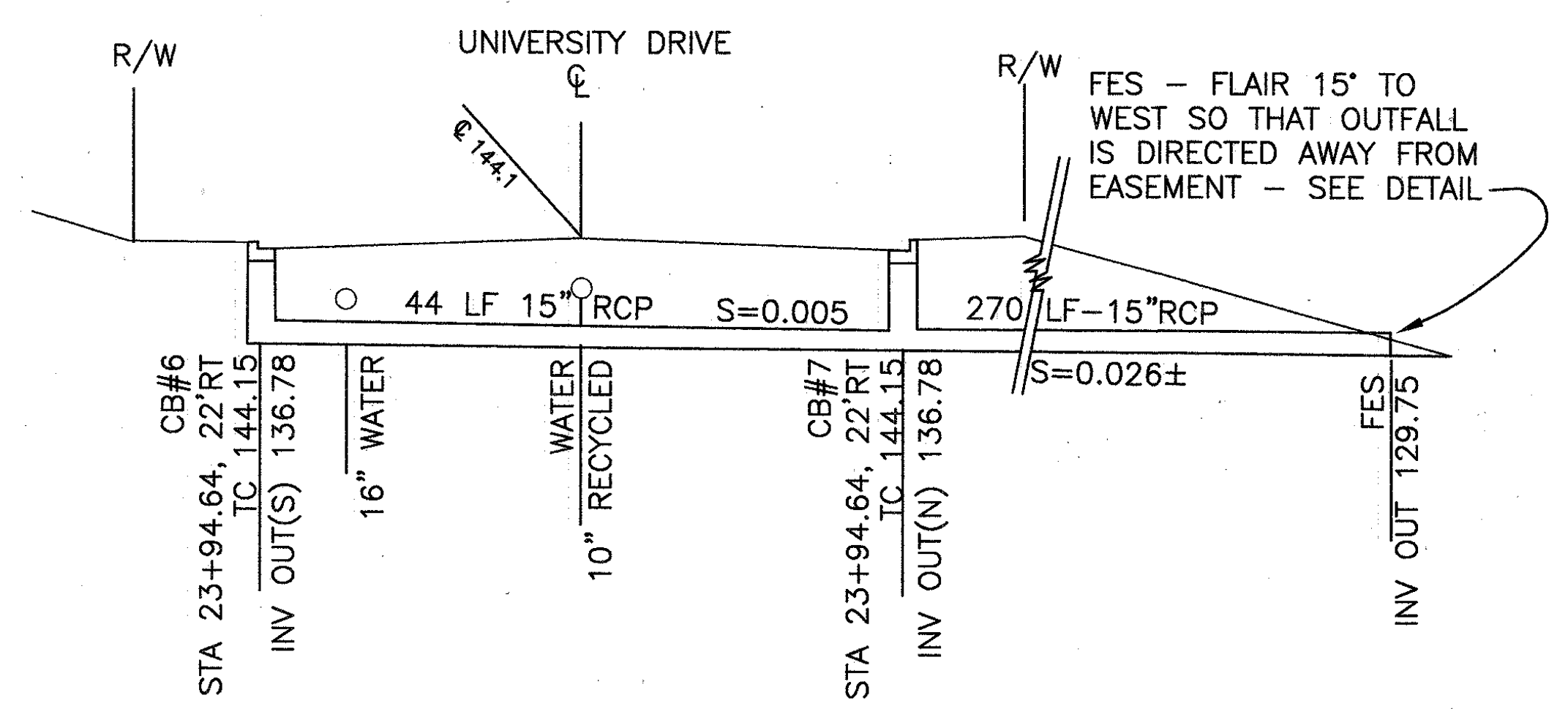
**STORM DRAIN @ STATION 9 + 88
UNIVERSITY DRIVE**

NTS



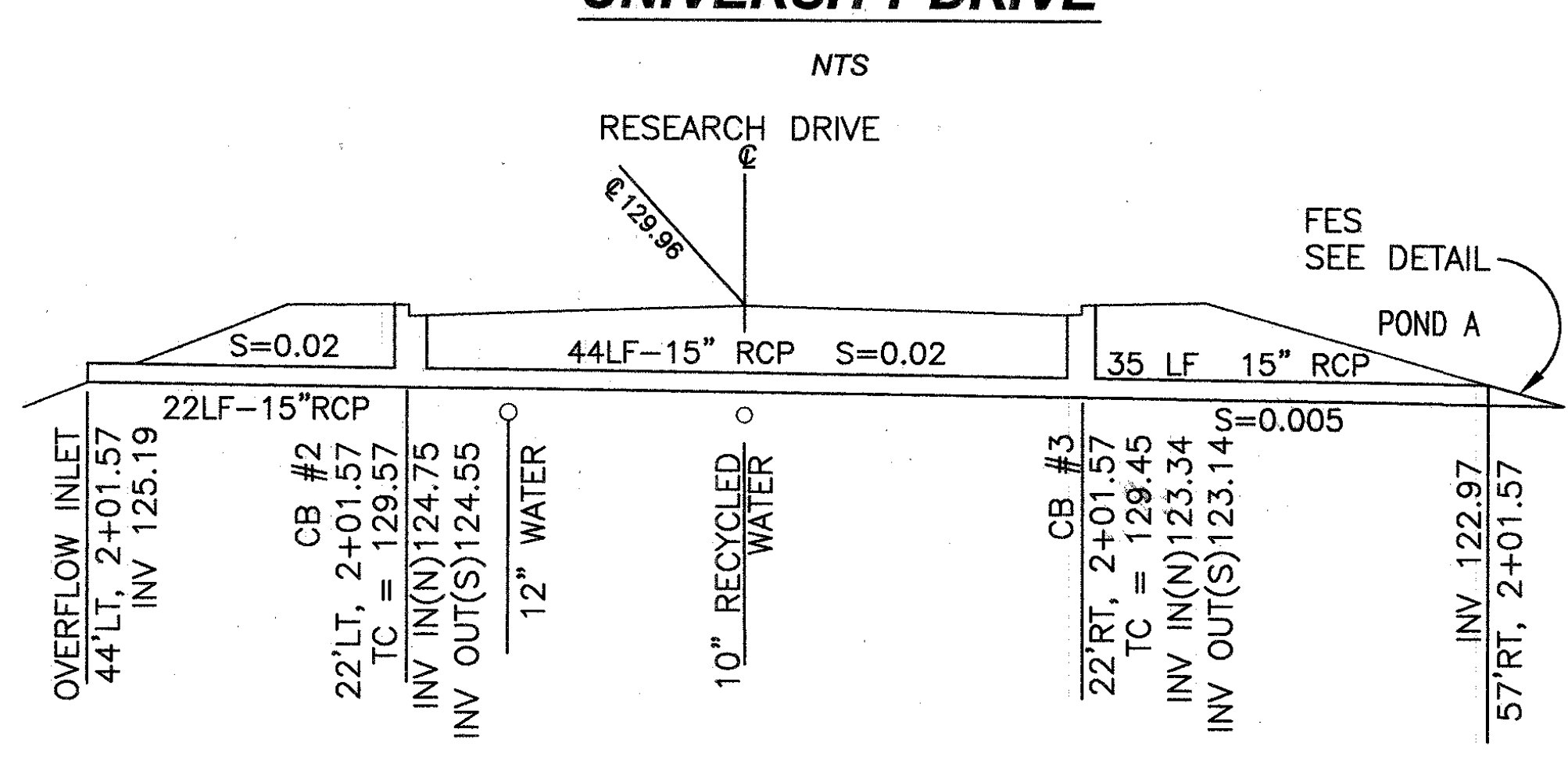
STORM DRAIN OUTFALL

NTS



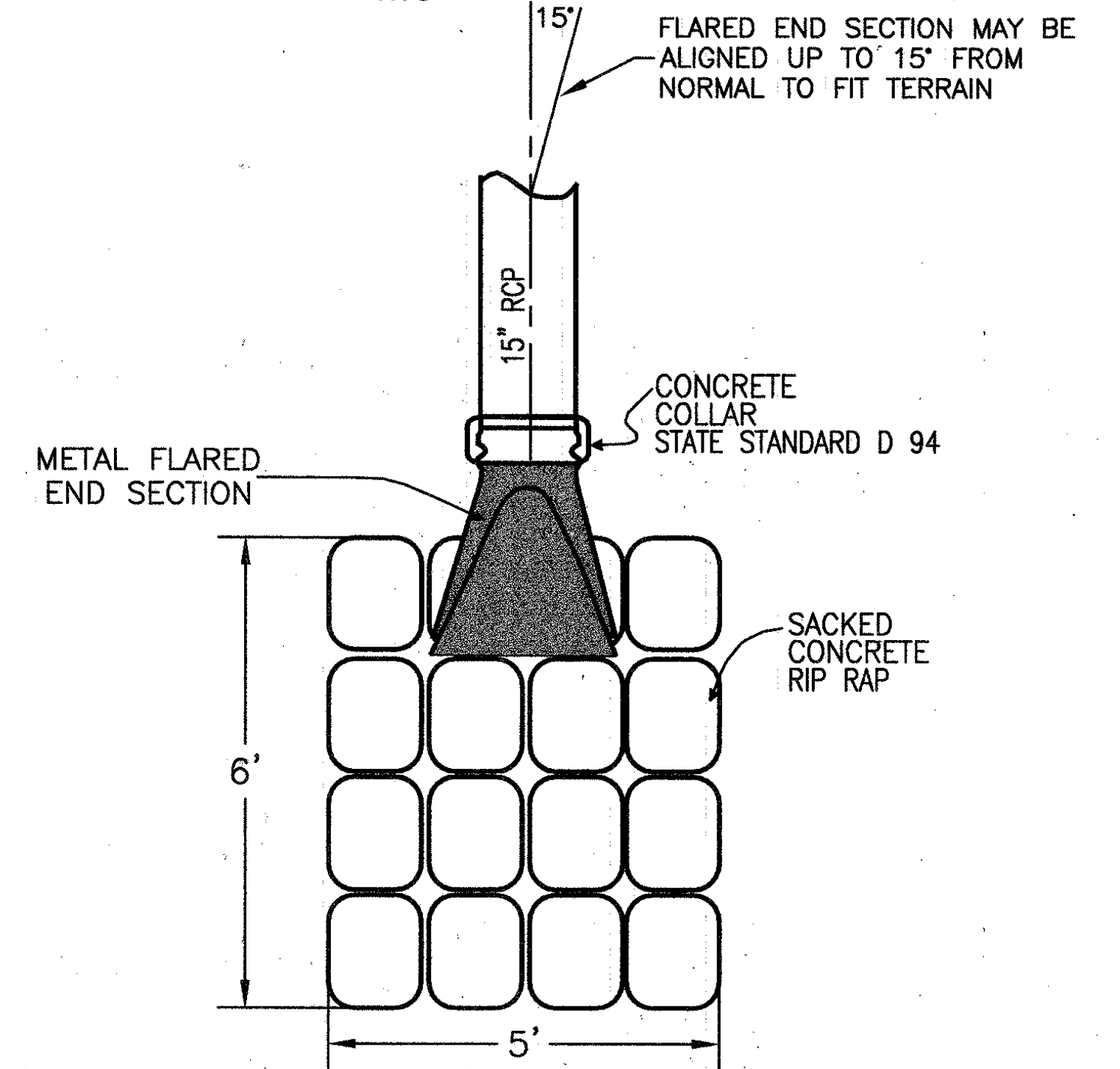
**STORM DRAIN @ STATION 23 + 94.64
UNIVERSITY DRIVE**

NTS



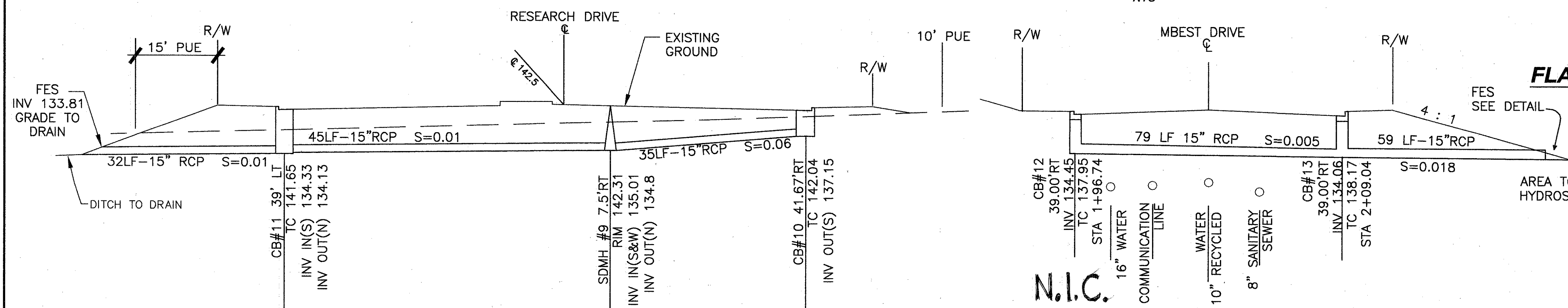
**STORM DRAIN @ STATION 2 + 01.57
RESEARCH DRIVE**

NTS



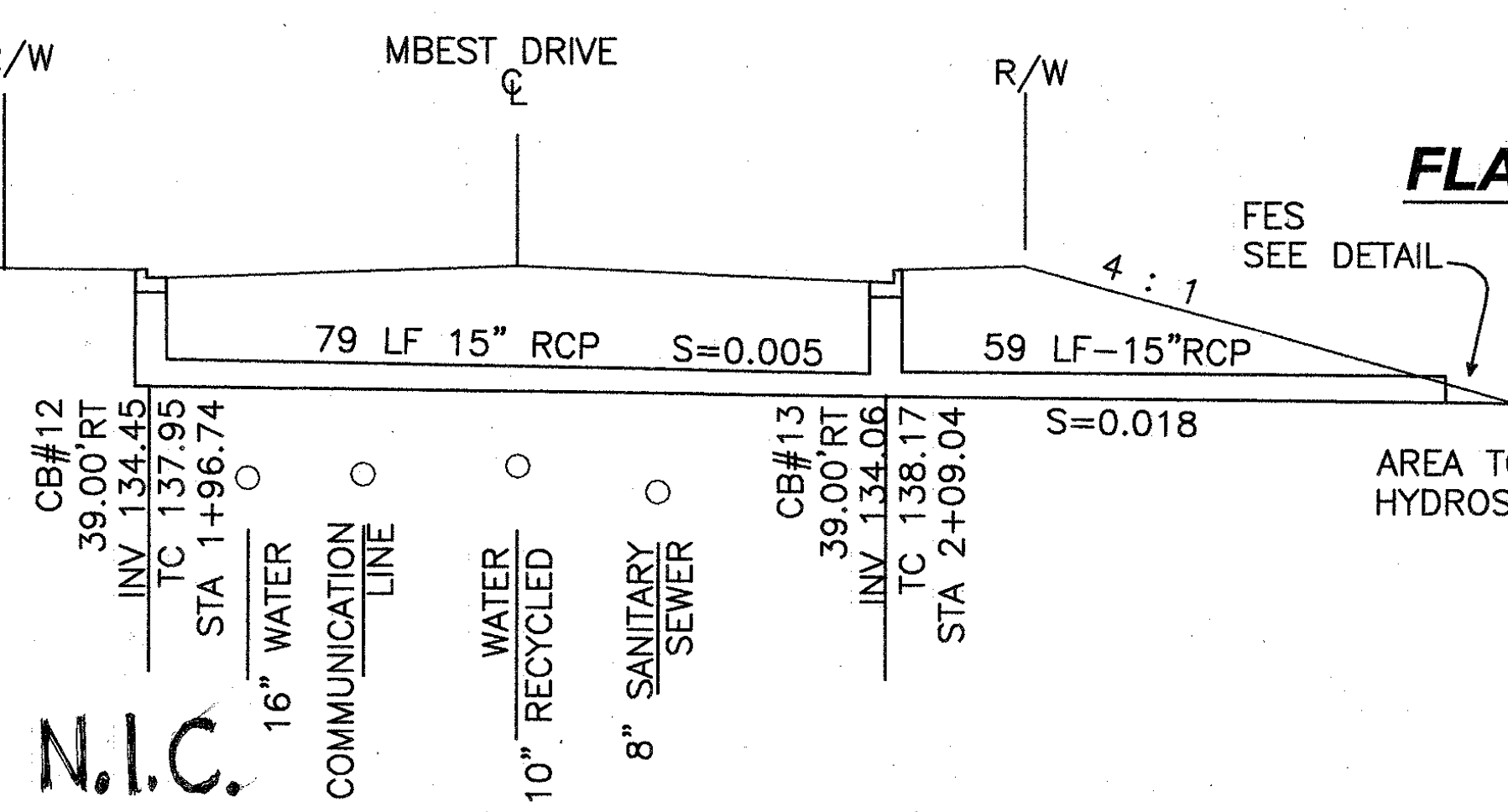
FLARED END SECTION (FES) OUTFALL

NTS



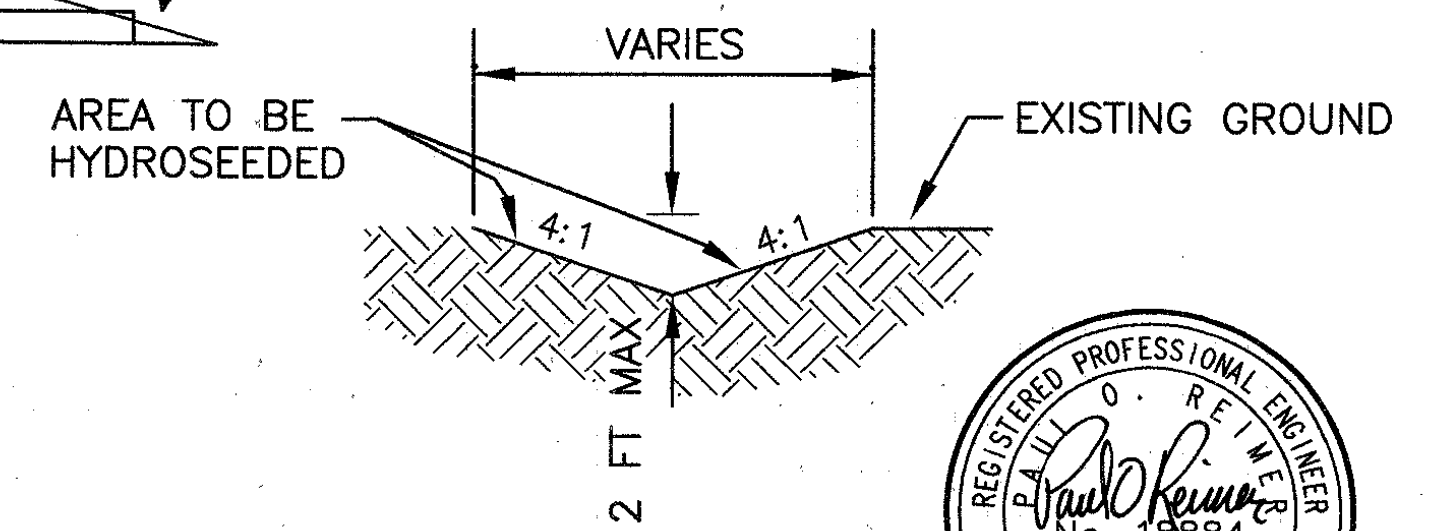
**STORM DRAIN STATION 7+16.46
RESEARCH DRIVE**

NTS



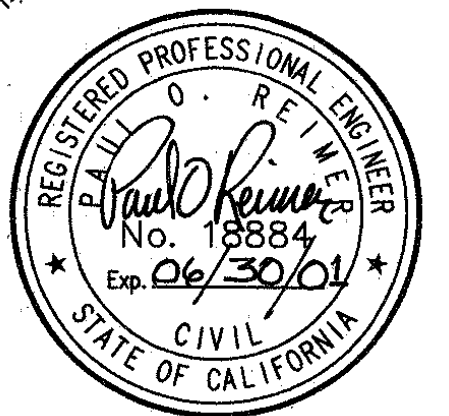
**STORM DRAIN @ RESERVATION ROAD
AND MBEST DRIVE INTERSECTION**

NTS



DITCH CROSS-SECTION

NTS



STORM DRAINAGE DETAILS

Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

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COMPANY: Reimer Associates

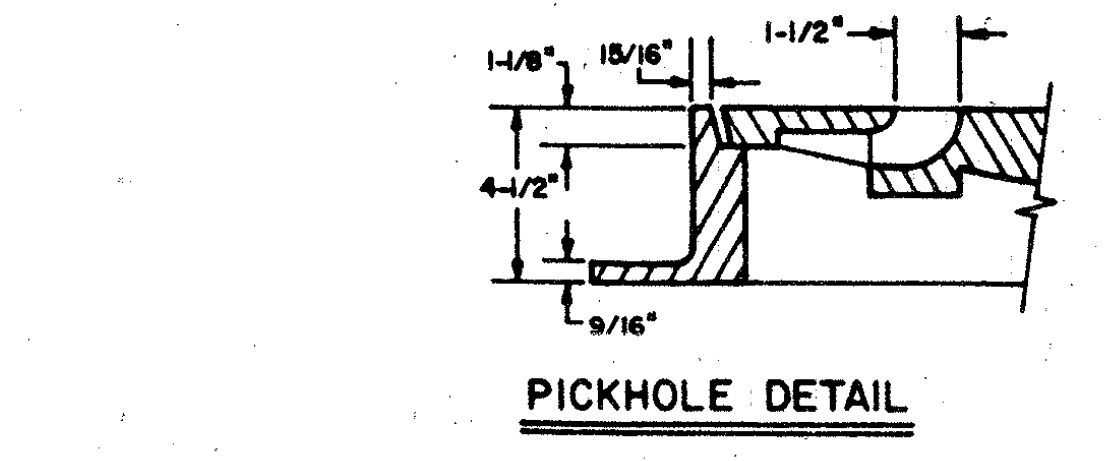
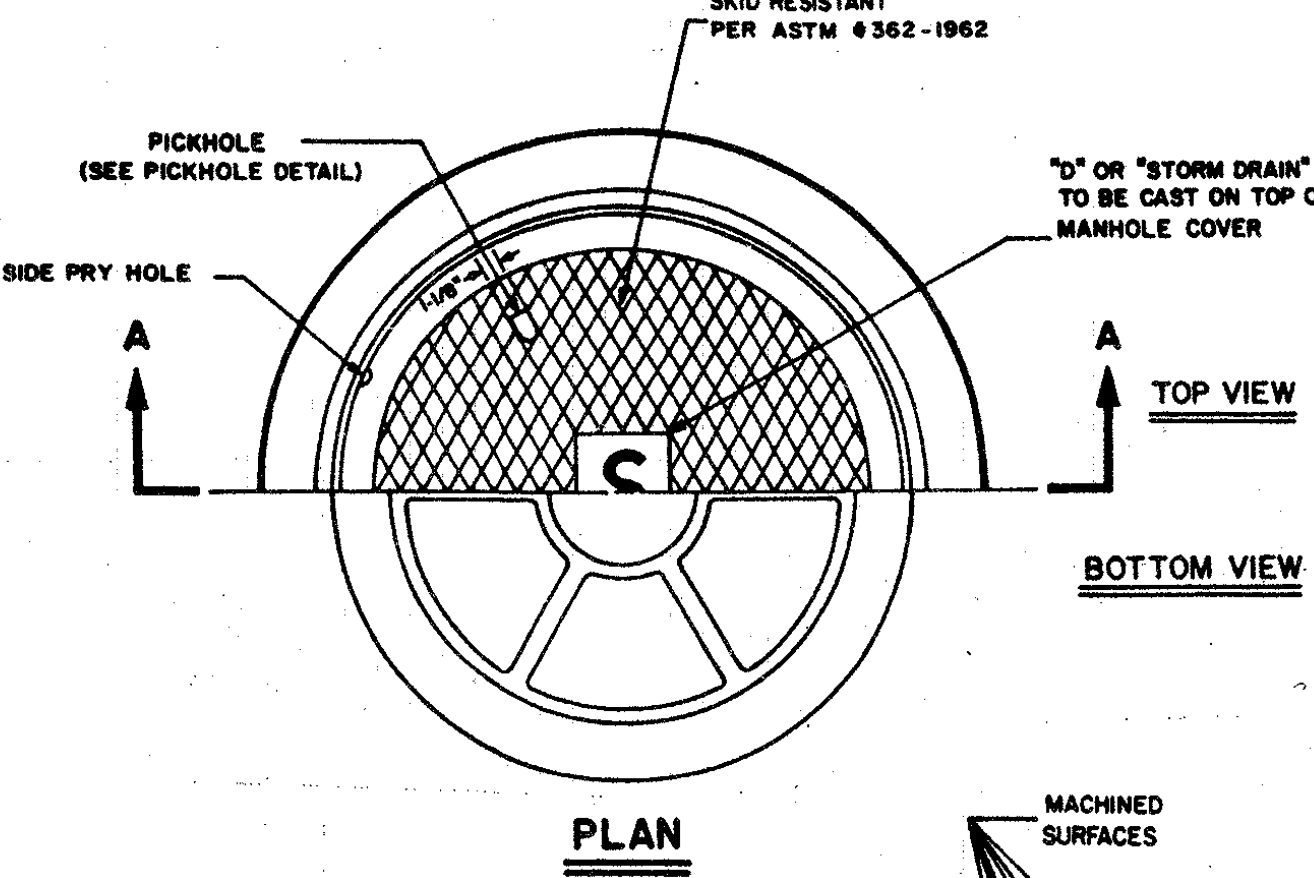
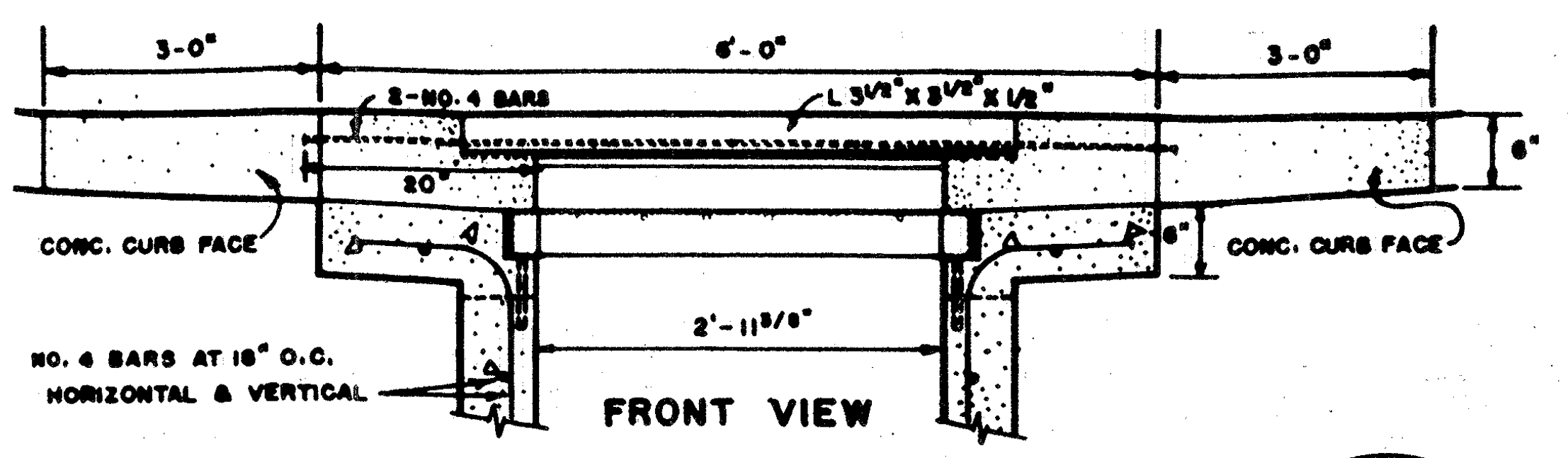
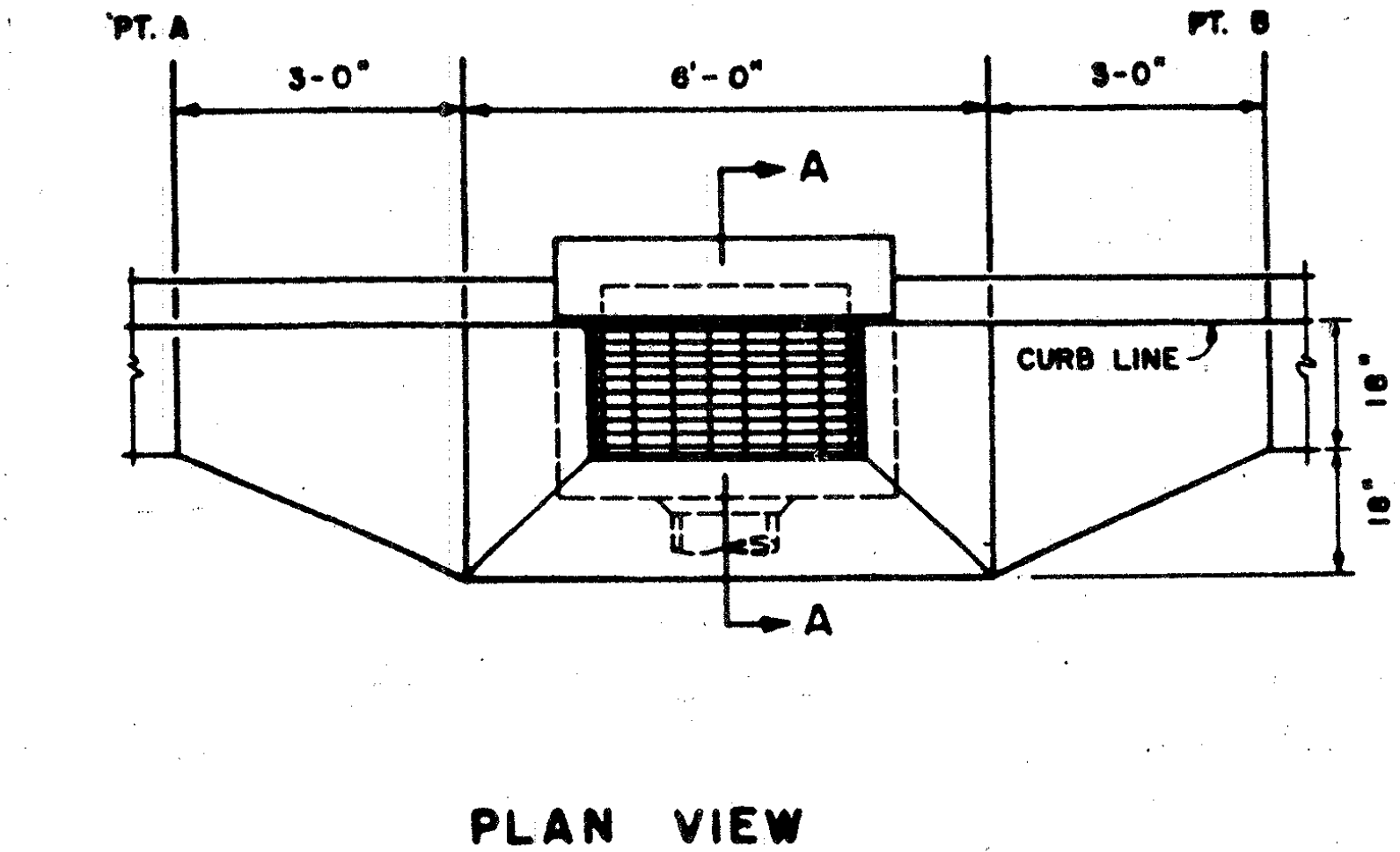
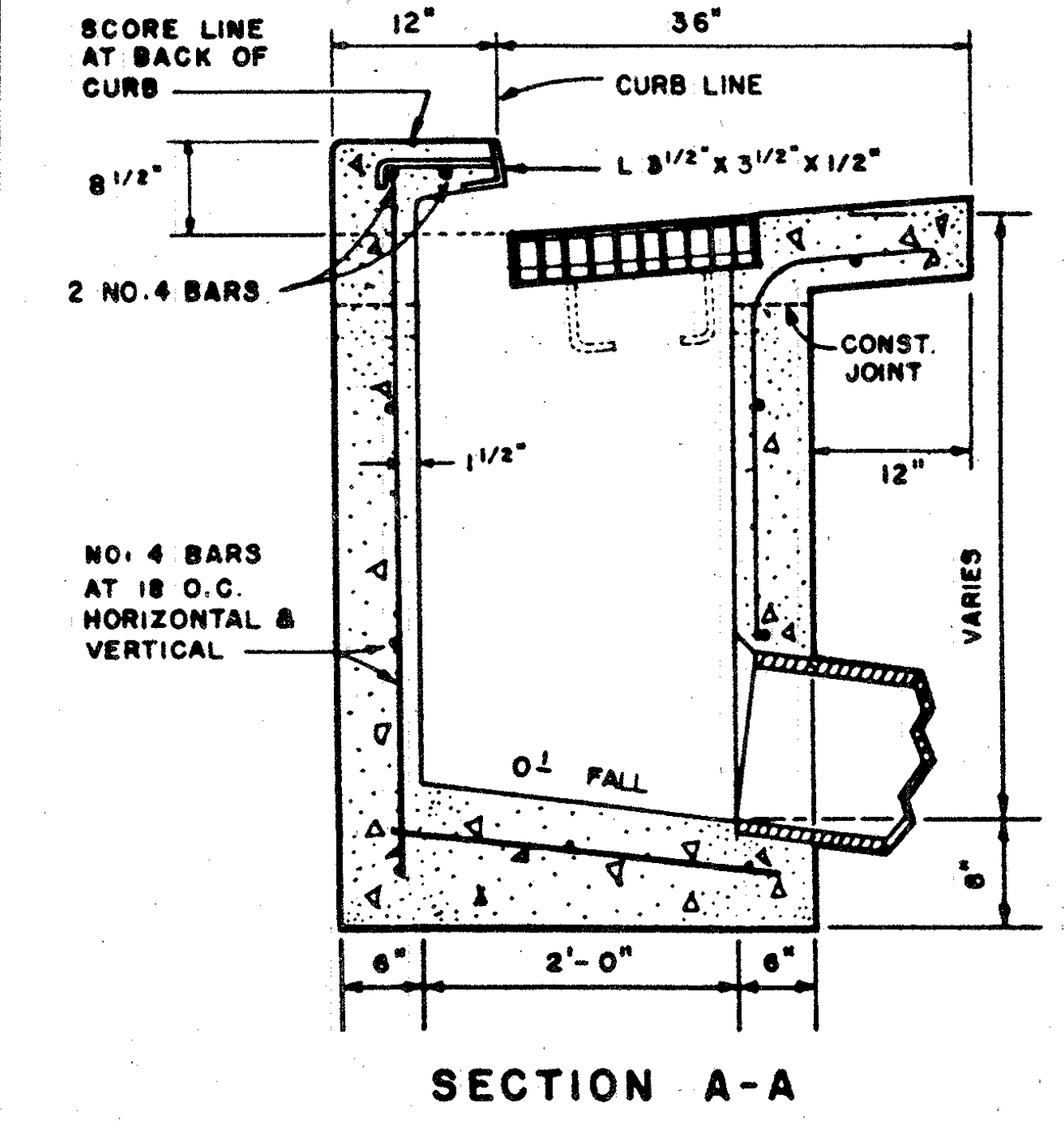
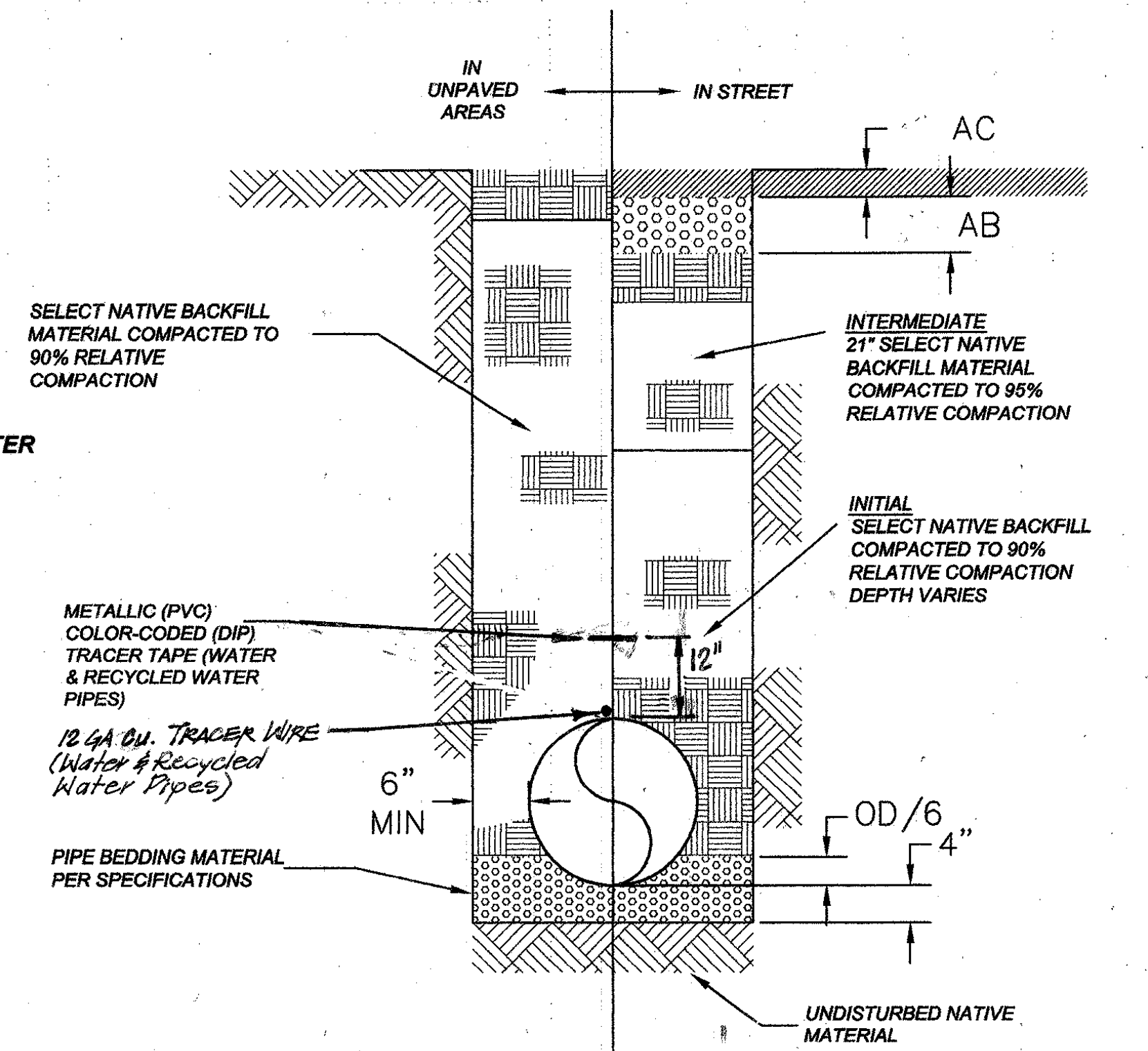
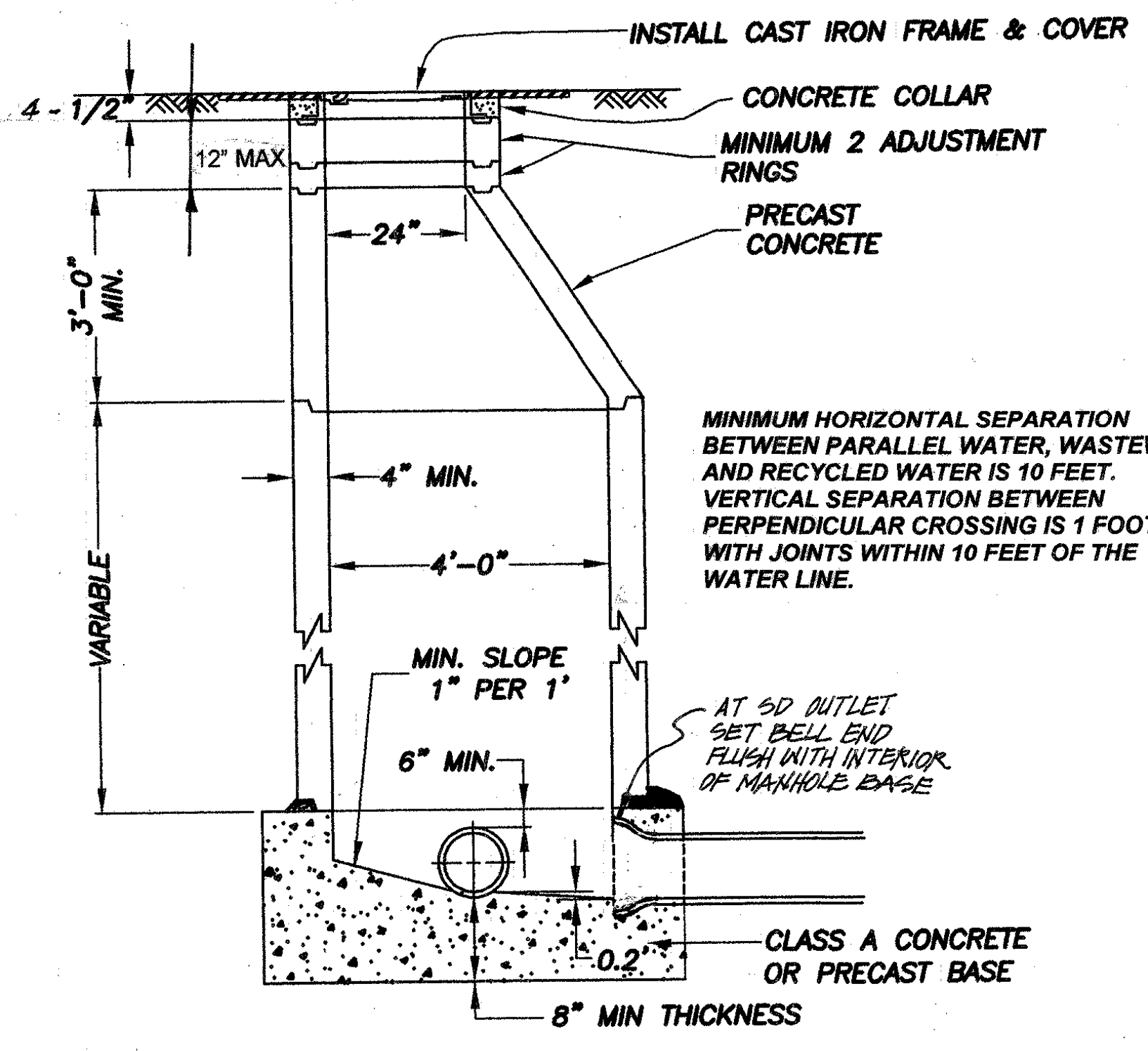
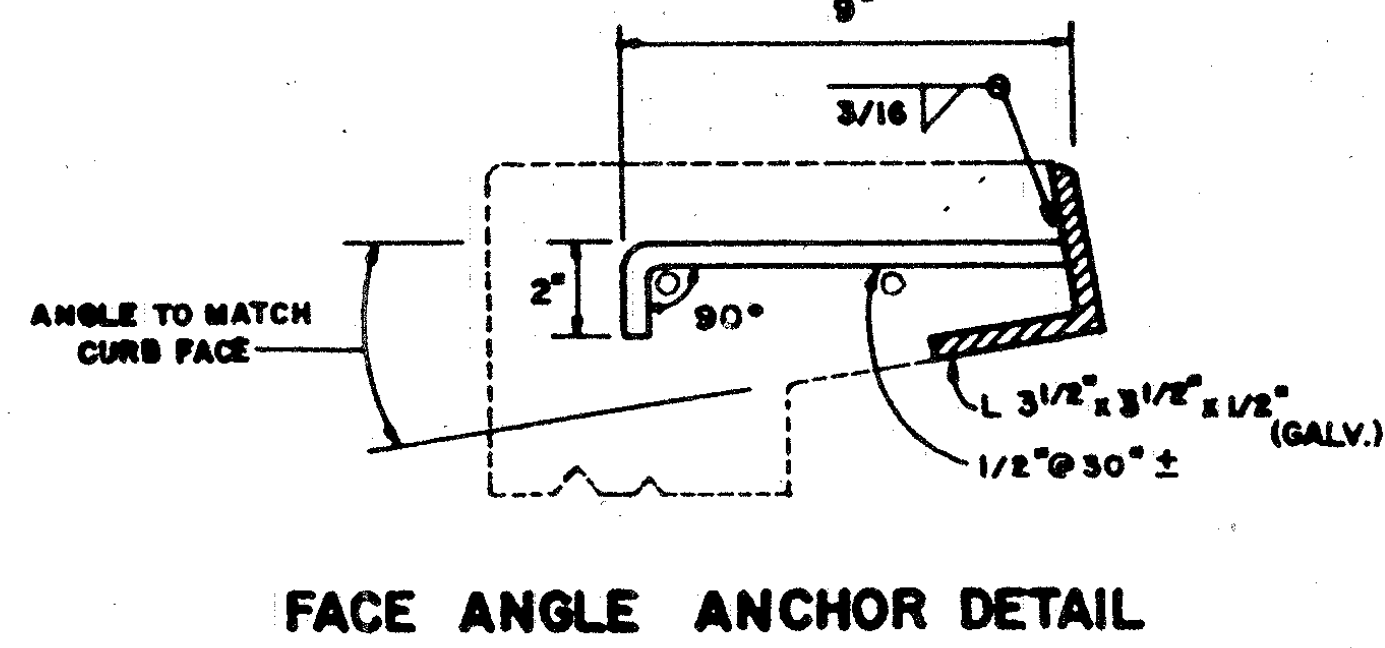
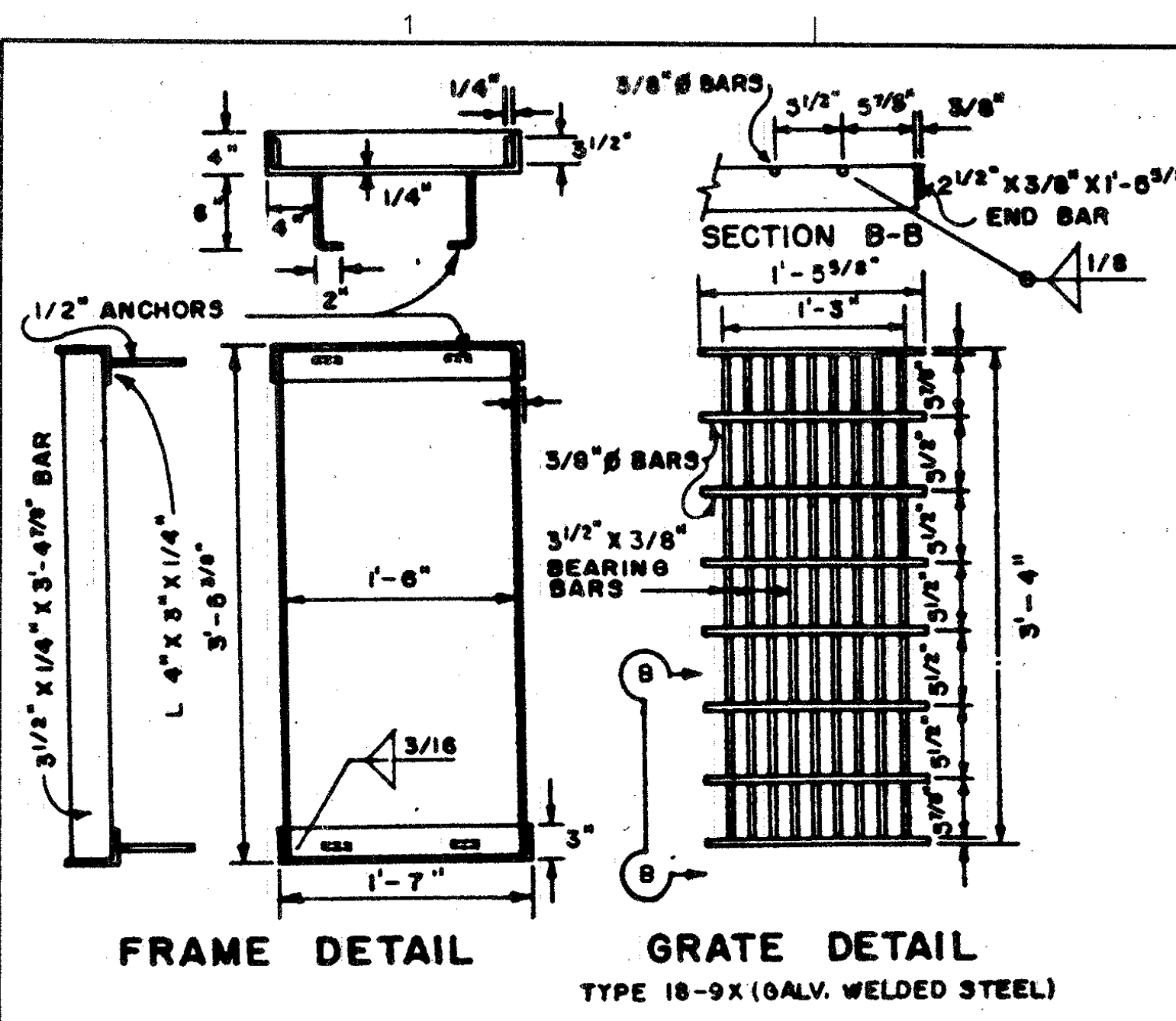
Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933

DR: RSG
CHK: POR

Approved: *[Signature]* Date: 1/6/99

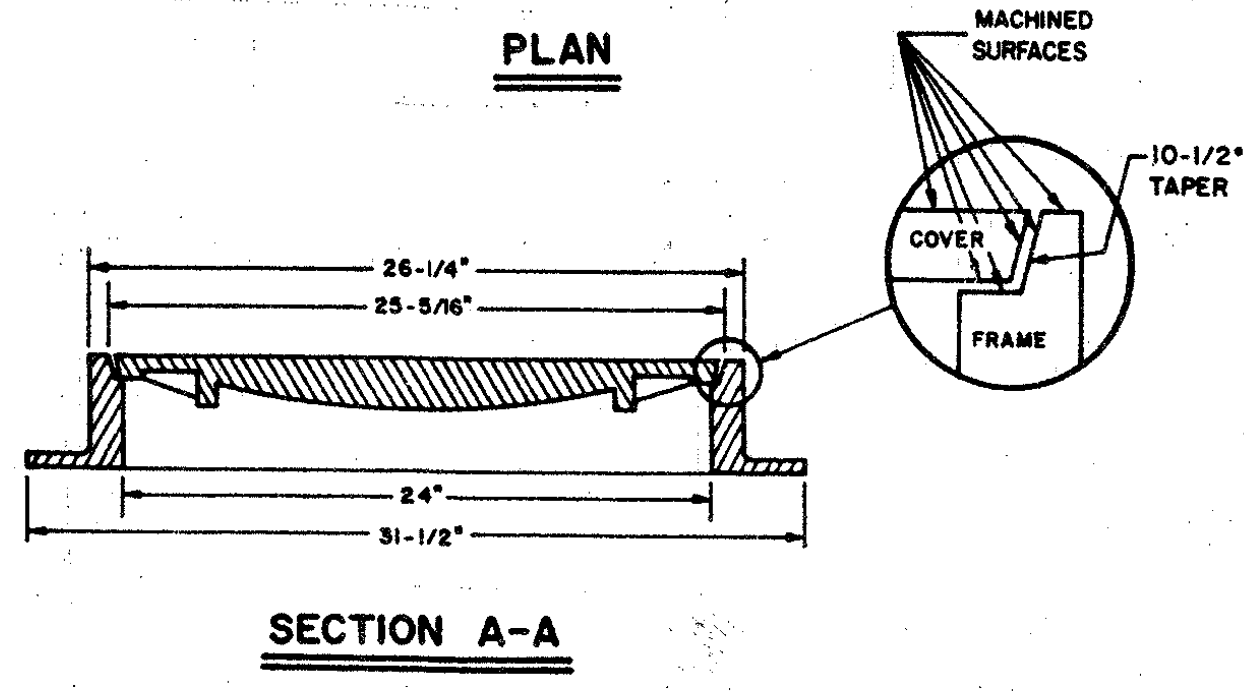
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STREET AND UTILITY OPENING PROJECT
STANDARD DETAILS

SHEET 22 of 41
DWG
DATE June 1999
PROJ R1680



- CATCH BASIN NOTES:**
- ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 51 OF THE CITY OF SALINAS STANDARD SPECIFICATIONS.
 - ALL CONCRETE SHALL BE CLASS A P.C.C.
 - FRAME AND GRATE SHALL CONFORM TO CALTRANS TYPE 18-9X GALVANIZED WELDED STEEL FRAME AND GRATE AND RATED FOR H-20 LOADING.
 - CURB AND GUTTER FROM PT. A TO PT. B SHALL BE INCLUDED IN THE CATCH BASIN FOR PAYMENT PURPOSES.
 - CONTRACTOR MAY SUBSTITUTE APPROVED PRECAST CATCH BASIN FOR THE CAST-IN-PLACE AS SHOWN.

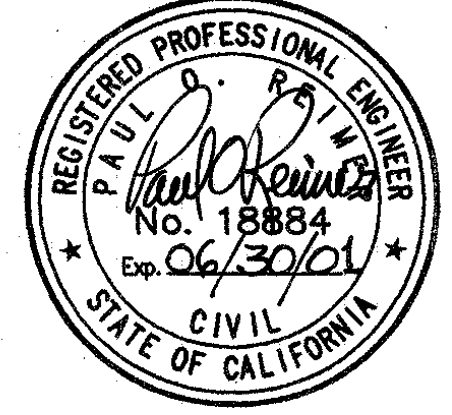
CATCH BASIN - TYPE "A" DETAIL
 NTS



- MANHOLE NOTES:**
- BEARING SURFACES OF FRAME AND COVER SHALL BE MACHINED TO FIT WITH POSITIVE PRESSURE ON ALL SURFACES.
 - MINIMUM WEIGHT FOR RING AND COVER SHALL BE 265 POUNDS.
 - MANHOLE NOT APPLICABLE TO UTILITIES.
 - ALL MATERIALS USED IN MANUFACTURING FRAME AND COVER SHALL CONFORM TO ASTM A-159-70T-G3000 OR U.S. GOVERNMENT SPECIFICATIONS QQ1-853.
 - ENTIRE FRAME AND COVER ASSEMBLY SHALL BE CAPABLE OF SUPPORTING H-20 HIGHWAY LOADING.

MANHOLES COVER DETAIL
 NTS

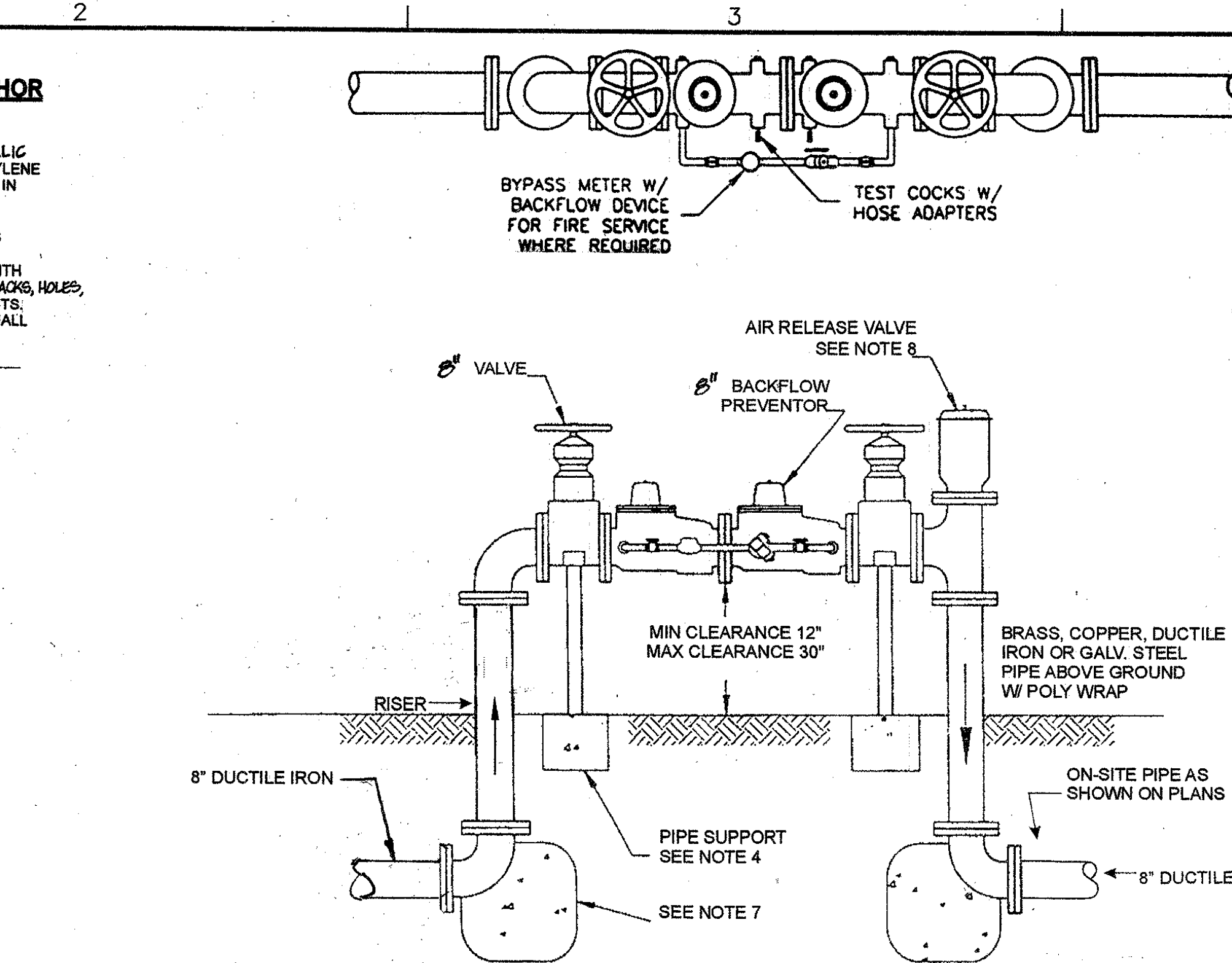
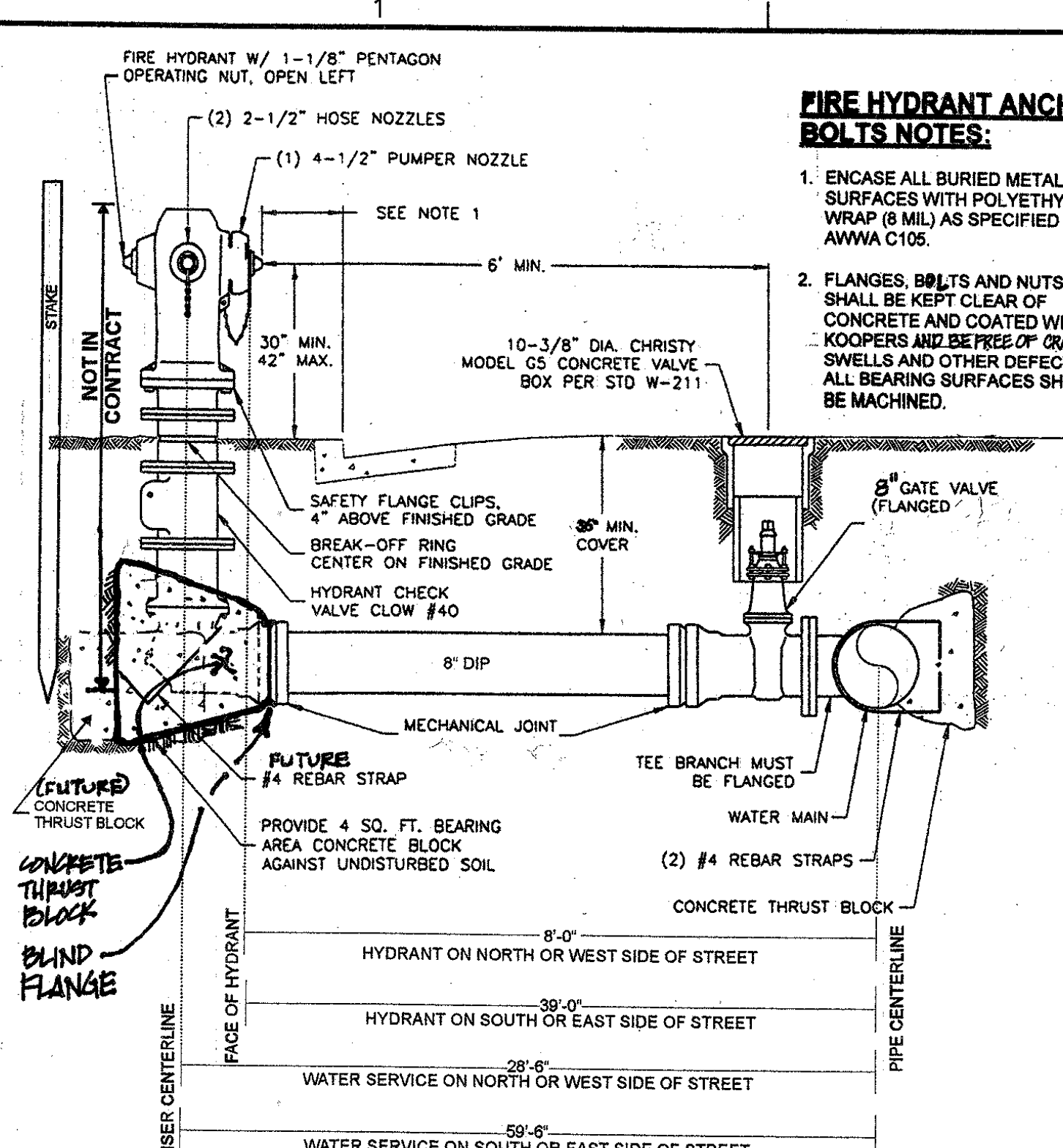
STORM DRAINAGE DETAILS



Project Design Team:		VERIFY SCALE		COMPANY		Fort Ord Reuse Authority		University of California - Santa Cruz		SHEET 23 of 41	
• Reimer Associates	• CH2MHill	BAR IS ONE INCH ON ORIGINAL DRAWING.		Reimer Associates		100 12th Street, Bldg. 2880		Monterey Bay Education, Science and Technology Park		DWG	
• Kleinfelder	• Higgins Associates	0"		DSGN POR/BCC		Marina, CA 93933		STREET AND UTILITY OPENING PROJECT		DATE June 1999	
• EMC Planning Group	• HD Peters Associates, Inc.	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		DR KKR		Approved <i>[Signature]</i> 7/16/99		STANDARD DETAILS		PROJ R1680	
				CHK BCC		Date					
NO.	DATE	REVISION		BY		APVD					



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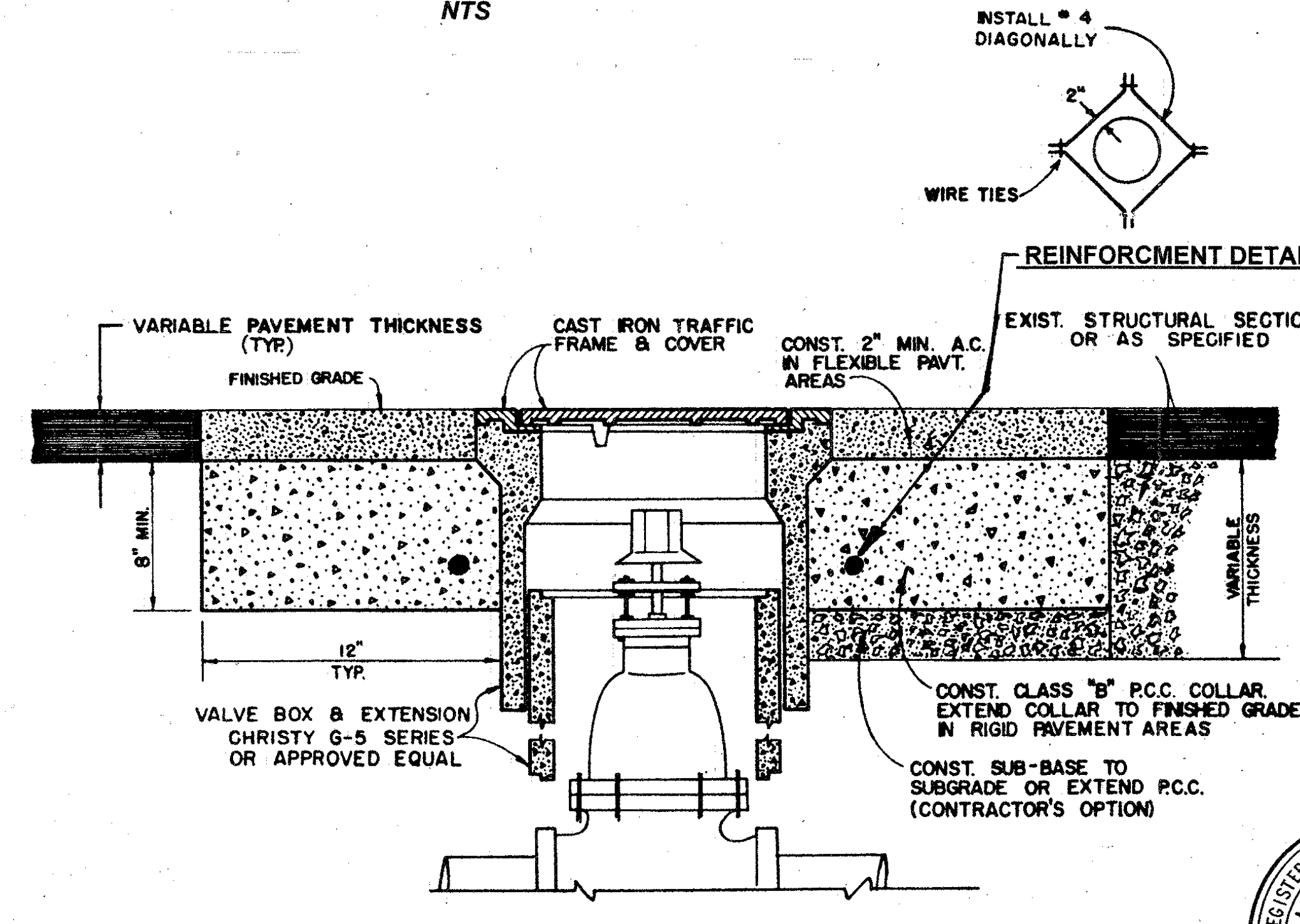


- REDUCED PRESSURE AND DOUBLE CHECK VALVE BACKFLOW PREVENTER NOTES:**
1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLIES SHALL BE FEBCO MODEL 825Y OR EQUAL. ENTIRE ASSEMBLY INCLUDING ISOLATION VALVES, TEST COCKS AND BYPASS METER WITH BACKFLOW DEVICE (IF REQUIRED) SHALL BE PROVIDED AS A COMPLETE UNIT.
 2. DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLIES SHALL BE FEBCO MODEL 805 OR 806 SERIES OR EQUAL. ENTIRE ASSEMBLIES INCLUDING ISOLATION VALVES, TEST COCKS AND BYPASS METER (IF REQUIRED) SHALL BE PROVIDED AS A COMPLETE UNIT.
 3. TEST COCKS FOR BACKFLOW PREVENTERS 3" AND LARGER SHALL BE PROVIDED WITH STANDARD MALE 3/4" IRON PIPE BY MALE GARDEN HOSE THREAD ADAPTERS.
 4. BACKFLOW PREVENTERS 3" AND LARGER SHALL BE SUPPORTED BY GALVANIZED PIPE SADDLE SUPPORTS WITH 4" THICK, 12" SQUARE CONCRETE FOOTINGS.
 5. ASSEMBLIES ON FIRE SERVICE LINES SHALL HAVE OS&Y VALVES. HAND WHEELS ON OS&Y VALVES SHALL BE CHAINED AND LOCKED. USE GALVANIZED CHAIN, STRAIGHT LINK. CHAIN SHALL BE DOUBLE LOCKED. ONE LOCK WILL BE SUPPLIED BY MCWD.
 6. INSTALLATION REQUIRED BY TITLE 17 OF THE CALIFORNIA CODE OF REGULATIONS AND THE DEPARTMENT OF HEALTH SERVICES RECOMMENDATIONS.
 7. THRUST BLOCKING SHALL BE REQUIRED PER STANDARD DETAILS OF MARINA COAST WATER DISTRICT.
 8. BACKFLOW PREVENTERS 3" AND LARGER SHALL HAVE AN AIR RELEASE VALVE. VALVES SHALL BE APCO NO. 50, 1/2" FOR 3" TO 6" SERVICE, 3/4" FOR 8" TO 12" SERVICE.
 9. ASSEMBLY SHALL BE PROTECTED BY GUARD POSTS WHEN LOCATED NEAR TRAFFIC AREAS.
 10. NO CONNECTIONS OR TEES WILL BE ALLOWED BETWEEN METER AND BACKFLOW PREVENTER.
 11. DEVICE MUST BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
 12. INSTALLATIONS USING THREADED OR SOLDERED FITTINGS SHALL INCLUDE ONE THREE PART UNION ON EACH SIDE OF THE ASSEMBLY. SOLDER SHALL BE LEAD FREE.
 13. ASSEMBLIES INSTALLED IN AREAS SUBJECT TO VANDALISM SHALL BE ENCLOSED IN A CAGE. CAGE SHALL PROVIDE 12" MINIMUM CLEARANCE ALL AROUND AND SHALL BE SUBMITTED TO MCWD FOR APPROVAL.

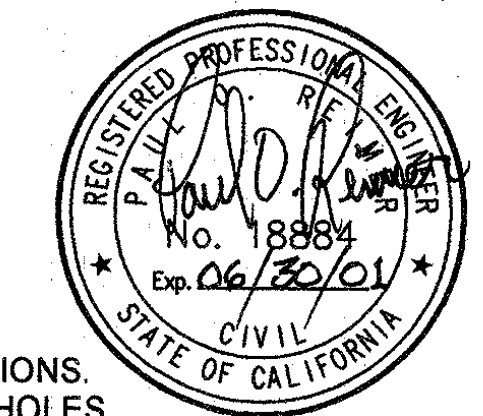
- FIRE HYDRANT ASSEMBLY NOTES:**
1. FACE OF HYDRANT SHALL BE LOCATED 18" BEHIND FACE OF CURB.
- WATER SERVICE ASSEMBLY NOTES:**
1. CENTER OF RISER TO BLIND FLANGE SHALL BE LOCATED 22' BEHIND FACE OF CURB.

FIRE HYDRANT AND WATER SERVICE ASSEMBLY DETAIL

NTS

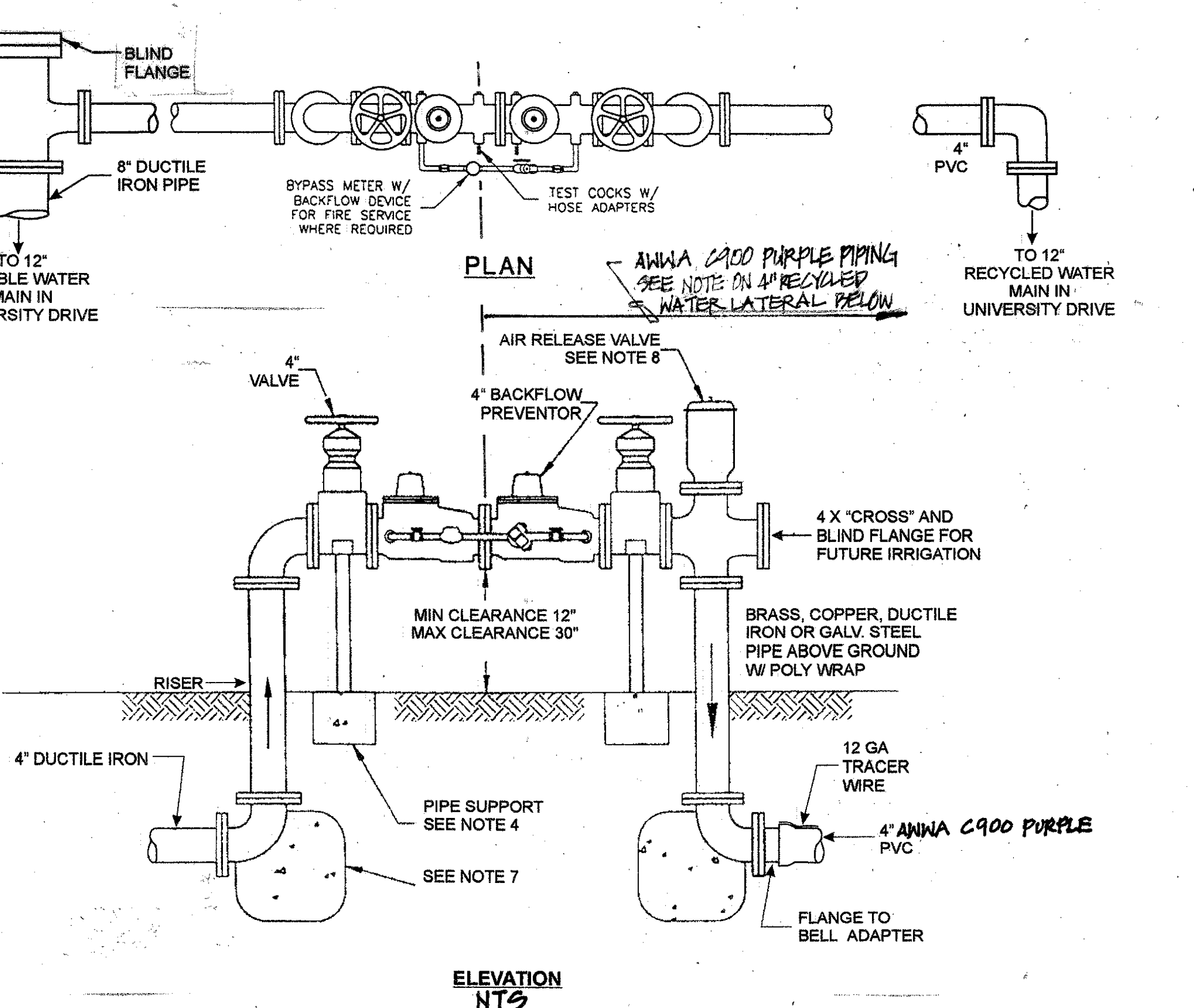
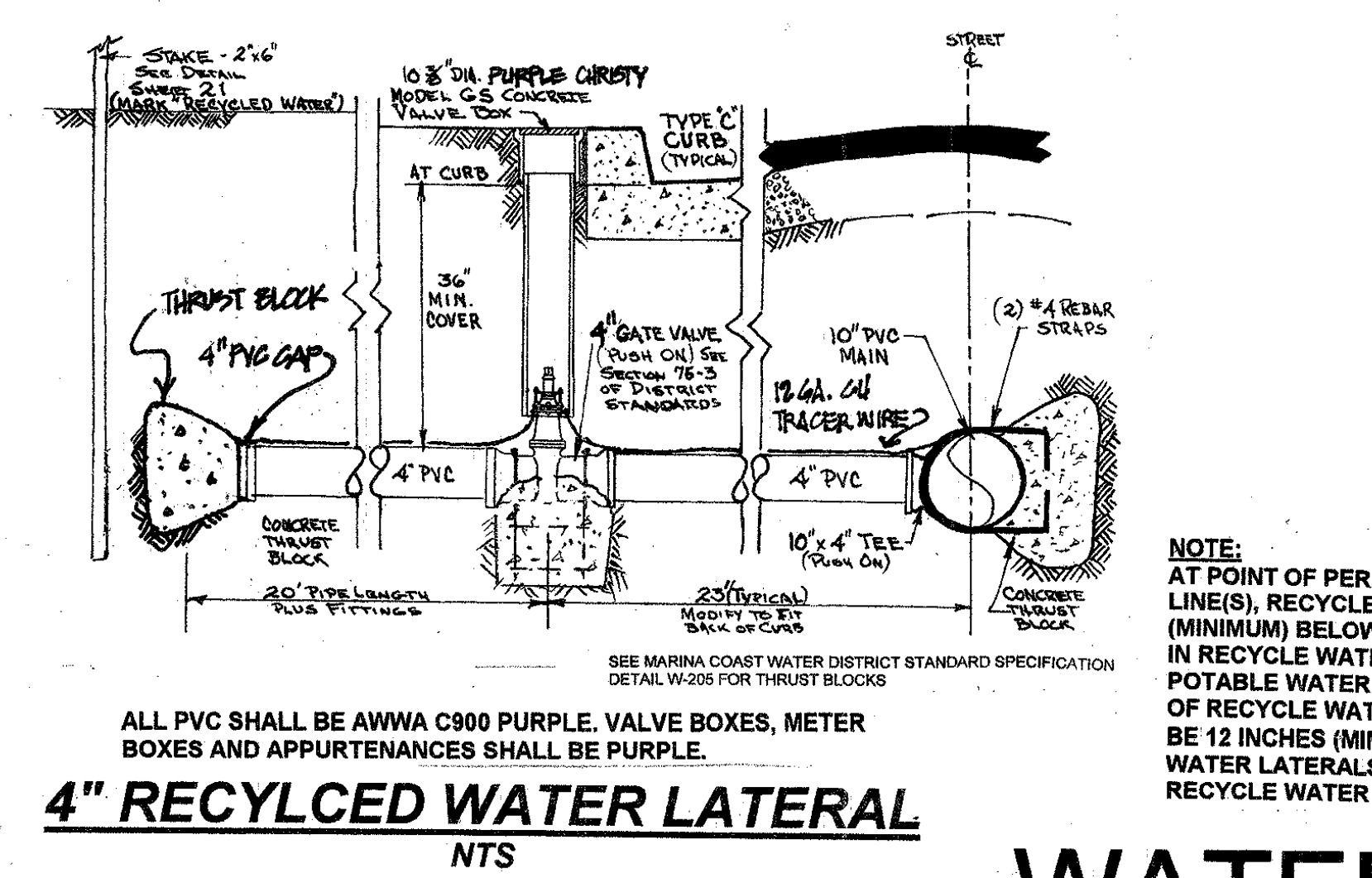
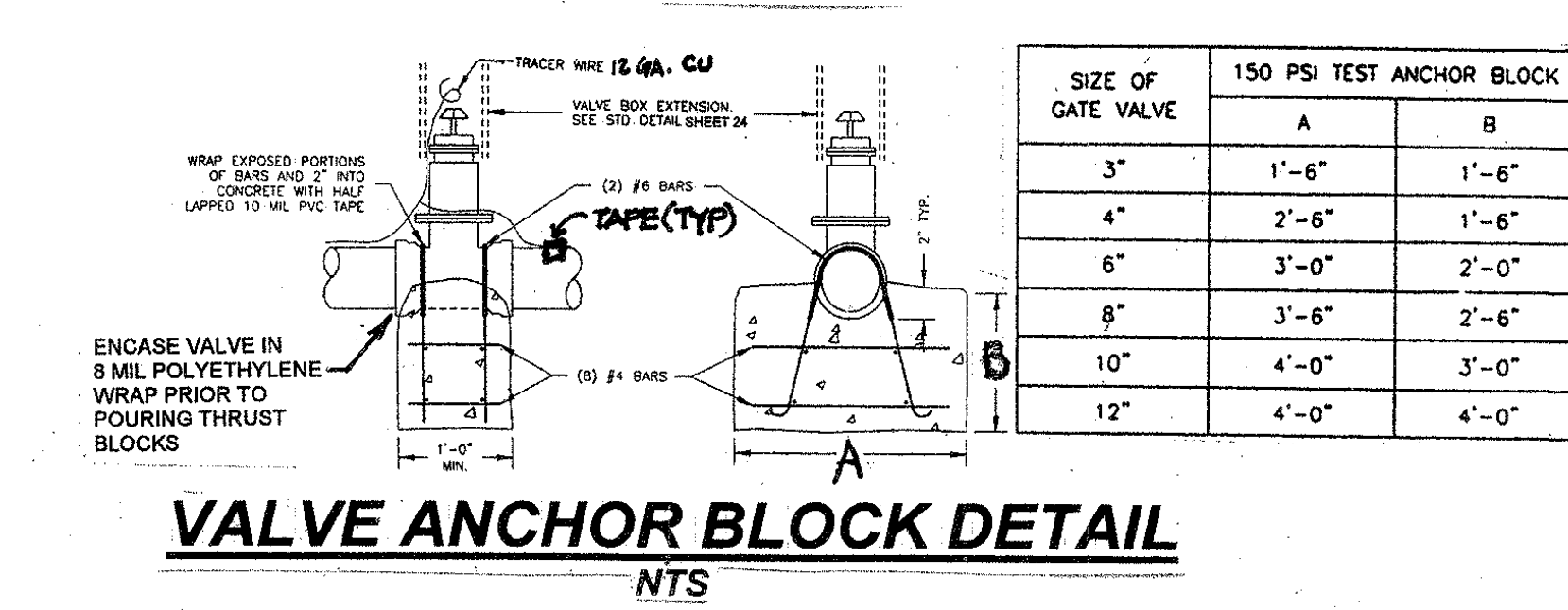


- VALVE BOX NOTES:**
1. P.C.C. SHALL BE CLASS "B" CONSTRUCTED PER SECTION 51 OF THE CITY OF SALINAS STANDARD SPECIFICATIONS.
 2. ALL CASTINGS SHALL BE GREY CAST IRON CONFORMING TO ASTM A-48, CLASS 30 AND BE FREE OF CRACKS, HOLES, SWELLS, AND OTHER DEFECTS. ALL BEARING SURFACES SHALL BE MACHINED.



REDUCED PRESSURE AND DOUBLE CHECK VALVE BACKFLOW PREVENTER

NTS



- REDUCED PRESSURE AND DOUBLE CHECK VALVE BACKFLOW PREVENTER**
- NOTE:
- AT POINT OF PERPENDICULAR CROSSING OF POTABLE WATER LINE(S), RECYCLE WATER LATERAL LINES SHALL BE 12 INCHES (MINIMUM) BELOW POTABLE WATER LINE WITH NO PIPE JOINTS IN RECYCLE WATER LINE WITHIN 10 FEET OF C/L OF POTABLE WATER LINE. AT POINT OF PERPENDICULAR CROSSING OF RECYCLE WATER MAIN, POTABLE WATER LATERALS SHALL BE 12 INCHES (MINIMUM) BELOW RECYCLE WATER MAIN. POTABLE WATER LATERALS SHALL PASS 12 INCHES (MINIMUM) ABOVE RECYCLE WATER LATERALS.
- SEE MARINA COAST WATER DISTRICT STANDARD SPECIFICATIONS DETAIL W-205 FOR THRUST BLOCKS AT ALL WATER LINE FITTINGS

WATER & RECYCLED WATER DETAILS

Project Design Team:			VERIFY SCALE		COMPANY Reimer Associates DSGN POR/BCC DR RSG CHK POR	Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 Approved: Date: 7/6/99	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT STANDARD DETAILS		SHEET 24 of 41
• Reimer Associates	• CH2MHill		NO.	DATE			REVISION	BY	APVD
• Kleinfelder	• Higgins Associates								PROJ R1680
• EMC Planning Group	• HD Peters Associates, Inc.								

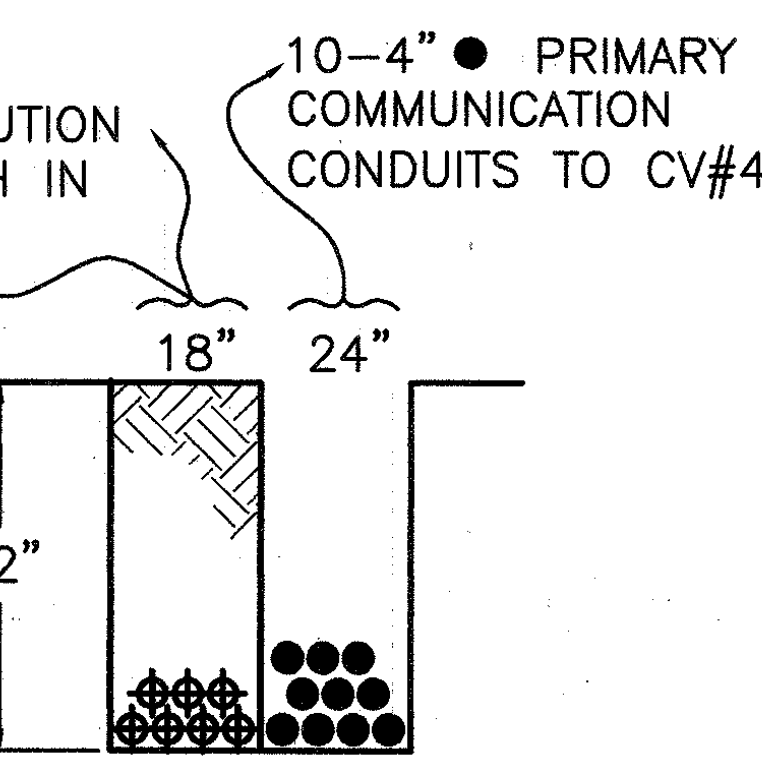
COMMUNICATION VAULT OCCUPANTS

- = 4" PRIMARY COMMUNICATION
- ◆ = 4" SECONDARY
- = 4" BLANK

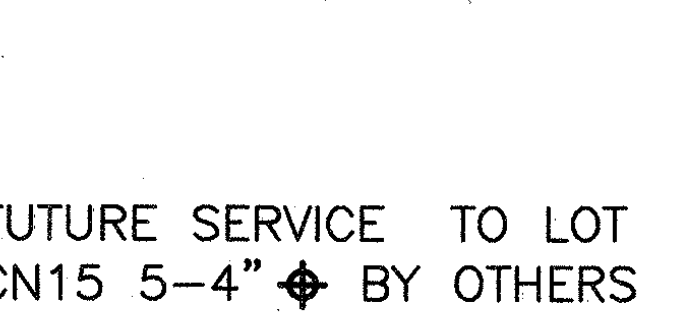
NOTE: CV'S AS SHOWN ARE PACIFIC BELL 38Y4048 MANHOLE (6'X15'X9'HR)

STANDARD NOTE FOR ALL TRENCH SECTIONS:
 MINIMUM OF 1" OF SAND BEDDING REQUIRED BETWEEN CONDUITS. INSTALL PLASTIC SADDLES TO MAINTAIN SPACING. COMPACT BACKFILL TO 95 %

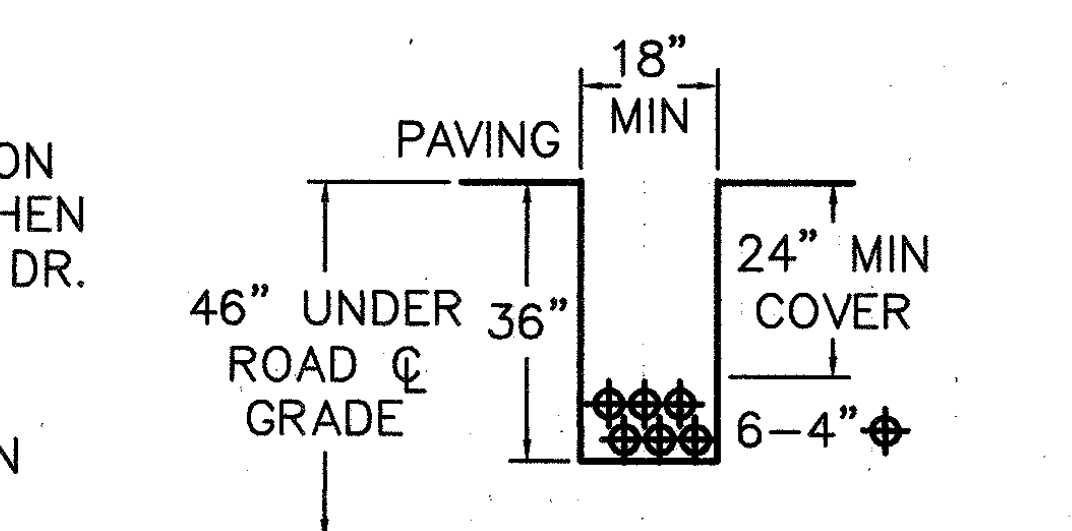
TYPICAL TRENCH DETAIL V-1 BETWEEN CV#1 & CV#2



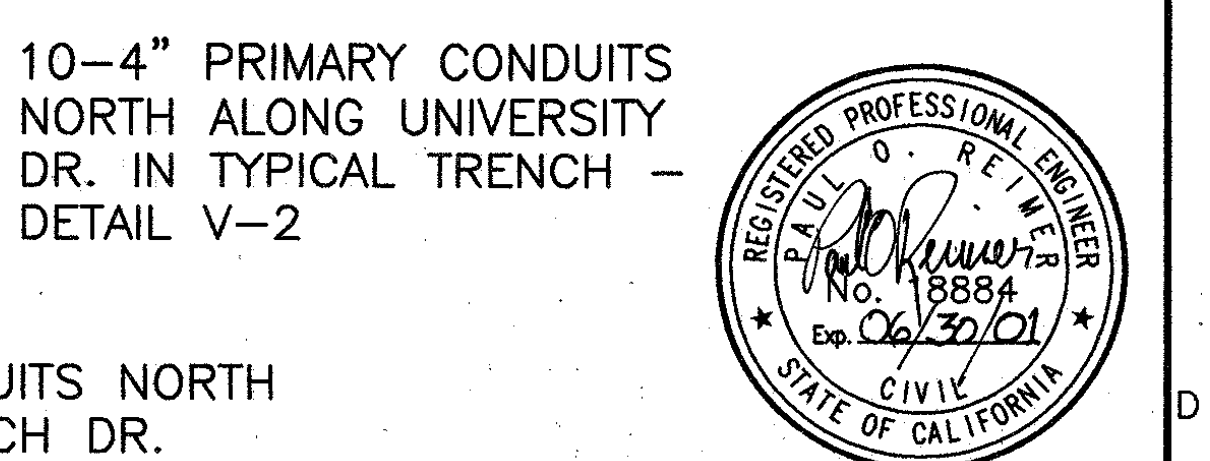
TYPICAL TRENCH DETAIL V-3 & V-4 EXITING CV#3



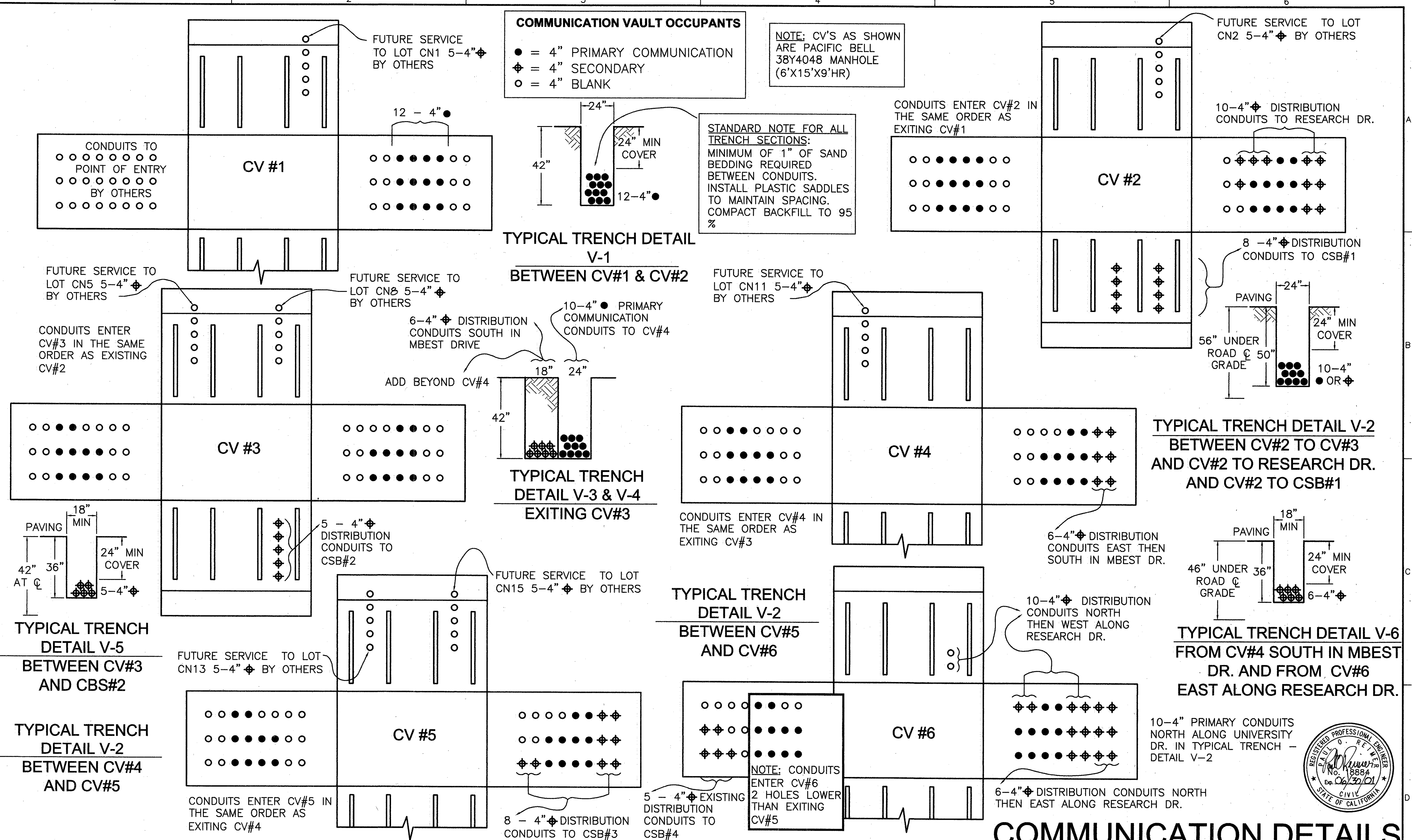
TYPICAL TRENCH DETAIL V-2 BETWEEN CV#2 TO CV#3 AND CV#2 TO RESEARCH DR. AND CV#2 TO CSB#1



TYPICAL TRENCH DETAIL V-6 FROM CV#4 SOUTH IN MBEST DR. AND FROM CV#6 EAST ALONG RESEARCH DR.



COMMUNICATION DETAILS



Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY
 Reimer Associates
 DSGN POR/BCC
 DR RSG
 CHK POR
 Approved: [Signature] Date: 1/6/99

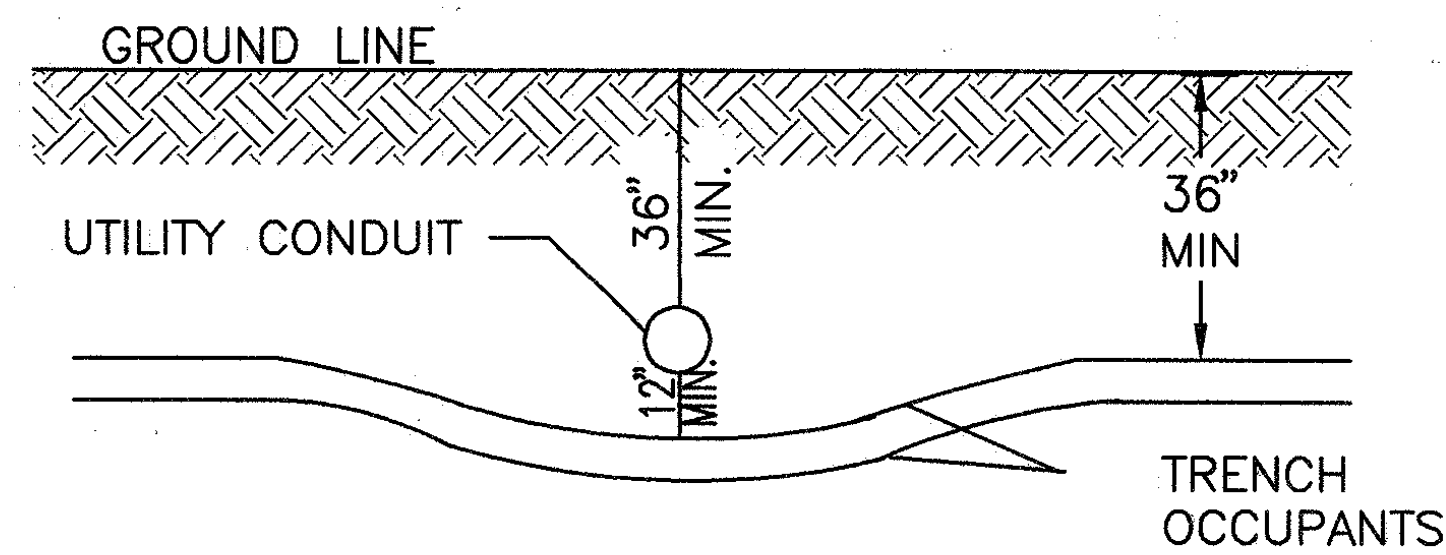
Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
 STREET AND UTILITY OPENING PROJECT
 STANDARD DETAILS

SHEET 25 of 41
 DWG
 DATE June 1999
 PROJ R1680

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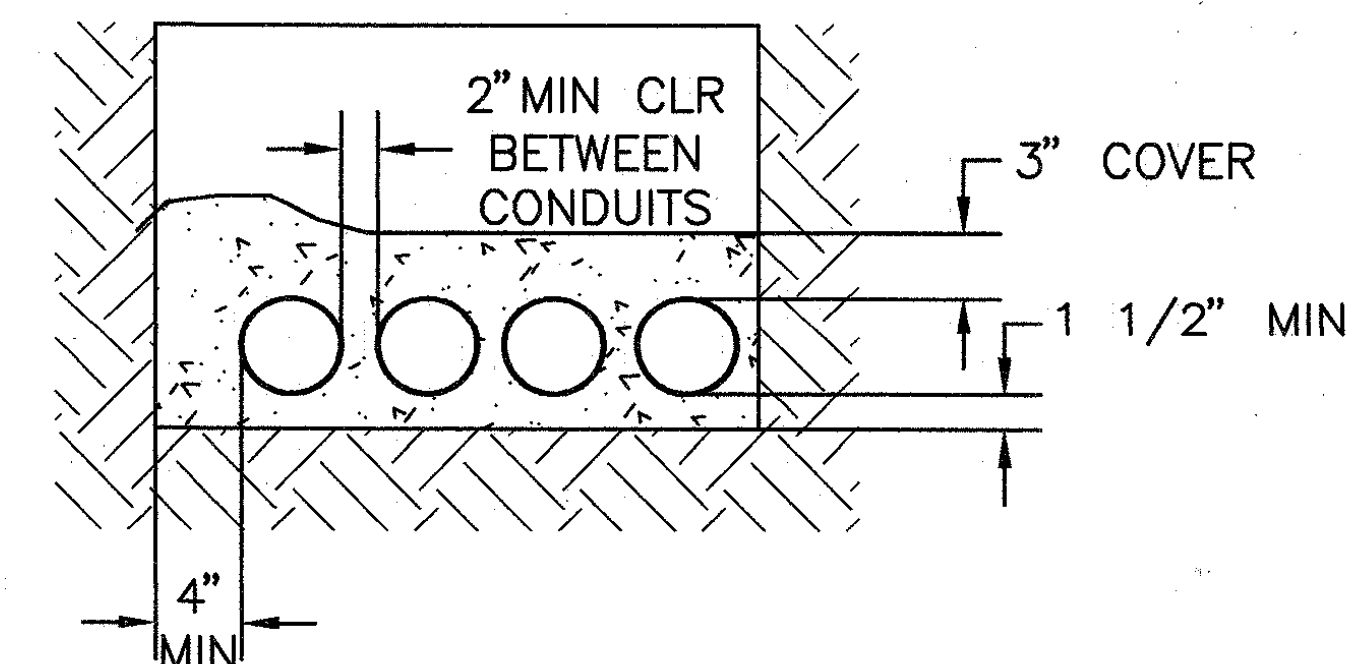




UTILITY CROSSING DETAIL

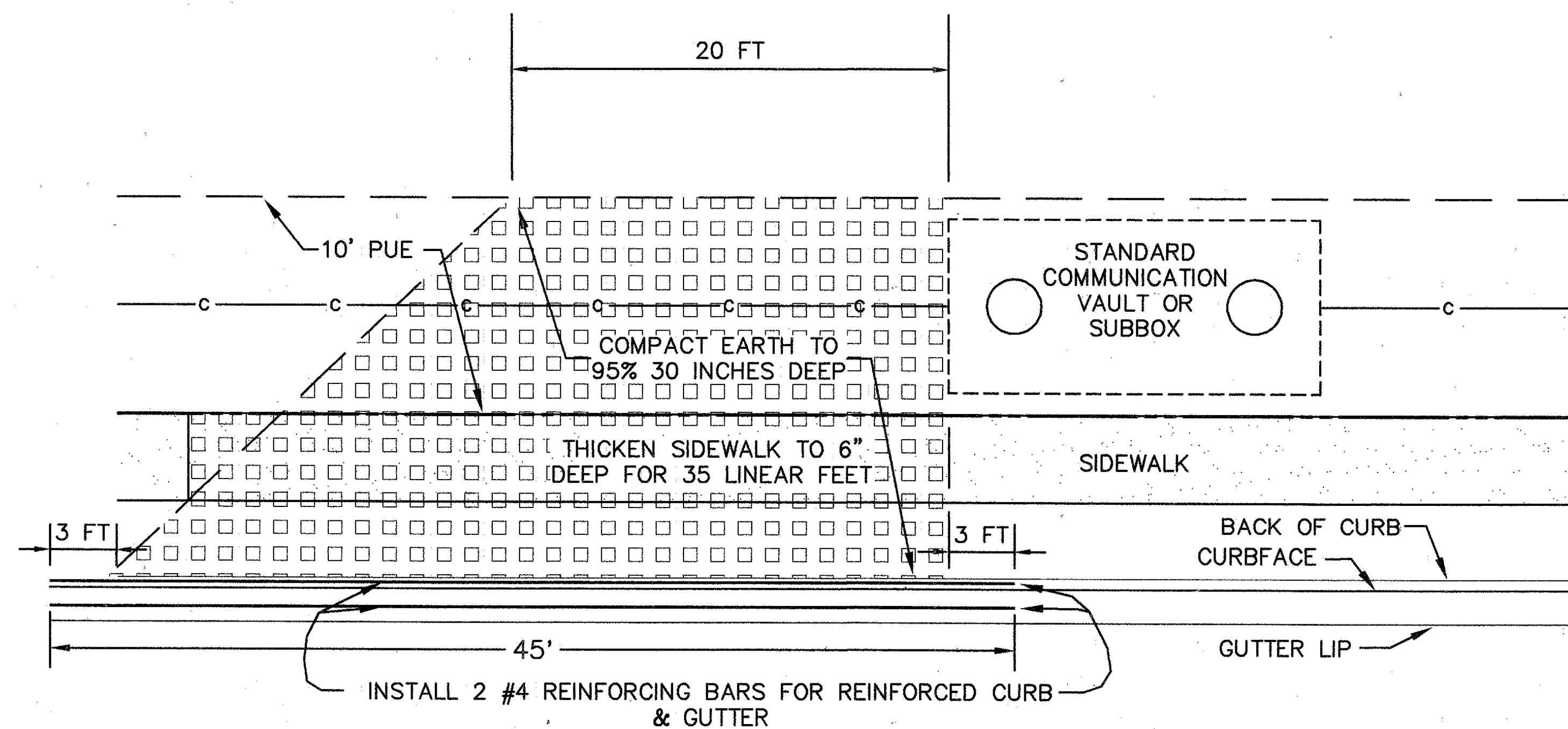
NTS

FOR CONDUITS WITH CURVE RADII LESS THAN 80FT, ENCASE IN CONCRETE AS SHOWN FOR FULL LENGTH OF CURVE.



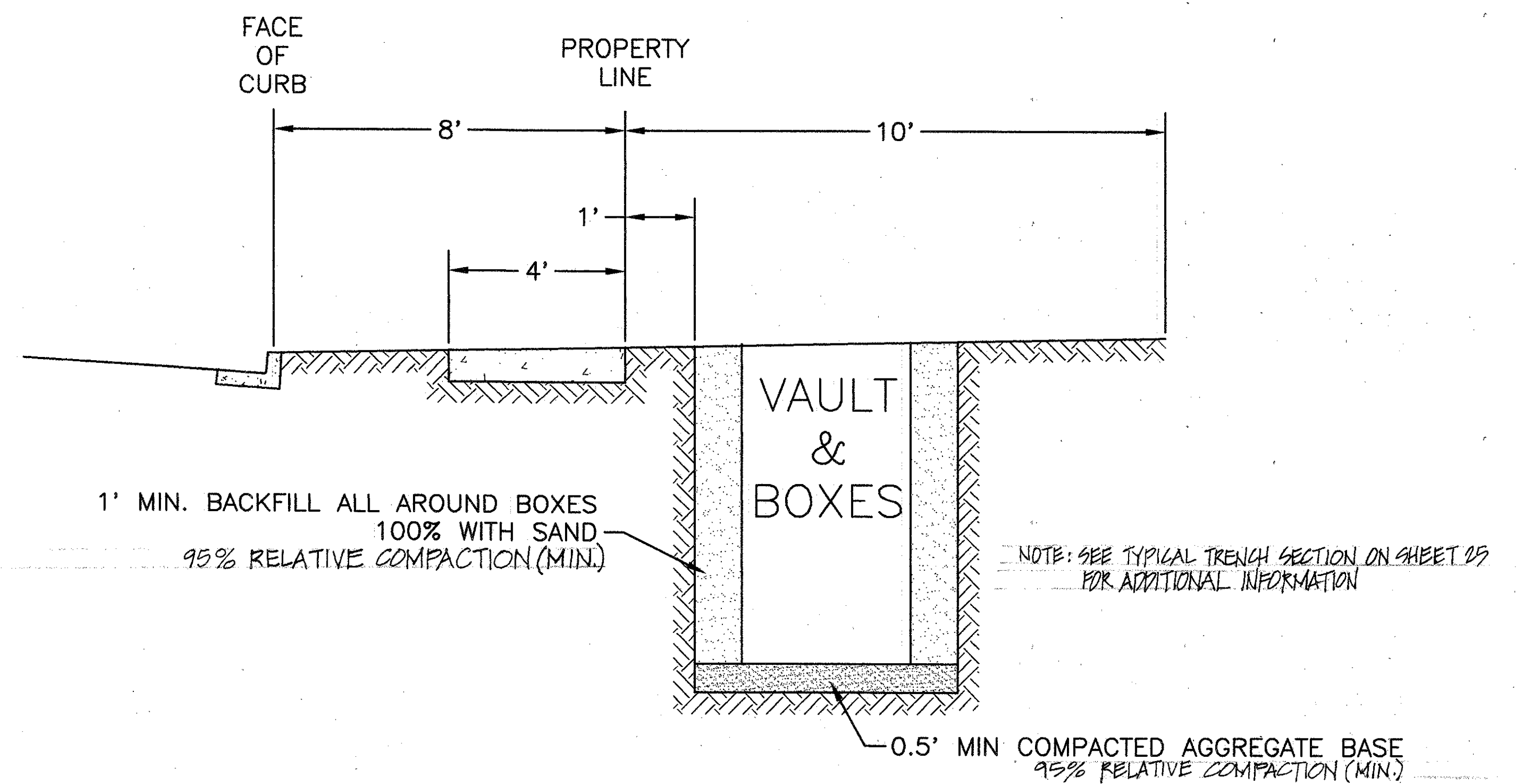
CONCRETE ENCASEMENT OF CURVED CONDUITS WITH LESS THAN 80 FT. RADIUS

NTS



TYPICAL DETAIL AT VAULTS AND SUBBOXES

NTS



TYPICAL LOCATIONS FOR VAULT AND BOX EXCAVATIONS

NTS



COMMUNICATION DETAILS

Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY	Reimer Associates
DSGN	POR/BCC
DR	RSG
CHK	POR

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100 12th Street, Bldg. 2880
Marina, CA 93933

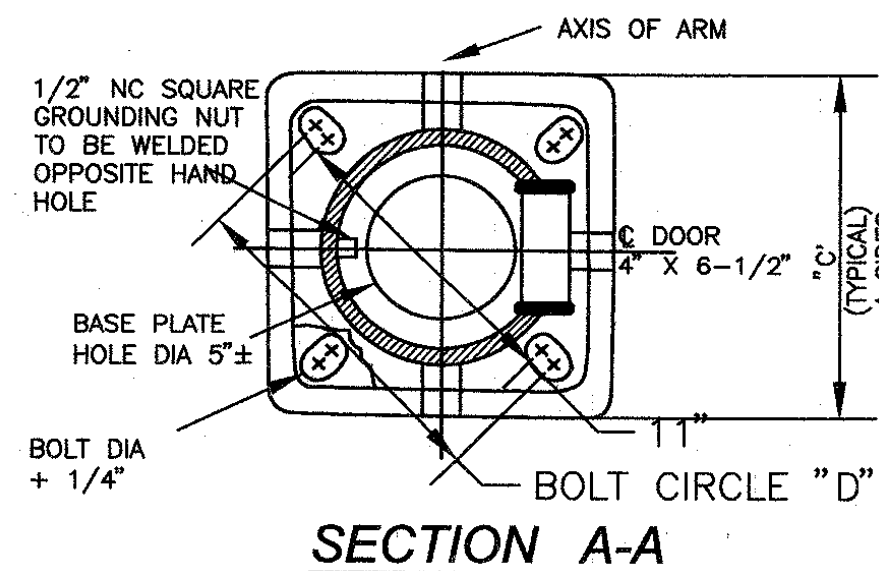
Approved: *[Signature]* Date: 7/6/99

University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
STANDARD DETAILS

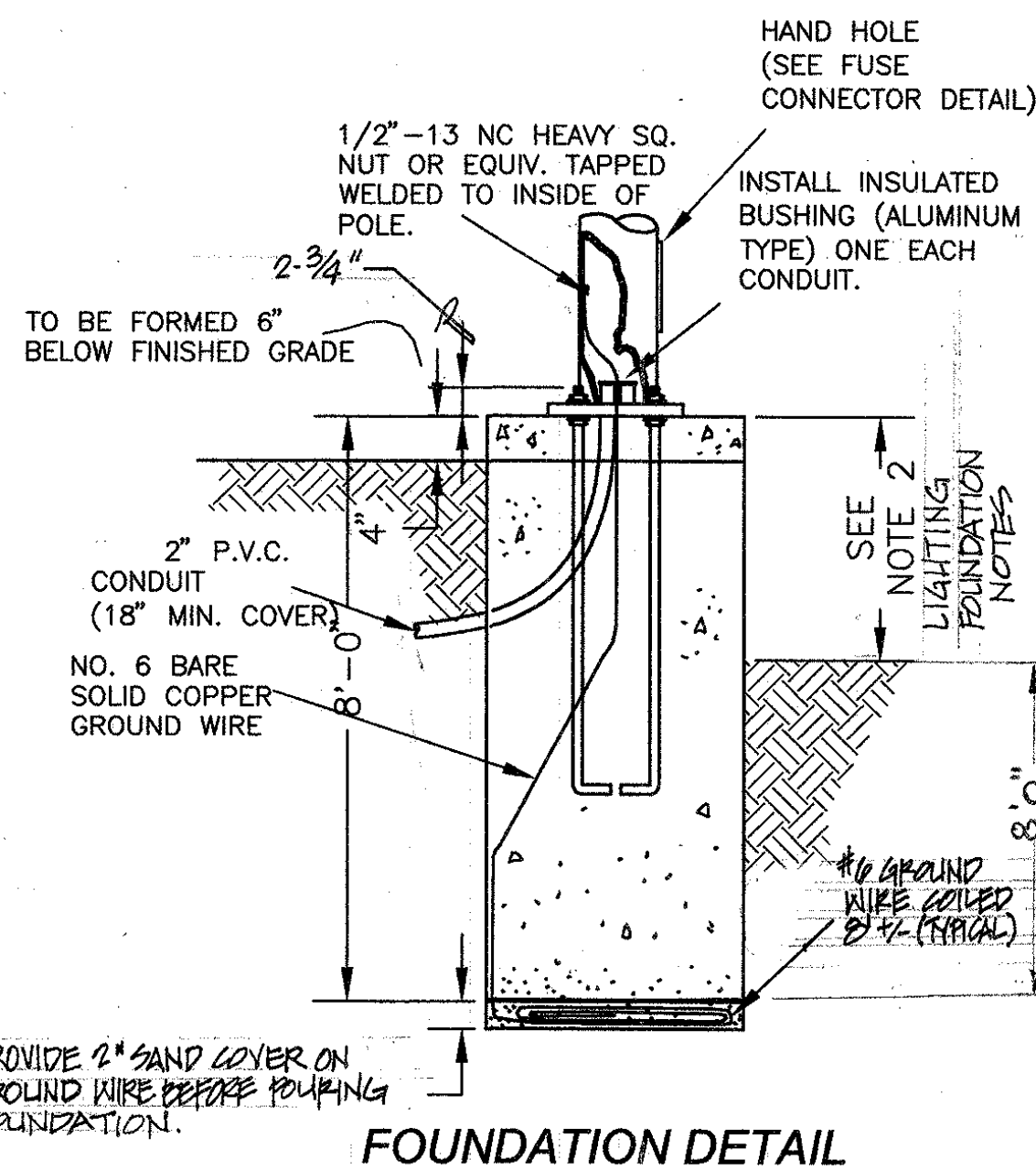
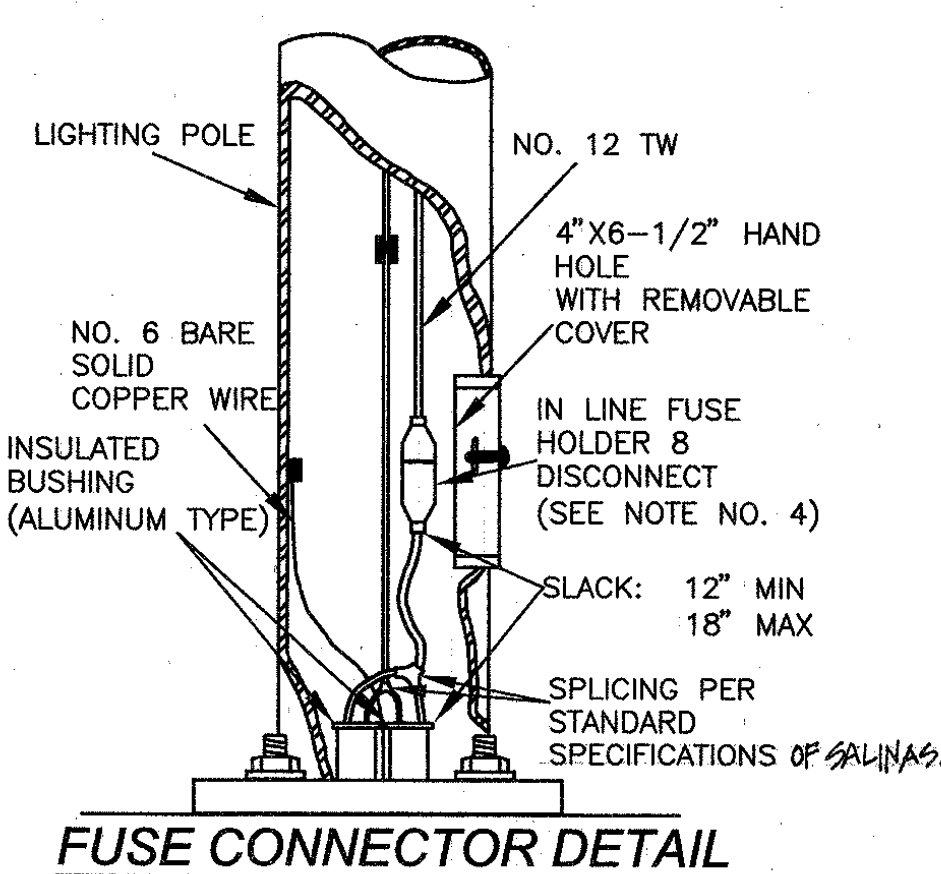
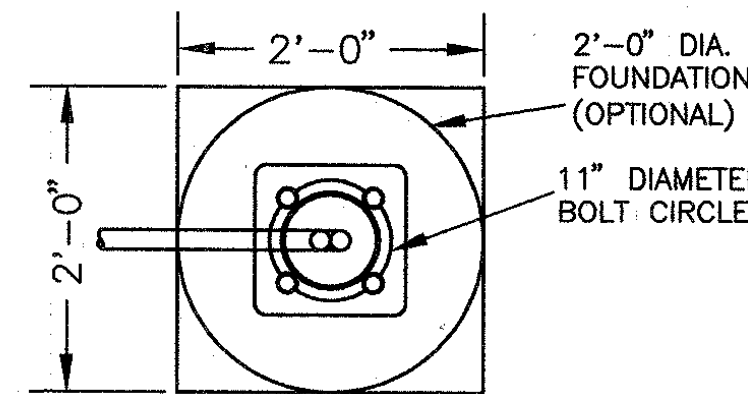
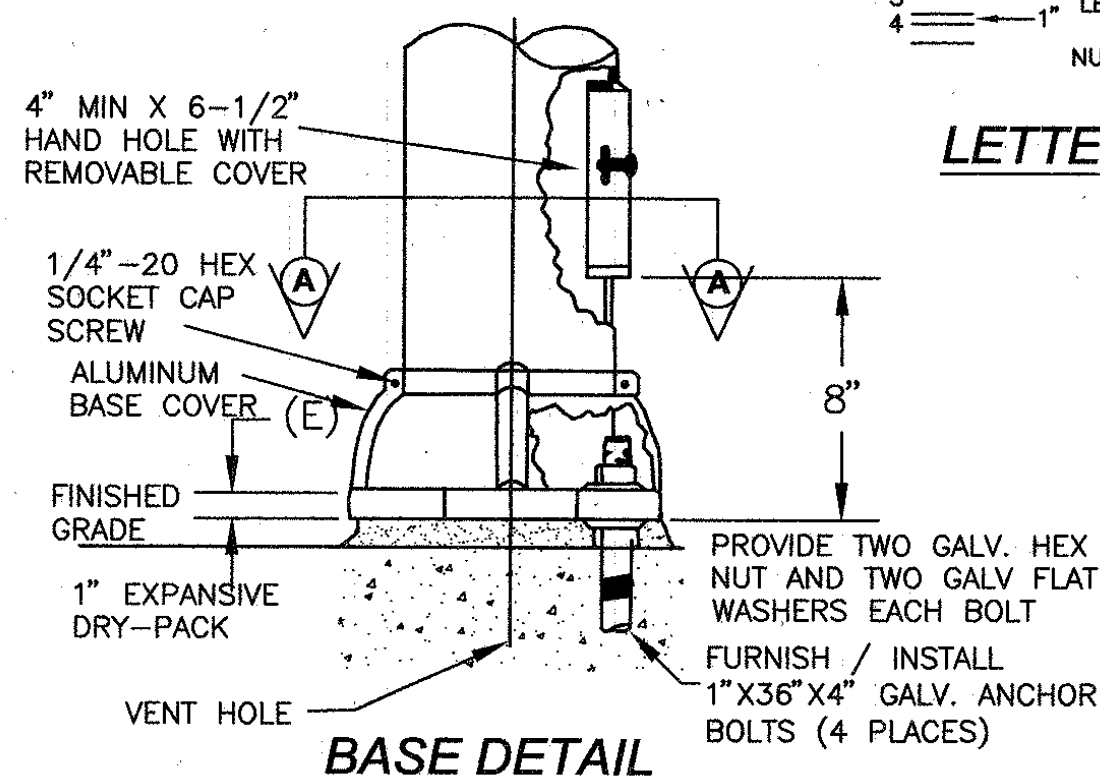
SHEET	26 of 41
DWG	
DATE	June 1999
PROJ	R1680

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POLE TYPE	POLE DATA				BASE PLATE DATA		
	"A" HEIGHT	MIN O.D.	THICKNESS	"C"	"D" BOLT CIRCLE	"E" THICKNESS	ANCHOR BOLTS
15	30'-0"	8"	3/78"	0.1198"	11-1/2"	1"	1"X3/4"X4"



LUMINAIRE	
SINGLE	DOUBLE
1	2
2	3
3	4
4	5

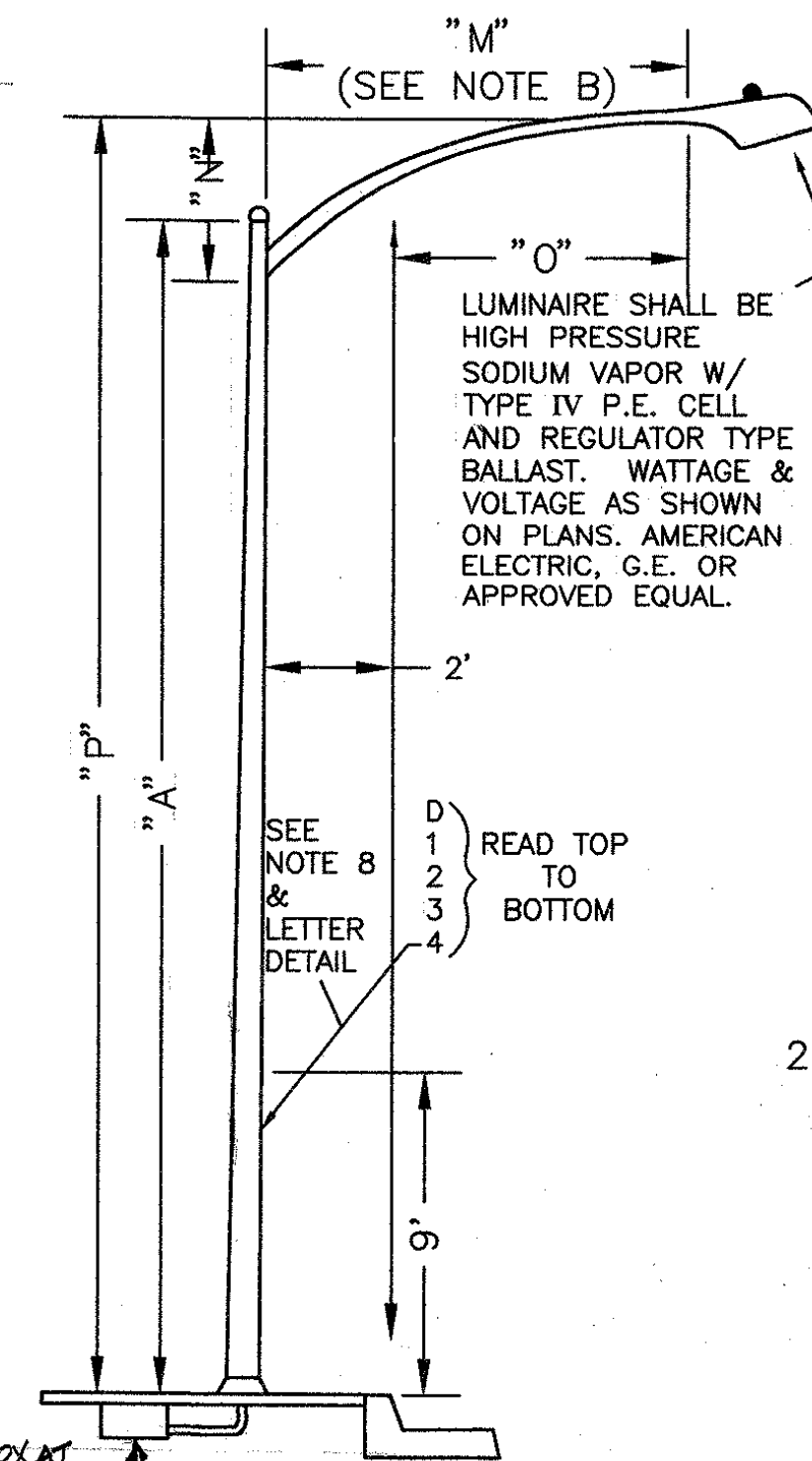


LIGHTING FOUNDATION NOTES:

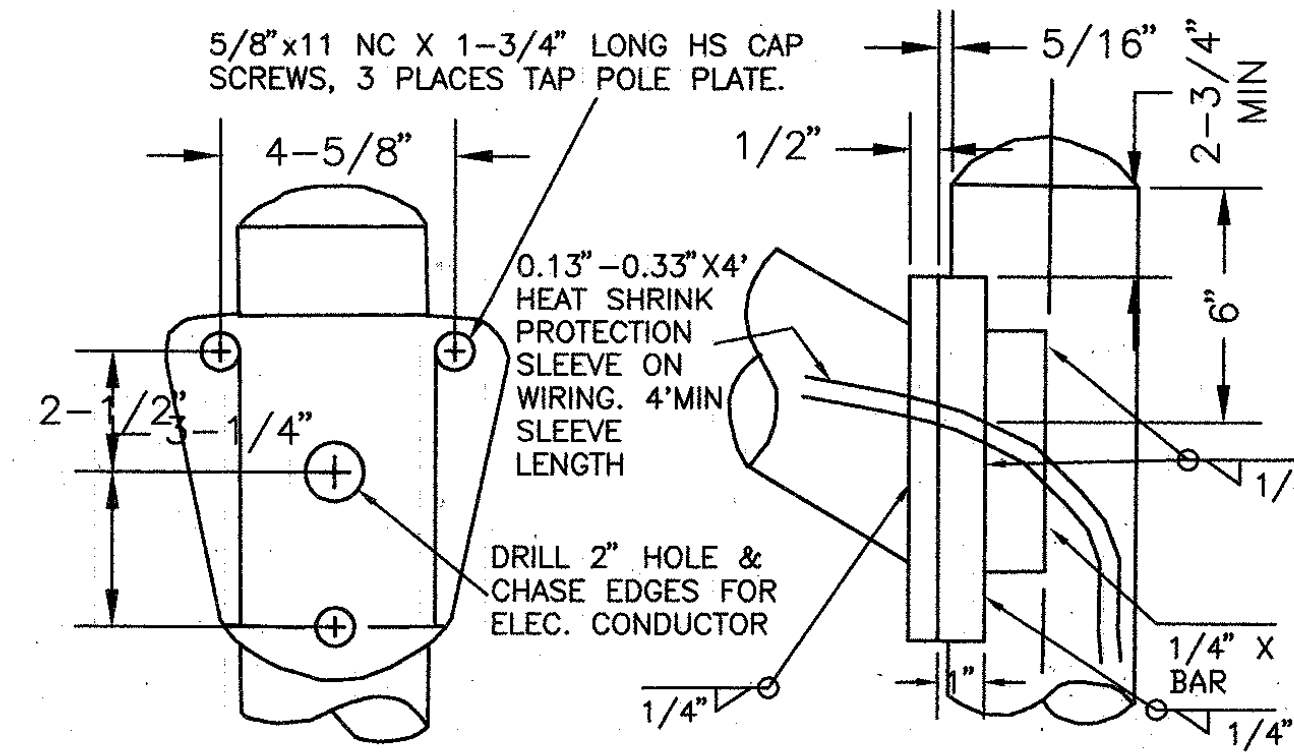
1. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE CITY OF SALINAS STANDARD SPECIFICATIONS, ELECTRICAL CODE & P.U.C.'S G.O. 95A.
2. COVER SHALL BE 18" MINIMUM IN SIDEWALK AREAS & 24" MIN. UNDER STREETS OR PROPERTY EASEMENTS.
3. ALL CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS OF THE CITY OF SALINAS.
4. INSTALL WATERPROOF IN-LINE FUSE HOLDER (BUSS TYPE TRON "L" RLA, ALUMINUM, OR RLC-J, COPPER WITH INSULATING BOOTS) IN UNDERGROUND LEG WITH MIDGET IOA. FUSE OR AS DIRECTED.

LIGHT POLE NOTES:

1. ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE CITY OF SALINAS STANDARD SPECIFICATIONS, ELECTRIC CODE AND P.U.C.'S
2. LUMINARIES AT STREET INTERSECTIONS SHALL HAVE TYPE IV IES DISTRIBUTION.
3. POLES SHALL BE STEEL WITH HOT DIP GALVANIZED FINISH
4. PHOTOELECTRIC CELLS SHALL BE INTEGRALLY MOUNTED ON THE HOOD OF THE LIGHTING FIXTURE.
5. LIGHTING POLE SHALL BE STATE TYPE 15, GALVANIZED: UNION MENTAL, AMERON, VALMONT OR APPROVED EQUAL
6. ALL CONCRETE SHALL BE CLASS "B" PER STANDARD SPECIFICATIONS OF CITY OF SALINAS.
7. CONTRACTOR SHALL INSTALL STREET LIGHT NUMBER (LETTER & NUMBER) ON LUMINAIRE SIDE, USUALLY STREET SIDE OF POLE FACING THE CURB. STREET LIGHT NUMBERING LEGEND SHALL BE 2-1/2" HIGH, BLACK WITH SILVER BACKGROUND, REFLECTIVE VINYL, ADHESIVELY BACKED LETTER (PANOUT PRL 250 YB, A TO Z) AND NUMBER (PANOUT PRL 250 YB, 0 TO 9), OR APPROVED EQUAL. OWNER SHALL PROVIDE STREET LIGHT NUMBER TO THE CONTRACTOR.
8. FOR POLE FOUNDATION & FUSE CONNECTOR DETAIL, SEE STANDARD PLAN NO. 49 OF SALINAS STANDARDS.
9. SPACING OF STREET LIGHTS SHALL BE DETERMINED BY THE OWNER.
10. CONDUIT COVER: 18" MINIMUM IN SIDEWALK, PARKWAY & MEDIAN, 24" MIN UNDER STREET OR PROPERTY EASEMENT



MAST ARM AND LUMINAIRE DATA						
STREET TYPE	"M" PROJECTED LENGTH (MIN.)	"O" RISE	MIN O.D. AT POLE	"O" PROJECTED LENGTH (MIN.)	"A" MOUNTING HEIGHT TYPE 15	WATT TYPE
COLLECTOR						200
ARTERIAL	15'-0"	4'-9"	4-1/4"	10'	31'-3"	SC III
MEDIAN	15'-0"	4'-9"	4-1/4"	10'	34'-3"	SC III



GENERAL NOTES

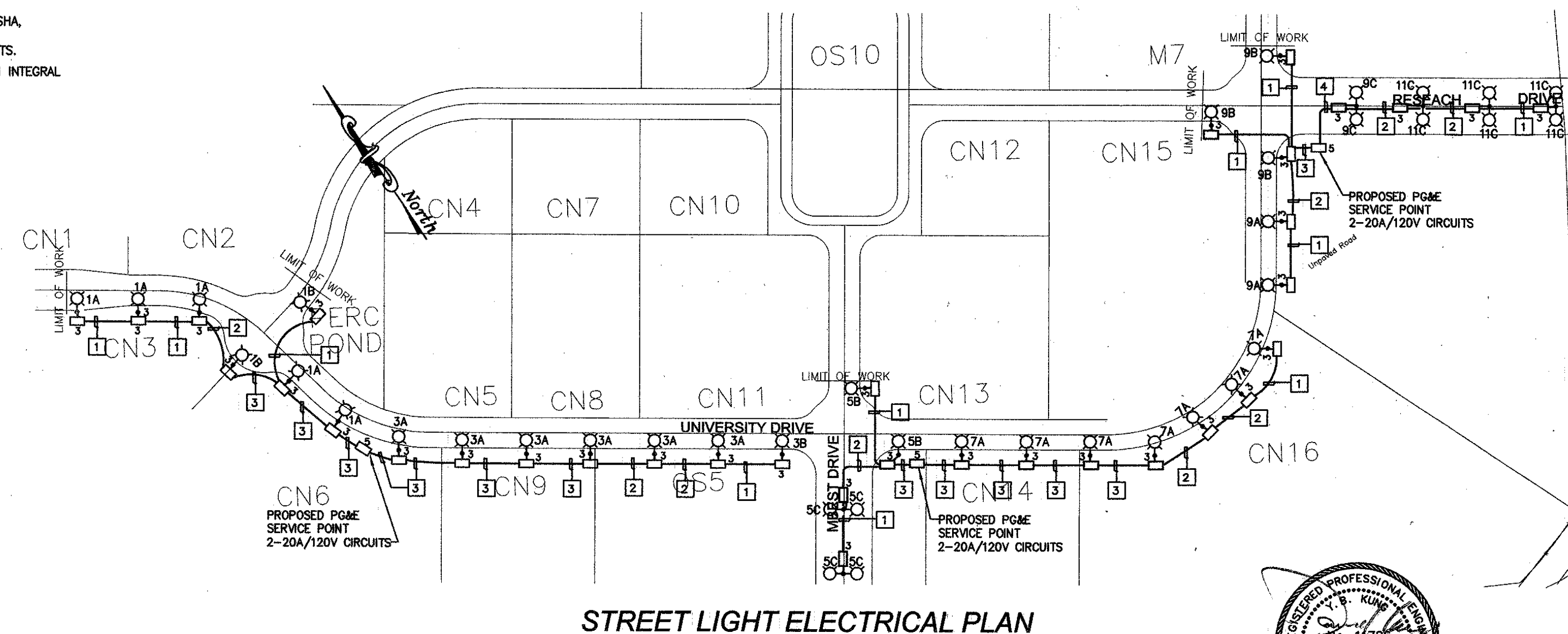
1. ALL WORK AND MATERIAL SHALL COMPLY WITH NEC, UL, OSHA, CITY OF SALINAS - DEPARTMENT OF PUBLIC WORK (CSPW) STANDARDS AND ALL APPLICABLE LOCAL CODE REQUIREMENTS.
2. ALL STREET ELECTROLIER SHALL BE GE M400 SERIES, WITH INTEGRAL PHOTOCELL CONTROL, 120V OR APPROVED EQUIPMENT BY THE CITY. SEE CSPW STANDARD PLAN 50 FOR ADDITIONAL REQUIREMENTS.
3. THE POLE FOUNDATION SHALL BE MINIMUM 8 FOOT DEEP IN LIEU OF 4'-6" AS SHOWN ON CSPW STANDARD PLAN 49.

SYMBOL LIST

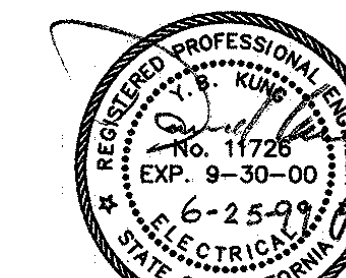
- 1A ROADWAY ELECTROLIER, NUMBER INDICATES CIRCUIT #1 & LETTER A INDICATES TYPE OF ELECTROLIER. SEE GENERAL NOTE 2 FOR FIXTURE TYPE.
- Wires in conduit-lighting, unless otherwise noted.
- PULL BOX - NO. 3 1/2
- SHEET NOTE REFERENCE MARKER, NOTE #1 SHOWN

SHEET NOTES:

- 1 2"C-2#10 & 1#10 (GROUND)
- 2 2"C-2#8 & 1#10 (GROUND)
- 3 2"C-2#6 & 1#10 (GROUND)
- 4 2"C-3#6 & 1#10 (GROUND)

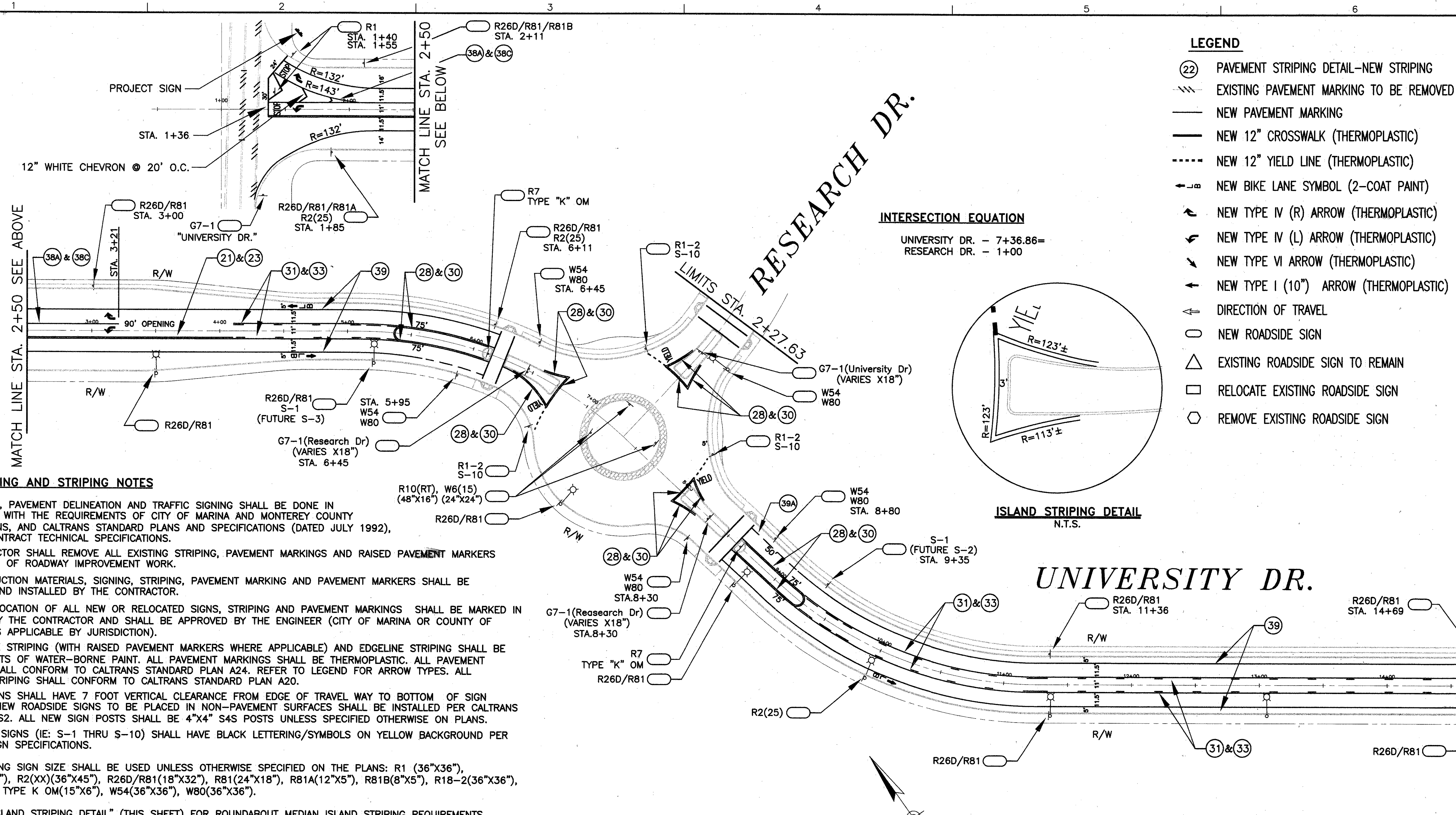


STREET LIGHT ELECTRICAL PLAN



STREET LIGHTING DETAILS

Project Design Team: • Reimer Associates • Kleinfelder • EMC Planning Group	• CH2MHill • Higgins Associates • HD Peters Associates, Inc.	Reimer Associates	NO. DATE REVISION BY APVD	VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	COMPANY Ackerman - Practicon DSGN POR/BCC DR RSG CHK POR	Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 Approved: <i>[Signature]</i> Date: 1/6/99	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT STANDARD DETAILS	SHEET 27 of 41 DWG DATE June 1999 PROJ R1680
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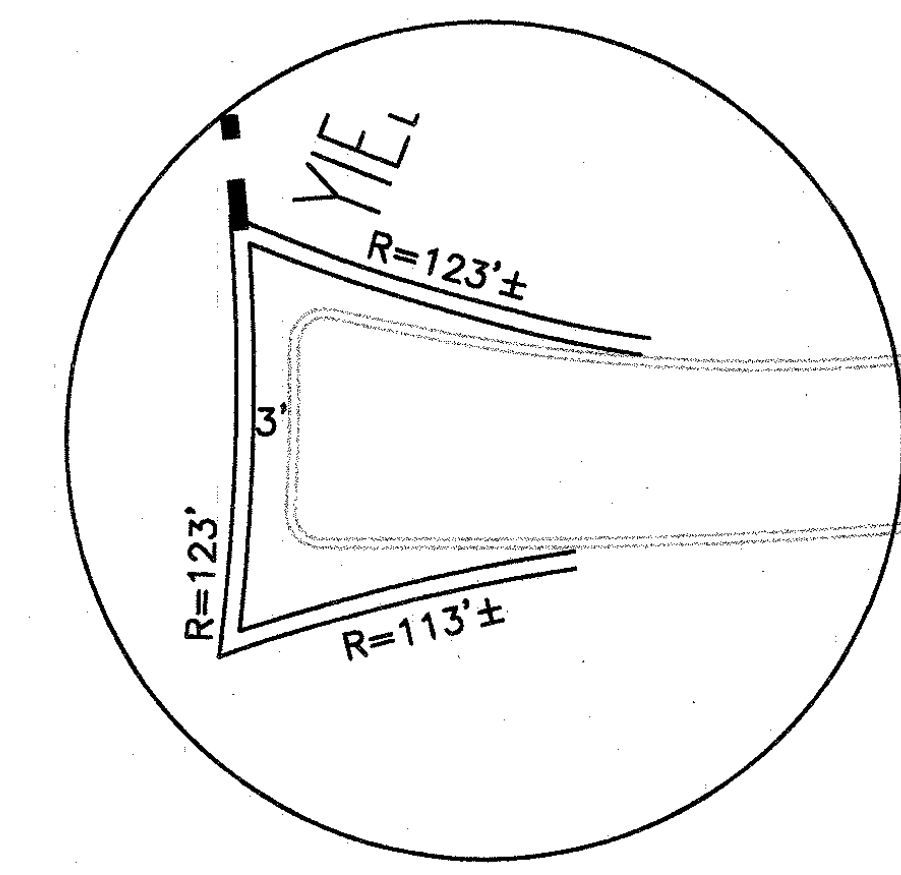


LEGEND

- (22) PAVEMENT STRIPING DETAIL-NEW STRIPING
- EXISTING PAVEMENT MARKING TO BE REMOVED
- NEW PAVEMENT MARKING
- NEW 12" CROSSWALK (THERMOPLASTIC)
- NEW 12" YIELD LINE (THERMOPLASTIC)
- NEW BIKE LANE SYMBOL (2-COAT PAINT)
- ↖ NEW TYPE IV (R) ARROW (THERMOPLASTIC)
- ↙ NEW TYPE IV (L) ARROW (THERMOPLASTIC)
- ↗ NEW TYPE VI ARROW (THERMOPLASTIC)
- ↑ NEW TYPE I (10") ARROW (THERMOPLASTIC)
- ↔ DIRECTION OF TRAVEL
- NEW ROADSIDE SIGN
- △ EXISTING ROADSIDE SIGN TO REMAIN
- RELOCATE EXISTING ROADSIDE SIGN
- ◇ REMOVE EXISTING ROADSIDE SIGN

INTERSECTION EQUATION

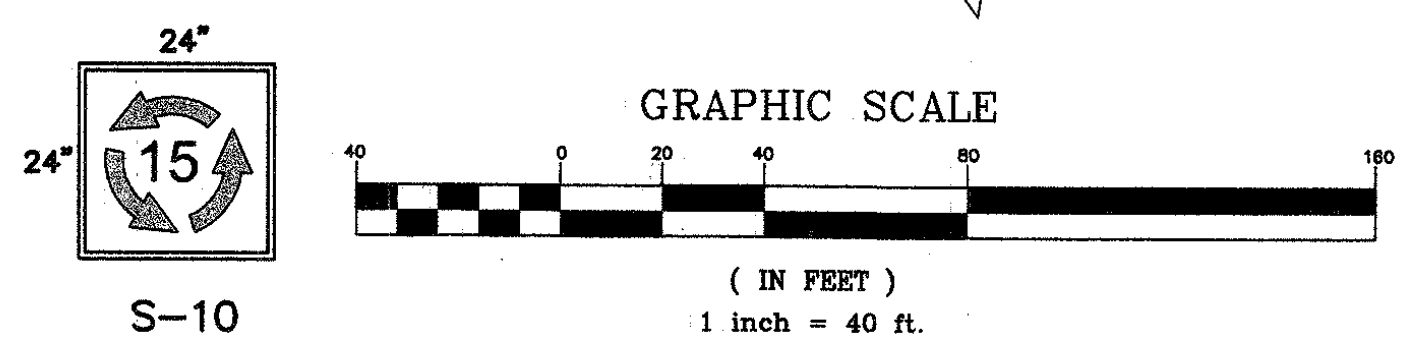
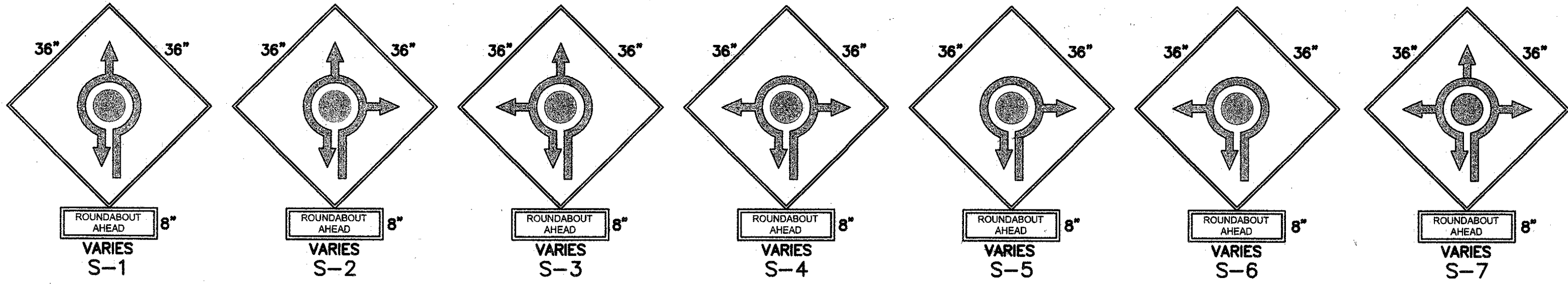
UNIVERSITY DR. - 7+36.86=
RESEARCH DR. - 1+00



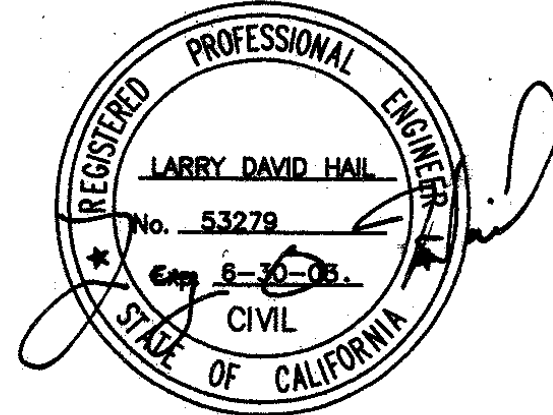
ISLAND STRIPING DETAIL
N.T.S.

GENERAL SIGNING AND STRIPING NOTES

1. ALL STRIPING, PAVEMENT DELINEATION AND TRAFFIC SIGNING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF CITY OF MARINA AND MONTEREY COUNTY SPECIFICATIONS, AND CALTRANS STANDARD PLANS AND SPECIFICATIONS (DATED JULY 1992), AND THE CONTRACT TECHNICAL SPECIFICATIONS.
2. THE CONTRACTOR SHALL REMOVE ALL EXISTING STRIPING, PAVEMENT MARKINGS AND RAISED PAVEMENT MARKERS WITHIN LIMITS OF ROADWAY IMPROVEMENT WORK.
3. ALL CONSTRUCTION MATERIALS, SIGNING, STRIPING, PAVEMENT MARKING AND PAVEMENT MARKERS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
4. THE EXACT LOCATION OF ALL NEW OR RELOCATED SIGNS, STRIPING AND PAVEMENT MARKINGS SHALL BE MARKED IN THE FIELD BY THE CONTRACTOR AND SHALL BE APPROVED BY THE ENGINEER (CITY OF MARINA OR COUNTY OF MONTEREY AS APPLICABLE BY JURISDICTION).
5. ALL LANELINE STRIPING (WITH RAISED PAVEMENT MARKERS WHERE APPLICABLE) AND EDGELINE STRIPING SHALL BE TWO (2) COATS OF WATER-BORNE PAINT. ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC. ALL PAVEMENT MARKINGS SHALL CONFORM TO CALTRANS STANDARD PLAN A24. REFER TO LEGEND FOR ARROW TYPES. ALL PAVEMENT STRIPING SHALL CONFORM TO CALTRANS STANDARD PLAN A20.
6. ALL NEW SIGNS SHALL HAVE 7 FOOT VERTICAL CLEARANCE FROM EDGE OF TRAVEL WAY TO BOTTOM OF SIGN PANEL. ALL NEW ROADSIDE SIGNS TO BE PLACED IN NON-PAVEMENT SURFACES SHALL BE INSTALLED PER CALTRANS STD. PLAN RS2. ALL NEW SIGN POSTS SHALL BE 4"x4" S4S POSTS UNLESS SPECIFIED OTHERWISE ON PLANS.
7. ALL SPECIAL SIGNS (IE: S-1 THRU S-10) SHALL HAVE BLACK LETTERING/SYMBOLS ON YELLOW BACKGROUND PER CALTRANS SIGN SPECIFICATIONS.
8. THE FOLLOWING SIGN SIZE SHALL BE USED UNLESS OTHERWISE SPECIFIED ON THE PLANS: R1 (36"x36"), R1-2(36"x36"), R2(XX)(36"x45"), R26D/R81(18"x32"), R81(24"x18"), R81A(12"x5"), R81B(8"x5"), R18-2(36"x36"), R7(24"x30"), TYPE K OM(15"x6"), W54(36"x36"), W80(36"x36").
9. REFER TO "ISLAND STRIPING DETAIL" (THIS SHEET) FOR ROUNDABOUT MEDIAN ISLAND STRIPING REQUIREMENTS.



BEFORE EXCAVATING CALL U.S.A. UNDERGROUND SERVICE ALERT
800-642-2444
48 HOURS NOTICE REQUIRED BEFORE ALL PLANNED WORK



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY	Higgins Associates
DSGN	LDH
DR	CJI
CHK	KBH

Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933
Approved: *[Signature]* Date: 7/6/99

University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
SIGNING AND STRIPING

SHEET 28 of 41
DWG
DATE JUNE 1999
PROJ R1680

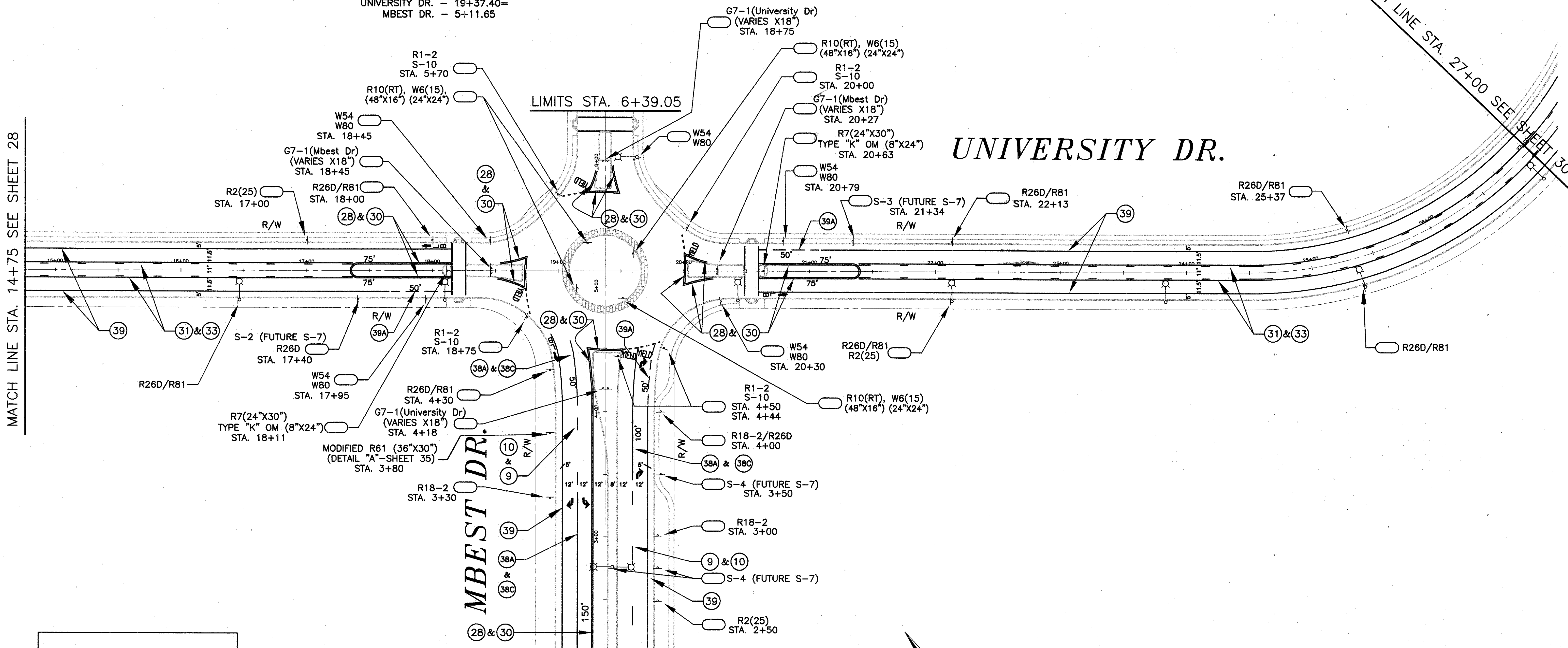
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INTERSECTION EQUATION

UNIVERSITY DR. - 19+37.40=
MBEST DR. - 5+11.65

MATCH LINE STA. 14+75 SEE SHEET 28

MATCH LINE STA. 27+00 SEE SHEET 30



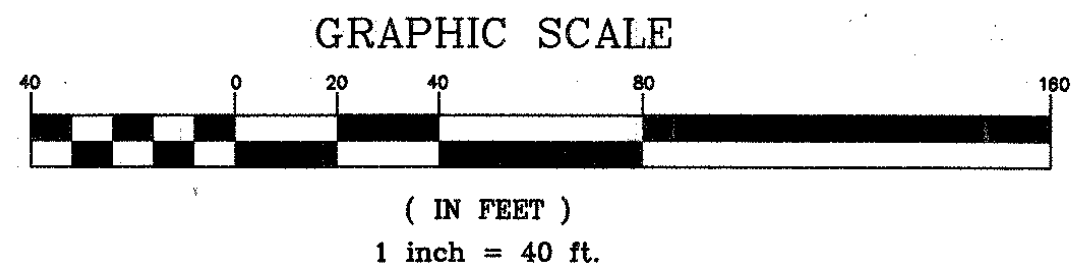
LIMITS STA. 6+39.05

UNIVERSITY DR.

MBEST DR.

MATCH LINE STA. 2+09.5 SEE SHEET 31

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Project Design Team:
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 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.



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	DR C.J
	CHK KBH

Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933
Sam DeYoung
Approved Date 7/6/99

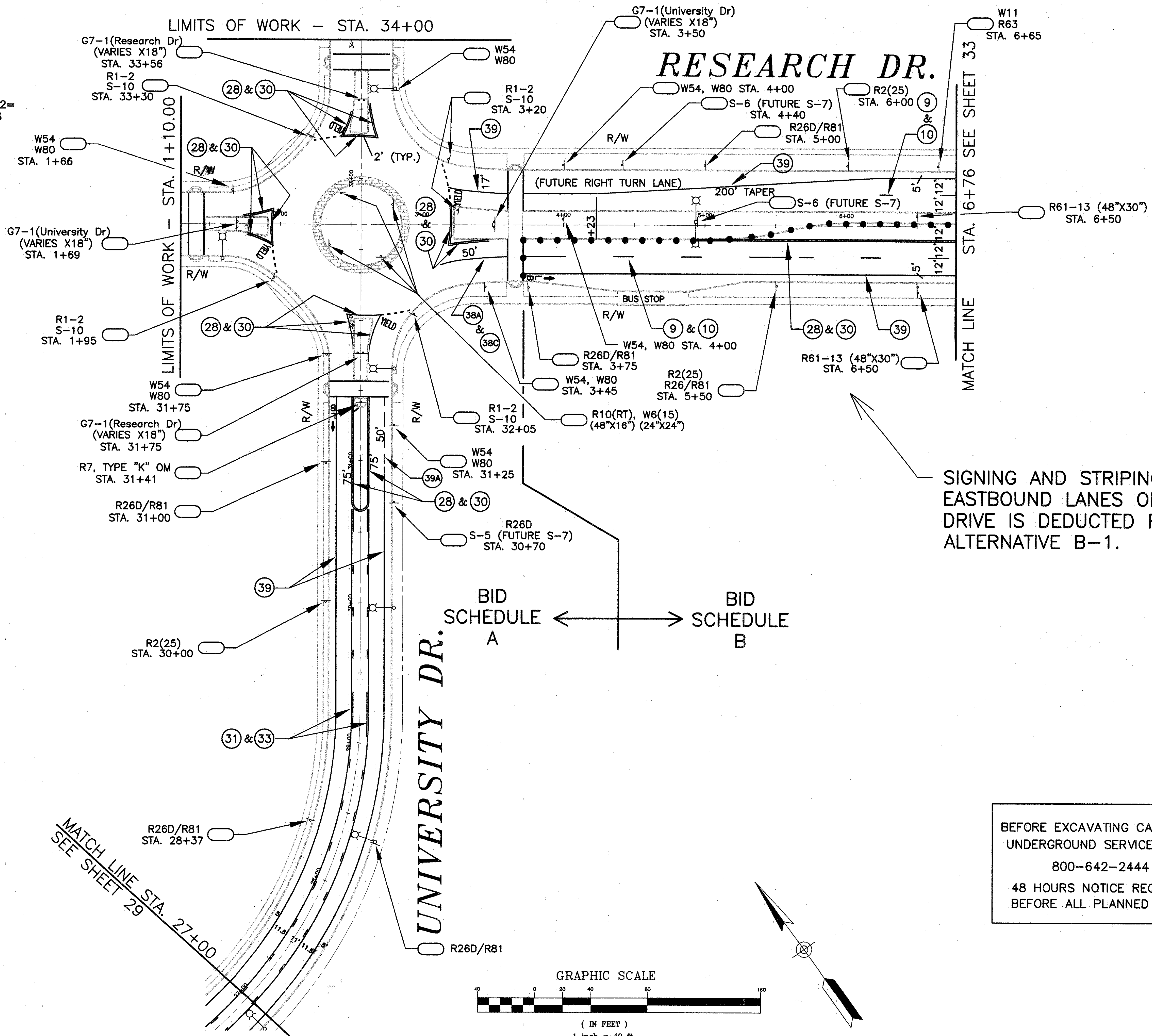
University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
**STREET AND UTILITY OPENING PROJECT
SIGNING AND STRIPING**

SHEET 29 of 41
DWG
DATE JUNE 1999
PROJ R1680

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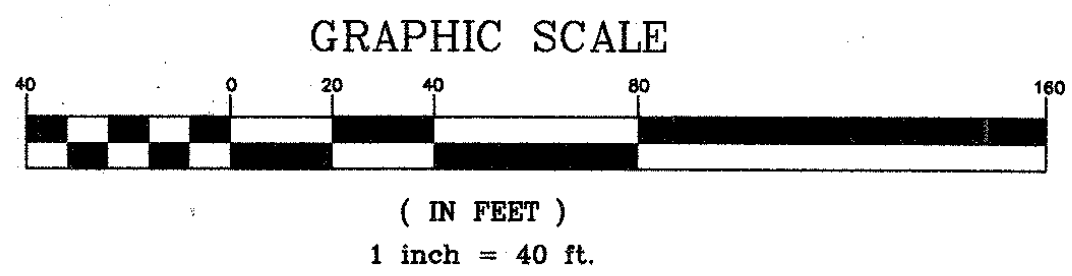
INTERSECTION EQUATION

UNIVERSITY DR. - 32+67.52=
RESEARCH DR. - 2+57.03



SIGNING AND STRIPING FOR EASTBOUND LANES OF RESEARCH DRIVE IS DEDUCTED FOR ALTERNATIVE B-1.

BEFORE EXCAVATING CALL U.S.A. UNDERGROUND SERVICE ALERT
800-642-2444
48 HOURS NOTICE REQUIRED BEFORE ALL PLANNED WORK



Project Design Team:

- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.

Reimer Associates

NO.	DATE	REVISION	BY	APVD

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COMPANY
Higgins Associates

DSGN LDH
DR CJJ
CHK KBH

Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933

Approved: *[Signature]* Date: *[Date]*

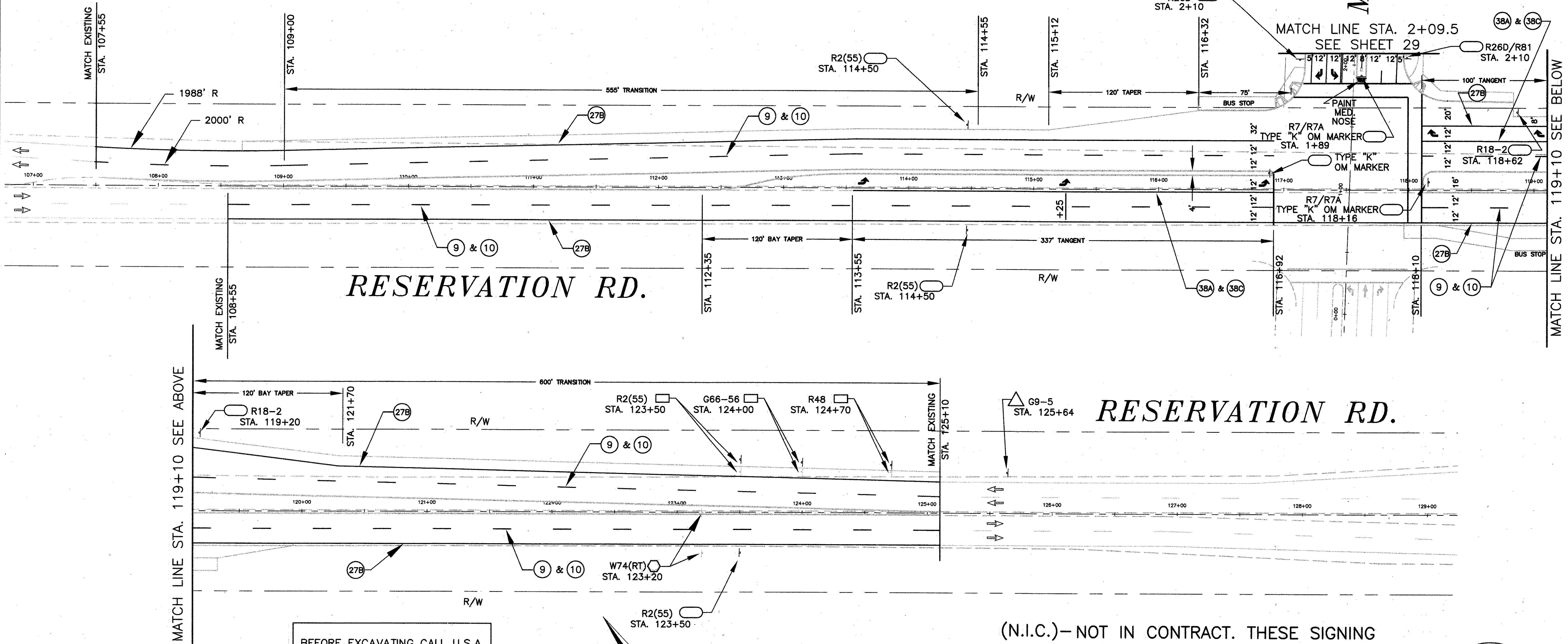
University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
SIGNING AND STRIPING

SHEET 30 of 41
DWG
DATE JUNE 1999
PROJ R1680

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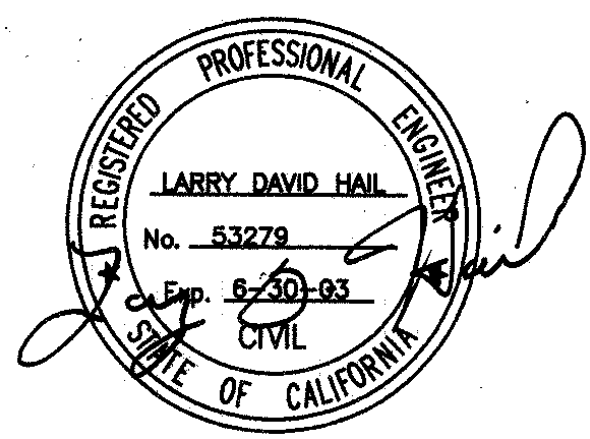
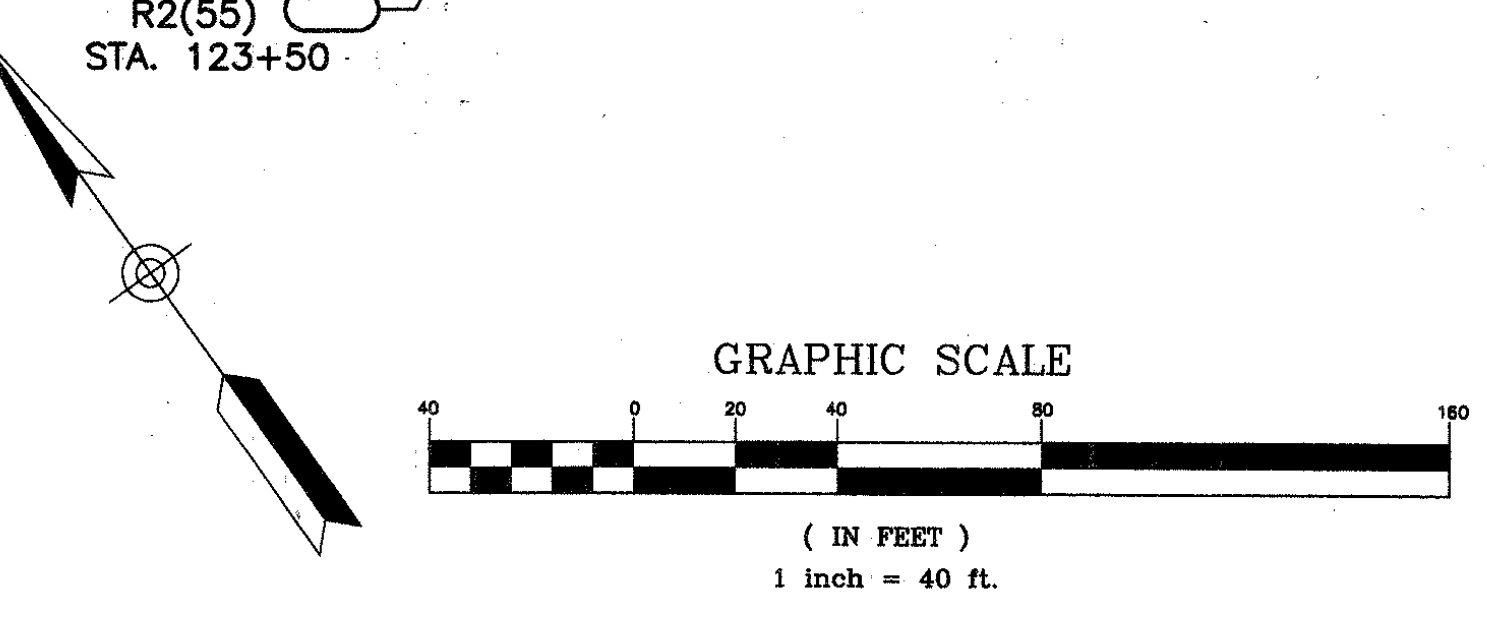
INTERSECTION EQUATION
 RESERVATION RD. - 117+52.41=
 MBEST DR. - 0+99.78

MBEST DR.



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Project Design Team: • Reimer Associates • CH2MHill • Kleinfelder • Higgins Associates • EMC Planning Group • HD Peters Associates, Inc.			<table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION</th> <th>BY</th> <th>APVD</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	REVISION	BY	APVD						VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	COMPANY Higgins Associates DSGN LDH DR CJI CHK KBH	 Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 Approved: <i>[Signature]</i> Date: 7/6/99	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT SIGNING AND STRIPING	SHEET 31 of 41 DWG DATE JUNE 1999 PROJ R1680
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 SELECTED BY OWNER. BASE BID
 FOR SCHEDULE B IS TO INCLUDE
 SIGNING AND STRIPING AS SHOWN
 ON SHEETS 32, 33 AND 34.

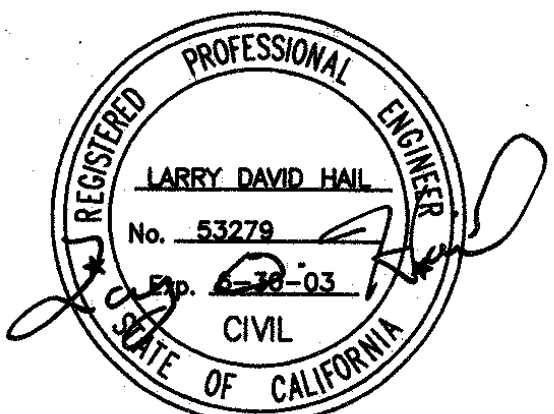
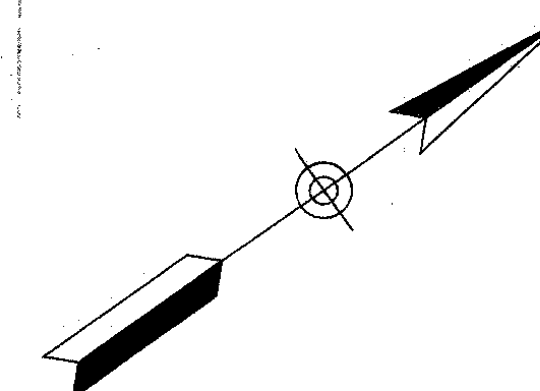
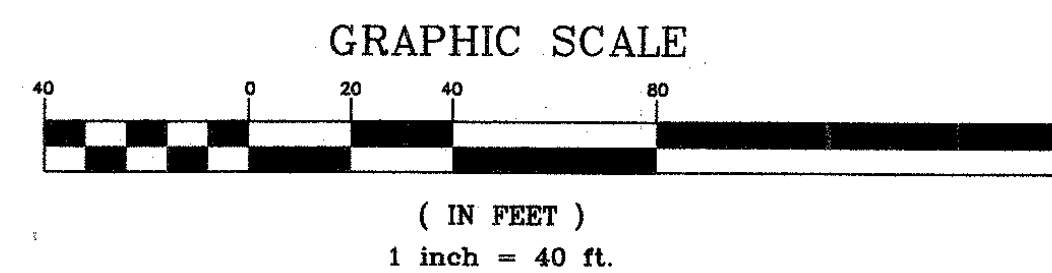
RESERVATION ROAD

BLANCO ROAD

INTERSECTION EQUATION

RESERVATION RD. - 133+47.34=
 BLANCO RD. - 10+00.12

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MATCH LINE STA. 14+00 SEE SHEET 33

UC MBEST
 CITY OF MARINA

COUNTY OF MONTEREY
 UC MBEST

Project Design Team:

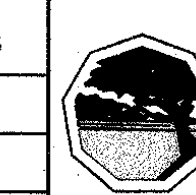
- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
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NO.	DATE	REVISION	BY	APVD

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COMPANY	Higgins Associates
DSGN	LDH
DR	CJI
CHK	KBH



Fort Ord Reuse Authority
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 Marina, CA 93933

Approved: *[Signature]* 7/6/99
 Date

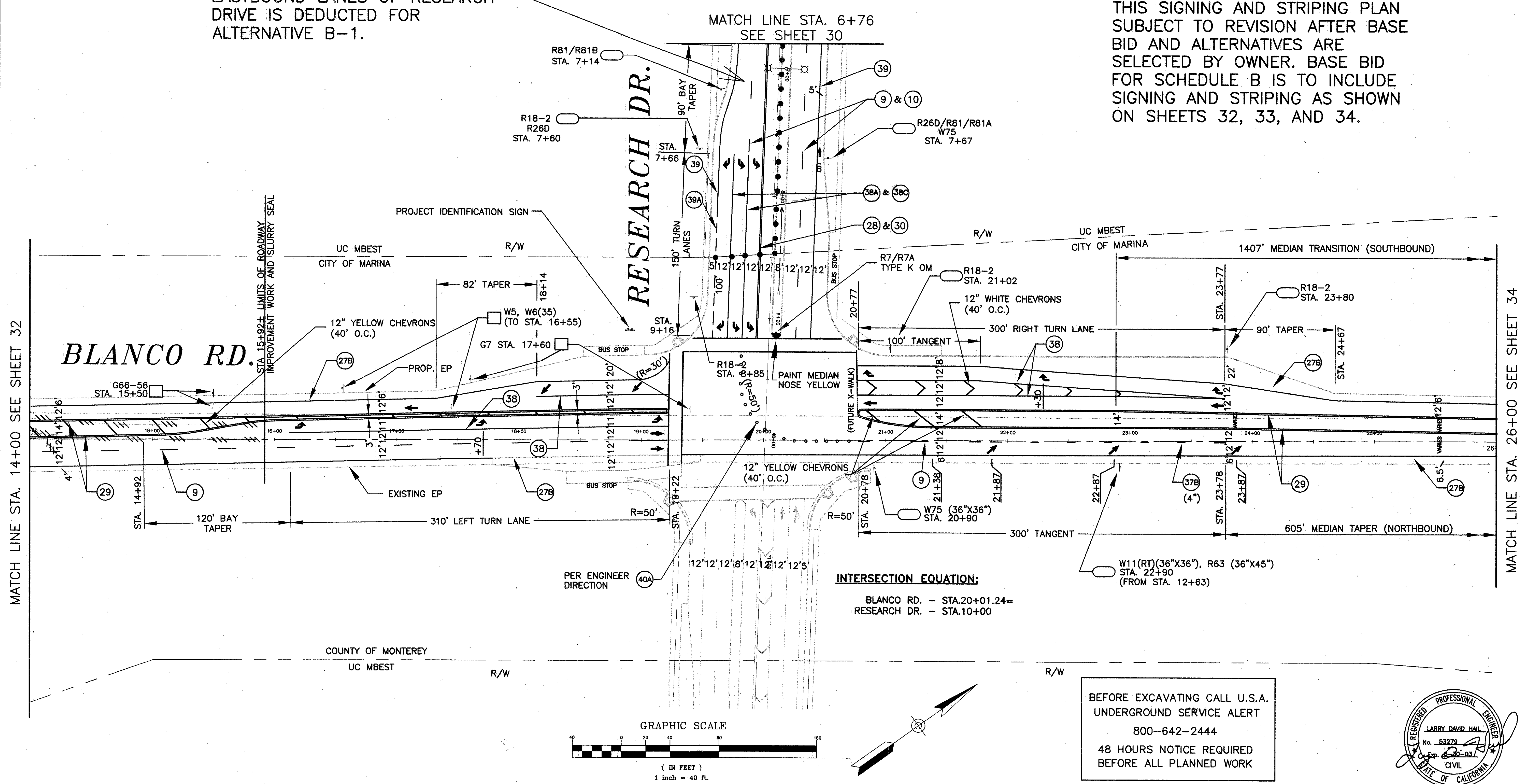
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**STREET AND UTILITY OPENING PROJECT
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SHEET 32 of 41
DWG
DATE JUNE 1999
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SIGNING AND STRIPING FOR EASTBOUND LANES OF RESEARCH DRIVE IS DEDUCTED FOR ALTERNATIVE B-1.

THIS SIGNING AND STRIPING PLAN SUBJECT TO REVISION AFTER BASE BID AND ALTERNATIVES ARE SELECTED BY OWNER. BASE BID FOR SCHEDULE B IS TO INCLUDE SIGNING AND STRIPING AS SHOWN ON SHEETS 32, 33, AND 34.

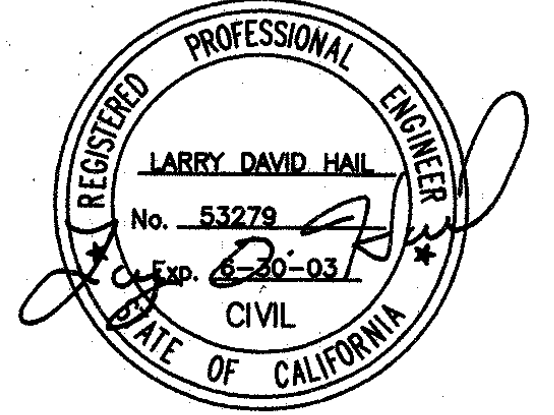


MATCH LINE STA. 14+00 SEE SHEET 32

MATCH LINE STA. 26+00 SEE SHEET 34

INTERSECTION EQUATION:
 BLANCO RD. - STA. 20+01.24=
 RESEARCH DR. - STA. 10+00

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 • Kleinfelder
 • EMC Planning Group
 • CH2MHill
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 • HD Peters Associates, Inc.



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COMPANY
 Higgins Associates
DSGN LDH
DR CJJ
CHK KBH

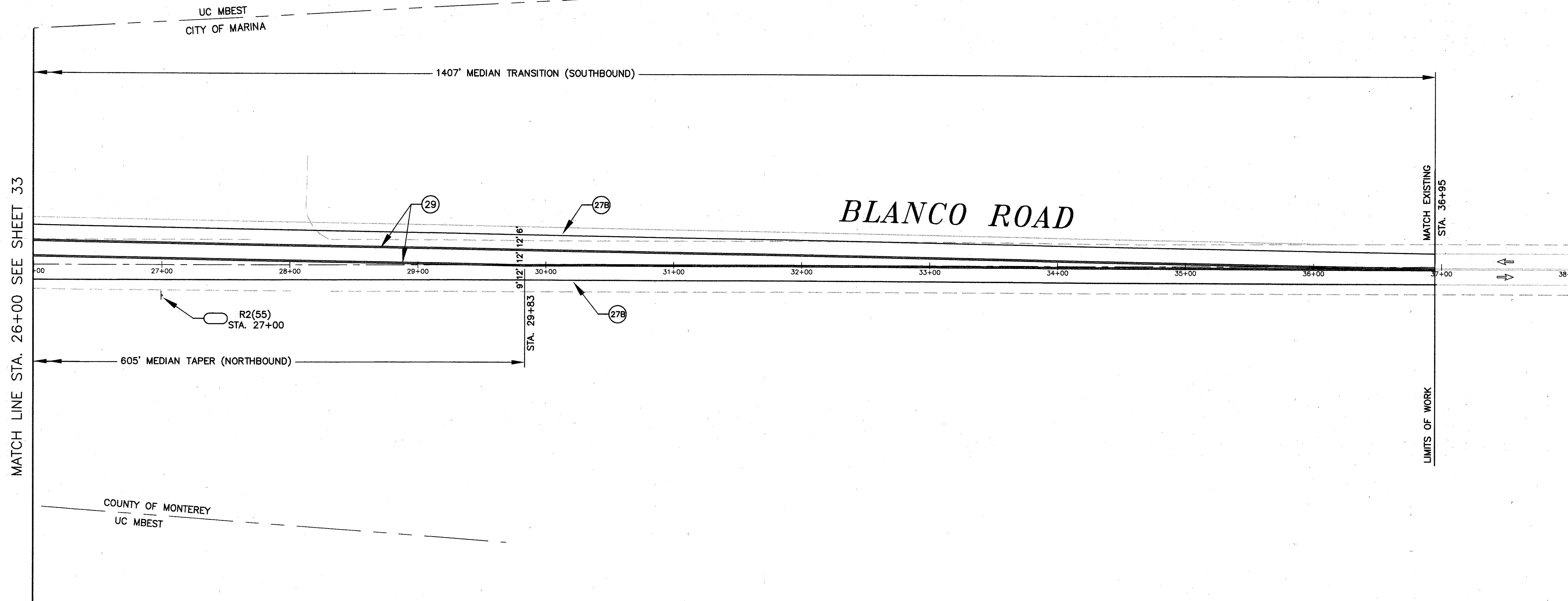
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 100 12th Street, Bldg. 2880
 Marina, CA 93933
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STREET AND UTILITY OPENING PROJECT
SIGNING AND STRIPING

SHEET 33 of 41
 DWG
 DATE JUNE 1999
 PROJ R1680

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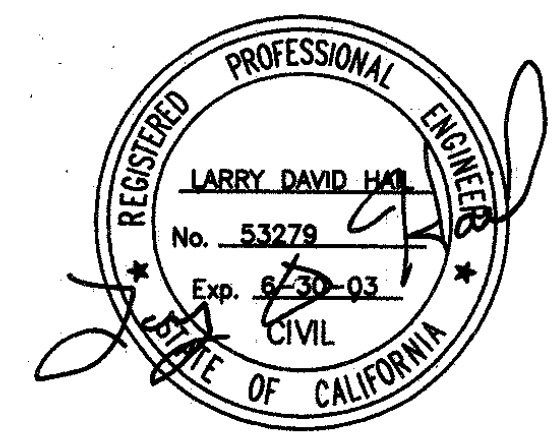
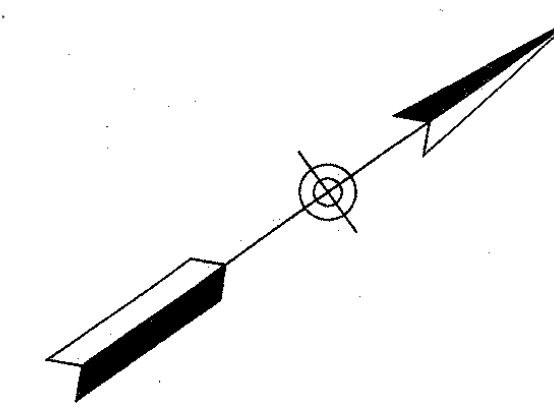
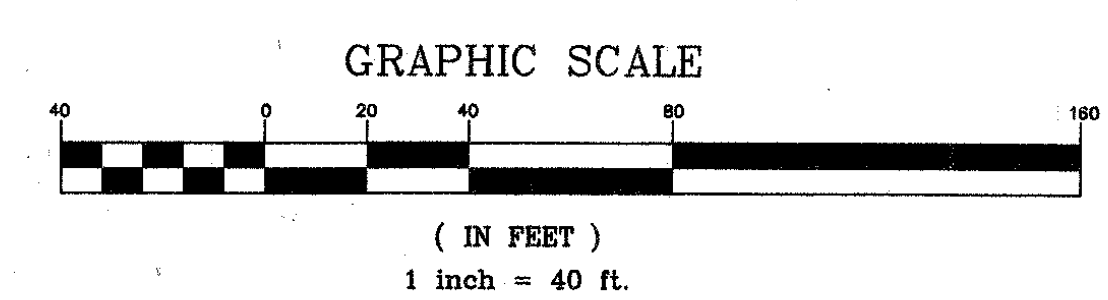
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 FOR SCHEDULE B IS TO INCLUDE
 SIGNING AND STRIPING AS SHOWN
 ON SHEETS 32, 33 AND 34.



MATCH LINE STA. 26+00 SEE SHEET 33

MATCH EXISTING STA. 36+95
 LIMITS OF WORK

BLANCO ROAD



Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.

NO.	DATE	REVISION	BY	APVD

VERIFY SCALE		COMPANY
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DR	CJI	
CHK	KBH	

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 Approved Date 10/1/99

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STREET AND UTILITY OPENING PROJECT
SIGNING AND STRIPING

SHEET 34 of 41
 DWG
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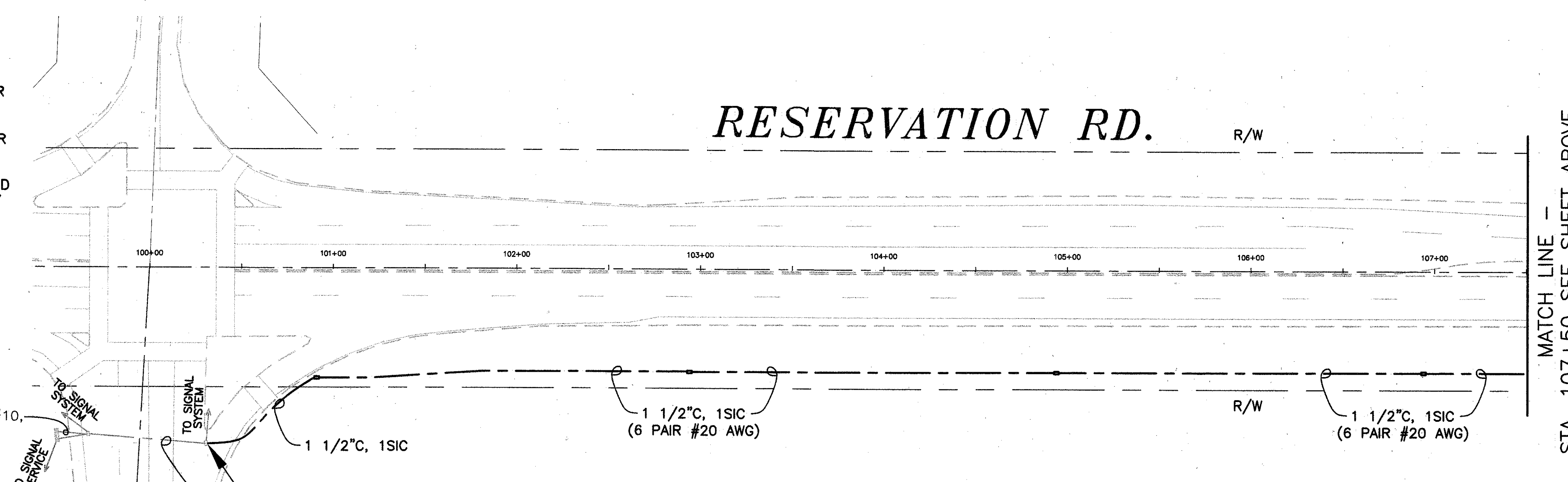
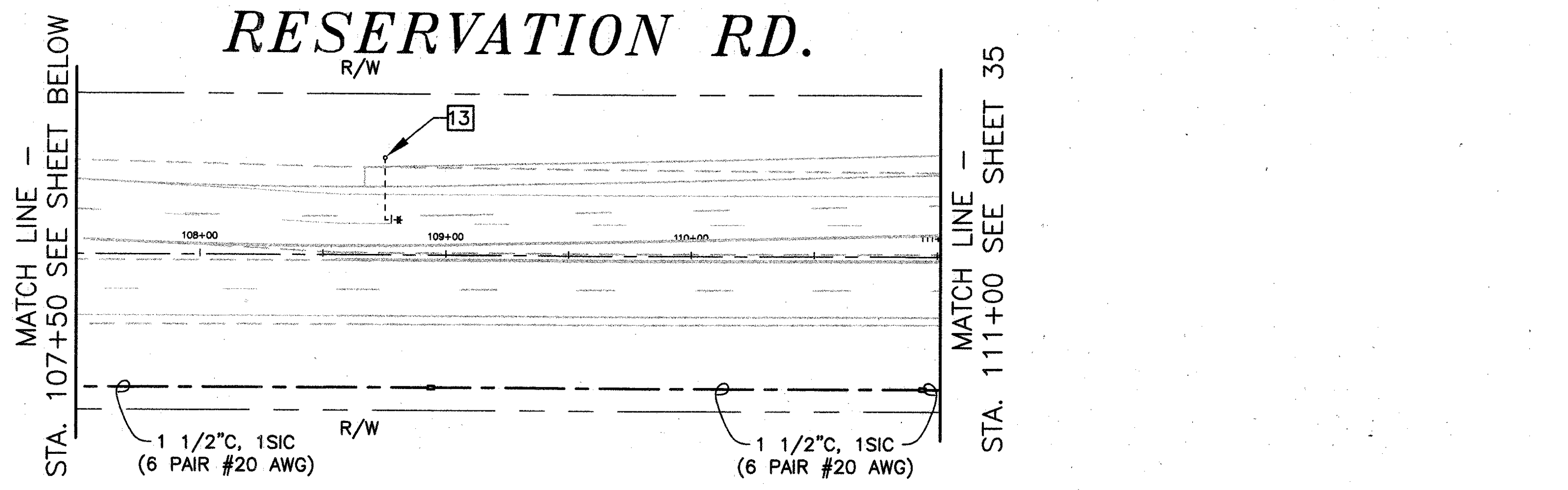
PROJECT NOTES(RESERVATION RD./MBEST DR.):

- 1 COORDINATE SERVICE CONNECTION WITH PG&E (831-648-3243).
- 2 RESERVATION RD./MBEST DRIVE: FURNISH AND INSTALL TYPE III-AF ALUMINUM SERVICE EQUIPMENT ENCLOSURE. PEU SHALL BE MOUNTED ON THE RIGHT SIDE IN THE SERVICE SECTION, 18" MINIMUM FROM THE BOTTOM OF ENCLOSURE. PEU SHALL CONTROL BOTH IISNS & INTERSECTION SAFETY LIGHTING. FOR SERVICE WIRING DIAGRAM FOR RESERVATION ROAD/MBEST DRIVE SEE CALTRANS STD. PLAN (1992) ES-2D.
- 3 FURNISH AND INSTALL IDC TRACONEX MODEL 390 CJ (32 CHANNELS OF DETECTION) MODULAR PROGRAMMABLE 8-PHASE NEMA CONTROLLER ASSEMBLY IN TYPE "P" CABINET COMPLETE WITH FOUNDATION, ANCHOR BOLTS & ANODIZED ALUMINUM "ANTI-GRAFFITI" FINISH PER SPECIFICATIONS.
- 4 FURNISH AND INSTALL EMERGENCY VEHICLE DETECTOR (OPTICOM 711) ON MAST ARM AS SHOWN ON PLANS.
- 5 FURNISH AND INSTALL R73-2 (36"x36") SIGN ON THE MAST ARM. SIGN MOUNTING PER DETAIL U, CALTRANS STD. PLAN ES-6T.
- 6 FURNISH AND INSTALL R34-2 (30"x30") SIGN ON MAST ARM. SIGN MOUNTING PER "DETAIL U", CALTRANS STD. PLAN ES-6T.
- 7 FURNISH AND INSTALL MODIFIED R61 (36"x30") SIGN ON MAST ARM, REFER TO DETAIL "A"(THIS SHEET). SIGN MOUNTING PER "DETAIL U", CALTRANS STD. PLAN ES-6T.
- 8 COIL ADDITIONAL 200' OF DETECTOR LEAD-IN CABLE(S) IN PULLBOX FOR FUTURE DETECTION. COIL 20' OF DETECTOR LEAD-IN CABLE(S) IN BOTTOM OF CONTROLLER FOR FUTURE INSTALLATION.
- 9 INSTALL NEW CONDUIT IN EXISTING PULL BOX.
- 10 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R43 (36"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 11 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R49(LT) (42"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 12 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R49(RT) (42"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 13 REMOVE AND SALVAGE EXISTING FLASHING BEACON, AND ABANDON EXISTING CONDUIT AND CONDUCTORS IN PLACE. SALVAGED EQUIPMENT SHALL BE DISPOSED OF AS DIRECTED BY THE ENGINEER.
- 14 FURNISH AND INSTALL W56 (48"x24") SIGN ON S4S 4"x4" REDWOOD POST.

GENERAL CONSTRUCTION NOTES

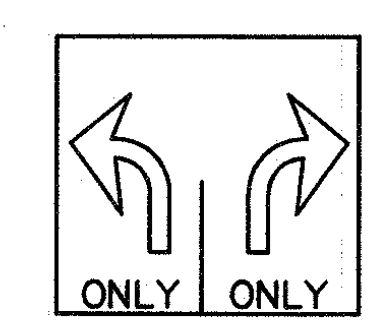
1. THIS PLAN IS ACCURATE FOR ELECTRICAL WORK ONLY.
2. TRAFFIC SIGNAL & ELECTRICAL WORK SHALL CONFORM TO THE STATE OF CALIFORNIA STANDARD PLANS AND SPECIFICATIONS (DATED JULY 1992) AND THE PROJECT SPECIAL PROVISIONS.
3. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS OF ALL UNDERGROUND UTILITIES AND VERIFY ALL CONDITIONS ON THE JOB SITE. HAND DIG FOUNDATIONS UNTIL CLEAR OF ALL OBSTRUCTIONS. REFER TO UTILITY PLAN FOR THE APPROXIMATE LOCATIONS OF EXISTING UTILITIES.
4. FOR LAYOUT OF SIGNING AND STRIPING, SEE SIGNING AND STRIPING PLAN.
5. OBTAIN APPROVAL FOR EXACT LOCATION OF SIGNAL POLES, PULL BOXES, FOUNDATIONS, SIGNS AND DETECTOR LOOPS FROM CITY ENGINEER (OR COUNTY) PRIOR TO FOUNDATION INSTALLATION.
6. ALL SIGNAL HEADS SHALL BE 12" LENSES WITH PLASTIC BACKPLATES, UNLESS OTHERWISE NOTED. ALL RED SIGNAL FACES AND RED ARROWS SHALL BE RED LIGHT EMITTING DIODE (LED) SIGNAL MODULES, ALL PEDESTRIAN "UPRAISED" HAND SYMBOLS SHALL BE PORTLAND ORANGE LED SIGNAL MODULES.
7. SCREWS SHALL BE PLACED IN ALL BACK PLATE SCREW HOLES.
8. ALL PULL BOXES ARE NO. 5 EXCEPT AS OTHERWISE NOTED ON PLANS AND ALL CONDUIT IS 2" EXCEPT AS OTHERWISE NOTED IN THE CONDUIT AND CONDUCTOR SCHEDULE AND ON THE PLANS. PULL BOXES SHALL HAVE A MAXIMUM SPACING OF 200'.
9. ALL DLC SHALL BE INSTALLED WITHOUT SPLICES.
10. ALL SIGNAL STANDARDS WITH PEDESTRIAN PUSH BUTTON SHALL BE LOCATED WITHIN 5 FEET OF THE NEAREST CROSSWALK/ACCESS RAMP.

IMJIN RD.



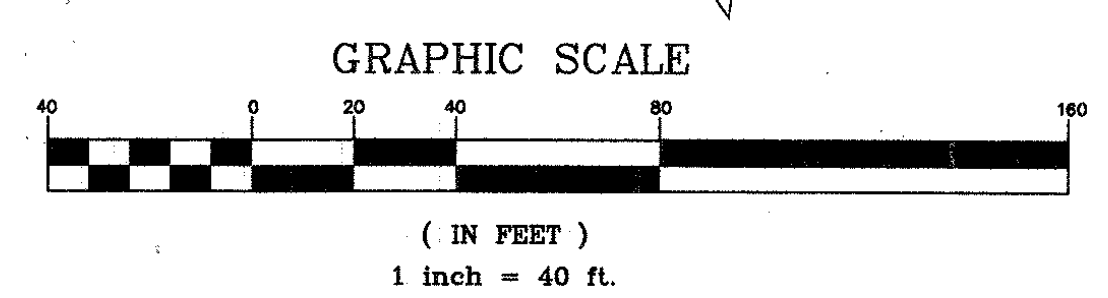
EXIST. 2-3"C,
80#14, 4#12, 4#10,
9dlc,
ADD 1SIC

EXIST. 2-3"C, 15#14, 2#12,
4#10, 2#8, 5dlc,
ADD 1SIC(6 PAIR #20 AWG)

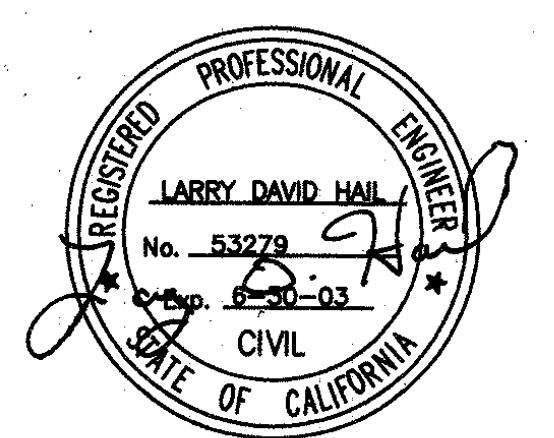


DETAIL "A"
NOT TO SCALE

(N.I.C.)- NOT IN CONTRACT. THESE SIGNAL, LIGHTING AND INTERCONNECT IMPROVEMENTS ARE ELIMINATED FROM THE BASE BID.



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UNDERGROUND SERVICE ALERT
800-642-2444
48 HOURS NOTICE REQUIRED
BEFORE ALL PLANNED WORK



Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.

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COMPANY
 Higgins Associates
 DSGN LDH
 DR CJJ
 CHK KBH

Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933
 Approved: *[Signature]* Date: 7/6/99

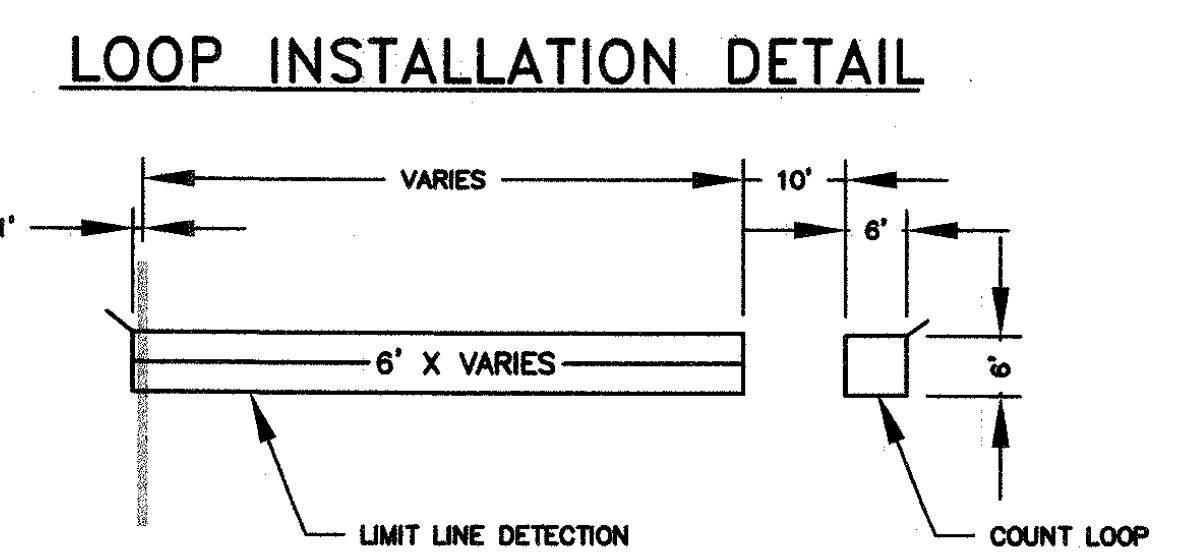
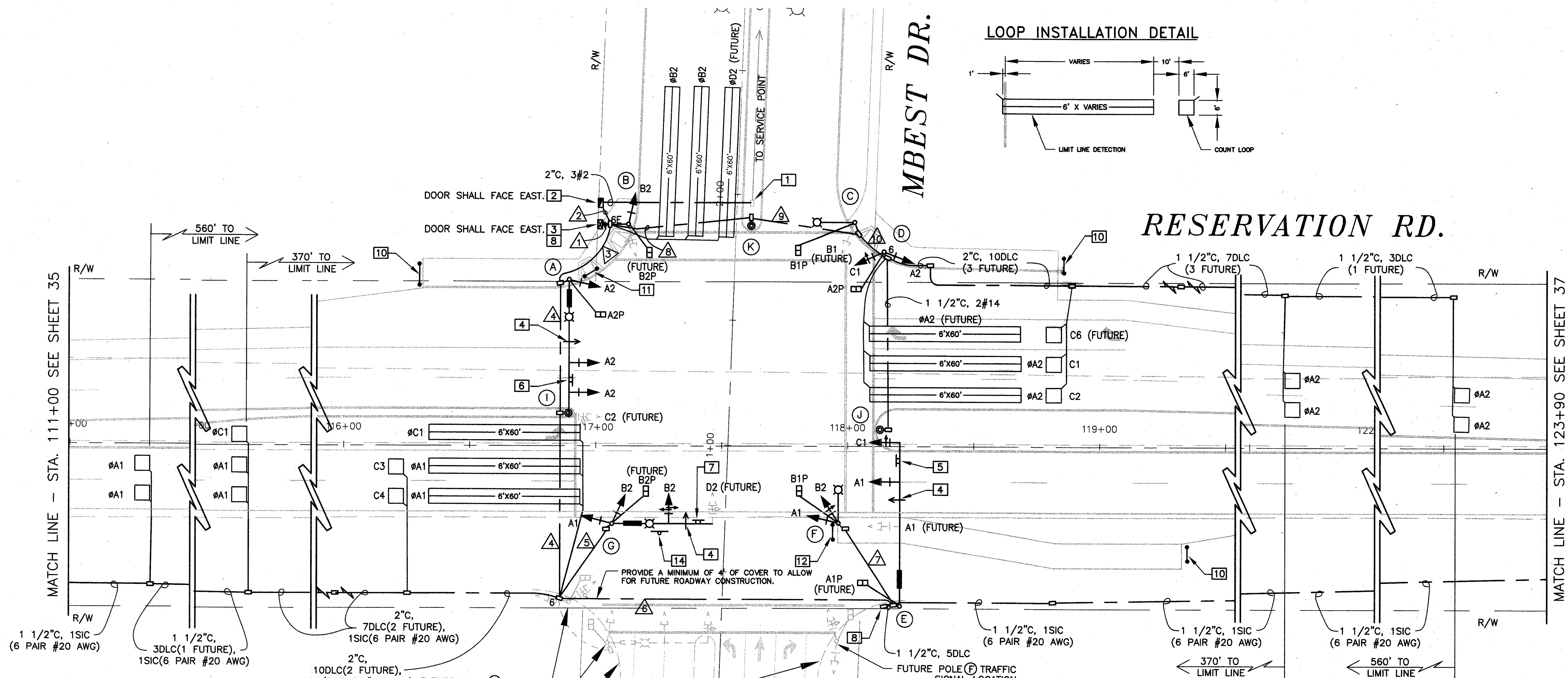
University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
**STREET AND UTILITY OPENING PROJECT
 SIGNAL, LIGHTING AND INTERCONNECT PLAN**

SHEET 35 of 41
 DWG
 DATE JUNE 1999
 PROJ R1680

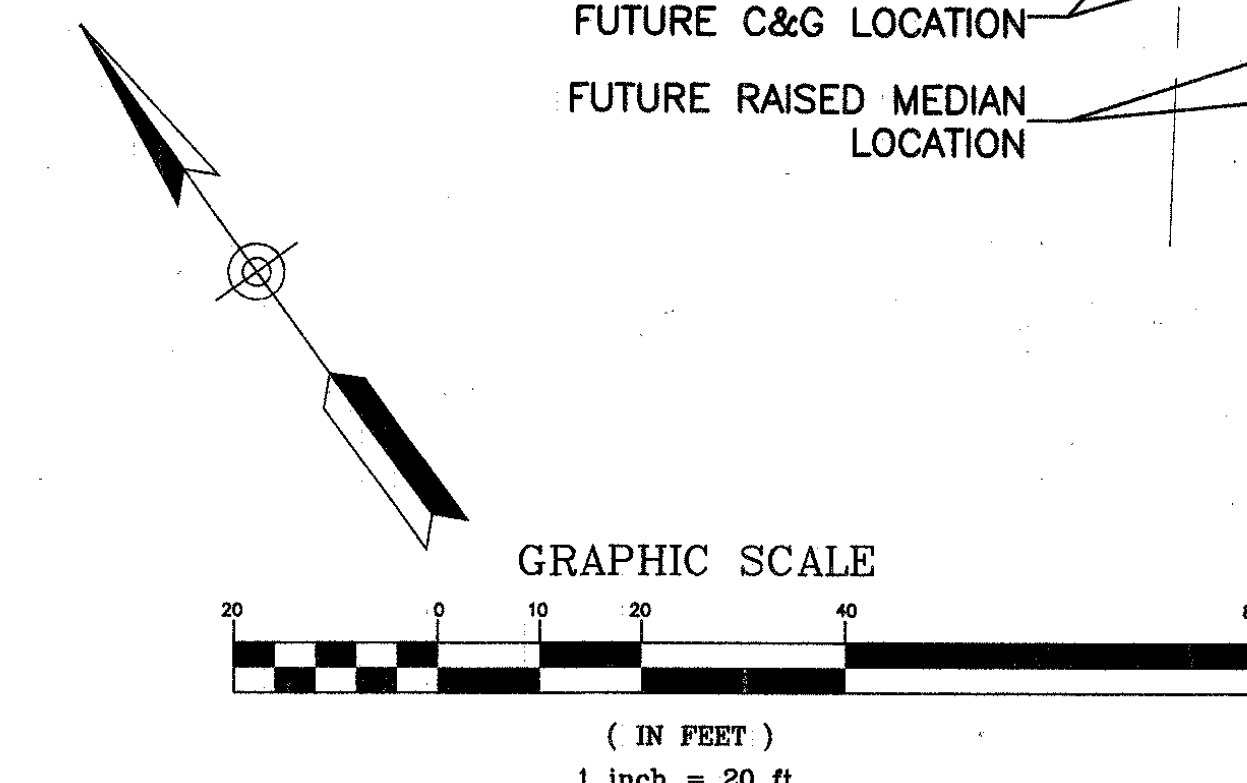
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MATCH LINE - STA. 111+00 SEE SHEET 35

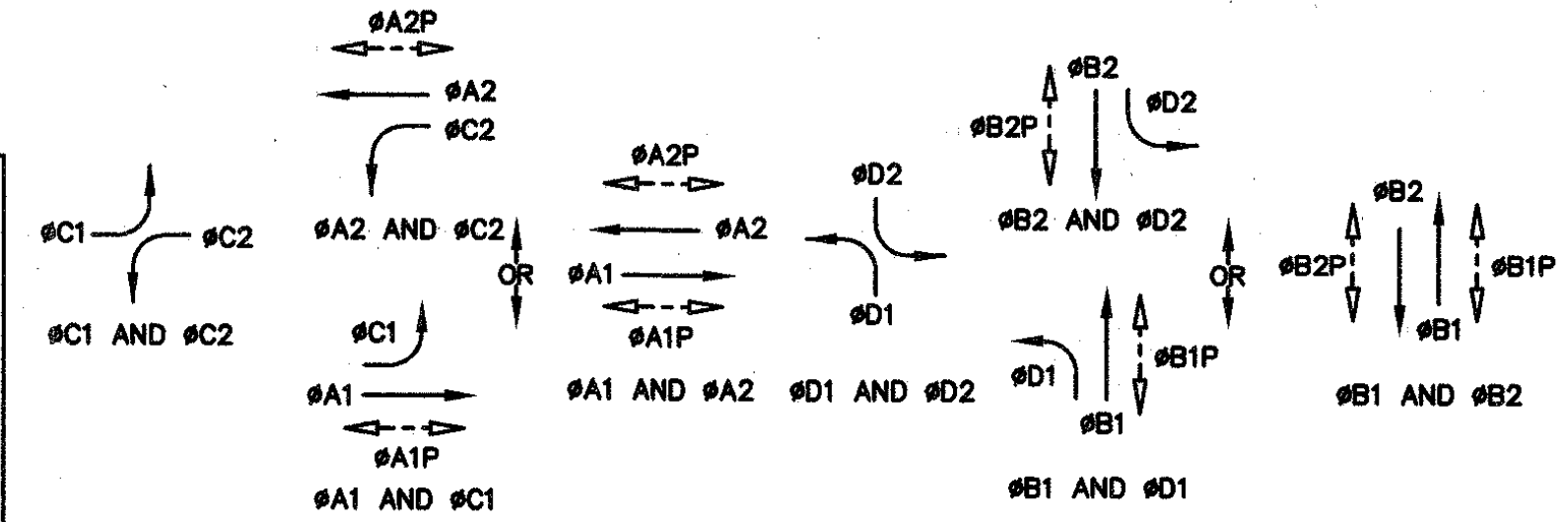
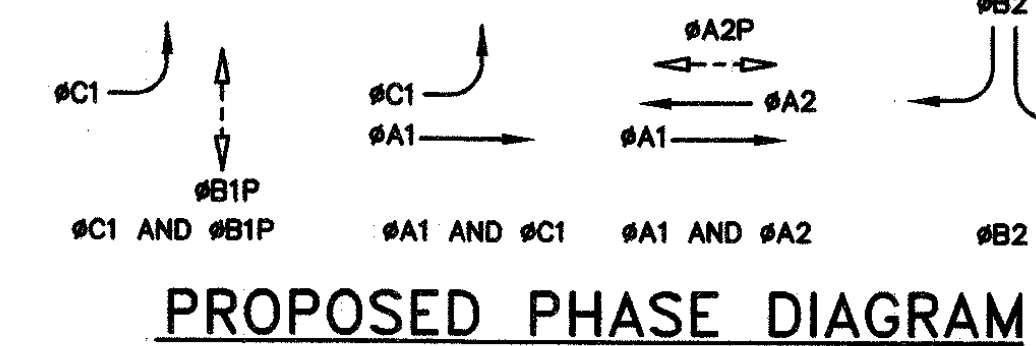
MATCH LINE - STA. 123+90 SEE SHEET 37



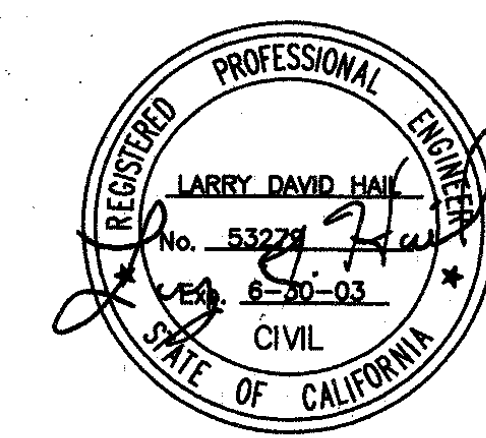
- 2\"/>
- 10DLC(2 FUTURE), 1SIC(6 PAIR #20 AWG) FUTURE POLE (H) TRAFFIC SIGNAL LOCATION
- FUTURE POLE (C) TRAFFIC SIGNAL LOCATION
- FUTURE C&G LOCATION
- FUTURE RAISED MEDIAN LOCATION



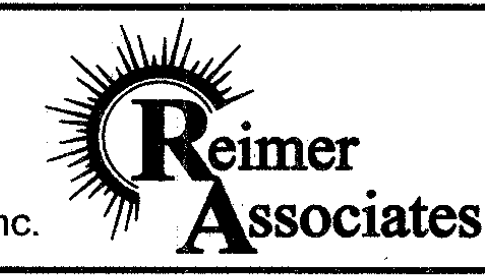
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 • HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

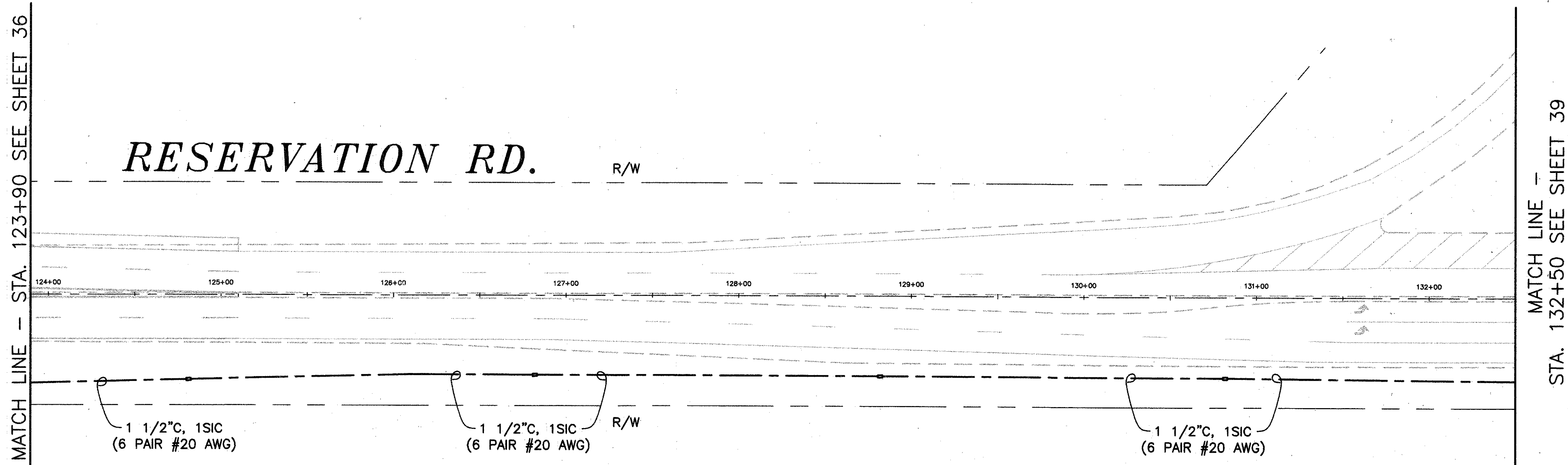
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COMPANY
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 DR CJJ
 CHK KBH
 Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933
 Approved: [Signature] 1/6/99 Date

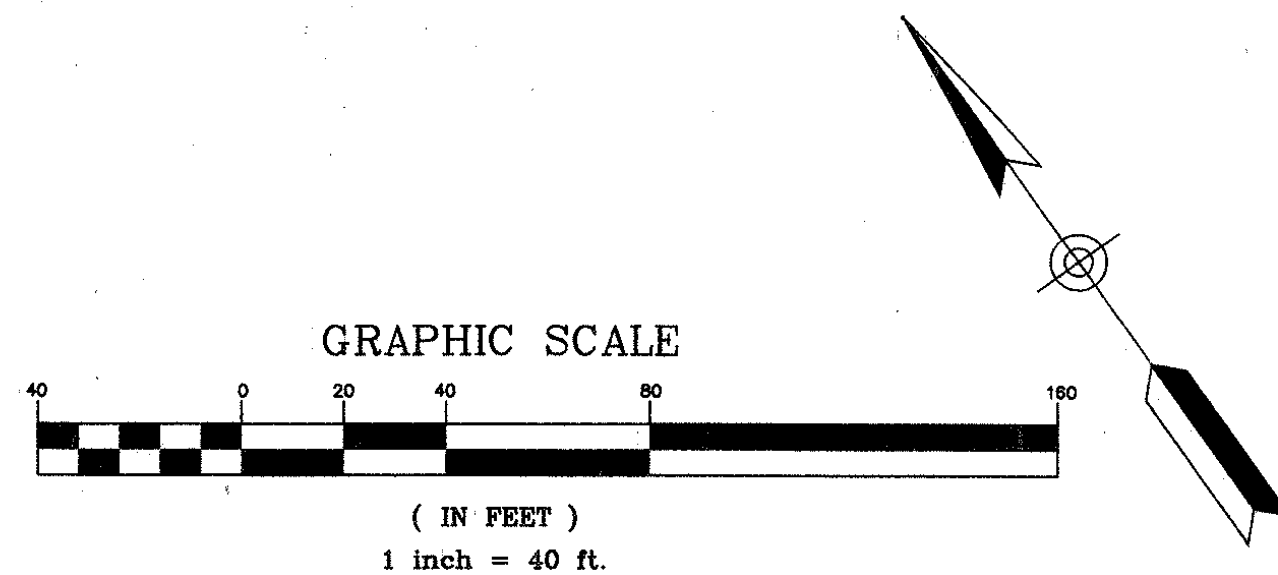
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 Monterey Bay Education, Science and Technology Park
 STREET AND UTILITY OPENING PROJECT
 SIGNAL, LIGHTING AND INTERCONNECT PLAN

SHEET 36 of 41
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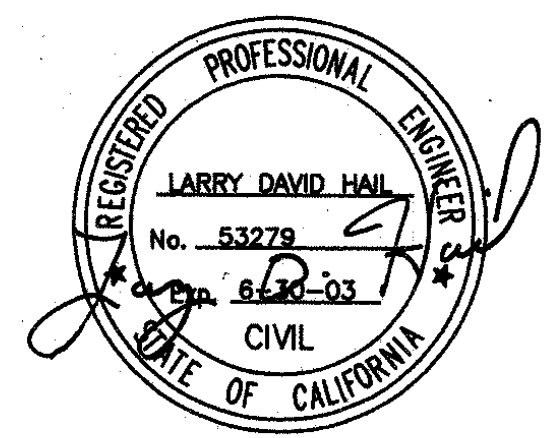
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CONDUCTOR AND CONDUIT SCHEDULE

AWG	CONDUCTOR DESIGNATION	NUMBER OF CONDUCTORS																			
		RUN NUMBER																			
		1	2	3	4	5	6	7	8	9	10										
#14	Ø A1 SIGNAL	3		3	3	3	3	3													
	Ø A2 SIGNAL	6		3								3	3								
	Ø B1 SIGNAL (F)	6		3	3		3				3										
	Ø B2 SIGNAL	6		3	3	3	3	3													
	Ø C1 SIGNAL	6		3	3		3					3	3								
	Ø C2 SIGNAL (F)	3		3	3																
	Ø D1 SIGNAL (F)	6											3								
	Ø D2 SIGNAL (F)	3		3	3		3														
	Ø A1 P (F)	2		2	2		2														
	Ø A2 P	4		2	2							2	2								
	Ø B1 P	4		2	2		2	2													
	Ø B2 P (F)	4		2	2																
	Ø A1 PPB (F)	1		1	1		1														
	Ø A2 PPB	2											1								
Ø B1 PPB	2		1	1		1	1	1	1												
Ø B2 PPB (F)	1		1	1																	
PPB COMMON	3		1	1		1	1	1	1												
SPARES	9		3	3	3	3	3	3	3												
TOTAL #14	71		36	31	9	25	13	22	13												
#10	I.I.S.N.S.	4	2	2	2	2			2												
	LIGHTING (240V)	4	2	2	2	2	2	2													
	SIGNAL COMMON	2		1	1	1	1	1	1	1											
	TOTAL #10	2	8	5	5	5	5	3	5	1											
#6	120V SERVICE TO CON.	3	3																		
DLC	Ø A1 DETECTOR	9		9	9																
	Ø A2 DETECTOR	9									9	9									
	Ø B1 DETECTOR (F)	2		2	2		2														
	Ø B2 DETECTOR	3																			
	Ø C1 DETECTOR	2		2	2																
	Ø C2 DETECTOR (F)	2										2	2								
	Ø D1 DETECTOR (F)	1		1	1		1														
	Ø D2 DETECTOR (F)	1																			
	COUNT 1	1										1	1								
	COUNT 2	1										1	1								
	COUNT 3	1		1	1																
	COUNT 4	1		1	1																
	COUNT 5 (FUTURE)			1	1																
	COUNT 6 (FUTURE)											1	1								
TOTAL DLC	33		17	17		3		14	14												
SIC	SIC	2		2	2		1														
EV	PREEMPTION CABLE	4		3	2	1	1		1												
	CONDUIT SIZE (INCHES)	2-4	2	4	4	1 1/2	3	1 1/2	3 1/2	3											

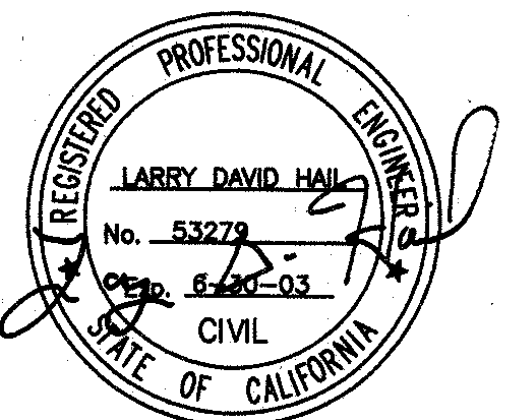
(F) - DENOTES CONDUCTORS TO BE INSTALLED NOW AND COILED AT BOTTOM OF CONTROLLER FOR ULTIMATE TRAFFIC MODIFICATIONS.

RESERVATION RD./MBEST DR.

POLE AND EQUIPMENT SCHEDULE

TYPE	STANDARD		VEH. SIGNAL MOUNTING		PED SIGNAL MOUNTING	PPB Ø	HPS LUMINAIRE (WATTS)	IISNS SIGN	SPECIAL REMARKS
	SIG. MAST (FEET)	LUM. MAST (FEET)	MAST ARM	POLE					
(A) 29A-5-113	55 (16.8m)	15 (4.60m)	MAS MAS	SV-1-T	SP-1-T	—	310	6' IISNS - "MBest Dr"	Refer To Caltrans 1997 Metric Std. Plans For Pole Specification Data. Do Not Install Signal Head For Future #C2 Operations.
(B) 1-A (10')	—	—	—	TV-1-T	SP-1-T	A2P	—		Install #B2P Pedestrian Signal Head And Coil Conductor In Bottom Of Controller Cabinet. Do Not Connect. Do Not Install Signal Head For Future #D1 Operations.
(C) 26A-4-80	—	15	—	—	SP-1-T	A2P	310		Pole Sized for Future 40' Mast Arm. Do Not Install Signal Head For Future #B1 Operations.
(D) 1-A (10')	—	—	—	TV-2-T	SP-1-T	B1P	—		
(E) 61A-5-129	65 (19.81m)	15 (4.60m)	MAS MAS	—	—	—	—	6' IISNS - "MBest Dr"	Refer To Caltrans 1997 Metric Std. Plans For Pole Specification Data. Do Not Install Signal Head For Future #A1 Operations. Foundation Shall Be Constructed In Order To Provide A Minimum Of 17' Of Clearance Between Travel Lanes (Roadway Surface) And Mast Arm Mounted Signal Heads. Total Depth Of Foundation To Be Determined By City Engineer During Construction. Provide A Minimum Of 4.87m(15.97') Of Foundation Below Existing Surface Per Caltrans Std. Plans.
(F) TYPE 22	—	15	—	SV-2-TB	—	B1P	310		
(G) 26A-4-80	40	15	MAS	SV-2-TA	—	—	310	8' IISNS - "Reservation Rd"	Do Not Install Signal Head For Future #D2 Operations.
(H) 1-A (10') (FUTURE)	—	—	—	TV-2-T (FUTURE)	SP-1-T (FUTURE)	B2P (FUT)	—		
(I) PPB POST	—	—	—	—	—	—	—		
(J) PPB POST	—	—	—	—	—	—	—		
(K) PPB POST	—	—	—	—	—	—	—		

(N.I.C.)—NOT IN CONTRACT. THESE SIGNAL, LIGHTING AND INTERCONNECT IMPROVEMENTS ARE ELIMINATED FROM THE BASE BID.



Project Design Team:

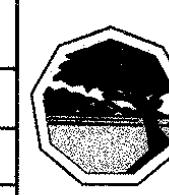
- Reimer Associates
- CH2MHill
- Kleinfelder
- Higgins Associates
- EMC Planning Group
- HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

COMPANY	Higgins Associates
DSGN	LDH
DR	CJI
CHK	KBH

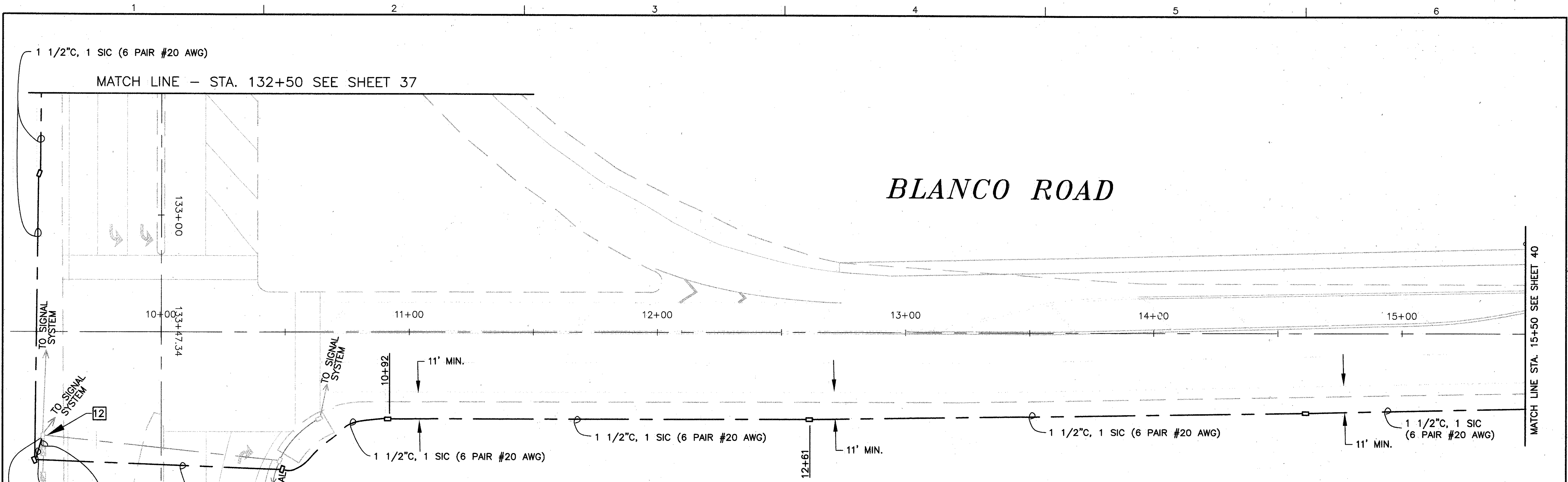


Fort Ord Reuse Authority
100 12th Street, Bldg. 2880
Marina, CA 93933
Approved: *[Signature]* Date: 6/6/99

University of California - Santa Cruz
Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
SIGNAL AND INTERCONNECT PLAN

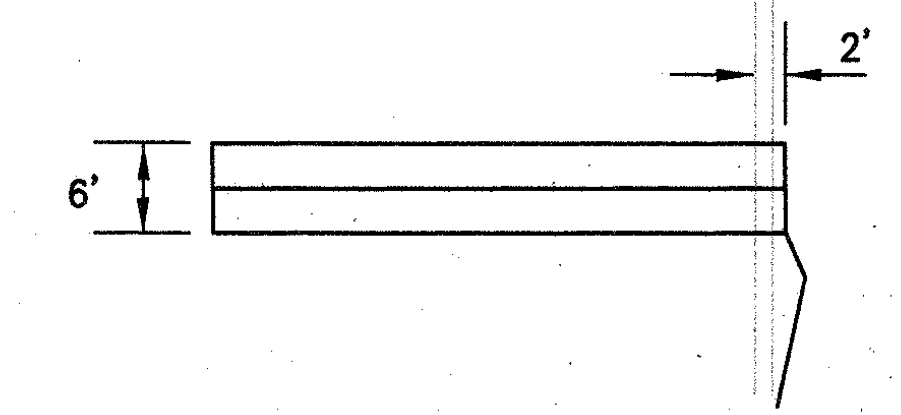
SHEET 38 of 41
DWG
DATE June 1999
PROJ R1680

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PROJECT NOTES(BLANCO RD./RESEARCH DR.):

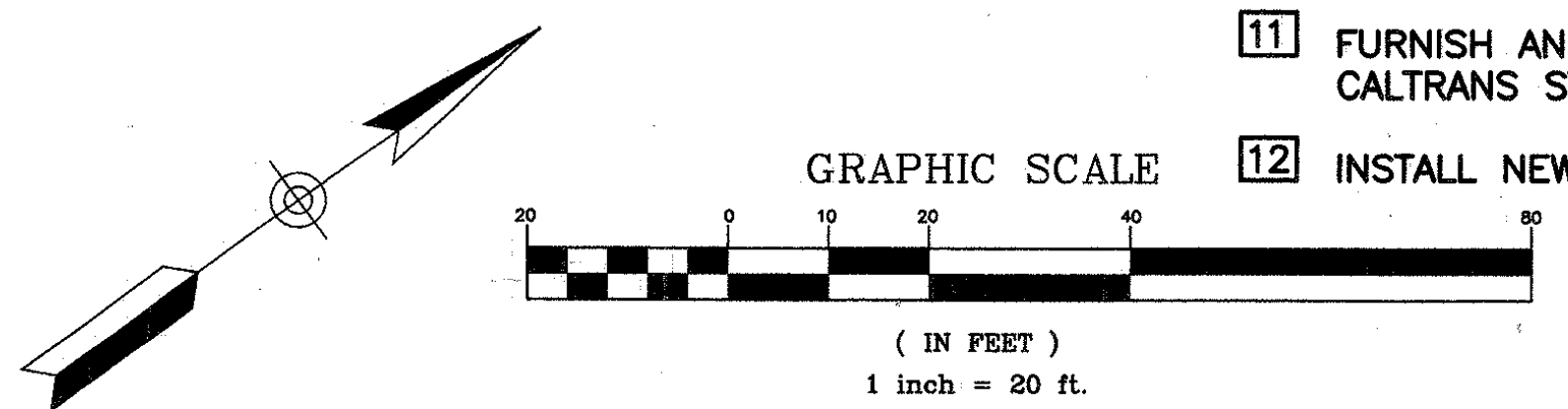
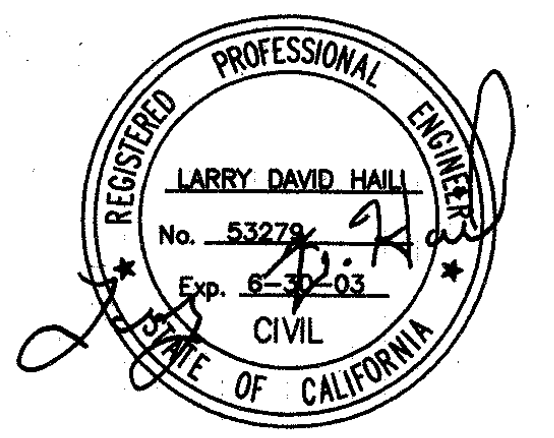
- 1 COORDINATE SERVICE CONNECTION WITH PG&E (831-648-3243).
- 2 BLANCO ROAD & RESEARCH DRIVE: FURNISH AND INSTALL TYPE III-BF SERVICE EQUIPMENT AND ALUMINUM ENCLOSURE. PEU SHALL BE MOUNTED IN THE RIGHT SIDE OF THE SERVICE SECTION, 18" MINIMUM FROM THE BOTTOM OF ENCLOSURE, AND PEU SHALL CONTROL BOTH IISNS & INTERSECTION SAFETY LIGHTING. DOOR SHALL FACE SOUTH. FOR SERVICE WIRING DIAGRAM FOR BLANCO ROAD/RESEARCH DRIVE SEE SHEET 41.
- 3 FURNISH AND INSTALL MODEL 170E TRAFFIC CONTROLLER ASSEMBLY IN MODEL 332 ALUMINUM CABINET. FRONT DOOR SHALL FACE SOUTH.
- 4 FURNISH AND INSTALL EMERGENCY VEHICLE DETECTOR (OPTICOM 711) ON MAST ARM AS SHOWN ON PLANS.
- 5 FURNISH AND INSTALL R73-2 (36"x36") ON THE MAST ARM. SIGN MOUNTING PER DETAIL U, CALTRANS STD. PLAN ES-6T.
- 6 FURNISH AND INSTALL R34-2 (30"x30") ON MAST ARM. SIGN MOUNTING PER "DETAIL U", CALTRANS STD. PLAN ES-6T.
- 7 FURNISH AND INSTALL R61-13 (48"x30") ON MAST ARM. SIGN MOUNTING PER "DETAIL U", CALTRANS STD. PLAN ES-6T.
- 8 COIL 200' OF ADDITIONAL DETECTOR LEAD-IN CABLE(S) IN PULLBOX FOR FUTURE DETECTION.
- 9 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R43 (36"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 10 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R49(LT) (42"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 11 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE WITH R49(RT) (42"x18") SIGN PER CALTRANS STD. PLAN ES-5F.
- 12 INSTALL NEW CONDUIT IN EXISTING PULL BOX.



DETECTOR LOOP DETAIL
N.T.S

(N.I.C.)—NOT IN CONTRACT. THESE SIGNAL, LIGHTING AND INTERCONNECT IMPROVEMENTS ARE ELIMINATED FROM THE BASE BID.

BEFORE EXCAVATING CALL U.S.A.
UNDERGROUND SERVICE ALERT
800-642-2444
48 HOURS NOTICE REQUIRED
BEFORE ALL PLANNED WORK



Project Design Team:
 • Reimer Associates
 • Kleinfelder
 • EMC Planning Group
 • CH2MHill
 • Higgins Associates
 • HD Peters Associates, Inc.
Reimer Associates

NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
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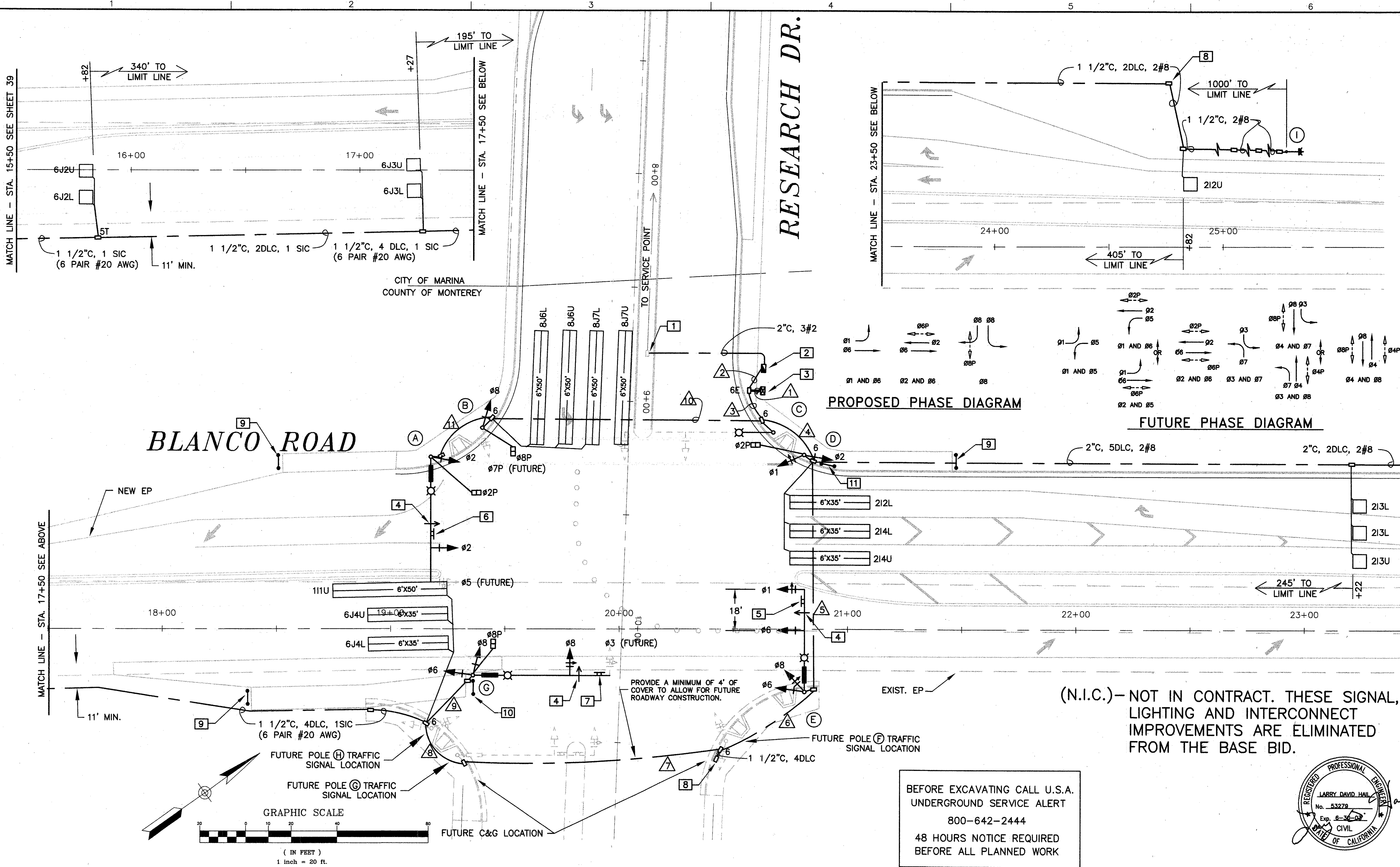
COMPANY: Higgins Associates
 DSGN: LDH
 DR: CJI
 CHK: KBH

Fort Ord Reuse Authority
 100 12th Street, Bldg. 2880
 Marina, CA 93933
 Approved: *[Signature]* Date: 7/6/99

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
STREET AND UTILITY OPENING PROJECT
SIGNAL, LIGHTING AND INTERCONNECT PLAN

SHEET 39 of 41
 DWG
 DATE June 1999
 PROJ R1680

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RESEARCH DR.

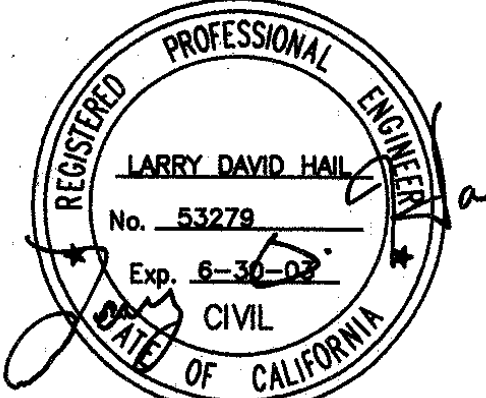
BLANCO ROAD

PROPOSED PHASE DIAGRAM

FUTURE PHASE DIAGRAM

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800-642-2444
48 HOURS NOTICE REQUIRED BEFORE ALL PLANNED WORK



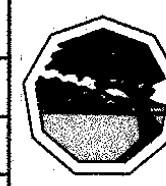
Project Design Team:
 • Reimer Associates • CH2MHill
 • Kleinfelder • Higgins Associates
 • EMC Planning Group • HD Peters Associates, Inc.



NO.	DATE	REVISION	BY	APVD

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COMPANY
 Higgins Associates
 DSGN LDH
 DR CJI
 CHK KBH



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 Marina, CA 93933
 Approved *[Signature]* 1/6/99
 Date

University of California - Santa Cruz
 Monterey Bay Education, Science and Technology Park
 STREET AND UTILITY OPENING PROJECT
 SIGNAL, LIGHTING AND INTERCONNECT PLAN

SHEET 40 of 41
 DWG
 DATE JUNE 1999
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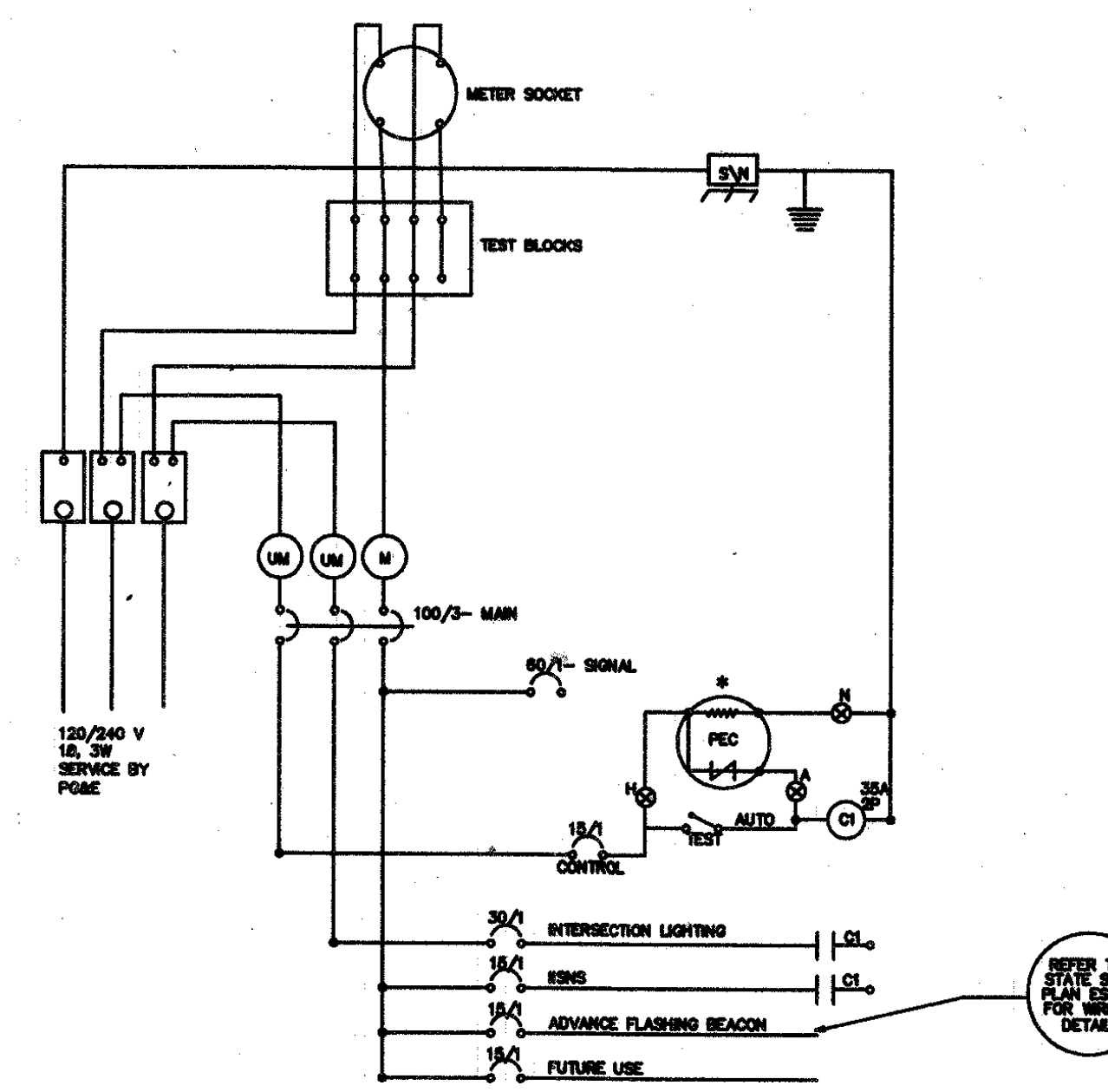
CONDUCTOR AND CONDUIT SCHEDULE

AWG	CONDUCTOR DESIGNATION	NUMBER OF CONDUCTORS																			
		RUN NUMBER																			
		1	2	3	4	5	6	7	8	9	10	11									
#14	Ø 1	3		3	3	3															
	Ø 2	6		6	3									3	3						
	Ø 3 (FUTURE)	3		3	3	3	3	3	3												
	Ø 4 (FUTURE)	6		6	3	3	3														
	Ø 5 (FUTURE)	6		6	3	3	3	3	3	3	3										
	Ø 6	3		3	3	3	3	3	3	3											
	Ø 7 (FUTURE)	6		6																3	
	Ø 8	6		6	3	3	3	3	3	3										3	
	Ø 2P	4		4	2															2	2
	Ø 4P (FUTURE)	4		4	2	2	2														
	Ø 6P (FUTURE)	2		2	2	2	2	2	2	2											
	Ø 8P	4		4	2	2	2	2	2	2											2
	Ø 2PPB	2		2																	1
	Ø 4PPB (FUTURE)	1		1	1	1	1														
	Ø 6PPB (FUTURE)	1		1	1	1	1	1	1	1											
	Ø 8PPB	2		2	1	1	1	1	1	1	1										1
	PPB COMMON	3		3	1	1	1	1	1	1	1										1
	SPARES	9		9	3	3	3	3	3	3	3										3
	TOTAL #14		71		71	36	31	28	22	22	22	22	22	13							
	#8	IISNS		6	6	2	2	2	2	2	2	2	2	2							
LIGHTING (120V)			6	6	2	2	2	2	2	2	2	2	2								
SIGNAL COMMON		3		3	1	1	1	1	1	1	1	1	1								
TOTAL #8			3	12	15	5	5	5	5	5	5	5	5								
#6	120V SERVICE TO CON.	2	2																		
DLC	Ø 1	1		1	1	1	1	1													
	Ø 2	8		8	8																
	Ø 8 (Ø 3 FUTURE)	2		2																2	
	Ø 4 (FUTURE)	2		2	2	2															
	Ø 5 (FUTURE)	1		1	1																
	Ø 6	6		6	6	6	6	6	6												
	Ø 7 (FUTURE)	2		2	2	2	2														
	Ø 8	2		2																	2
TOTAL DLC		24		24	20	11	11	7	7											4	
SIC	SIC	1		1	1	1	1	1	1												
EV	PREEMPTION CABLE	4		4	2	2	1	1	1	1	1	1	1								
CONDUIT SIZE (INCHES)		2-4	2 1/2	2-4	4	4	3 1/2	3 1/2	3 1/2	2 1/2	3	2									

BLANCO RD./RESEARCH DR.

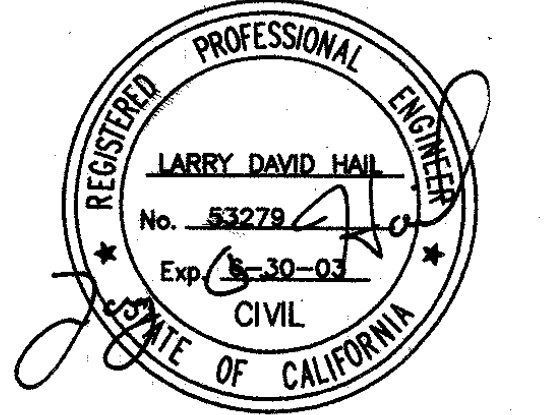
POLE AND EQUIPMENT SCHEDULE

TYPE	STANDARD		VEH. SIGNAL MOUNTING		PED SIGNAL MOUNTING	PPB	HPS LUMINAIRE (WATTS)	IISNS SIGN	SPECIAL REMARKS	
	SIG. MAST (FEET)	LUM. MAST (FEET)	MAST ARM	POLE						
(A)	29A-5-80	55	15	MAS	SV-1-T	SP-1-T	8P	310	8' IISNS - "Research Dr"	DO NOT INSTALL SIGNAL HEAD FOR FUTURE #5 OPERATIONS.
(B)	1-A (10')	—	—	—	TV-1-T	SP-1-T	2P	—	—	DO NOT INSTALL SIGNAL HEAD FOR FUTURE #7 OPERATIONS.
(C)	61A-5-129	—	15 (4.57m)	—	—	—	2P	310	—	POLE SIZED FOR ULTIMATE 65'(19.81m) MAST ARM. REFER TO CALTRANS 1997 METRIC STD. PLANS FOR POLE SPECIFICATION DATA.
(D)	1-A (10')	—	—	—	TV-2-T	SP-1-T	—	—	—	—
(E)	26A-4-80	45	15	MAS/MAS	SV-2-TB	—	—	310	8' IISNS - "Research Dr"	DO NOT INSTALL SIGNAL HEAD FOR FUTURE #6 OPERATIONS. FOUNDATION SHALL BE CONSTRUCTED IN ORDER TO PROVIDE A MINIMUM OF 17' OF CLEARANCE BETWEEN TRAVEL LANES (ROADWAY SURFACE) AND MAST ARM MOUNTED SIGNAL HEADS. TOTAL DEPTH OF FOUNDATION TO BE DETERMINED BY COUNTY ENGINEER DURING CONSTRUCTION, PROVIDE A MINIMUM OF 915mm(3') OF FOUNDATION BELOW EXISTING SURFACE PER CALTRAN STD. PLAN.
(F)	1-A (10') (FUTURE)	—	—	—	TV-2-T (FUTURE)	SP-1-T (FUTURE)	8P (FUT)	—	—	—
(G)	61A-5-129	60 (18.28m)	15	MAS	SV-2-A	SP-1-T	8P	310	6' IISNS - "Blanco Rd"	REFER TO CALTRANS 1997 METRIC STD. PLANS FOR POLE SPECIFICATION DATA.
(H)	1-A (10') (FUTURE)	—	—	—	TV-2-T (FUTURE)	SP-1-T (FUTURE)	6P (FUT)	—	—	—
(I)	1-A (10')	—	—	—	TV-1	—	—	—	—	ADVANCED FLASHING BEACON WITH FBCA & W41 SIGN.



* INTERNAL PHOTO ELEC. UNIT INSTALLED IN SERVICE PEDESTAL
TYPE III BF
SERVICE WIRING DIAGRAM

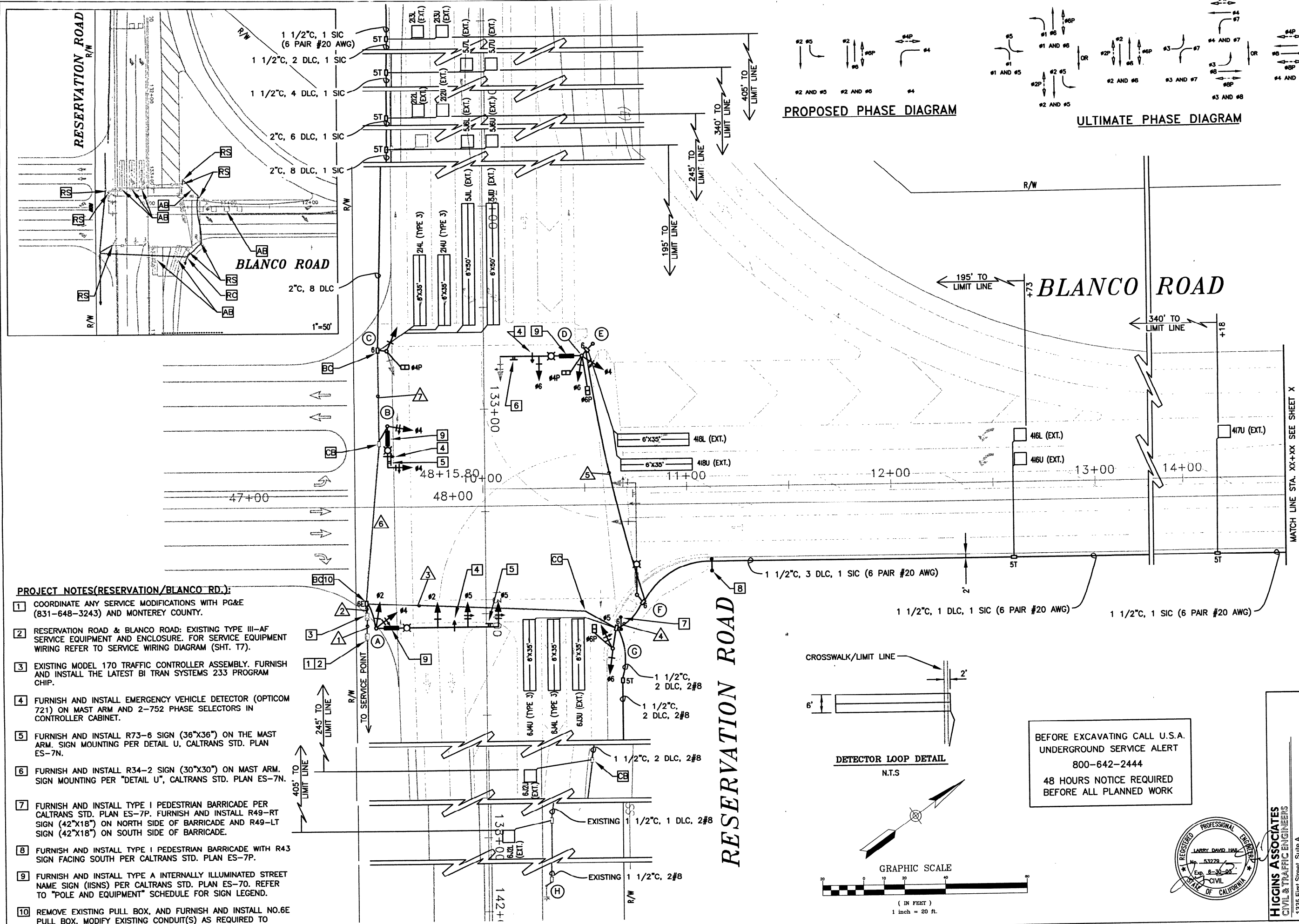
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Project Design Team: • Reimer Associates • CH2MHill • Kleinfelder • Higgins Associates • EMC Planning Group • HD Peters Associates, Inc.		VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	COMPANY Higgins Associates DSGN LDH DR CJJ CHK KBH	Fort Ord Reuse Authority 100 12th Street, Bldg. 2880 Marina, CA 93933 Approved: [Signature] Date: 1/6/99	University of California - Santa Cruz Monterey Bay Education, Science and Technology Park STREET AND UTILITY OPENING PROJECT SIGNAL AND INTERCONNECT PLAN	SHEET 41 of 41 DWG DATE June 1999 PROJ R1680
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APPENDIX I
RESERVATION ROAD SIGNAL PLANS AND
TIE-IN LOCATIONS



DESIGNED BY: LDH	DRAWN BY: CLM	CHECKED BY: KSH	DATE: JULY 2001	SCALE: AS SHOWN	DESCRIPTION:
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	
LDH	CLM	KSH	JULY 2001	AS SHOWN	

DESIGNED BY: LDH	DRAWN BY: CLM	CHECKED BY: KSH	DATE: JULY 2001	SCALE: AS SHOWN	DESCRIPTION:
LDH	CLM	KSH	JULY 2001	AS SHOWN	

CONSULTING CIVIL AND STRUCTURAL ENGINEERS CREEGAN+D'ANGELO 225 CANTREY ROW, SUITE 14 MONTEREY, CALIFORNIA 93940 TEL: (831) 373-1333 FAX: (831) 373-0733 FARRFIELD • MONTEREY • PLEASANTON • SAN FRANCISCO • SAN JOSE, CALIFORNIA
--

FORT ORD REUSE AUTHORITY TRAFFIC SIGNAL PLAN STREET AND UTILITY OPENING PROJECT SIGNAL LIGHTING AND INTERCONNECT PLAN
--

SHEET NUMBER T6
OF SHEETS
DRAWING NO.

CONDUCTOR AND CONDUIT SCHEDULE

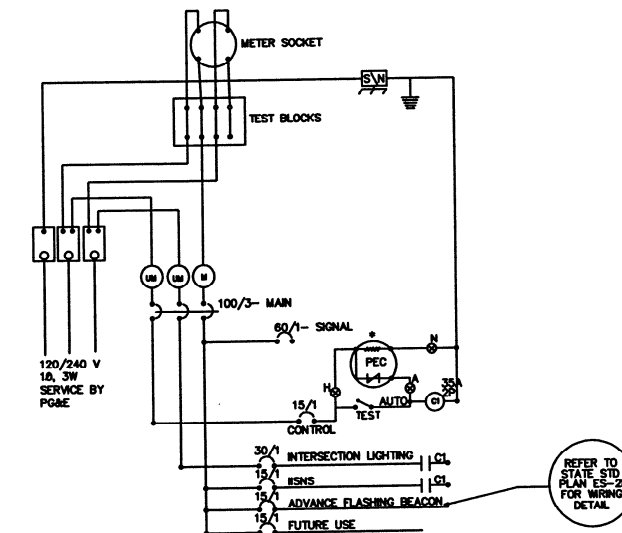
AWG	CONDUCTOR DESIGNATION	NUMBER OF CONDUCTORS						
		RUN NUMBER						
		1	2	3	4	5	6	7
#14	Ø1 (FUTURE)							
	Ø2		6				3	3
	Ø3 (FUTURE)							
	Ø4		9	3	3	3	3	
	Ø5		6	3				
	Ø6		3	3	3	3		
	Ø7 (FUTURE)							
	Ø8 (FUTURE)							
	Ø2PPB (FUTURE)							
	Ø4PPB		4	2	2	2	2	2
	Ø6PPB		2	2	2	2		
	Ø8PPB (FUTURE)							
	PPB COMMON SPARES		2	1	1	1	1	1
	TOTAL #14		44	19	16	16	13	10
#8	IISNS	6	6	2	2	2	2	
	LIGHTING (120V)	6	6	2	2	2	2	
	SIGNAL COMMON	3	1	1	1	1	1	
	TOTAL #8	12	15	5	5	5	5	1
#6	120V SERVICE TO CON.	2						
DLC	Ø1 (FUTURE)							
	Ø2		6				6	6
	Ø3 (FUTURE)							
	Ø4		5	5	2	2		
	Ø5		6				6	6
	Ø6		5	5				
	Ø7 (FUTURE)							
	Ø8 (FUTURE)							
TOTAL DLC		22	10	2	2	12	12	
SIC	SIC	2	1	1		1	1	
EV	PREEMPTION CABLE	3	1	1	1	1		
CONDUIT SIZE (INCHES)		2 1/2	2-3 1/2	3 1/2	2 1/2	3 1/2	3 1/2	3

NOTE: NO FUTURE CONDUCTORS OR DETECTOR LEAD-IN CABLES ARE TO BE INSTALLED. FUTURE SIGNAL MODIFICATION REQUIRED FOR "ULTIMATE" CONDITIONS WILL REQUIRE THE RELOCATION OF THE EXISTING CONTROLLER, WHICH WILL REQUIRE THE SIGNAL TO BE REWIRED.

POLE AND EQUIPMENT SCHEDULE (*)

	STANDARD	SIG. MAST (FEET)	LUM. MAST (FEET)	VEH. SIGNAL MOUNTING		PED SIGNAL MOUNTING	PPB	HPS LUMINAIRE (WATTS)	SIGNS	SPECIAL REMARKS
				TYPE	MAST ARM					
(A)	61A-5-129	18.2m (60')	4.6m (15')	MAS MAS (F=15') MAS (F=30')	SV-2-TB			310	[5] [9] 6' IISNS - "Blanco Rd"	[4] MODIFY MAST ARM CONNECTION PLATE AS REQUIRED TO ACCOMMODATE 18.2m MAST ARM (IN LIEU OF 19.8m MAST ARM). TIP OF MAST ARM SHALL BE HORIZONTAL. LARGER STANDARD REQUIRED FOR 310W LUMINAIRE MOUNTING HEIGHT.
(B)	19A-3-129 (19A-3-80)	6.1m (20')	4.6m (15')	MAS	SV-1-T			310	[5] [9] 8' IISNS - "Reservation Rd"	[4] MODIFY MAST ARM CONNECTION PLATE AS REQUIRED TO ACCOMMODATE 20 FOOT MAST ARM (IN LIEU OF 25 FOOT MAST ARM). TIP OF MAST ARM SHALL BE HORIZONTAL. LARGER STANDARD REQUIRED FOR 310W LUMINAIRE MOUNTING HEIGHT.
(C)	1-A (10')				TV-1-T	SP-1-T	4P			FUTURE Ø1 SIGNAL HEAD SHALL NOT BE INSTALLED.
(D)	26A-4-129 (26A-4-80)	12.2m (40')	4.6m (15')	MAS (F=19')	SV-2-TB	SP-2-T		310	[6] [9] 6' IISNS - "Blanco Rd"	[4] FUTURE Ø1 SIGNAL HEAD AT END OF MAST ARM SHALL NOT BE INSTALLED.
(E)	PPB POST						6P 4P			
(F)	29A-5-129 (29A-5-80)		4.6m (15')				6P	310		55' MAST ARM AND SIGNAL EQUIPMENT FOR FUTURE PHASE Ø3 AND Ø8 OPERATIONS SHALL BE INSTALLED WITH THE CONSTRUCTION OF BLANCO ROAD SOUTH OF RESERVATION ROAD (ULTIMATE CONDITIONS).
(G)	1-A (10')				TV-2-T	SP-1-T				
(H)	1-A (10')									EXISTING "SIGNAL AHEAD" FLASHING BEACON.

"F" DIMENSION IS DISTANCE BETWEEN SIGNAL HEAD AND END OF MAST ARM.
(*)-REFER TO CALTRANS 1992 STANDARD PLANS FOR SIGNAL STANDARD SPECIFICATIONS IN ENGLISH UNITS.



* INTERNAL PHOTO ELEC. UNIT INSTALLED IN SERVICE PEDESTAL
TYPE III AF
SERVICE WIRING DIAGRAM



HIGGINS ASSOCIATES
CIVIL & TRAFFIC ENGINEERS
1335 First Street, Suite A
Gilroy, CA 95020
Phone: 408 846-3122 Fax: 408 848-2202
e-mail: info@khiggin.com

Consulting Civil and Structural Engineers
225 SANJAY ROAD, SUITE 111
MONTEREY, CALIFORNIA 93940
TELE: (831)373-1333 FAX: (831)373-0733
FAIRFIELD · MONTEREY · PLEASANTON · SAN FRANCISCO · SAN JOSE, CALIFORNIA

FORT ORD REUSE AUTHORITY
CONDUIT & CONDUCTOR AND POLE AND EQUIPMENT SCHEDULES
STREET AND UTILITY OPENING PROJECT
SIGNAL, LIGHTING AND INTERCONNECT PLAN

SHEET NUMBER
T7
OF SHEETS
DRAWING NO.

DATE	DESCRIPTION	BY

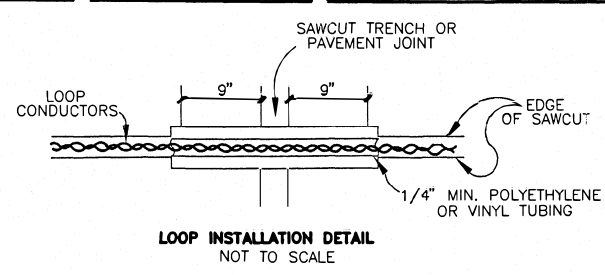
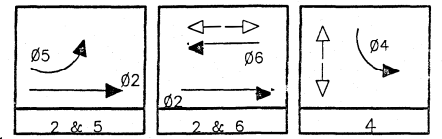
CONDUCTOR SCHEDULE

AWG	CIRCUIT	CONDUIT SIZE & RUN				
		1"	1 1/2"	2"	3"	4"
14	Ø2 SIGNAL			3	3	3
	Ø4 SIGNAL			3	3	3
	Ø5 SIGNAL					3
	Ø6 SIGNAL	3	3	3	3	
	Ø4 PEDESTRIAN			2	2	2
	Ø6 PEDESTRIAN	2	2	2	2	
	Ø4 PPB	1	1	1	1	1
	Ø6 PPB					
	PPB NEUTRAL					
	SPARES	3	3	3	3	3
TOTAL	9	15	15	18	10	
12	IISNS	2	2	2	2	2
	LUMINAIRES	2	2	2	2	2
10	SIGNAL COMMON	1	1	1	1	1
	TOTAL	3	3	3	3	3
8	FLASHING BEACON					2
	Ø2					3
DLC	Ø4			2	2	2
	Ø6					5
	Ø6					4
	TOTAL			2	2	6
OPTICOM CABLE *		1	1	1	1	1

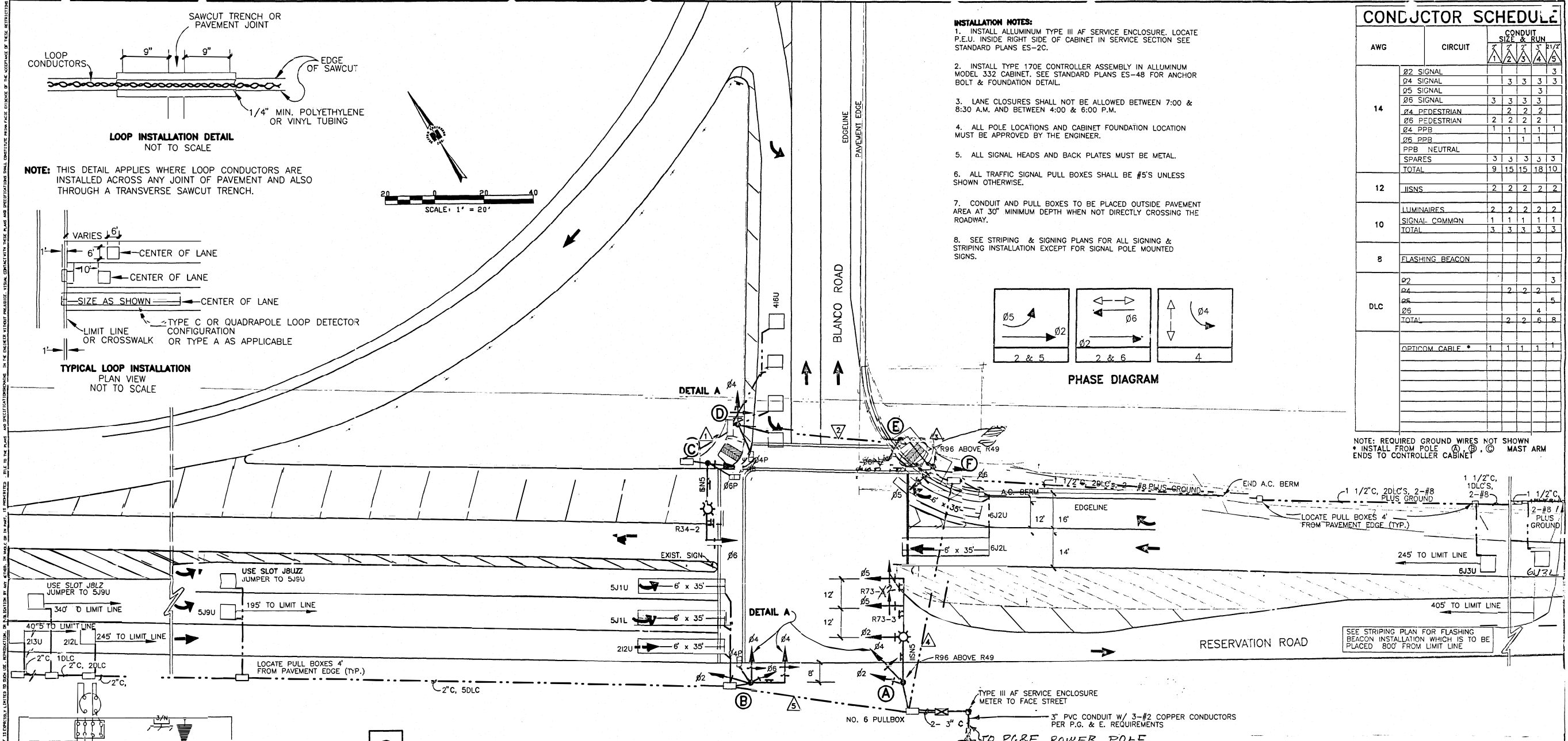
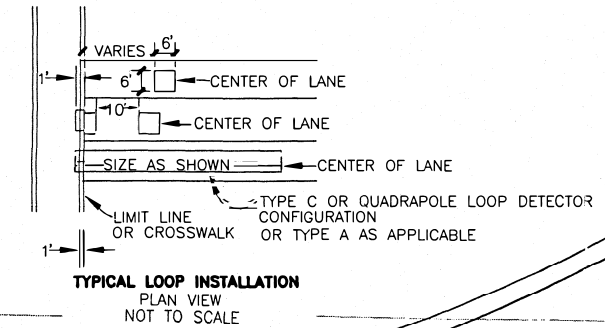
NOTE: REQUIRED GROUND WIRES NOT SHOWN
* INSTALL FROM POLE (A), (B), (C) MAST ARM
ENDS TO CONTROLLER CABINET

old

- INSTALLATION NOTES:**
- INSTALL ALUMINUM TYPE III AF SERVICE ENCLOSURE. LOCATE P.E.U. INSIDE RIGHT SIDE OF CABINET IN SERVICE SECTION SEE STANDARD PLANS ES-2C.
 - INSTALL TYPE 170E CONTROLLER ASSEMBLY IN ALUMINUM MODEL 332 CABINET. SEE STANDARD PLANS ES-48 FOR ANCHOR BOLT & FOUNDATION DETAIL.
 - LANE CLOSURES SHALL NOT BE ALLOWED BETWEEN 7:00 & 8:30 A.M. AND BETWEEN 4:00 & 6:00 P.M.
 - ALL POLE LOCATIONS AND CABINET FOUNDATION LOCATION MUST BE APPROVED BY THE ENGINEER.
 - ALL SIGNAL HEADS AND BACK PLATES MUST BE METAL.
 - ALL TRAFFIC SIGNAL PULL BOXES SHALL BE #5'S UNLESS SHOWN OTHERWISE.
 - CONDUIT AND PULL BOXES TO BE PLACED OUTSIDE PAVEMENT AREA AT 30" MINIMUM DEPTH WHEN NOT DIRECTLY CROSSING THE ROADWAY.
 - SEE STRIPING & SIGNING PLANS FOR ALL SIGNING & STRIPING INSTALLATION EXCEPT FOR SIGNAL POLE MOUNTED SIGNS.



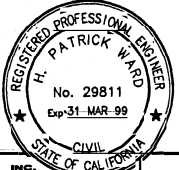
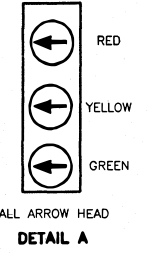
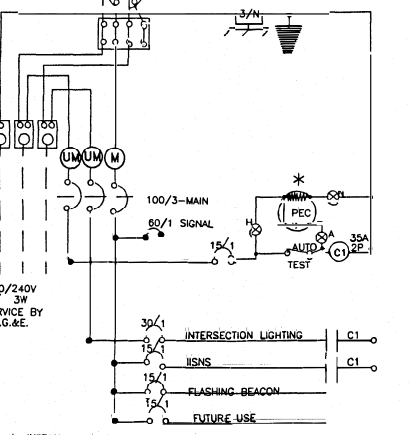
NOTE: THIS DETAIL APPLIES WHERE LOOP CONDUCTORS ARE INSTALLED ACROSS ANY JOINT OF PAVEMENT AND ALSO THROUGH A TRANSVERSE SAWCUT TRENCH.



POLE SCHEDULE

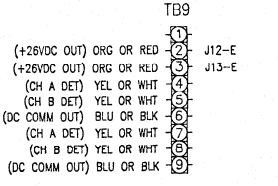
TYPE	STANDARD		VEH. SIG. MAST ARM	MTG. POLE	PED SIGNAL Ø	PPB Ø	HPS LUMINAIRE 90° CUTOFF TYP.	SIGNS	ILLUMINATED STREET NAME SIGNS	REMARKS & SPECIAL REQUIREMENTS
	SIGNAL M.A.	LUM. M.A.								
(A)	26-4-70 MODIFIED	40'	3-MAS	SV-2-T	-	-	(120V TYP) 200W	1 R73-3, 1 R73-2, R96 above R49	** BLANCO RD	MUST BE STRUCTURALLY DESIGNED FOR 3-MAS + SIGNS
(B)	17-2-70	20'	MAS	SV-2-T	4	SP-1-T	4	LEFT	** RESERVATION RD	NEARSIDE Ø2 SIGNAL HEAD 8" LENSES Ø4 ALL ARROW HEADS
(C)	24-4-70	35'	MAS	SV-1-T	6	SP-1-T	4	LEFT	** BLANCO RD	
(D)	1-A			TV-1-T	4	SP-1-T	6	RIGHT		ALL ARROW HEAD
(E)	PEDESTRIAN PUSHBUTTON POST						6	LEFT		
(F)	1-A			TV-2-T	6	SP-1-T			R96 above R49	NEARSIDE Ø6 SIGNAL HEAD 8" LENSES

* USE 12" LENSES, EXCEPT WHERE NOTED IN SPECIAL REQUIREMENTS
** DOUBLE-FACED SIGNS WITH 8" UPPER CASE, 6" LOWER CASE, SERIES E LETTERING, MINIMUM SIZE

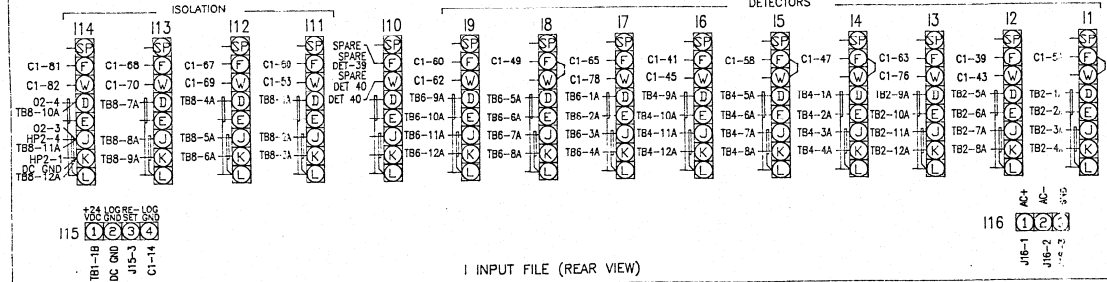


DESIGNED: J.P.W. / N.T.	BESTOR ENGINEERS, INC.	COUNTY OF MONTEREY	FORT ORD REUSE AUTHORITY APPROVED	SIGNAL PLAN	SHEET 30
DRAWN: N.C.	SUBMITTED: [Signature]	APPROVED: PUBLIC WORKS DIRECTOR	100 12th Street, Building 2880	RESERVATION ROAD & BLANCO ROAD	DATE: JUNE 1996
CHECKED: N.T.	PROJECT ENGINEER: H. PATRICK WARD	BY: DEPUTY - ENGINEERING	Marina, CA 93933	INTERSECTION	PROJ. 5572.04
NO. DATE DESC. RPT. ON R.Y.	29811 - 6/19/96 R.C.E. NO. DATE EXPIRES 3/31/99	DATE	DATE	COUNTY OF MONTEREY	

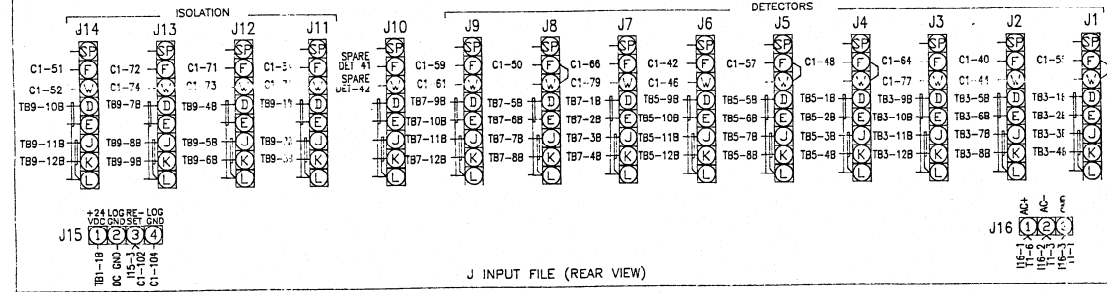
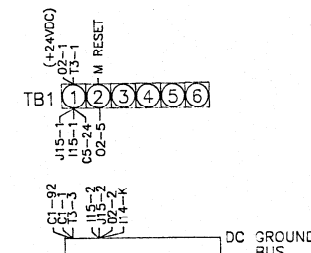
OPTICOM FIELD WIRE DETAIL



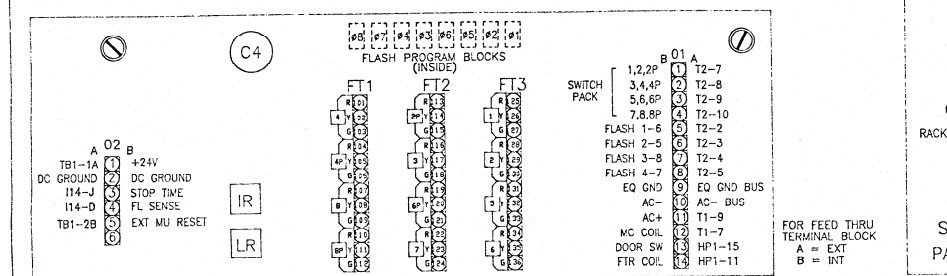
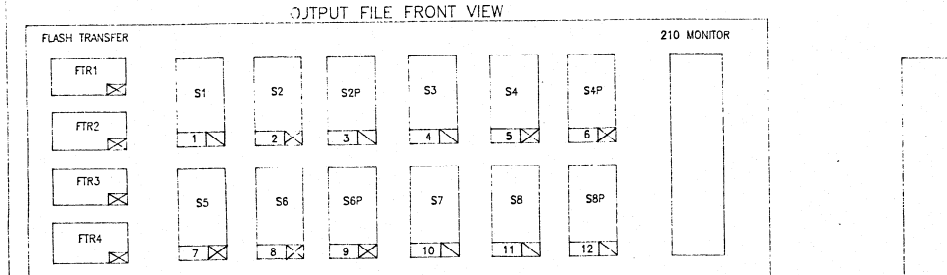
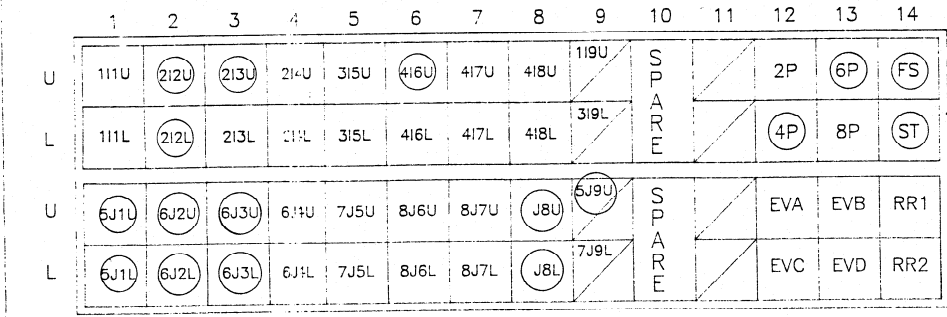
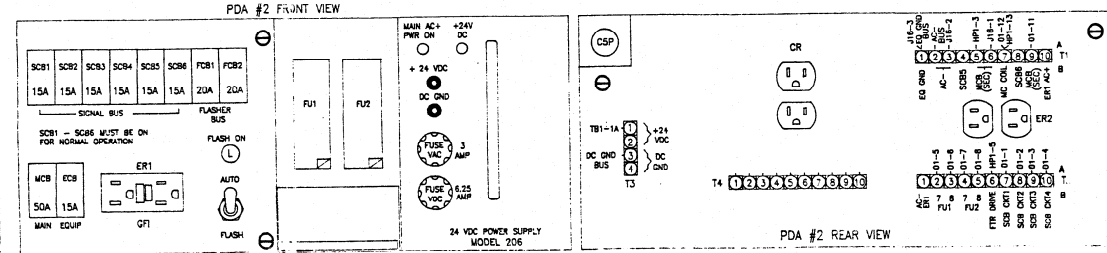
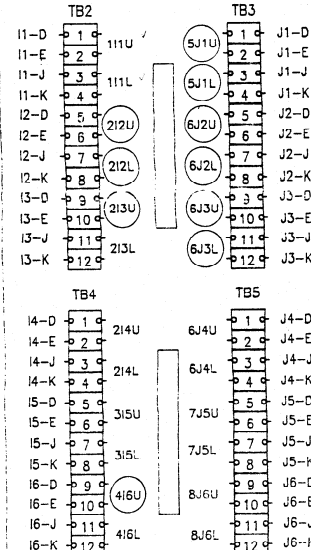
ASSUMING TB9-2 & TB9-3 ARE UNUSED ON THE J FILE. MOVE WIRES ON J11-3 & J11-K (TWISTED PAIR) TO J12-E & J13-E RESPECTIVELY.



UPPER INPUT PANEL #1

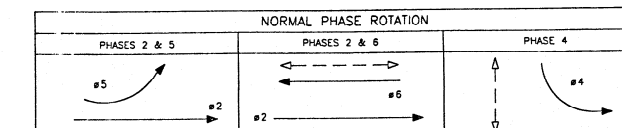
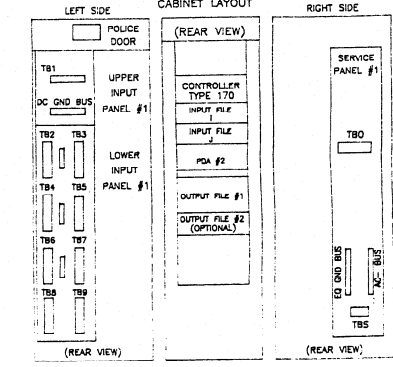
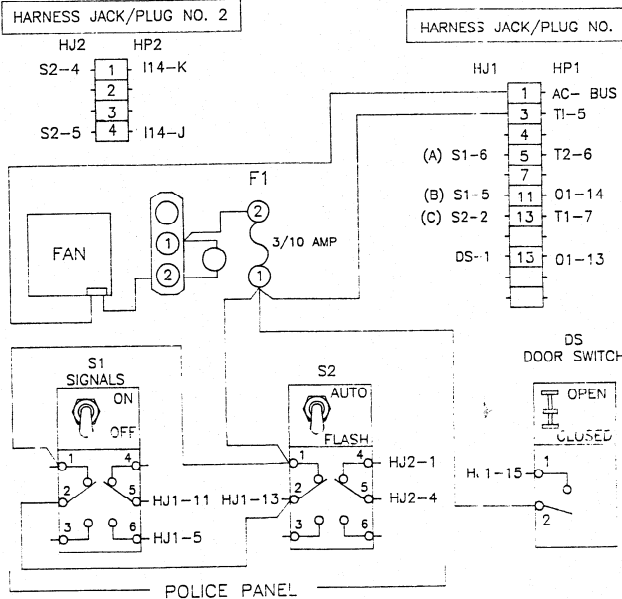


LOWER INPUT PANEL #1

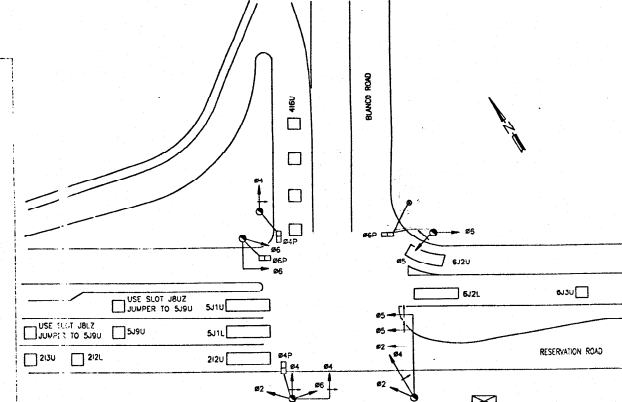
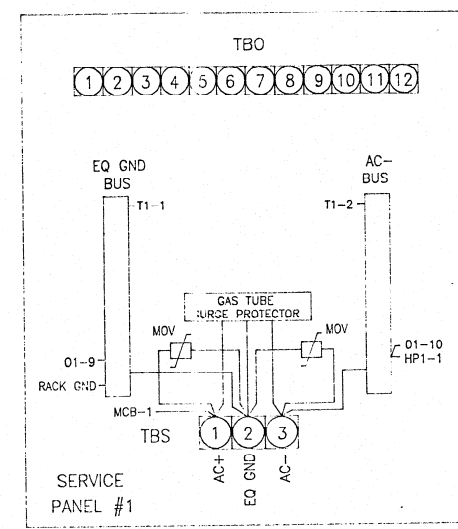


170 CONTROLLER C1 ASSIGNMENT table with columns for PIN NO., SOURCE, UNIVERSAL FUNCTION, and CONN. TO.

170 CONT C2 CABLE table with columns for PIN, FUNCTION, and CONN TO.



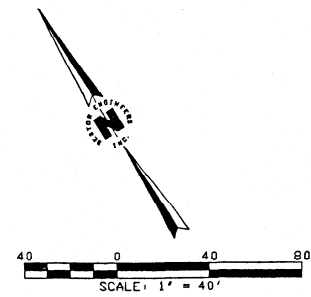
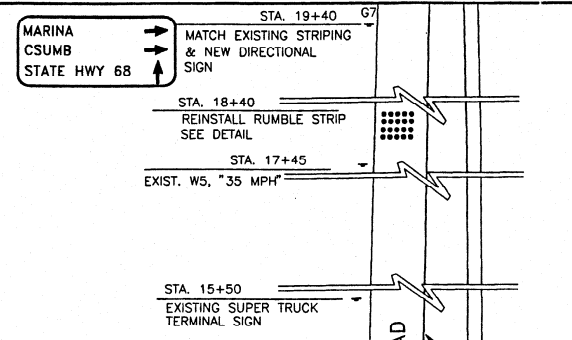
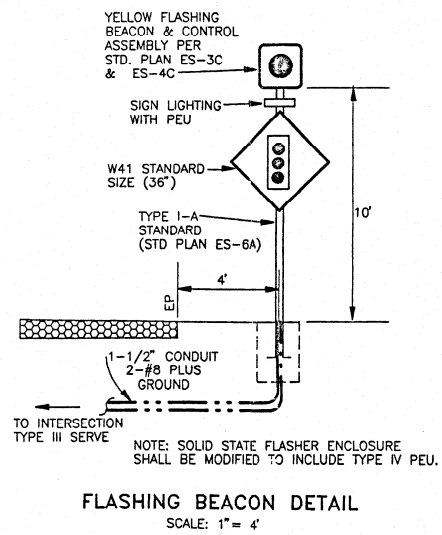
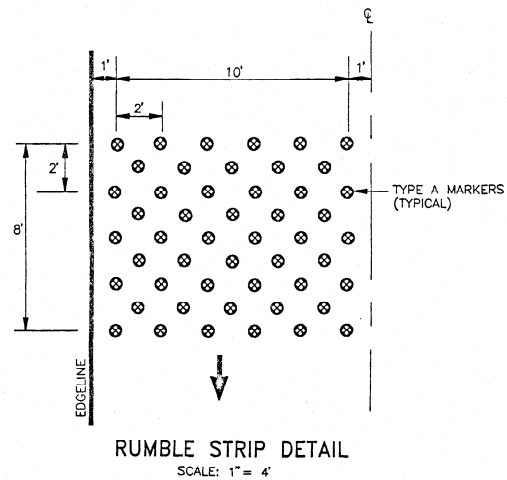
- SHEET DEFINITIONS list: 11COM, CG, CKT, CR, DET1, DS, EQB, ER1, EVA, F1, FCB1, FT1, FTR, FU, GF1, HJ1, HP1, I14-D, M RESET, MC, MCB, MOV, MU, RR1, S1, S2P, SCB1.



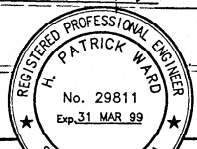
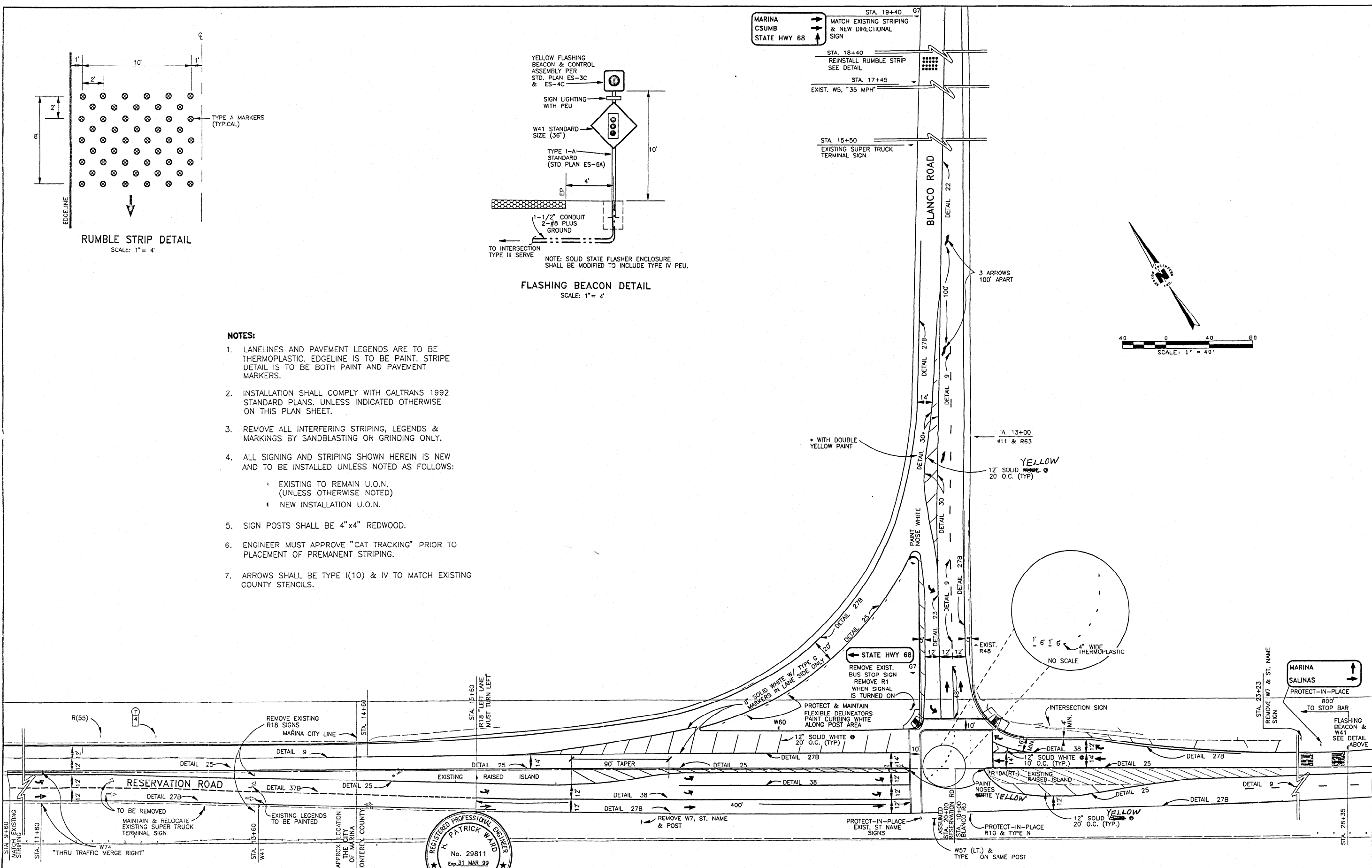
NOTE: THE OPERATION OF THE CIRCUITS AND EQUIPMENT REPRESENTED HEREON CANNOT BE FINALLY CHECKED UNTIL CONNECTED TO FORM A COMPLETE SYSTEM OR AN EFFECTIVE PORTION THEREOF.

McCain Traffic Supply logo and address: 2575 PIONEER AVE. VISTA, CA 92083. Part number MDR3221.

Blanco Reservacion



- NOTES:**
1. LANELINES AND PAVEMENT LEGENDS ARE TO BE THERMOPLASTIC. EDGE LINE IS TO BE PAINT. STRIPE DETAIL IS TO BE BOTH PAINT AND PAVEMENT MARKERS.
 2. INSTALLATION SHALL COMPLY WITH CALTRANS 1992 STANDARD PLANS, UNLESS INDICATED OTHERWISE ON THIS PLAN SHEET.
 3. REMOVE ALL INTERFERING STRIPING, LEGENDS & MARKINGS BY SANDBLASTING OR GRINDING ONLY.
 4. ALL SIGNING AND STRIPING SHOWN HEREIN IS NEW AND TO BE INSTALLED UNLESS NOTED AS FOLLOWS:
 - ◊ EXISTING TO REMAIN U.O.N. (UNLESS OTHERWISE NOTED)
 - ◄ NEW INSTALLATION U.O.N.
 5. SIGN POSTS SHALL BE 4"x4" REDWOOD.
 6. ENGINEER MUST APPROVE "CAT TRACKING" PRIOR TO PLACEMENT OF PERMANENT STRIPING.
 7. ARROWS SHALL BE TYPE I(10) & IV TO MATCH EXISTING COUNTY STENCILS.



				BESTOR ENGINEERS, INC. CIVIL ENGINEERING • SURVEYING • LAND PLANNING 8701 BLUE LARKSPUR LANE, MONTEREY, CALIFORNIA 93940		COUNTY OF MONTEREY APPROVED: PUBLIC WORKS DIRECTOR BY: DEPUTY - ENGINEERING		FORT ORD REUSE AUTHORITY APPROVED 100 12th Street, Building 2880 Marina, CA 93933		STRIPING & SIGNING PLAN RESERVATION ROAD & BLANCO ROAD INTERSECTION COUNTY OF MONTEREY		SHEET 31 DATE JUNE 1996 PROJ. 5572.04
DESIGNED	H.P.W./ N.T.	CHECKED	N.T.	PROJECT ENGINEER	H. PATRICK WARD	R.C.E. NO.	29811	DATE	6/19/96			
NO.	DATE	DESCRIPTION	BY									

CALTRANS STANDARD NOTES

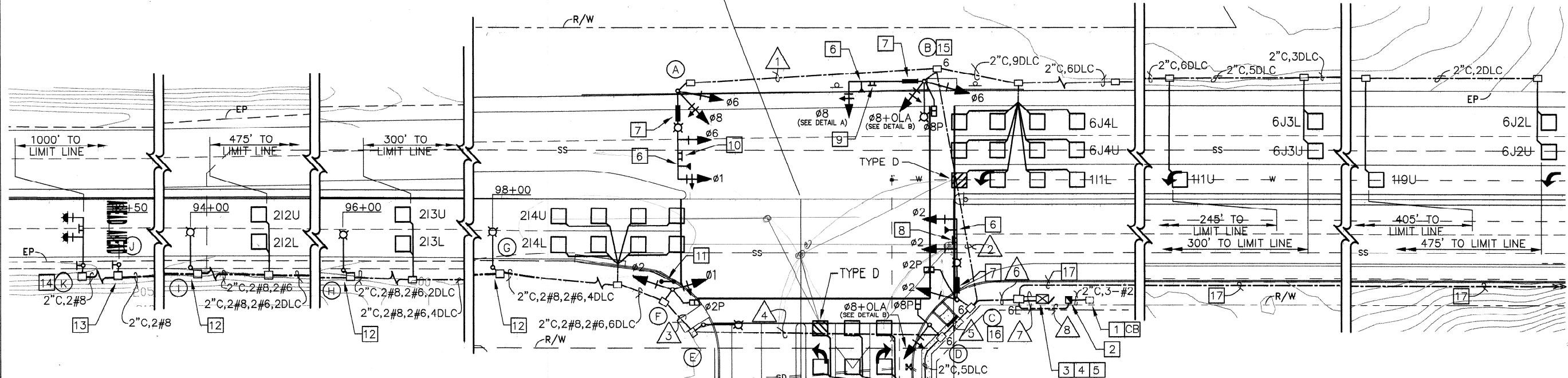
CB INSTALL NEW CONDUIT INTO EXISTING PULL BOX

(SIGNAL SCHEDULES ON SHEET 2 OF 4)

BEFORE ANY EXCAVATING CALL U.S.A.
(UNDERGROUND SERVICE ALERT)
1-800-642-2444
OR
1-800-227-2600
48 HOURS NOTICE REQUIRED
BEFORE ALL SCHEDULED WORK

STA. 100+00.00 RESERVATION RD. =
STA. 10+00.00 INTER-GARRISON RD.

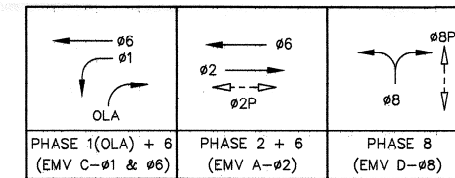
RESERVATION ROAD



PROJECT CONSTRUCTION NOTES (THIS SHEET)

- 1 ELECTRICAL SERVICE POINT. COORDINATE CONNECTION WITH P.G.&E.
- 2 FURNISH AND INSTALL TYPE III-BF SERVICE EQUIPMENT AND ALUMINUM ENCLOSURE (REFER TO PROJECT SPECIAL PROVISIONS). PHOTOELECTRIC CONTROL (PEC) SHALL BE MOUNTED ON THE LEFT SIDE INSIDE THE ENCLOSURE, 18 INCHES MINIMUM FROM THE BOTTOM OF ENCLOSURE. PEC SHALL CONTROL BOTH IISNS AND INTERSECTION SAFETY LIGHTING. DOOR SHALL FACE NORTH. REFER TO "TYPE III-BF SERVICE WIRING DIAGRAM" DETAIL ON SHEET 2.
- 3 FURNISH AND INSTALL MODEL 170E CONTROLLER ASSEMBLY IN MODEL 332 ALUMINUM CABINET, INCLUDING ALL AUXILIARY EQUIPMENT AND THE LATEST BI-TRAN SYSTEMS 233 PROGRAM CHIP (REFER TO PROJECT SPECIAL PROVISIONS). FRONT DOOR SHALL FACE EAST.
- 4 FURNISH AND INSTALL BATTERY BACK-UP SYSTEM (BBS) PER THE PROJECT SPECIAL PROVISIONS.
- 5 FURNISH AND INSTALL 3M OPTICOM 2-752 PHASE SELECTOR MODULES AND MANUFACTURER'S HARNESS ASSEMBLY (REFER TO PROJECT SPECIAL PROVISIONS).
- 6 FURNISH AND INSTALL 3M OPTICOM 721 DUAL-CHANNEL (ONE DIRECTION) DETECTOR ON MAST ARM.
- 7 FURNISH AND INSTALL LIGHT EMITTING DIODE (LED) TYPE INTERNALLY ILLUMINATED STREET NAME SIGN (IISNS) PER THE PROJECT SPECIAL PROVISIONS. REFER TO POLE AND EQUIPMENT SCHEDULE FOR IISNS LEGEND (SHEET 2).
- 8 FURNISH AND INSTALL R3-18 SIGN (24"x24"). MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 9 FURNISH AND INSTALL R3-4 SIGN (24"x24"). MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 10 FURNISH AND INSTALL R73-3 (CA) SIGN (24"x24"). MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 11 FURNISH AND INSTALL TYPE I PEDESTRIAN BARRICADE PER CALTRANS STD. PLAN ES-7P. INSTALL R9-3a SIGN (24"x24") AND R9-3b SIGN ON BOTH SIDES OF BARRICADE. ARROWS SHALL POINT EAST TOWARDS CROSSWALKS.
- 12 FURNISH AND INSTALL TYPE 30 LIGHTING STANDARD WITH SLIP BASE. REFER TO CALTRANS STD. PLAN ES-6E AND ES-6F.
- 13 FURNISH AND INSTALL TYPE 15-FBS STANDARD WITH SLIP BASE AND INCANDESCENT LIGHTING FIXTURE PER CALTRANS STD. PLAN ES-7J AND ES-6F. DO NOT INSTALL FLASHING BEACON HEADS AND MODIFY POLE HEIGHT TO 15'. INSTALL W3-4 SIGN (48"x48") ON STANDARD AND PEC ON TOP OF POLE.
- 14 FURNISH AND INSTALL TYPE 9B CANTILEVEL FLASHING BEACON WITH SLIP BASE, W3-3 SIGN (48"x48") ON MAST ARM. INCANDESCENT LIGHTING FIXTURE AND LIGHT EMITTING DIODE (LED) FLASHING BEACON CONTROL ASSEMBLY WITH INTERNAL PEC PER CALTRANS STD. PLAN ES-3B, ES-6F, ES-7K AND ES-7L, AND THE PROJECT SPECIAL PROVISIONS. INSTALL R2-1 (40) SIGN (36"x48") ON VERTICAL POLE WITH SADDLE BRACKET PER CALTRANS STD. PLAN RS4.
- 15 INSTALL LUMINAIRE MAST ARM 90 DEGREES TO SIGNAL MAST ARM.
- 16 SIGNAL STANDARD SIZED FOR ULTIMATE 45' MAST ARM TO ACCOMODATE FUTURE NORTH LEG AND EASTBOUND LEFT TURN SIGNAL PHASE.
- 17 INSTALL 1 1/2" CONDUIT WITH PULL ROPE FOR FUTURE SIGNAL INTERCONNECT SYSTEM. EXTEND TO PULL BOX ADJACENT TO ADVANCE LOOP DETECTORS FOR EASTBOUND TRAFFIC AT EAST GARRISON DRIVE (STA. 124+97-SEE SHEET 3 OF 4). PULL BOXES SHALL HAVE A MAXIMUM SPACING OF 300' (8 PULL BOXES REQUIRED).

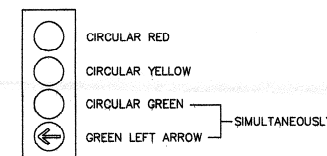
PHASE DIAGRAM



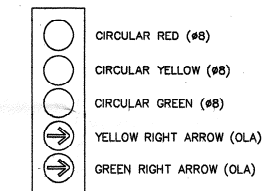
Design Speed = 55

EMV PREEMPT

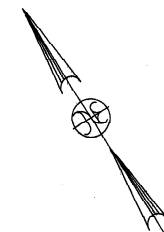
CHANNEL A = 02
CHANNEL C = 06+01
CHANNEL D = 08



DETAIL "A"
(08-END OF MAST ARM)



DETAIL "B"
(08 + OLA)



SCALE: 1"=20'

MONTEREY COUNTY PUBLIC WORKS DEPARTMENT
CONFORMS TO APPLICABLE ORDINANCES AND REQUIREMENTS
BY PUBLIC WORKS DIRECTOR *[Signature]* DATE 6/20/07

RECEIVED
JUN 07 2007
RBF-Monterey Bay

East Garrison
Recommendation
Of Approval
[Signature]
Initial Date

PTE PINNACLE TRAFFIC ENGINEERING
TRANSPORTATION PLANNING AND TRAFFIC ENGINEERING
930 SAN BENITO STREET HOLLISTER, CA 95023
(831) 638-9260 FAX (831) 638-9268
[Signature] 6/6/07

DATE: JUNE 2007
DRAWN BY: LDH
PROJ. ENGR: LDH
PROJ. MGR: LDH

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
6111 Bellinger Canyon Road, Suite 150 - San Ramon, CA 94583
925-666-0370 www.cbgi.com

PHASE 1
EAST GARRISON
SIGNAL AND LIGHTING PLAN
RESERVATION RD. / INTER-GARRISON RD.
MONTEREY COUNTY CALIFORNIA

SHEET NUMBER 1 OF 4
JOB NUMBER 05-031

CALTRANS STANDARD NOTES

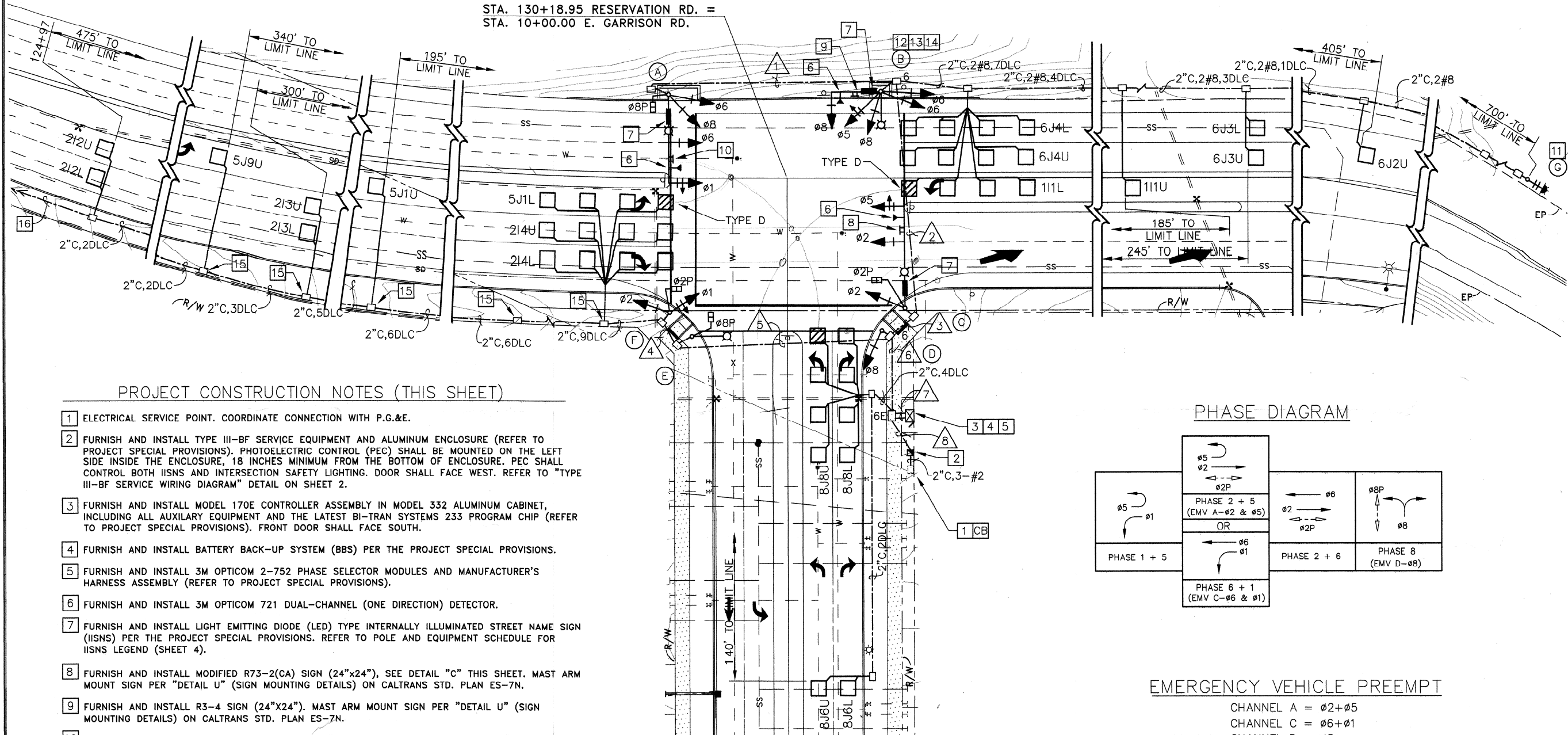
CB INSTALL NEW CONDUIT INTO EXISTING PULL BOX

(SIGNAL SCHEDULES ON SHEET 4 OF 4)

BEFORE ANY EXCAVATING CALL U.S.A.
(UNDERGROUND SERVICE ALERT)
1-800-642-2444
OR
1-800-227-2600
48 HOURS NOTICE REQUIRED
BEFORE ALL SCHEDULED WORK

RESERVATION ROAD

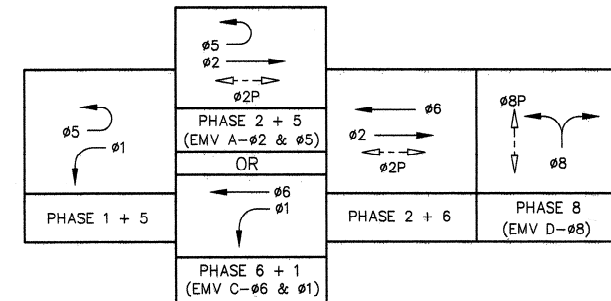
STA. 130+18.95 RESERVATION RD. =
STA. 10+00.00 E. GARRISON RD.



PROJECT CONSTRUCTION NOTES (THIS SHEET)

- 1 ELECTRICAL SERVICE POINT. COORDINATE CONNECTION WITH P.G.&E.
- 2 FURNISH AND INSTALL TYPE III-BF SERVICE EQUIPMENT AND ALUMINUM ENCLOSURE (REFER TO PROJECT SPECIAL PROVISIONS). PHOTOELECTRIC CONTROL (PEC) SHALL BE MOUNTED ON THE LEFT SIDE INSIDE THE ENCLOSURE, 18 INCHES MINIMUM FROM THE BOTTOM OF ENCLOSURE. PEC SHALL CONTROL BOTH IISNS AND INTERSECTION SAFETY LIGHTING. DOOR SHALL FACE WEST. REFER TO "TYPE III-BF SERVICE WIRING DIAGRAM" DETAIL ON SHEET 2.
- 3 FURNISH AND INSTALL MODEL 170E CONTROLLER ASSEMBLY IN MODEL 332 ALUMINUM CABINET, INCLUDING ALL AUXILIARY EQUIPMENT AND THE LATEST BI-TRAN SYSTEMS 233 PROGRAM CHIP (REFER TO PROJECT SPECIAL PROVISIONS). FRONT DOOR SHALL FACE SOUTH.
- 4 FURNISH AND INSTALL BATTERY BACK-UP SYSTEM (BBS) PER THE PROJECT SPECIAL PROVISIONS.
- 5 FURNISH AND INSTALL 3M OPTICOM 2-752 PHASE SELECTOR MODULES AND MANUFACTURER'S HARNESS ASSEMBLY (REFER TO PROJECT SPECIAL PROVISIONS).
- 6 FURNISH AND INSTALL 3M OPTICOM 721 DUAL-CHANNEL (ONE DIRECTION) DETECTOR.
- 7 FURNISH AND INSTALL LIGHT EMITTING DIODE (LED) TYPE INTERNALLY ILLUMINATED STREET NAME SIGN (IISNS) PER THE PROJECT SPECIAL PROVISIONS. REFER TO POLE AND EQUIPMENT SCHEDULE FOR IISNS LEGEND (SHEET 4).
- 8 FURNISH AND INSTALL MODIFIED R73-2(CA) SIGN (24"x24"), SEE DETAIL "C" THIS SHEET. MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 9 FURNISH AND INSTALL R3-4 SIGN (24"x24"). MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 10 FURNISH AND INSTALL R73-3 (CA) SIGN (24"x24"). MAST ARM MOUNT SIGN PER "DETAIL U" (SIGN MOUNTING DETAILS) ON CALTRANS STD. PLAN ES-7N.
- 11 FURNISH AND INSTALL TYPE 15-FBS FLASHING BEACON STANDARD WITH SLIP BASE, TWO (2) 1-SECTION SIGNAL HEADS, INCANDESCENT LIGHTING FIXTURE AND LIGHT EMITTING DIODE (LED) FLASHING BEACON CONTROL ASSEMBLY PER CALTRANS STD. PLAN ES-3B AND ES-7J. INSTALL W3-3 SIGN (48"x48") ON POLE WITH STRAP AND SADDLE BRACKET PER CALTRANS STD. PLAN RS4.
- 12 FURNISH AND INSTALL TWO (2) NEAR SIDE 3-SECTION SIGNAL HEADS ON SIGNAL STANDARD FOR PHASE 6. SIGNAL HEAD BELOW MAST ARM CONNECTION PLATE SHALL BE LOCATED AT A MINIMUM HEIGHT OF 10'. SIGNAL HEAD ABOVE MAST ARM CONNECTION PLATE SHALL BE LOCATED AT A MINIMUM HEIGHT OF 17'.
- 13 INSTALL LUMINAIRE MAST ARM 90 DEGREES TO SIGNAL MAST ARM.
- 14 MODIFY SIGNAL MAST ARM CONNECTION PLATE AS REQUIRED TO FIT THE 19-4-100 STANDARD.
- 15 INSTALL PULL BOX ADJACENT TO RIGHT-OF-WAY TO ACCOMMODATE FUTURE WIDENING FOR EASTBOUND RIGHT TURN LANE.
- 16 INSTALL 1 1/2" CONDUIT WITH PULL ROPE FOR FUTURE SIGNAL INTERCONNECT SYSTEM. EXTEND TO PULL BOX ADJACENT TO CONTROLLER AT INTER-GARRISON (STA. 100+90-SEE SHEET 1 OF 4). PULL BOXES SHALL HAVE A MAXIMUM SPACING OF 300' (8 PULL BOXES REQUIRED).

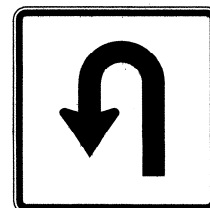
PHASE DIAGRAM



EMERGENCY VEHICLE PREEMPT

- CHANNEL A = 02+05
- CHANNEL C = 06+01
- CHANNEL D = 08

E. GARRISON DR.



DETAIL "C"
MODIFIED R73-2(CA)

East Garrison
Recommendation
Of Approval
Paul RBF
Initial Date 6/6/07

SCALE: 1"=20'

PTE PINNACLE TRAFFIC ENGINEERING
TRANSPORTATION PLANNING AND TRAFFIC ENGINEERING
930 SAN BENITO STREET HOLLISTER, CA 95023
(831) 638-9260 FAX (831) 638-9268
Larry D. Hall 6/6/07
LARRY D. HALL, P.E. DATE

DATE: JUNE 2007
DRAWN BY: LDH
PROJ. ENGR: LDH
PROJ. MGR: LDH

REVISIONS

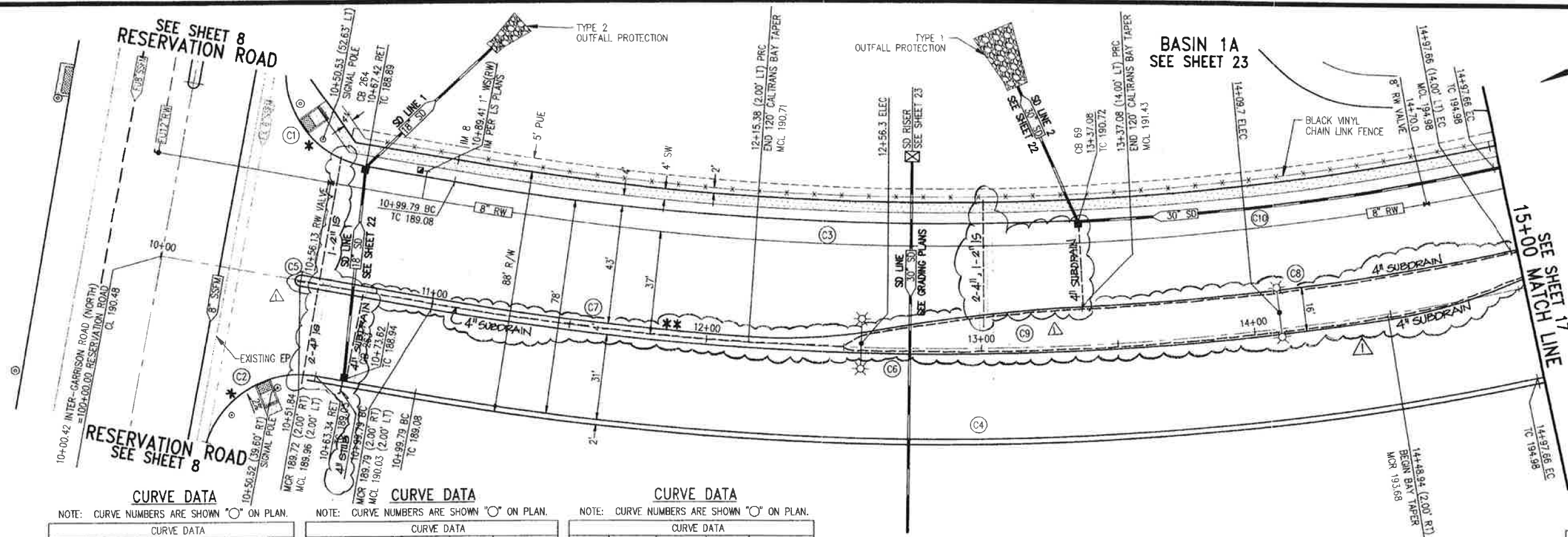
INCL. BY DATE

PROFESSIONAL ENGINEER
LARRY D. HALL
No. 13282
Exp. 12/31/07
CIVIL
STATE OF CALIFORNIA

Carlson, Barbee & Gibson, Inc.
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PHASE 1
EAST GARRISON
MONTEREY COUNTY
CALIFORNIA
SIGNAL AND LIGHTING PLAN
RESERVATION RD. / E. GARRISON DR.

SHEET NUMBER
3
OF 4
JOB NUMBER
05-031



CURVE DATA

NOTE: CURVE NUMBERS ARE SHOWN "O" ON PLAN.

CURVE	RADIUS	DELTA	LENGTH	DESCRIPTION
C1	35.00'	90°00'00"	54.98'	FC
C2	35.00'	83°01'52"	50.72'	FC
C3	958.00'	22°43'41"	380.02'	FC
C4	1036.00'	22°43'41"	410.96'	FC

CURVE DATA

NOTE: CURVE NUMBERS ARE SHOWN "O" ON PLAN.

CURVE	RADIUS	DELTA	LENGTH	DESCRIPTION
C5	2.00'	180°00'00"	6.28'	FMC
C6	1005.00'	19°56'42"	349.85'	FMC
C7	1001.00'	06°36'11"	115.36'	FMC

CURVE DATA

NOTE: CURVE NUMBERS ARE SHOWN "O" ON PLAN.

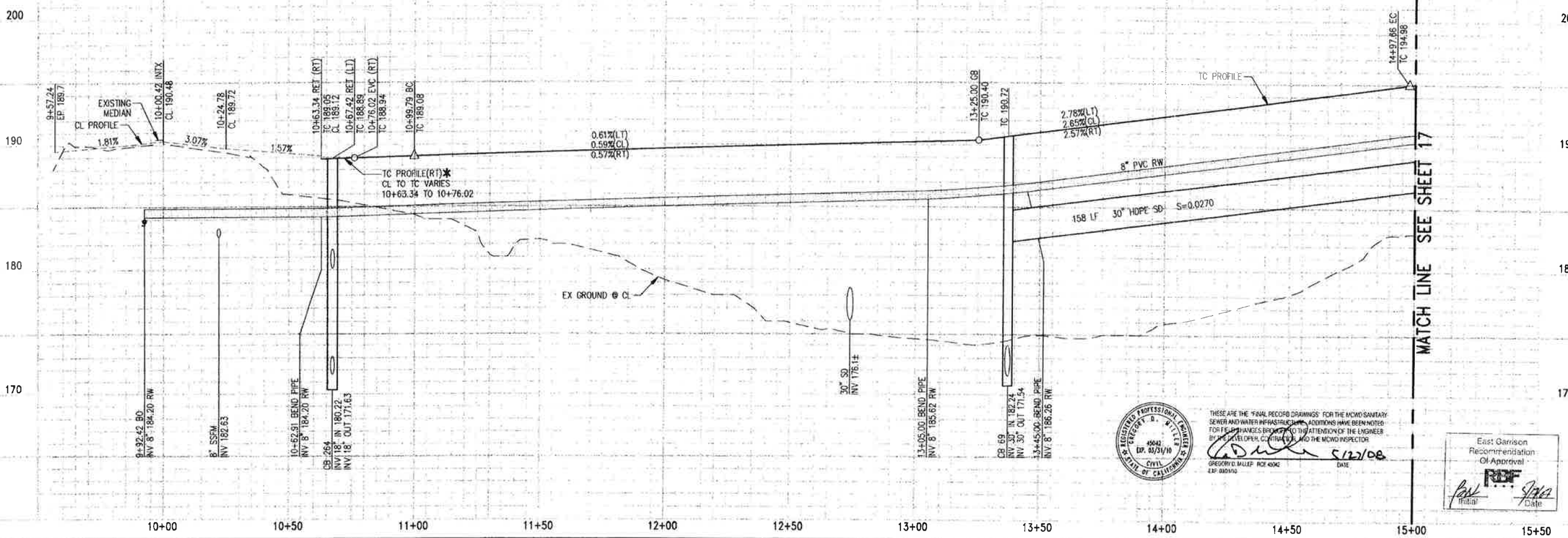
CURVE	RADIUS	DELTA	LENGTH	DESCRIPTION
C8	989.00'	09°10'23"	158.34'	FMC
C9	1003.00'	22°43'41"	397.87'	CL
C10	958.38'	12°09'41"	203.42'	SD

** SEE SHEET 22 FOR CURB RETURN PROFILE OF CURVES C1 & C2

INTER-GARRISON ROAD (NORTH)

SCALE: HORIZONTAL 1"=20'
VERTICAL 1"=4'

MC = TC + 0.71' **
** MEDIAN CURB AT TURN POCKET IS 0.24' HIGHER PER DETAIL SHEET 6



THESE ARE THE FINAL RECORD DRAWINGS FOR THE MCDW SANITARY SEWER AND WATER INFRASTRUCTURE. ADDITIONS HAVE BEEN NOTED FOR FIELD CHANGES BROUGHT TO THE ATTENTION OF THE ENGINEER BY THE FIELD OPERATOR, CONTRACTOR AND THE MCDW INSPECTOR.
DATE: 5/12/08
GREGORY D. MILLER, P.E. NO. 45042
L.P. 000102

East Garrison Recommendation: Of Approval
Date: 5/12/08
Initials: [Signature]

DATE	BY	REVISIONS
MAY 2007 <td>A.F.B. <td></td> </td>	A.F.B. <td></td>	
	A.P.H. <td></td>	
	G.D.M. <td></td>	

cbg
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PHASE 1 OFF-SITE
PLAN & PROFILE
INTER-GARRISON ROAD (NORTH) (10+00 TO 15+50)
MONTEREY COUNTY CALIFORNIA

SHEET NUMBER
16
OF 32
JOB NUMBER
1208-00

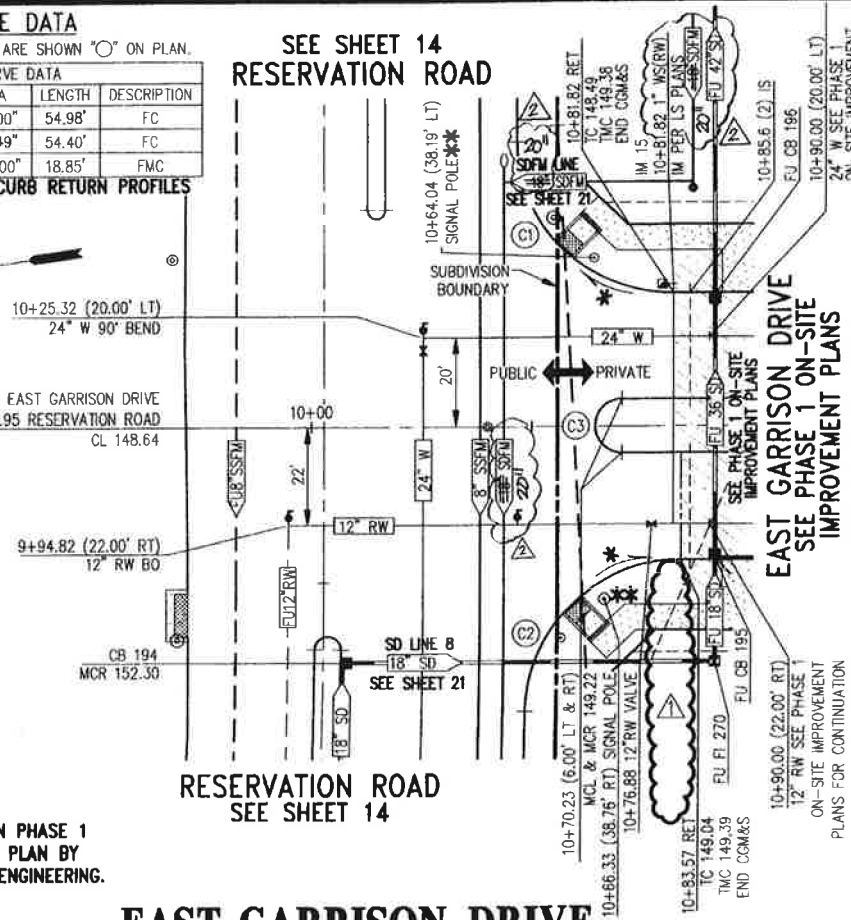
CURVE DATA

NOTE: CURVE NUMBERS ARE SHOWN "O" ON PLAN.

CURVE	RADIUS	DELTA	LENGTH	DESCRIPTION
C1	35.00'	90°00'00"	54.98'	FC
C2	35.00'	89°02'49"	54.40'	FC
C3	6.00'	180°00'00"	18.85'	FMC

**SEE SHEET 22 FOR CURB RETURN PROFILES C1, C2 & C3

**SEE SHEET 14
RESERVATION ROAD**



RESERVATION ROAD
SEE SHEET 14

EAST GARRISON DRIVE

SCALE: HORIZONTAL 1" = 20'
VERTICAL 1" = 4'

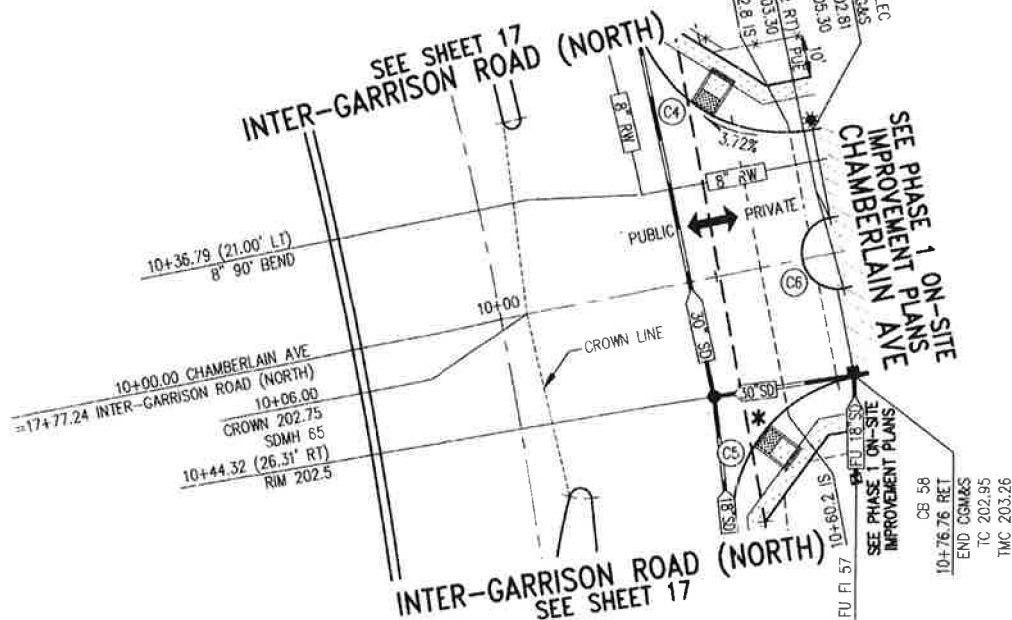
**SEE EAST GARRISON PHASE 1
SIGNAL & LIGHTING PLAN BY
PINNACLE TRAFFIC ENGINEERING.

CURVE DATA

NOTE: CURVE NUMBERS ARE SHOWN "O" ON PLAN.

CURVE	RADIUS	DELTA	LENGTH	DESCRIPTION
C4	35.00'	86°38'48"	52.93'	FC
C5	35.00'	84°26'58"	51.58'	FC
C6	8.00'	180°00'00"	25.13'	FMC

**SEE SHEET 17
INTER-GARRISON ROAD (NORTH)**



CHAMBERLAIN AVE

SCALE: HORIZONTAL 1" = 20'
VERTICAL 1" = 4'

NOTE:
NO JOINTS IN 12" RW MAIN WITHIN 10' OF 12" RW CROSSING
OF 8" SSFM AT STATION 10+38.32. USE CL 200 PRESSURE
RATED PVC WATER PIPE (DR 14 PER AWWA C900-97)

CL = TC + 0.15'
TMC = TC + 0.49'



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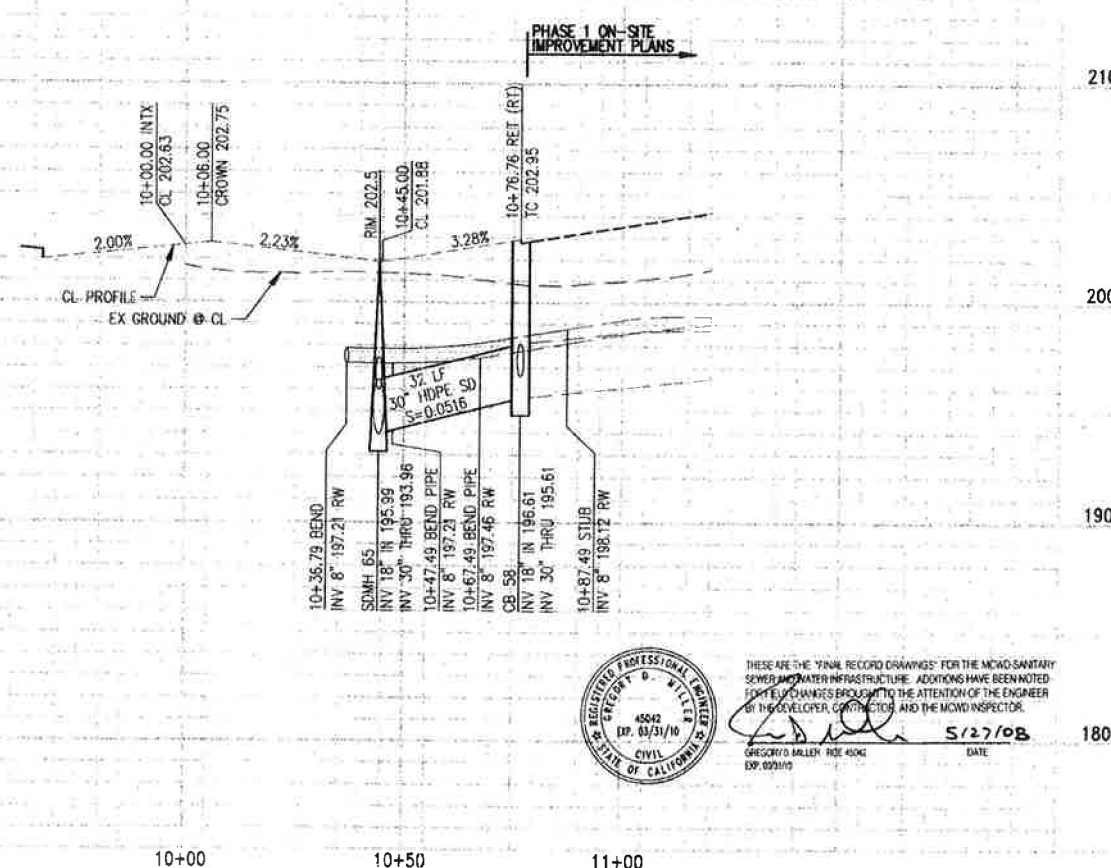
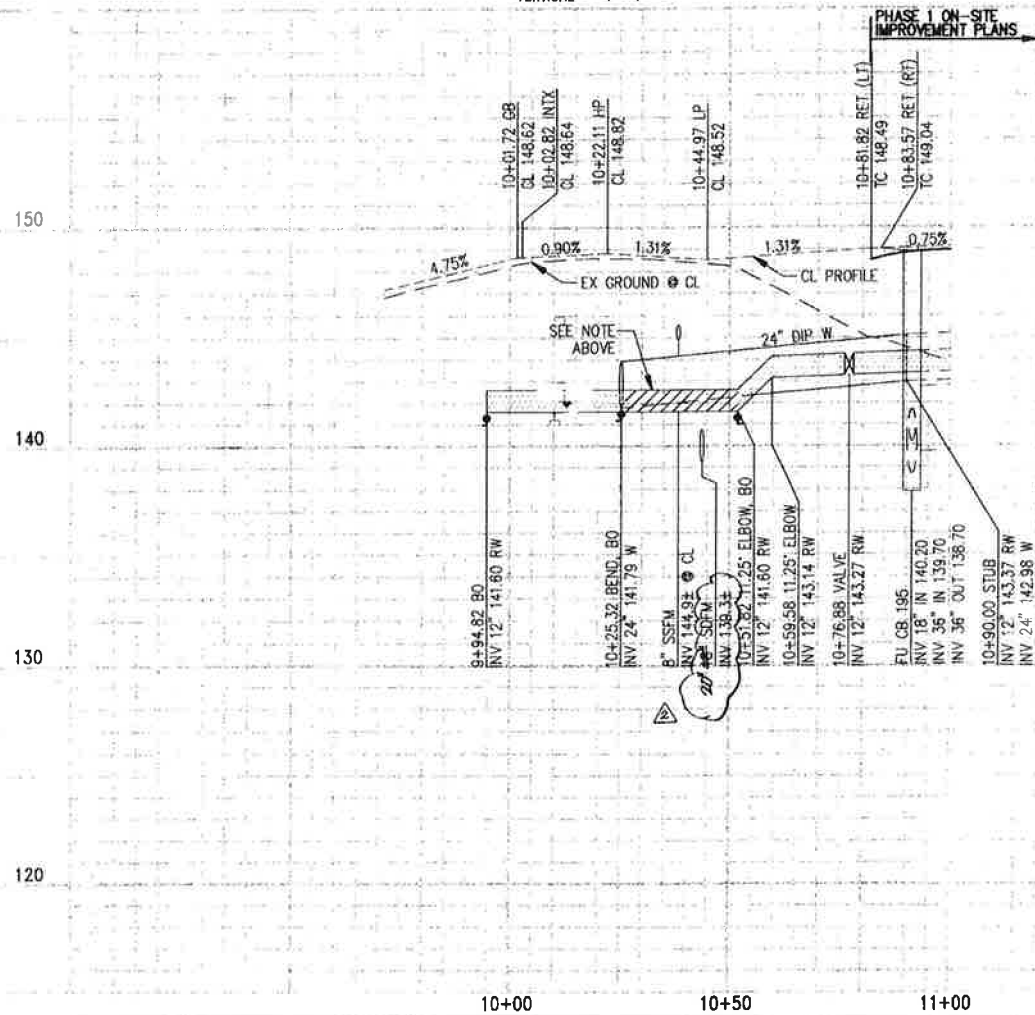
PHASE 1 OFF-SITE

EAST GARRISON

PLAN & PROFILE

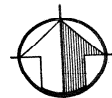
EAST GARRISON DRIVE & CHAMBERLAIN AVE
MONTEREY COUNTY CALIFORNIA

SHEET NUMBER
20
OF 32
JOB NUMBER
1288-00

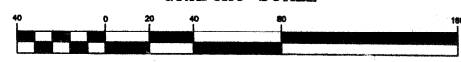


DATE: 5/27/08
GREGORY S. BALLER P.E. 45642
EXP. 03/31/16

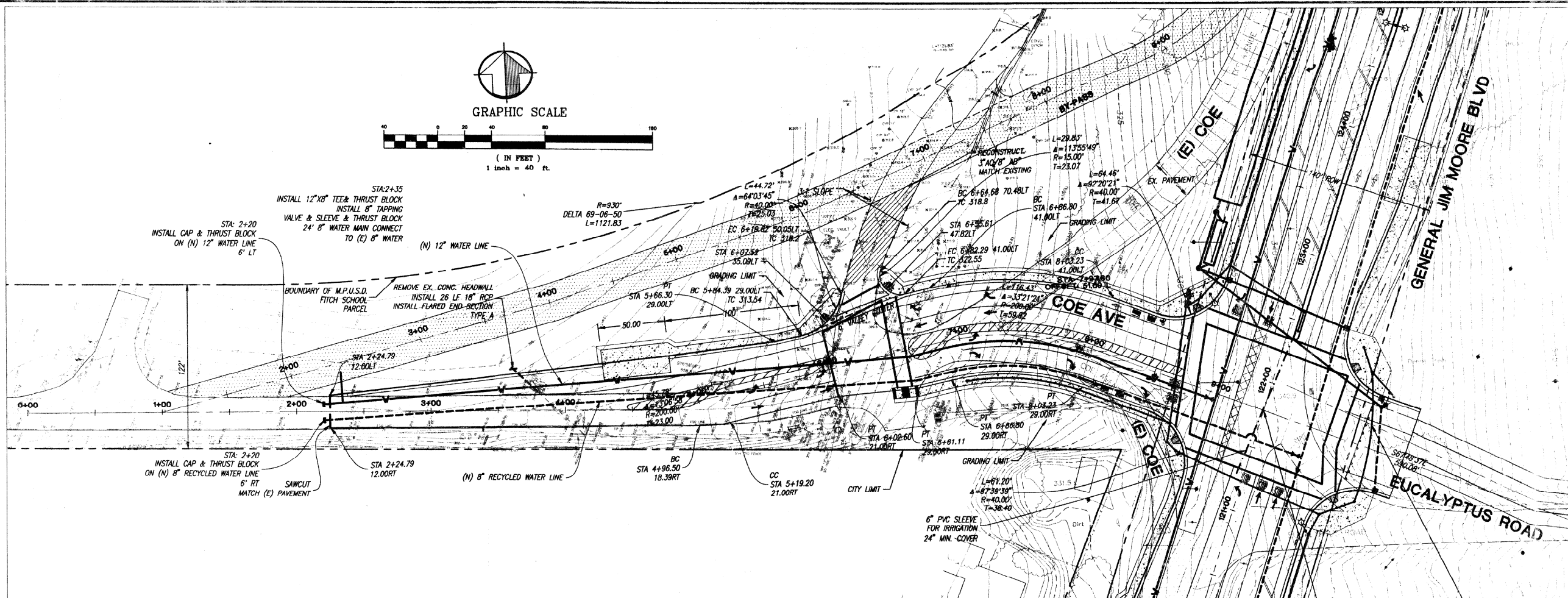
APPENDIX J
GENERAL JIM MOORE BLVD PHASE 3
RECORD DRAWINGS



GRAPHIC SCALE

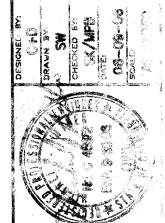
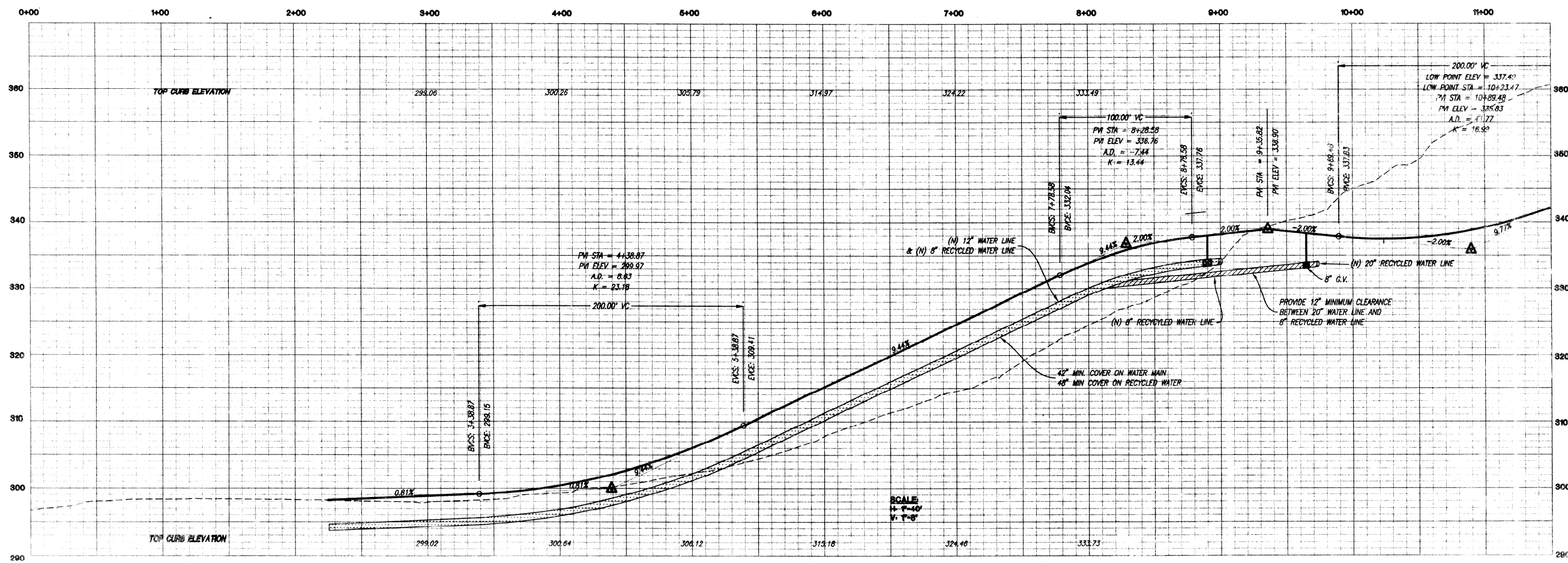


(IN FEET)
1 inch = 40 ft.



CENTER LINE INTERSECTION
STA 9+35.82
N 2121566.39
E 5735045.09

CONDUITS FOR TRAFFIC LIGHTS



Consulting Civil and Structural Engineers
320 JAMBLEY BLVD, SUITE 10
SAN FRANCISCO, CALIFORNIA 94104
TEL: (415) 775-1533 FAX: (415) 775-0725

FORT ORD REUSE AUTHORITY
COE AVENUE
PLAN AND PROFILE

SHEET NUMBER
0-07
OF 15 SHEETS
DRAWING NO.
706110

APPENDIX K
CITY OF MARINA BEACH ROAD
CROSSWALK SAFETY SYSTEM

SC320 Crosswalk Safety System with In-Road-Warning-Lights

Installation Manual



1455 Kleppe Lane
Sparks, NV 89431
888.520.0008 Toll Free
888.520.0007 Fax
www.spotdevices.com

Arrive Safely

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1 Introduction

1.1 SC320 System Overview

This manual provides instructions for installing the SC320 Controller with In-Road-Warning-Lights (IRWLs) and associated equipment. SC320 Controllers are offered in a variety of configurations. Detailed in this manual are instructions for installing IRWL systems in conjunction with beacons, Rectangular Rapid Flashing Beacons (RRFBs) and LED signs.

1.2 Installation Summary

Installation of the SC320 system consists of the following tasks:

- Install conduit from pole base locations to the edge of the roadway.
- Create pole foundations.
- Erect the system poles.
- Mount the SC320 Controller and the following optional equipment: Solar panels, pushbuttons, beacons, LED signs and RRFBs.
- Route AC power, if the SC320 is an AC-powered controller.
- Make cuts in the roadway for installing IRWLs and cabling.
- Thoroughly clean all holes and trenches in the roadway.
- Install IRWLs and system cabling in the roadway the provided Liquid Conduit epoxy.
- Terminate all components to the SC320.
- Power on and test the system.

1.3 Notices

- Spot Devices IRWLs should not be installed in asphalt or concrete that is less than 4" deep. The roadway should not be excessively cracked, uneven or otherwise damaged.
- When determining the location of poles and the height of pushbuttons and static signage, installers must comply with local design and code requirements.
- The installing party is responsible for avoiding damage to any pre-existing equipment and utility lines. USA marking should be used to identify any buried utility lines where pole bases will be dug.

- Always point solar panels due south. Choose a location that is open to the sky and not shaded during the day. Shading can prevent the battery from charging and cause system failure.
- The SC320 Controller must be installed in accordance with these instructions. Mounting the top of the controller lower than 84” above grade, cutting into or modifying the cabinet in any way, or otherwise changing the installation procedure will void the manufacturer’s warranty.
- If the system is being installed in conjunction with an SC315 or other Spot Devices Controller, please refer to the appropriate installation manual for that equipment.

1.4 Who to Contact?

For technical assistance, please contact Spot Devices Customer Service Department at 888-520-0008, Option 1.

2 Installation Equipment

Required Tools/Materials:

- Walk-behind road saw equipped with a 14" diameter asphalt diamond blade
- Hand-held road saw equipped with a 14" diameter asphalt diamond blade (optional, but recommended)
- Small – medium sized demolition hammer equipped with a 1" chisel tip
- Strong wet/dry vacuum
- Fresh water and hose, or pressure washer
- High pressure air and a long nozzle to direct it
- 12' or taller ladder, or bucket truck
- Plug-in drill and large paint-mixing bit
- Plastic trowels, 2" – 6"
- Duct tape, several roles
- Downward-spraying marking paint
- String line
- 1" Unibit
- Hole saw, 1 1/8"
- Hole saw, 2 1/4", if installing beacons
- 1/4 - 20 tap and tap handle
- 5/16-18 tap and tap handle
- Electrical tools: fish tape, strippers, crimpers
- Banding tool, banding and clips
- Allen key set
- Large pipe wrench or chain wrench
- Magnetic level
- Silicone sealant and caulking gun
- Small pipe wrench, if installing beacons
- Concrete (See pole foundation drawings for quantity)
- 2" conduit & elbows
- Duct seal
- Pull boxes (optional, but recommended)

Equipment Provided by Spot Devices:

- 5/16-18 bolts with rubber washers, for mounting signs
- Crimp-on quick-disconnect terminals
- All cabling required* (except cables for running AC power, if required)
- IRWL template
- Torx TP-30 security bit
- Liquid Conduit epoxy
- Poles, J-bolts, nuts and washers*

*Not included with all orders. Check with your purchaser.

3 Pole Foundations

This section describes how to create foundations for 4" (type 1B) and 2.5" poles. These instructions are recommendations only; adhere to local requirements. Beacons and SC320 Controllers must be installed on 4" poles or larger.

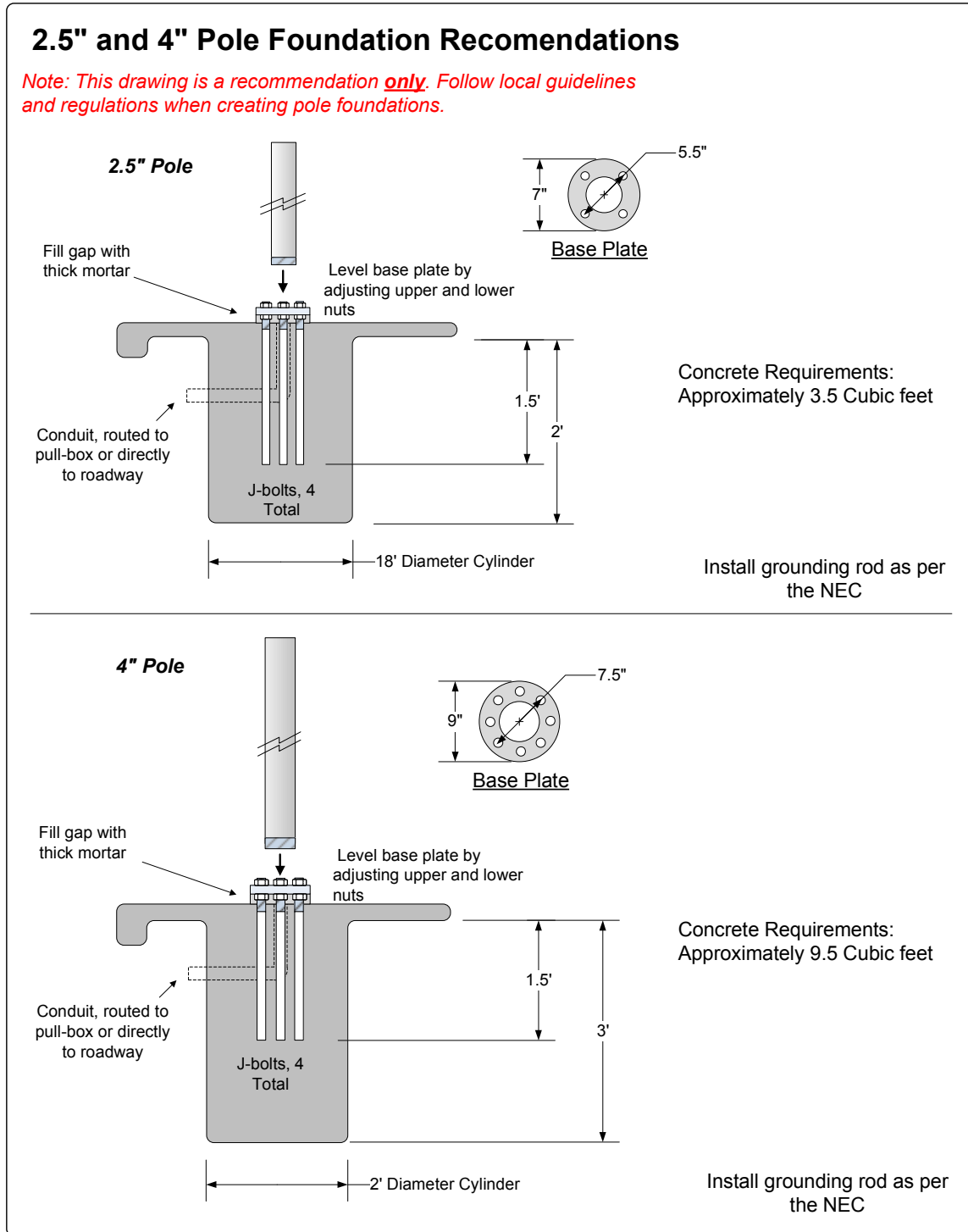


Figure 3-A: Pole Foundation Detail

4 System Layout

SC320 Crosswalk Safety Systems vary significantly in size and layout. The number and placement of IRWLs, the types of peripheral devices and pushbuttons can all vary significantly. Consult engineering plans or other layout documents to determine the proper location for devices. Refer to Figures 4-A and 4-B for basic guidelines.

Cable Routing

For components mounted on far-side poles, cables pass through the roadway with the IRWL cables. These cables are installed in 1" wide, 3.5" deep trenches cut with a road saw. After installation of the IRWLs and cables, they are sealed into the roadway with the provided Liquid Conduit epoxy.

For components on the same pole as the SC320 Controller, route cables through the pole.

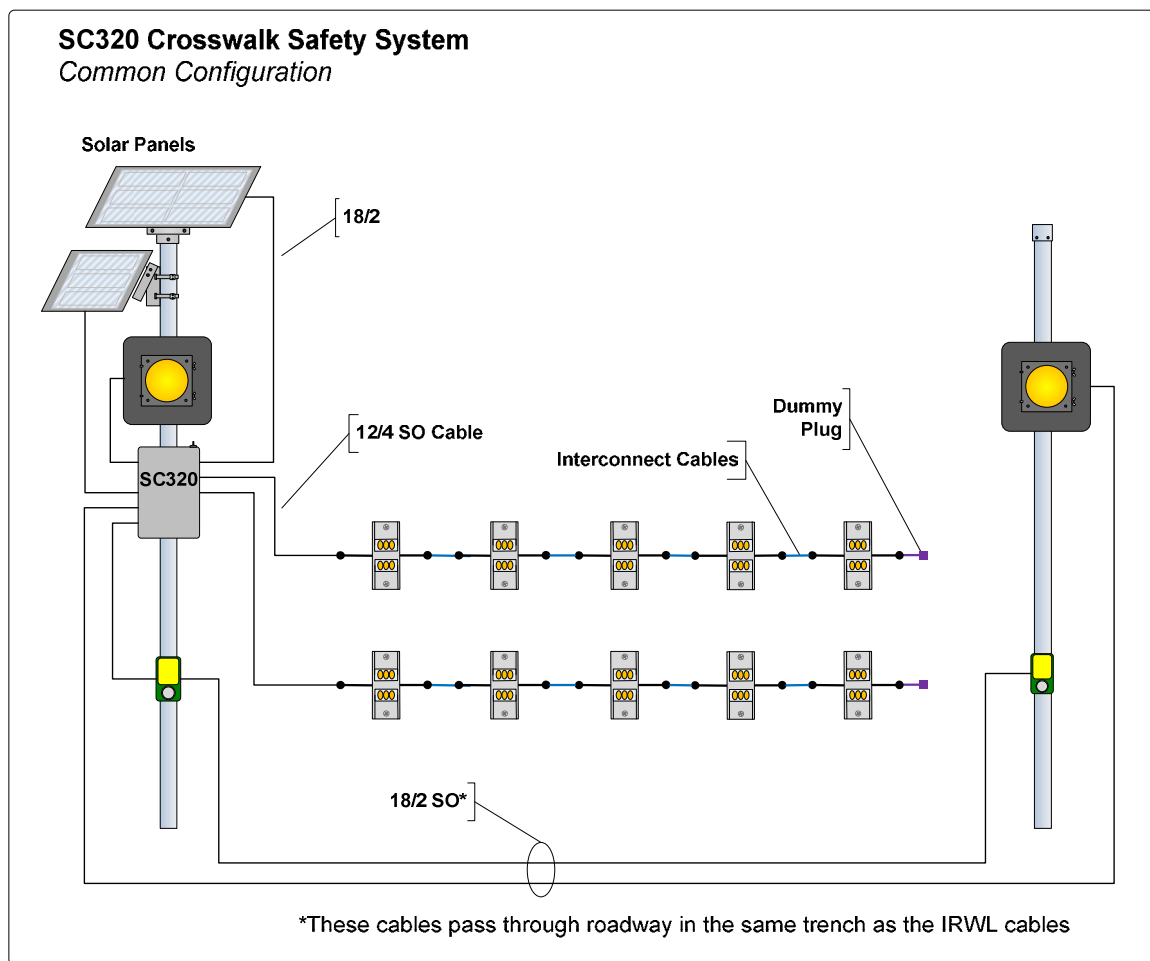


Figure 4-A: Sample IRWL System with Beacons

IRWLs, Trenches and Other Considerations

Spot Devices recommends installing pull boxes near the poles to assist with routing system cables. From the pull boxes install 2" conduit stub-outs into the roadway just underneath the asphalt. These conduits can be accessed by excavating through the asphalt. System trenches, which route all cables to the IRWLs and far-side components, should originate at the stub-outs. See Figure 4-B.

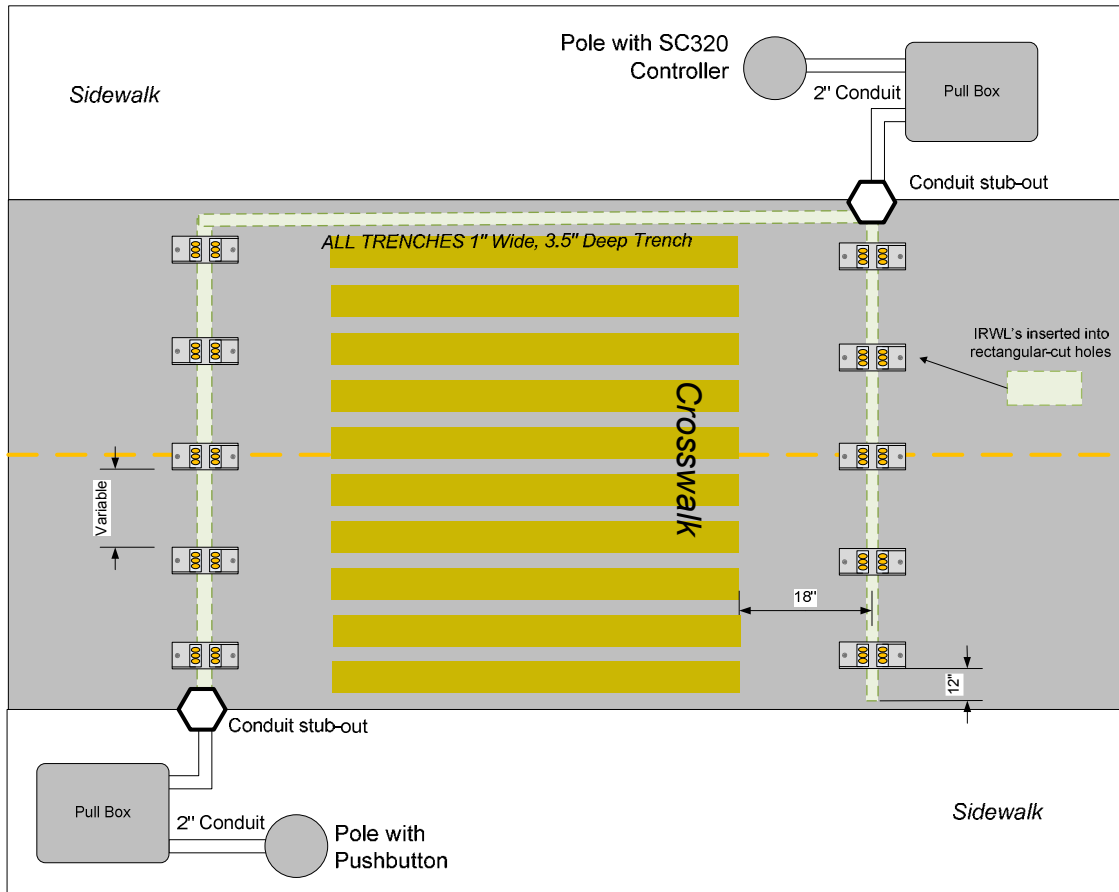


Figure 4-B: Top-Down Layout Diagram

5 Install Pole-Mounted Equipment

This section details how to install pole-mounted components. Before installing any equipment, use a marker to lay out where each component will be installed to ensure adequate spacing.

ATTENTION

After installing components on the pole, seal all pole openings with silicone sealant. No water should be allowed to enter the pole.

Where possible, create drip-loops in system cables so that moisture does not flow along a cable and into a device.

Equipment detailed in this section:

- SC320 Controller
- Beacons
- RRFBs
- LED signs
- Solar panels
- Polara XAV Talking Pushbutton Systems
- Polara Bulldog pushbuttons

5.1 Install the SC320 Controller

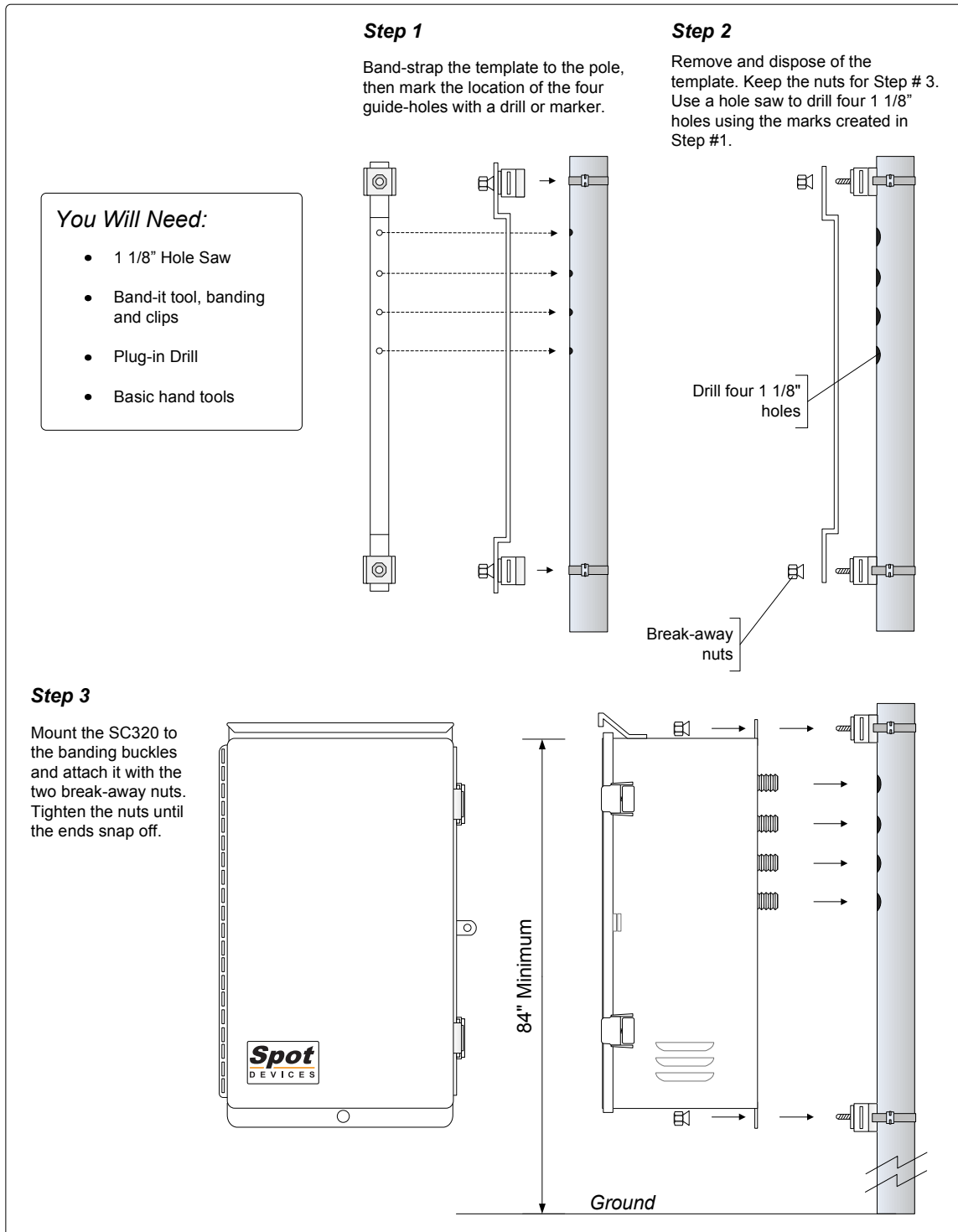
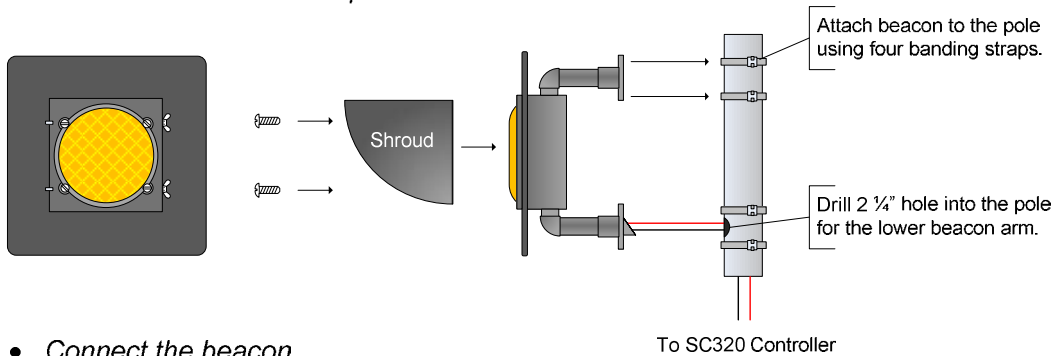


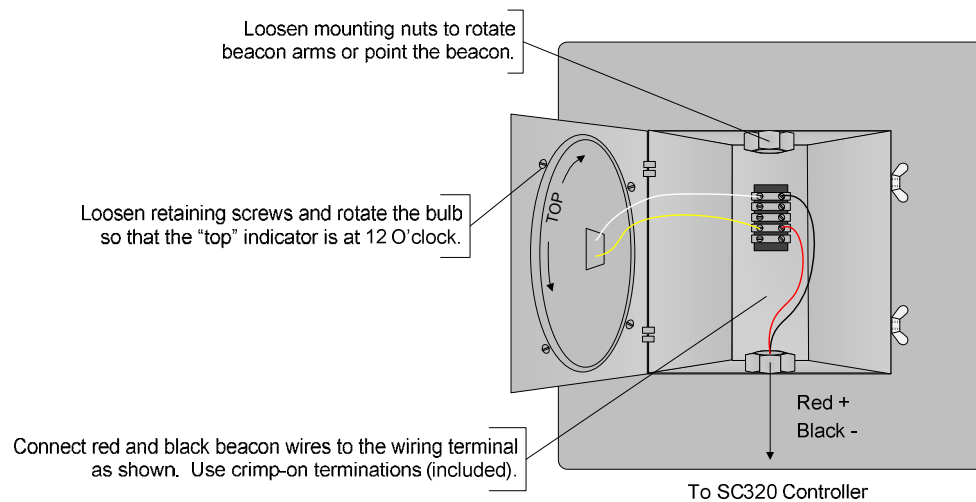
Figure 5-A: Install the SC320 Controller

5.2 Install Beacons

- *Mount the beacon to the pole*



- *Connect the beacon*



You Will Need:

- 2 1/4" Hole saw
- Band-it tool, banding and clips
- Plug-in Drill
- Electrical tools
- Basic hand tools
- Small pipe wrench

Beacons can mount straight onto or 90 degrees out from the pole.

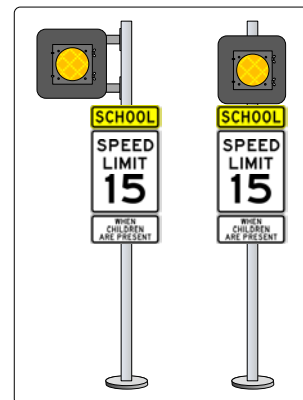


Figure 5-B: Install Beacons

5.3 Install RRFBs

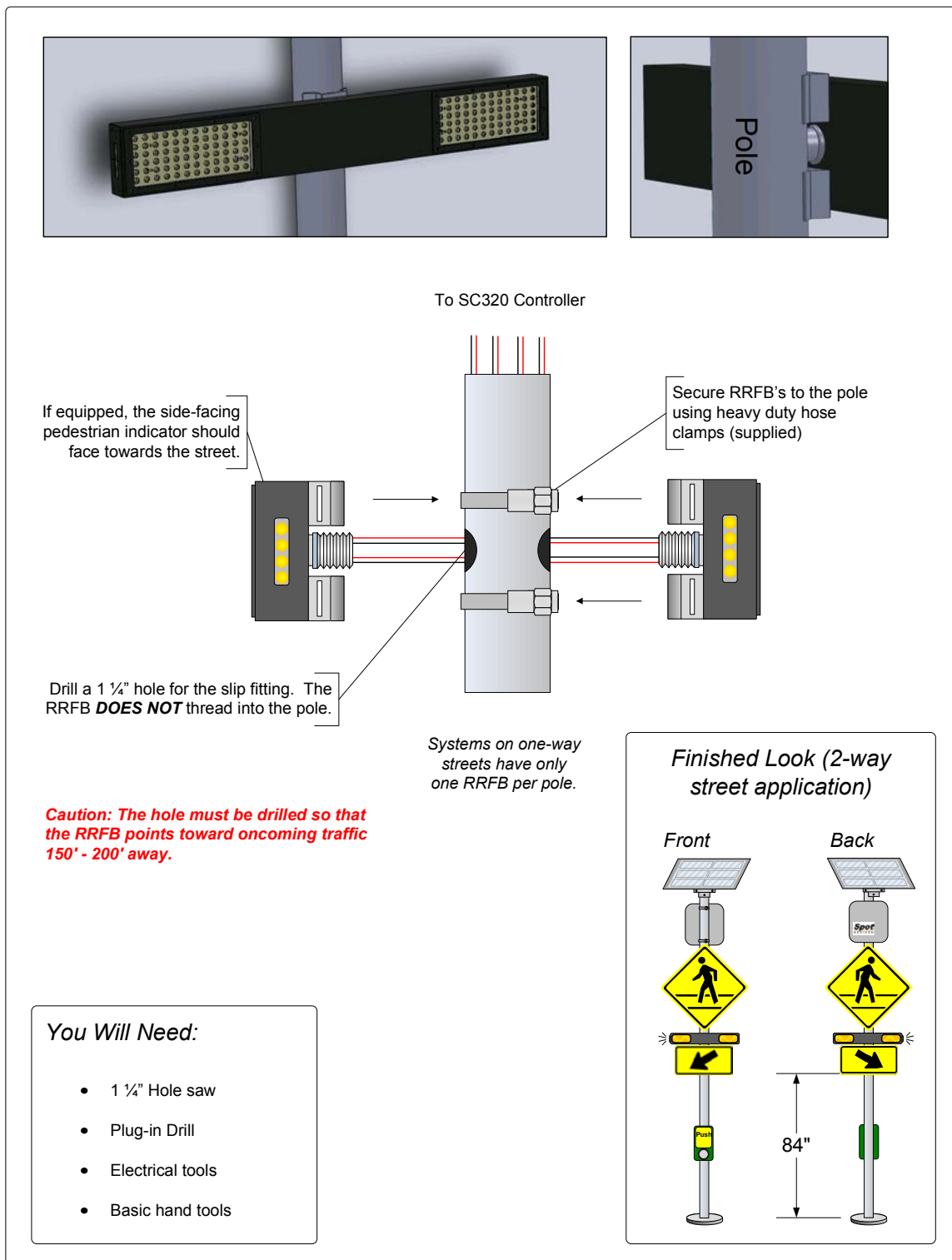


Figure 5-C: Install RRFBs

5.4 Install LED Signs

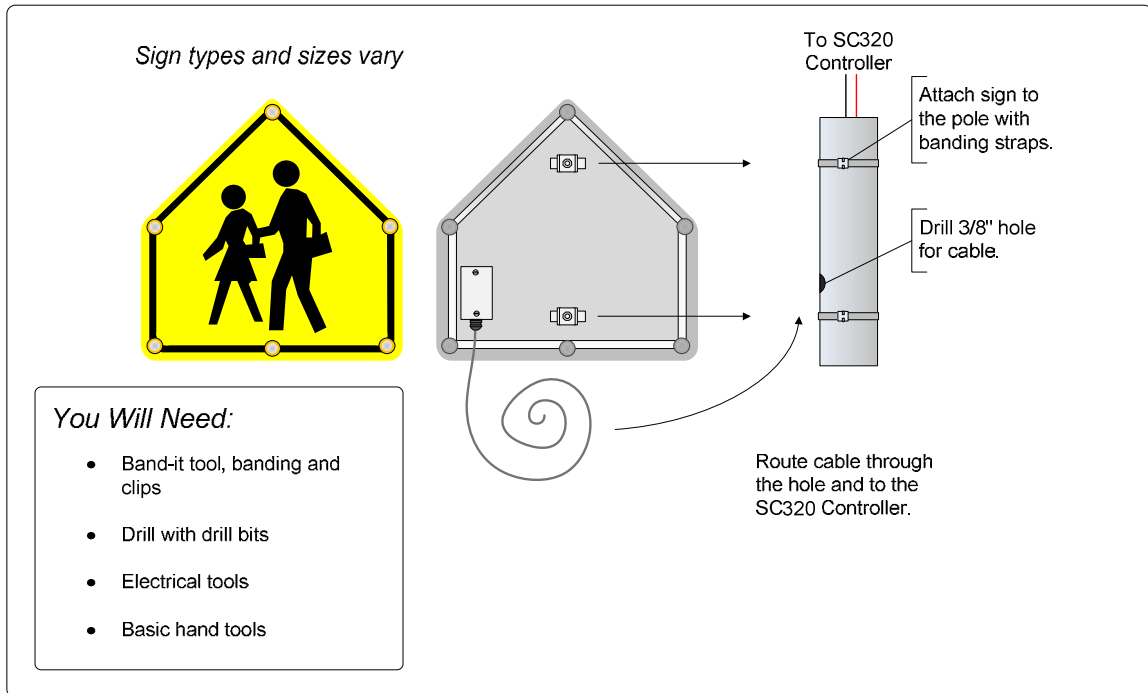
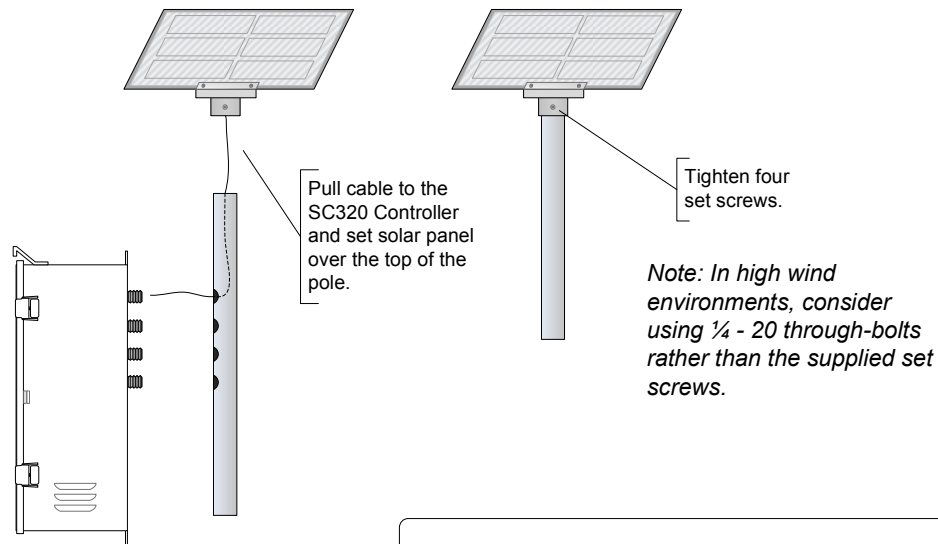


Figure 5-D: Install LED Enhanced Signs

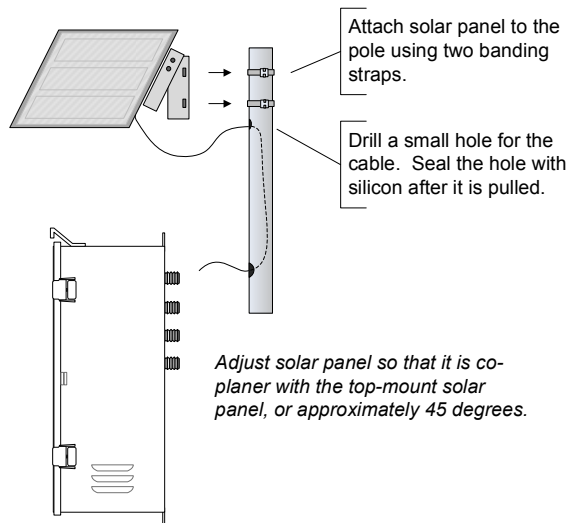
5.5 Install Solar Panels

• Top-Mount Solar Panels



Always point solar panels due south. Any amount of shading may result in premature battery failure.

• Side-Mount Solar Panels



You Will Need:

- Allen key set
- Electrical tools
- Drill, drill bits
- Band-it tool, banding and clips
- Basic hand tools

Figure 5-E: Install Solar Panels

5.6 Install Polara XAV2-LED Talking Pushbuttons

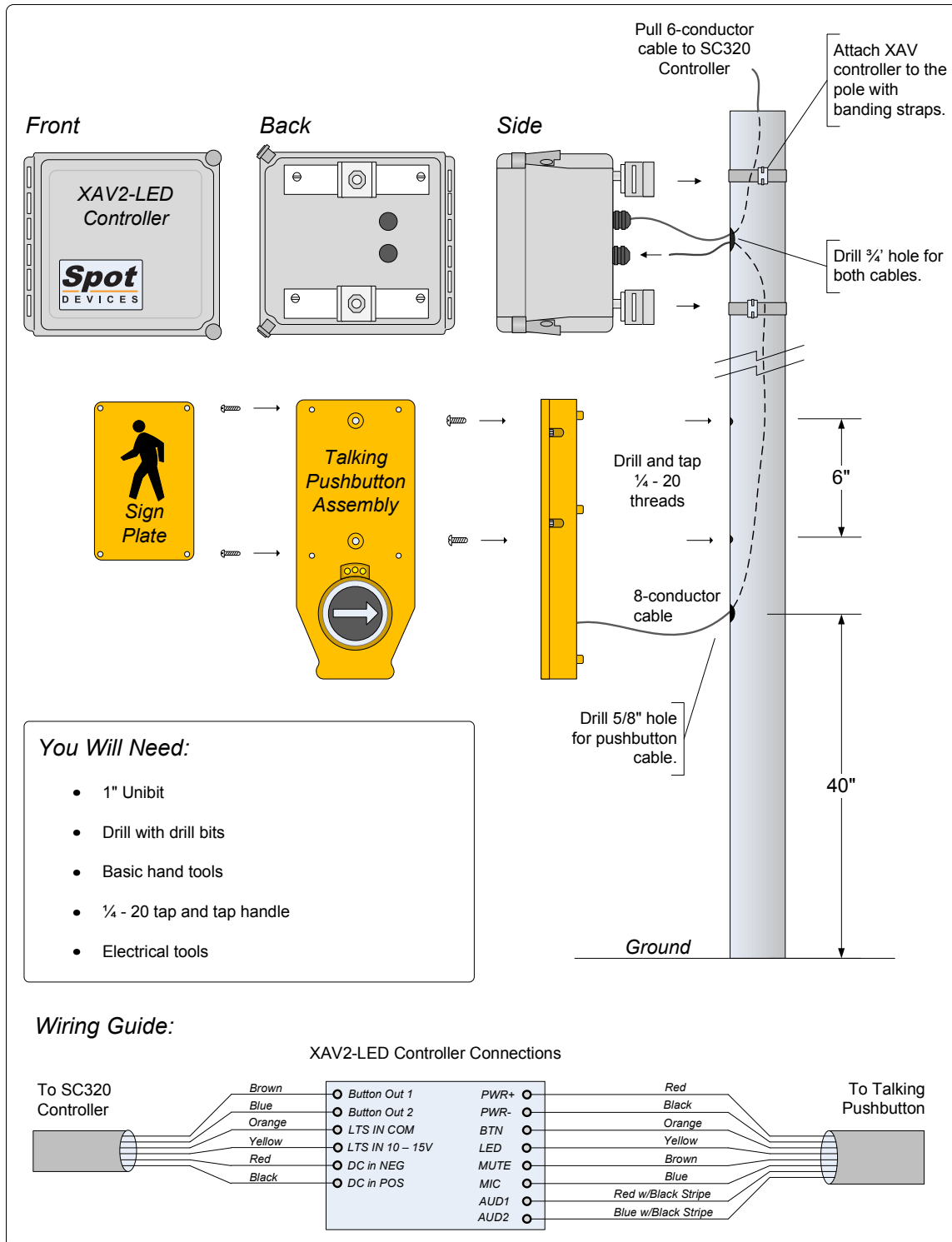


Figure 5-F: Install the XAV-LED2 Talking Pushbutton and Controller

5.7 Install Polara Bulldog Pushbuttons

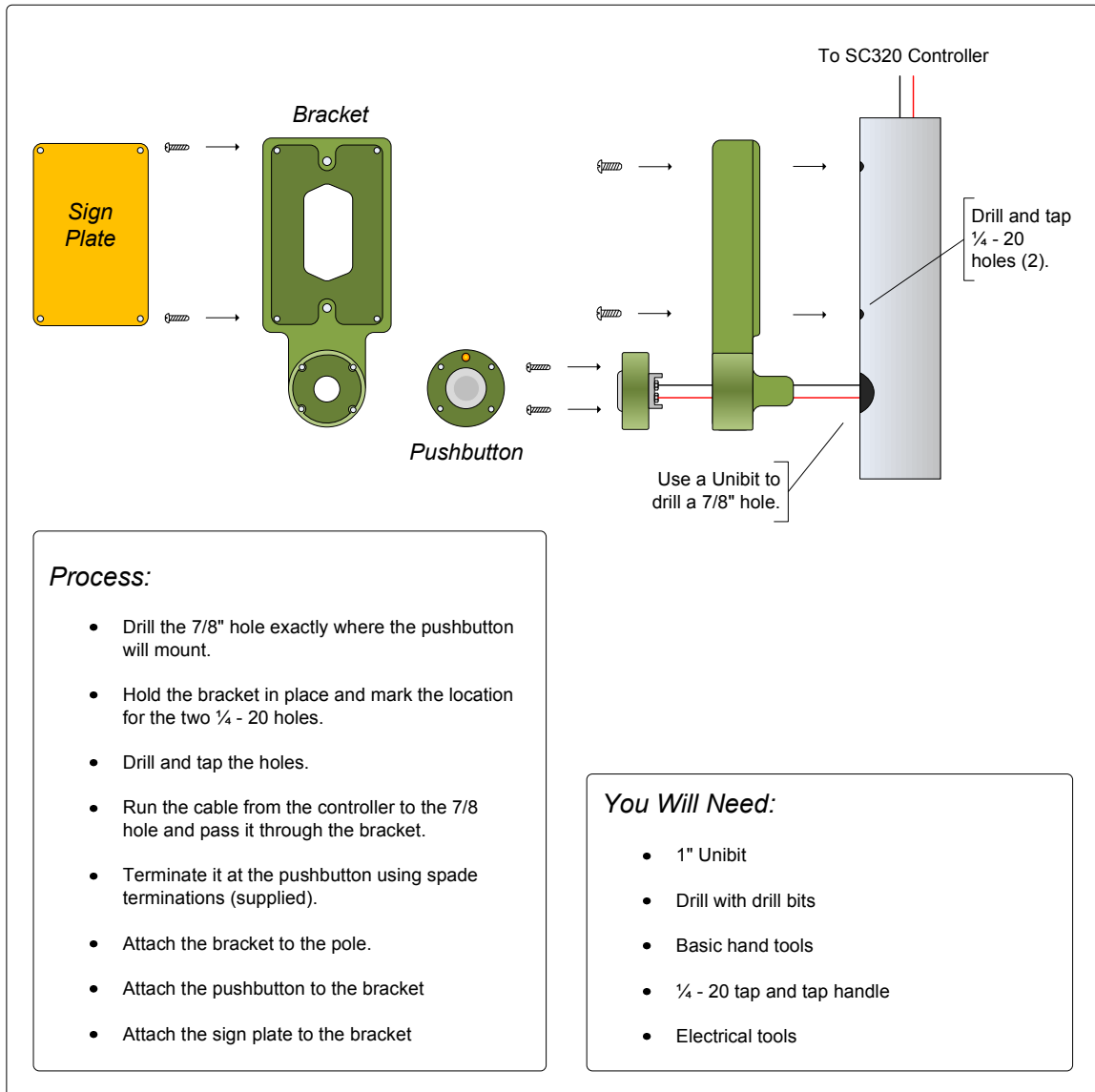


Figure 5-G: Install Polara Bulldog Pushbutton

6 Layout and Cut the Roadway

This section describes how to cut trenches and holes in the roadway for installing IRWLs. First lay out the system by painting the roadway with downward-spraying paint. Refer to engineering plans if applicable. Refer to Figure 6-A.

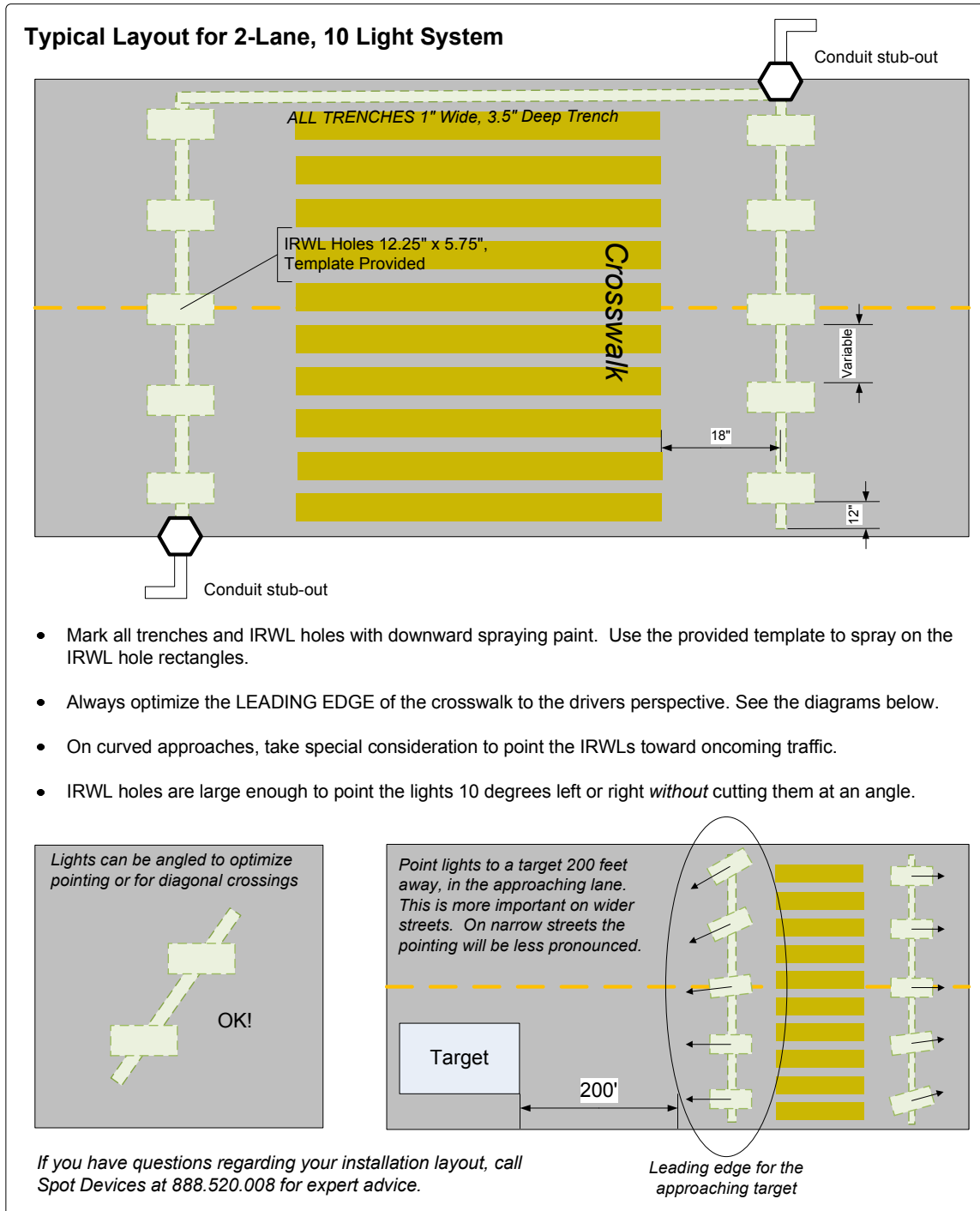


Figure 6-A: Layout Guidelines

6.1 Cut the Trenches

Cut the trenches first, followed by the IRWL holes. There are two common techniques for this:

1. Use a walk-behind road saw with a thin (1/8") asphalt diamond blade to make two cuts along the sides of the trenches. Mark the blade at 3.5" to ensure the proper depth.
2. Use a small to medium sized demolition hammer equipped with a 1" chisel tip to remove the contents of the trench. This is the preferred method.

Alternatively:

1. Use a stack of blades 1" wide to cut the trench. This method requires a very powerful saw and creates a large amount of mud and slurry.

6.2 Cut the IRWL Holes

Either a walk-behind saw or a handheld road saw can be used for this step. It is *critical* that a 14" diameter blade be used to cut out the IRWL holes. A 14" diameter blade makes the lengthwise cuts with a single plunge at the perfect depth. Refer to Figure 6-B.

After cutting the holes, chip out the contents using a demolition hammer. *When chipping, maintain the curvature of the plunge cuts; the bottom of the hole does not need to be flat.* Over chipping increases the amount of epoxy required.

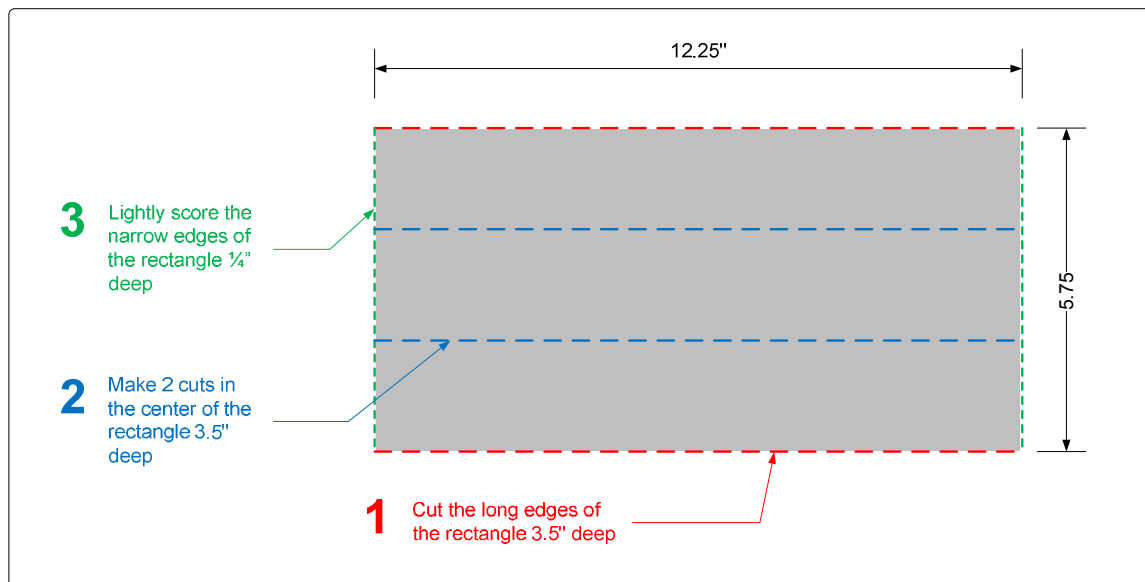


Figure 6-B: Cutting the IRWL Hole

6.3 Clean the Cuts

It is critical that all cuts be clean and dry before installing the IRWLs. Moisture or residual grit can weaken the epoxy by more than 50%. Flush all cuts with fresh water and use suction to collect the waste. A pressure washer is ideal for this step.

After flushing, dry the cuts by blowing them out with high pressure air. Ensure that the cuts are **fully dry** before continuing.

7 Install System Cables, IRWLs in the Roadway

This section describes how to set the IRWLs and system cables into the roadway, test the system and complete the roadwork by sealing the devices permanently in place.

7.1 Install Cables and IRWLs

1. Excavate and expose the conduit stub-outs.
2. Use duct tape to mask all the cuts in the roadway. This creates a better finished look.
3. Pull all non-IRWL cables first. Cables that connect to pushbuttons, beacons and other devices on the opposite side of the street from the SC320 Controller pass through the roadway *underneath* the IRWLs. Pull the other ends of these cables into the SC320 Controller. Ensure that there is enough slack to reach their destinations.
4. Pull the 12/4 SO Lead-In cables through the stub-outs and to the first light in each line. These are easily identified by the female plug on one end of the cable. Pull the other end of these cables into the SC320 Controller.
5. Attach the provided hang bars to the IRWL anchors using the provided self-tapping screws. The anchors are made from aluminum, DO NOT over tighten. See Figure 7-A.

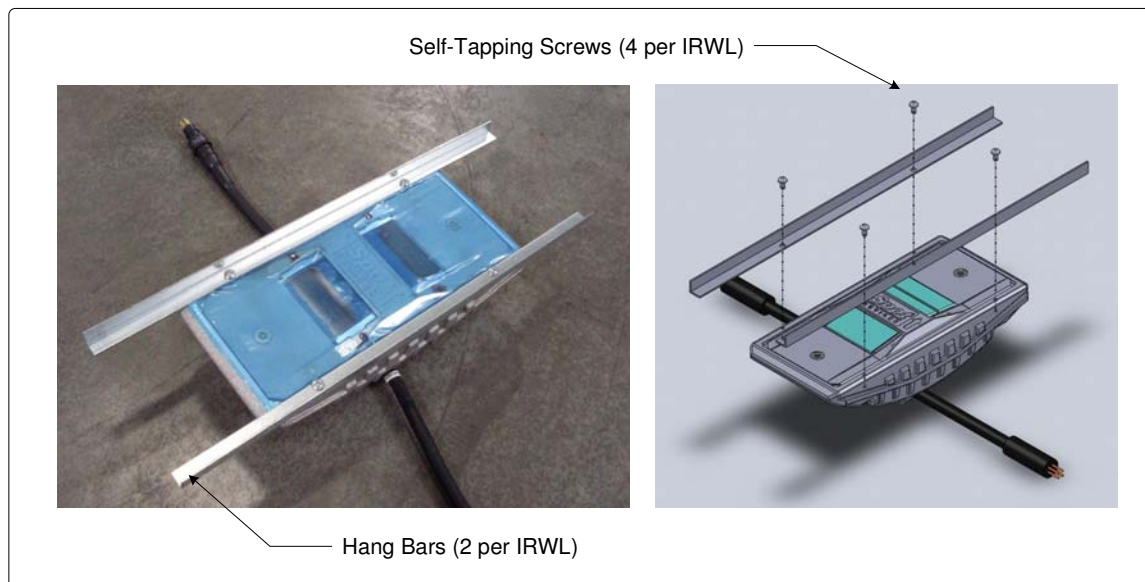


Figure 7-A: Attach the IRWL Hang Bars

6. Place the IRWLs into their respective holes. The lights have arrows on them; point all arrows AWAY FROM THE CROSSWALK. Ensure that the

lights do not touch the bottom of the hole; they should suspend from the hang bars.

7. Connect first IRWL to the Lead-In cable by mating the plugs together. These water proof plugs have alignment dots. Align the dots and plug the ends together. While pressing, squeeze the female plug between its alignment dots to release a built-up pocket of air. Ensure that the plugs seat fully. See Figure 7-B. Place a small amount of electrical tape over the plugs once they are mated.

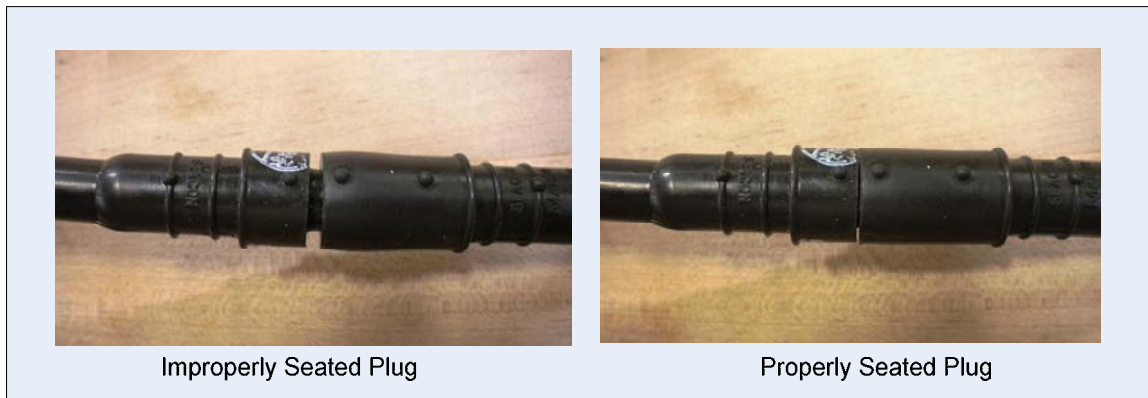


Figure 7-B: Properly Seating the Plugs

8. Plug the rest of the lights together using the female-ended interconnect cables. Place a small amount of electrical tape over each connection. At the end of each line, attach a dummy plug to the last light. Refer to Figure 4-A.
9. Tie off the extra slack in the interconnect cables using the supplied zip ties. Ensure all slack is tucked safely into the trench and no cable is within 1" of grade. Refer to Figure 7-C.



Figure 7-C: Tying Cables with Zip Ties

10. Point all of the lights to their desired angles. Remember that a light can rotate in its hole up to 10 degrees in either direction.

7.2 Test the IRWLs for Operation

It is critical that the lights be tested just prior to pouring the epoxy. Once the epoxy is set the lights are permanently set into the roadway.

1. Refer to the Site-Specific wiring diagram for your installation. This can be found in the document sleeve on the door of the SC320. This diagram details how each device is terminated to the SC320 Controller.
2. Strip the ends of each Lead-In cable and crimp on the supplied female quick-disconnect terminations. Attach these cables to the SC320 PCA as indicated by the wiring diagram. Figure 7-D shows an example of a wiring diagram.

Attention

Each SC320 system is unique. Always attach the IRWL cables exactly as indicated by the Site-Specific wiring diagram.

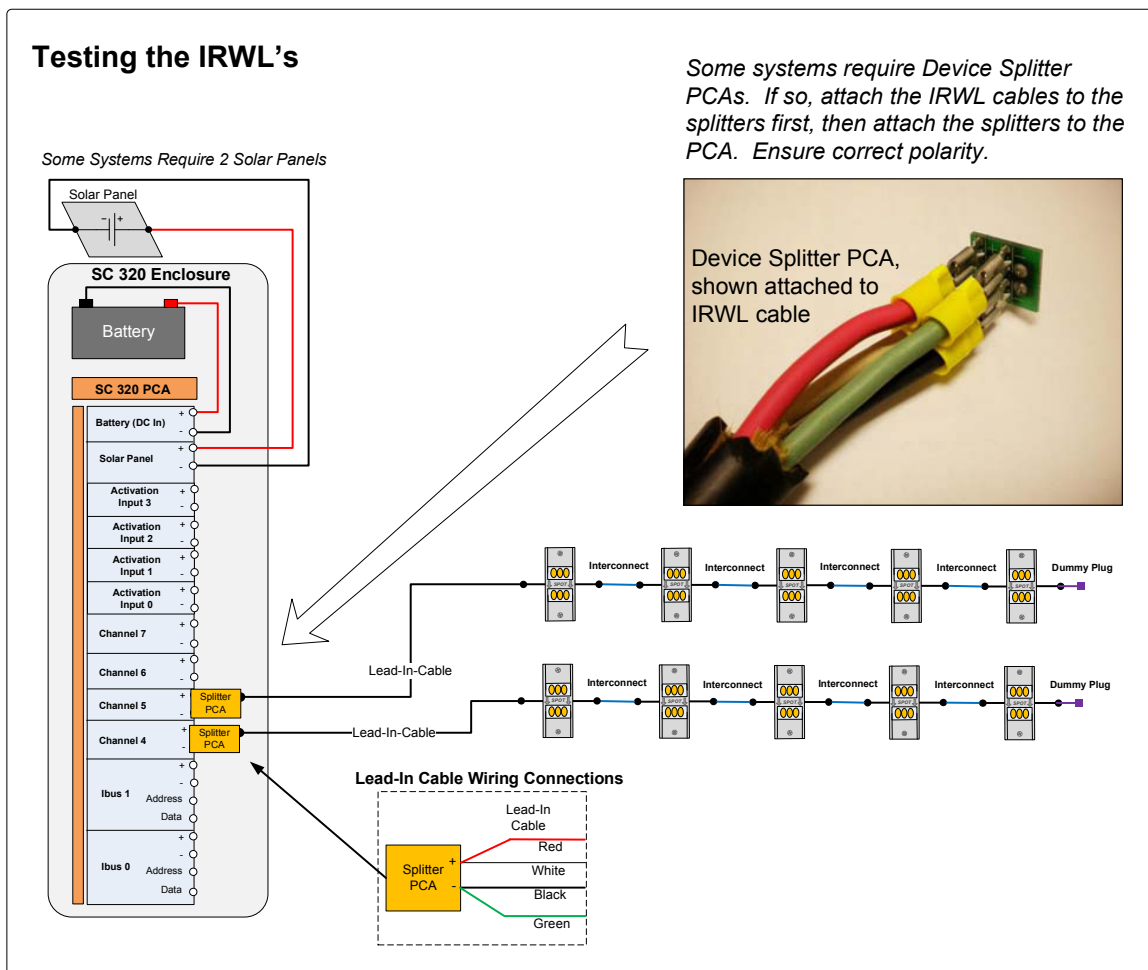


Figure 7-D: Using the Wiring Diagram to Terminate IRWLs

3. Attach power to the system.
 - a. For solar-powered systems, install the 12V, 105Ahr battery as shown in Figure 7-E. First attach the positive lug to the red wire, followed by the negative lug to the black wire. Tighten the lugs snugly with a wrench or socket. (The solar panel does not need to be attached yet.)
 - b. For AC-powered systems, route AC power cables (with power removed from the source) into the SC320 Controller. Attach the supplied NEMA ML-2 female AC plug to the hot, ground and neutral conductors. Insert the NEMA plug into the AC Input Plug shown in Figure 7-F.

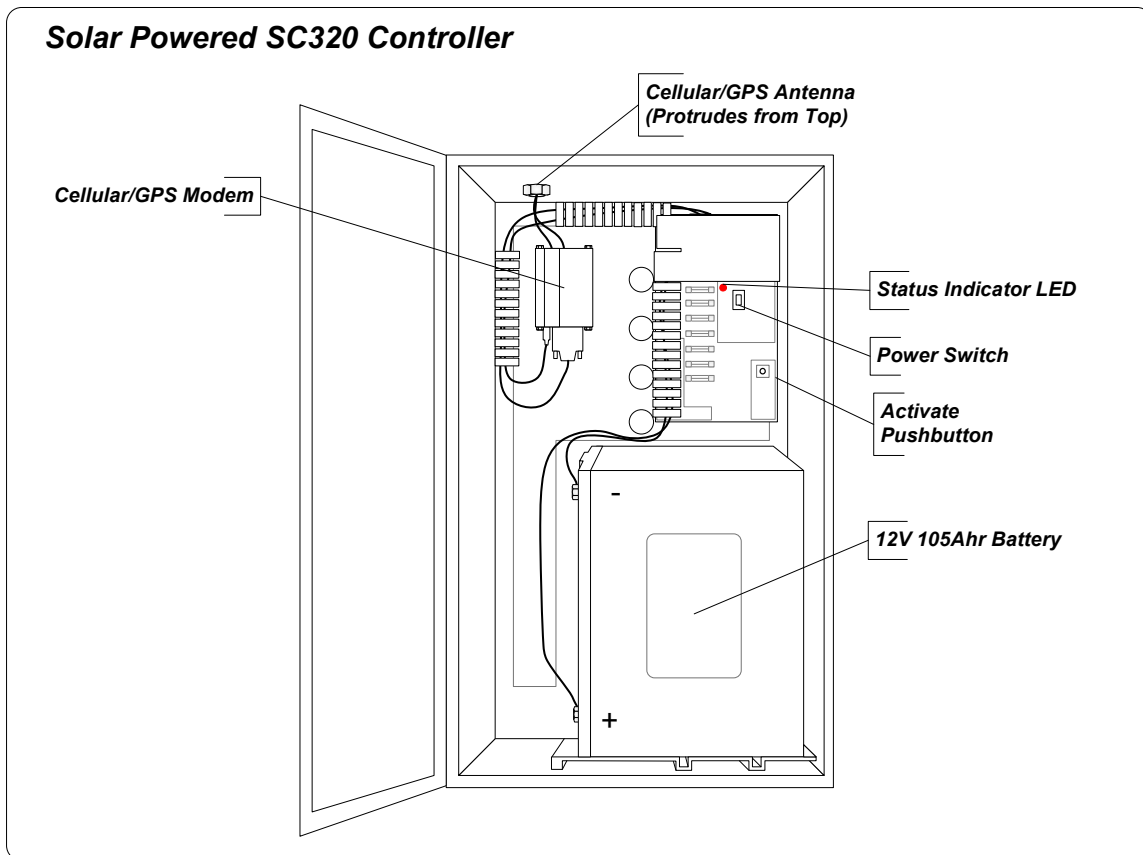


Figure 7-E: Solar-Powered SC320 Contents

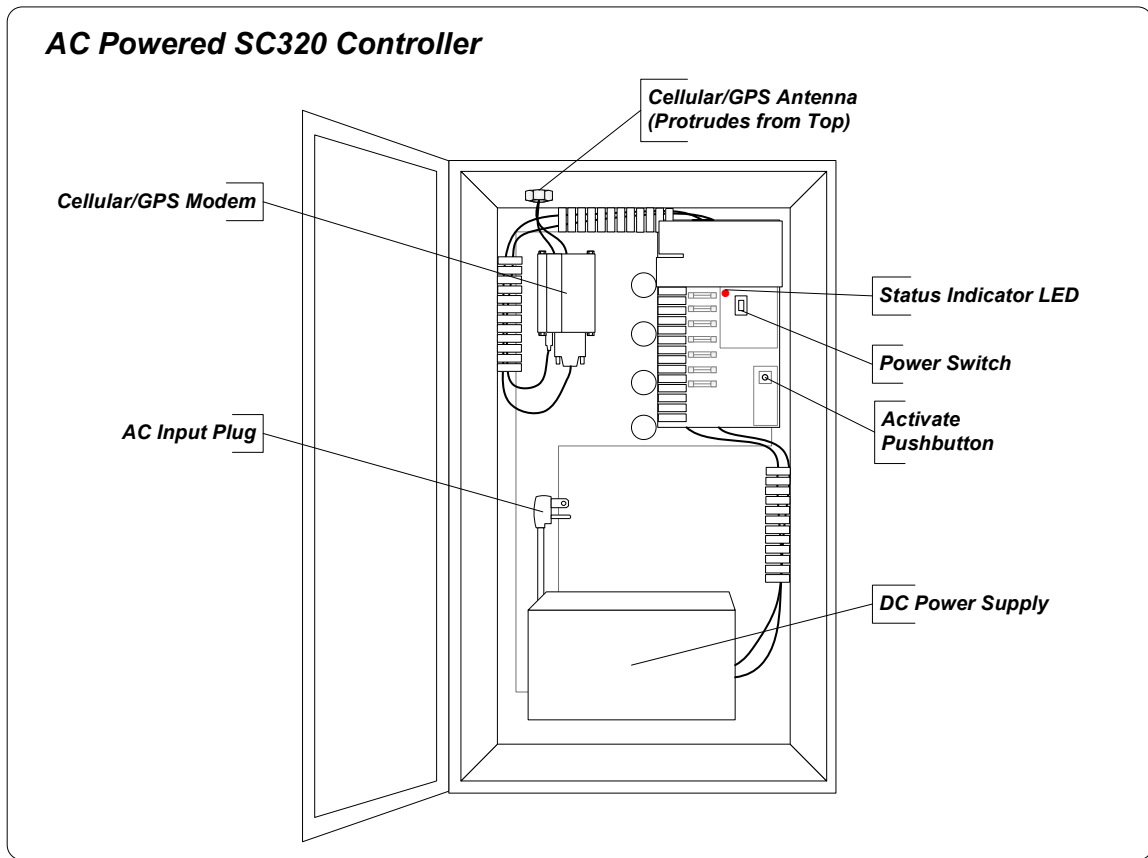


Figure 7-F: AC–Powered SC320 Contents

4. Turn on system power. Locate the Power Switch and set it to the ON position. The Status Indicator LED should flash rapidly, and then go dark for up to one minute. Following this it should begin to flash a slow, steady pulse. When this occurs, the system is ready to activate.
5. Press the small Activate Pushbutton located on the SC320 PCA. See either Figure 7-E or 7-F. This activates the IRWLs for a duration set by the duration dials. These dials come pre-set with time period determined during the sales process.
6. Verify that:
 - a. All IRWLs light.
 - b. All IRWLs are pointed in the correct direction.
 - c. IRWLs are the correct color (amber or red).
7. Remove power from the system.

Installation Tip:

If only half of the roadway can be installed at one time, plug in only the lights that are to be installed in the first phase. Plug interconnect cables into the last lights of each line and lay them in the trenches for protection. Place a dam in the trench on top of this interconnect cable so that epoxy does not flow into the open lane. Rags make excellent dams for the epoxy. This way lights can be plugged into the exposed interconnect cable when installing the 2nd lane.

7.3 Seal Cables, IRWLs with Liquid Conduit Epoxy

1. Seal the conduit stub-outs with duct seal so that no epoxy flows into them.
2. Only one bucket of Liquid Conduit should be mixed at a time. Do not mix a second bucket until the first has been used. Open a bucket of Liquid Conduit and remove its contents.
3. Pour in the large bag of sand and the liquid component "A". Mix thoroughly with a plug-in drill and paint-mixing bit. Mix for one minute.
4. Add liquid component "B" and mix for an additional minute, until the mixture is uniform. Once part "B" is added the Liquid Conduit begins to set. ***Working time is approximately 10-12 minutes, but may be less on hot days.***
5. Pour the epoxy directly into the trenches and around the IRWLs. Pour until the fluid is within 1/16" of grade. Work the Liquid Conduit around using plastic trowels. Mix additional buckets as needed.
6. The small bag of sand labeled "topping sand" can be applied to the Liquid Conduit to improve appearance and traction. This is an optional step. If desired, apply the sand when the Liquid Conduit is nearly firm and still tacky.
7. Allow the Liquid Conduit to cure until the lights do not move and the material is no longer tacky. Cure time is 30-40 minutes, depending on temperature. Extremely cold temperatures may extend this time significantly. If shorter times are needed, add the provided ZIP accelerant to part "B" of the Liquid Conduit Epoxy. See Figure 7-G.



<i>Ambient Temperature</i>	<i>ZIP Amount</i>
Above 70°	None
60° - 70°	1/3 Bottle/Bucket
50° - 60°	1/2 Bottle/Bucket
Below 50°	1 Bottle/Bucket*

* Start with 1 and adjust as necessary.

Figure 7-G: Zip Accelerant

8. Remove and dispose of hang bars and plastic coverings. Remove the duct tape from the roadway.
9. Use an angle grinder equipped with a diamond-cup grinding wheel to smooth any excess material around the IRWLs. If possible do this step the following day after the material has fully hardened. See Figure 7-H.

Attention

This step is critical and should not be skipped. Any protrusion of Liquid Conduit in front of the IRWLs will block light output and reduce the effectiveness of the system.

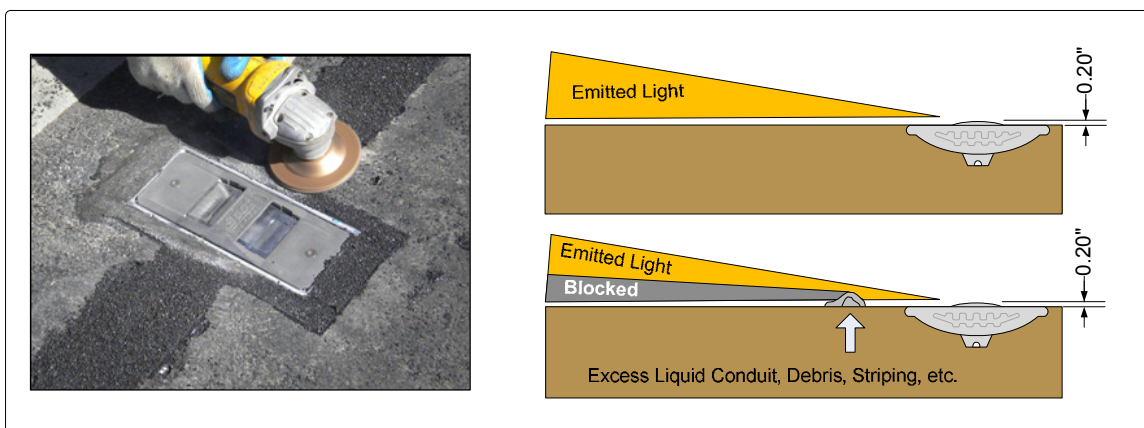


Figure 7-H: Grinding the IRWLs Flush

8 Prepare the System for Operation

This section describes how to make all electrical terminations and test the SC320 system. Each SC320 system is unique and ships with a Site-Specific-Wiring Diagram. This diagram can be found inside the door of the SC320 Controller. Use this diagram as a guide when terminating devices to the SC320 Controller.

Attention

The Site-Specific Wiring Diagram is the ONLY document that indicates proper wiring of the system. Attaching devices to the SC320 Controller in a different manner may result in failed operation and/or damage to components.

Refer to Figures 8-A and 8-B. Figure 8-A shows a sample wiring diagram for an SC320 system. Figure 8-B overviews the SC320 PCA features and components. The wiring diagram dictates where on the SC320 PCA a given device should attach. Always turn system power off before making or breaking any connections.

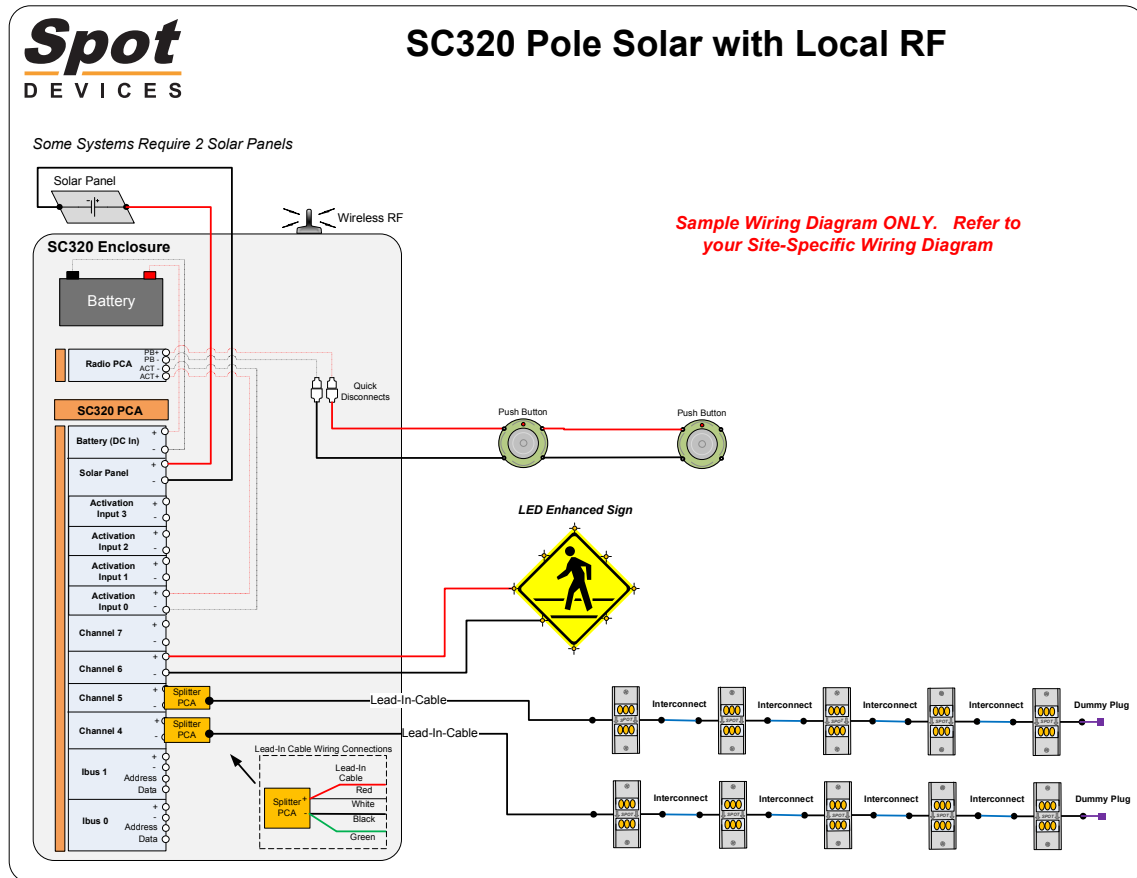


Figure 8-A: Sample SC320 Wiring Diagram

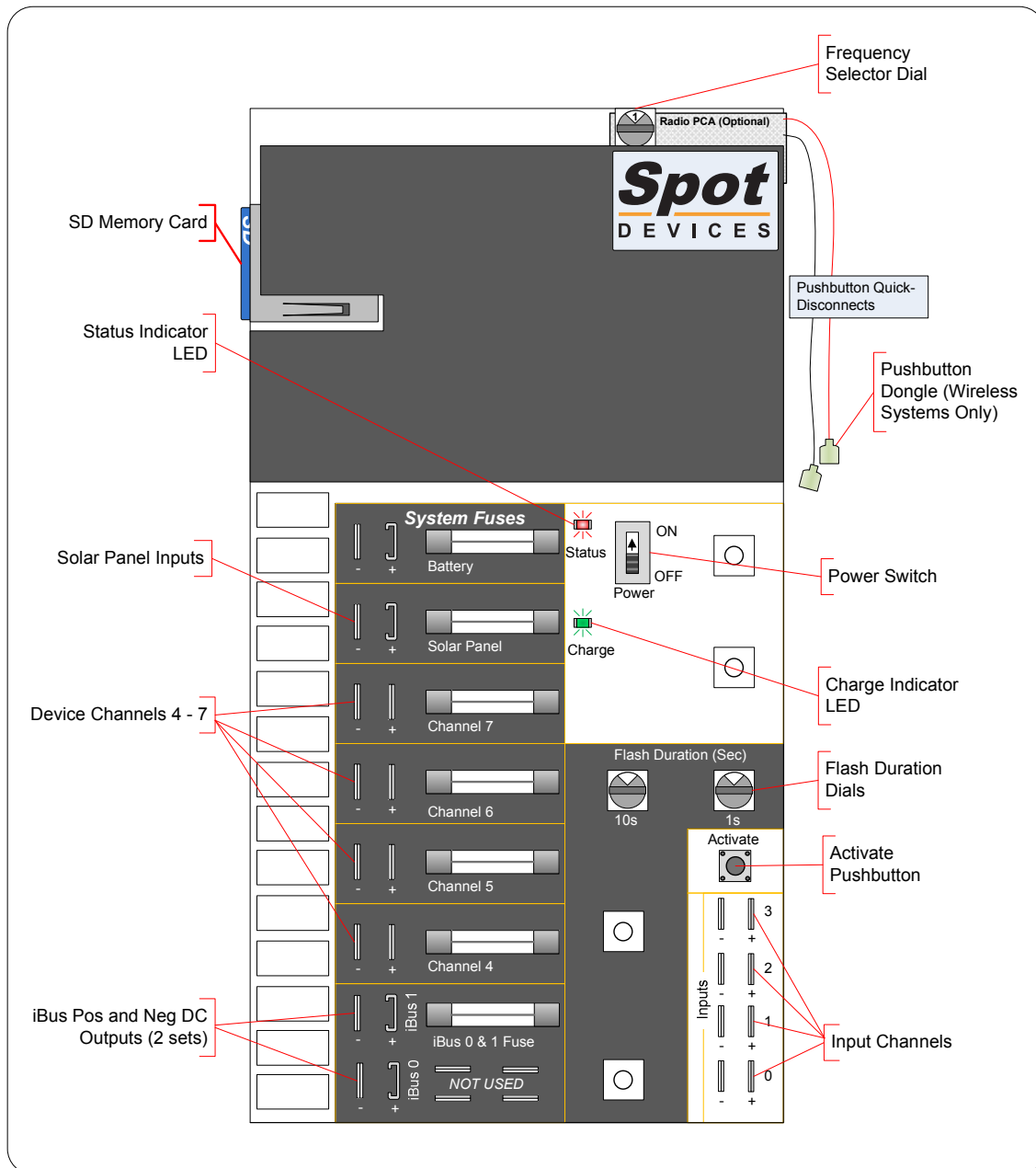


Figure 8-B: SC320 PCA Features

8.1 Connect Flashing Devices

Ensure that the SC320 Power Switch is in the off position. Beacons, LED signs, RRFBs and IRWLs attach to Device Channels 4 - 7 on the SC320 PCA. Crimp the supplied female quick-disconnect terminations onto the conductors and attach them as indicated on the Site-Specific Wiring Diagram.

Bidirectional IRWLs typically attach to a single channel and use a device splitter PCA. If so first attach the conductors to the splitter and then attach the splitter to the PCA. Ensure the correct polarity.

8.2 Connect Solar Panels

SC320 Controllers employ one or two solar panels. Both of these panels plug into the Solar Input connections on the PCA. If two solar panels are to be attached then a small splitter is provided.

The Charge Indicator LED lights green when the solar panels are properly attached and exposed to sunlight. If this LED does not light, the solar panel conductor polarity may be reversed.

8.3 Connect Polara™ Bulldog Pushbuttons

For systems without Wireless Activation

Refer to Figure 8-C. Connect the pushbutton conductors to Activation Inputs 0 – 3, as indicated by the Site-Specific Wiring Diagram.

For systems with Wireless Activation

Refer to Figure 8-C. Crimp the supplied male quick disconnect terminations onto the pushbutton conductors, and attach them to the wireless pushbutton dongle.

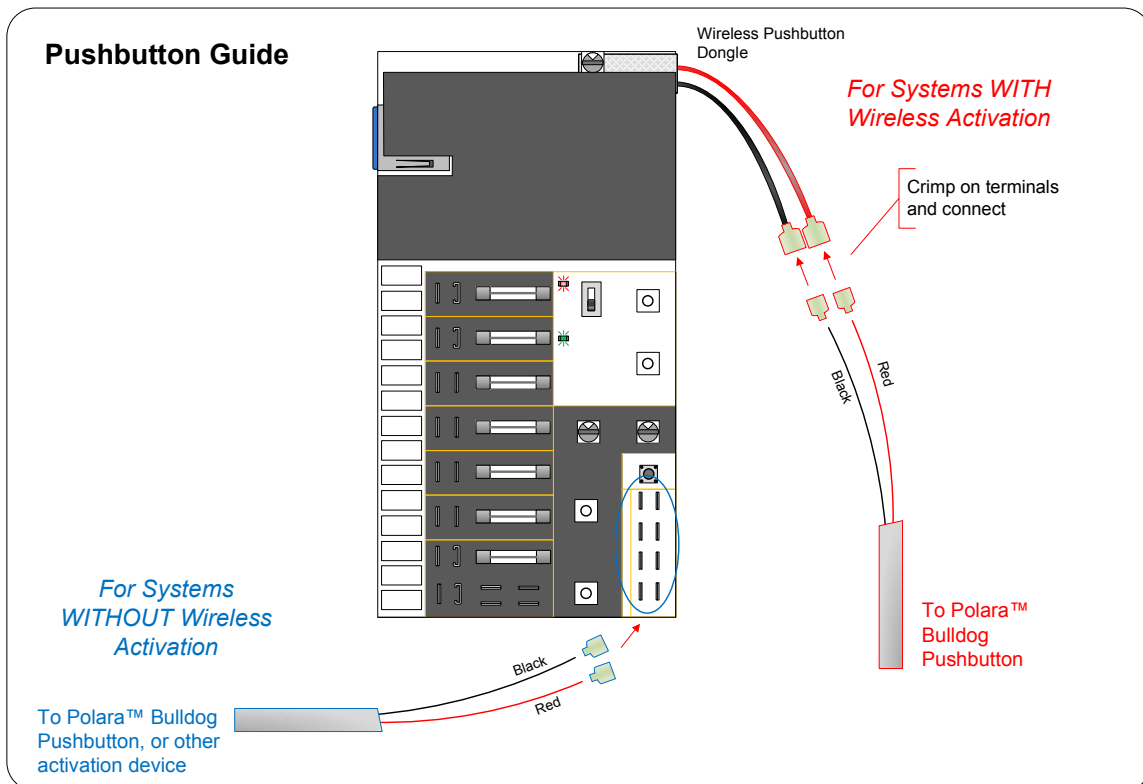


Figure 8-C: Terminate Polara™ Bulldog Pushbuttons

8.4 Connect Polara™ XAV-LED2 Talking Pushbutton

For systems without Wireless Activation

Refer to Figure 8-D. Connect the blue and brown “button out” conductors to Activation Inputs 0 – 3, as indicated by the Site-Specific Wiring Diagram.

For systems with Wireless Activation

Refer to Figure 8-D. Crimp the supplied male quick disconnect terminations onto the blue and brown “button out” conductors, and attach them to the wireless pushbutton dongle.

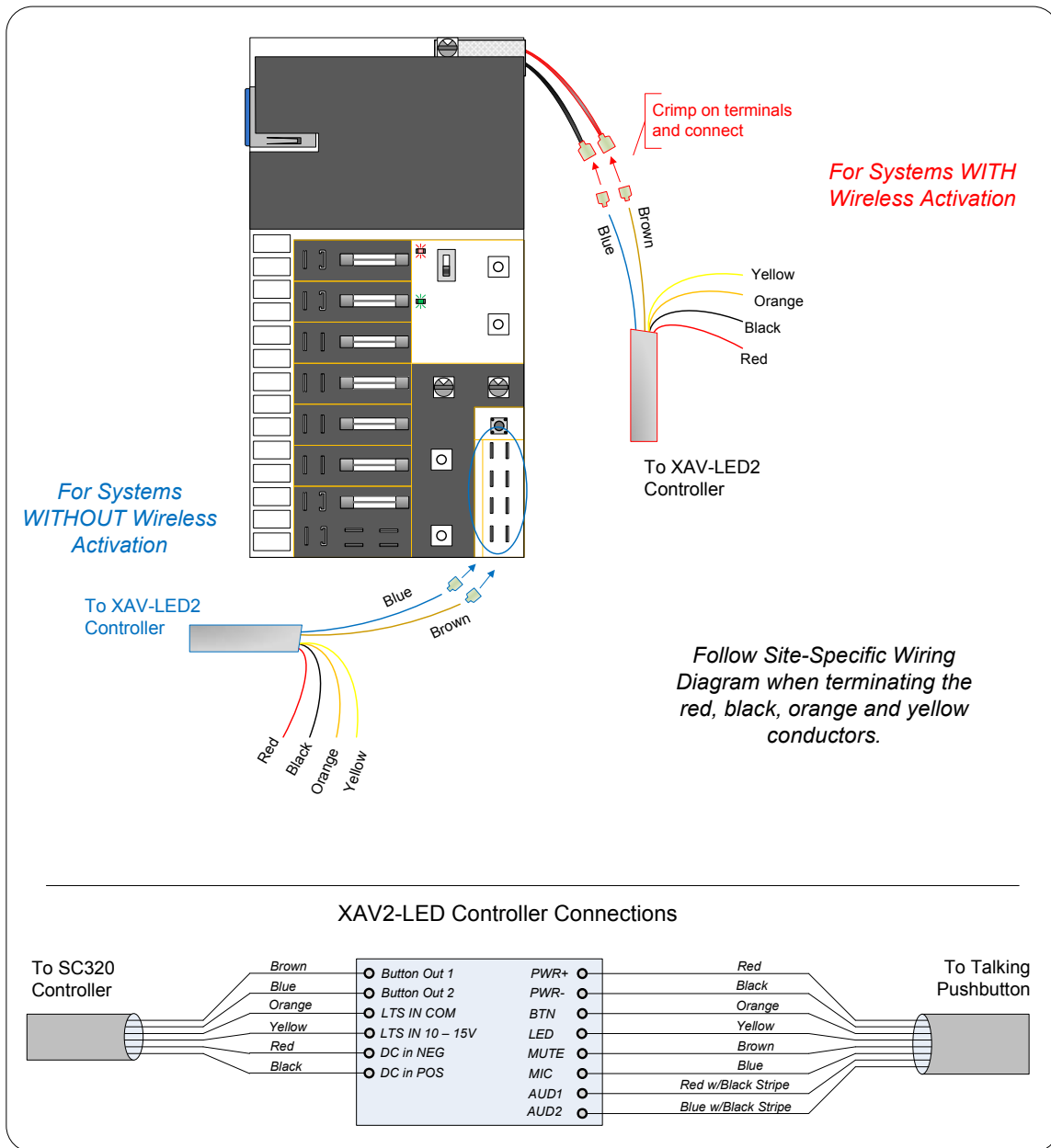


Figure 8-D: Connect XAV-LED2 Pushbuttons

8.5 Power on and Test the System

If not already done, install the battery for solar-powered systems or route AC power for AC-powered systems. Section 7.2 describes this process.

Turn on the SC320 Power switch and wait until the red Status Indicator LED assumes a slow, steady pulse. This may take up to one minute.

System Checklist

- ✓ First activate the system from the small Activate Pushbutton located on the PCA. Ensure that all IRWLs, beacons, RRFBs and other peripheral devices function properly.
- ✓ Activate the system from each pushbutton (if equipped) in the system to ensure that they operate properly.
- ✓ Ensure that talking pushbuttons are audible and their LEDs flash when activated.
- ✓ Ensure that the Charge Indicator LED is lit green when the solar panels are in direct or diffused sunlight.
- ✓ Locate the GPS/Cellular Modem shown in Figure 8-E. Ensure that the indicator LEDs on the modem flash properly. It may take several minutes for both LEDs to come online.

If any of the previous items do not function properly, contact Spot Devices Customer Support.

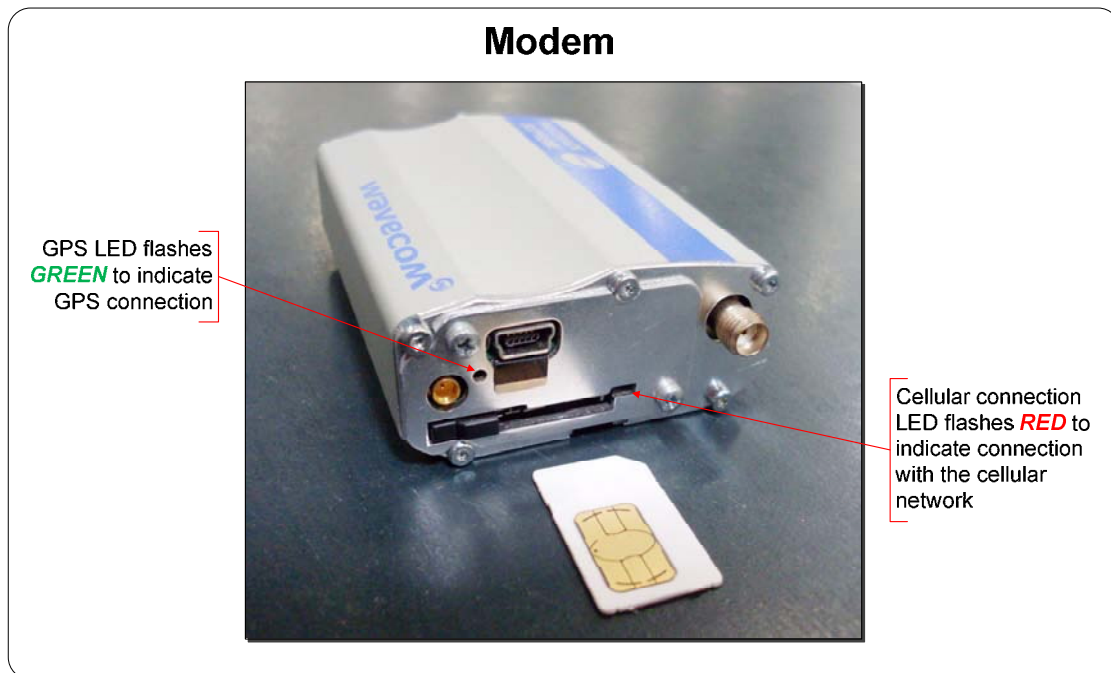


Figure 8-E: Modem Indicator LEDs

8.6 Wireless Activation Option

If so equipped, SC320 Controllers communicate with wirelessly. It is critical that all controllers in a system be set to the same frequency channel. There are 10 frequency channels to choose from, selectable from a small dial on the top right portion of the PCA. See Figure 8-B. All SC320 Controllers ship with the frequency dial set to channel 0.

Attention

Controllers that are *not supposed* to activate one another may do so if they are closer than 2500 feet apart and set to the same frequency channel.

To avoid accidental cross-system activation, make sure that each system uses a separate frequency channel.

8.7 Controller Dials and Flash Duration

SC320 Controllers activate for a period of time that is set by the controller dials. Refer to Figure 8-B. At shipment these dials are pre-set to a duration determined by the customer. These dials can be disabled and controlled via the Spot Devices secure website if desired. For more information, refer to the SIMA Admin Console Users Guide.

8.8 Initiate Calendar Operation

Many SC320 systems are activated via an internet-based calendar. Please refer to the separate manual, *SIMA Admin Console Users Guide*, to set up and initiate a calendar for operation.